Construction IQ –
A Smart Assistant for Diagnosing Risk on Construction Projects

Stella Xu, *Autodesk Inc.*
Matt Anderle, *AECOM*
Aaron Phillips, *Danis Construction*

AUTODESK. UNIVERSITY

SPEAKERS

STELLA XU

Data Scientist
Autodesk

MATT ANDERLE

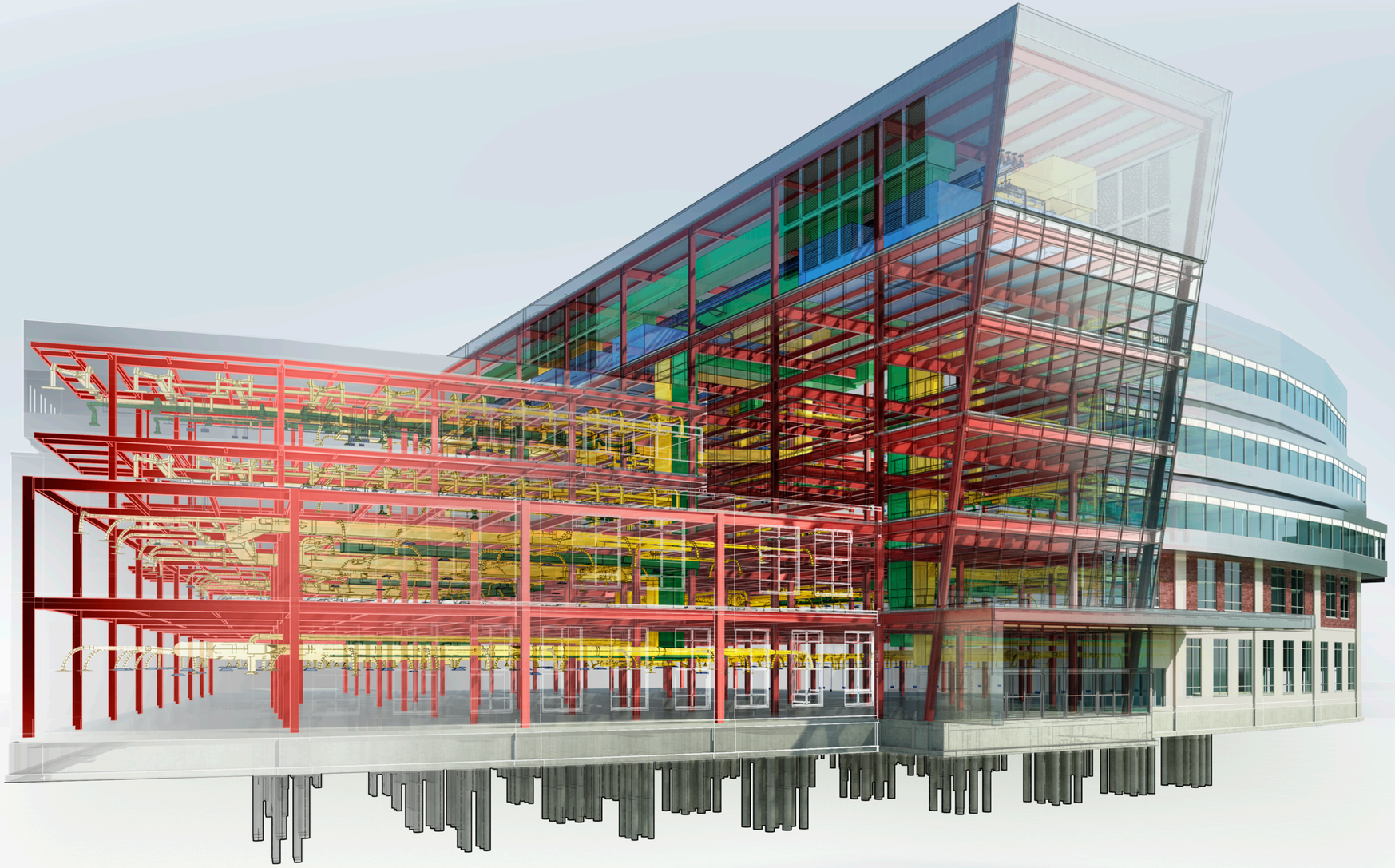
BIM Director B+P Americas
AECOM

AARON PHILLIPS

Director of VDC
Danis

AGENDA

- Introduction
- AECOM point of view
- Danis point of view
- Diagnosing risk with Construction IQ
- Q & A




CanPrumera

Source: https://geniebelt.com/blog/found-on-a-construction-site


GO SAINTS
Lite
St. Charles Vieux!
BABEL

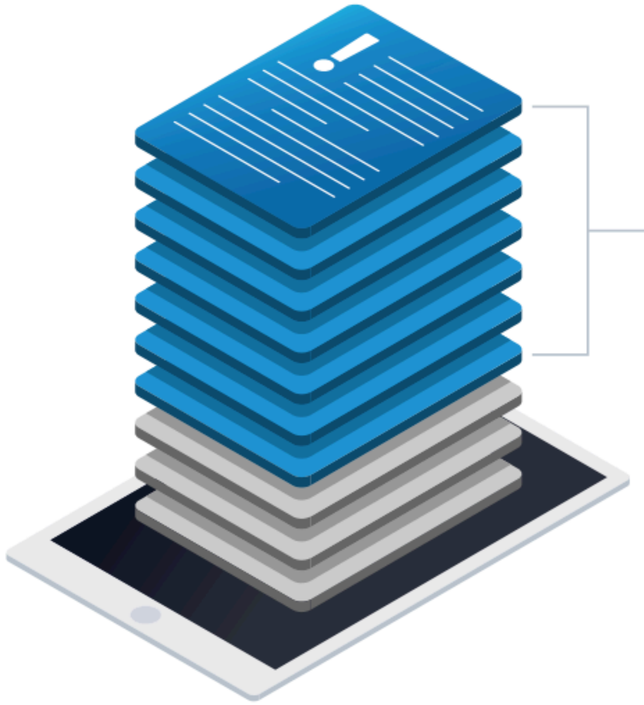
GAPS BETWEEN DESIGN AND CONSTRUCTION

- Missing dimensions/specifications
- Design conflicts/Constructability
- Unforeseen conditions

→ **RFI**

In most Construction Documents, it is inevitable that the agreement, drawings and specifications will not adequately address every single matter. Therefore, there may be gaps, conflicts or subtle ambiguities.

-- American Council of Engineering Companies of Kansas



70% of a construction project's RFIs stem from design or documentation errors.[1]

A study from Engineers Daily estimated that **design errors accounted for 38%** of construction disputes.[2]

1 Autodesk Research
2 Engineers Daily

Design and Constructability Review

- Scope
- Budget and schedule
- **C**ompleteness

  Consistency

  Coordination

  Constructability

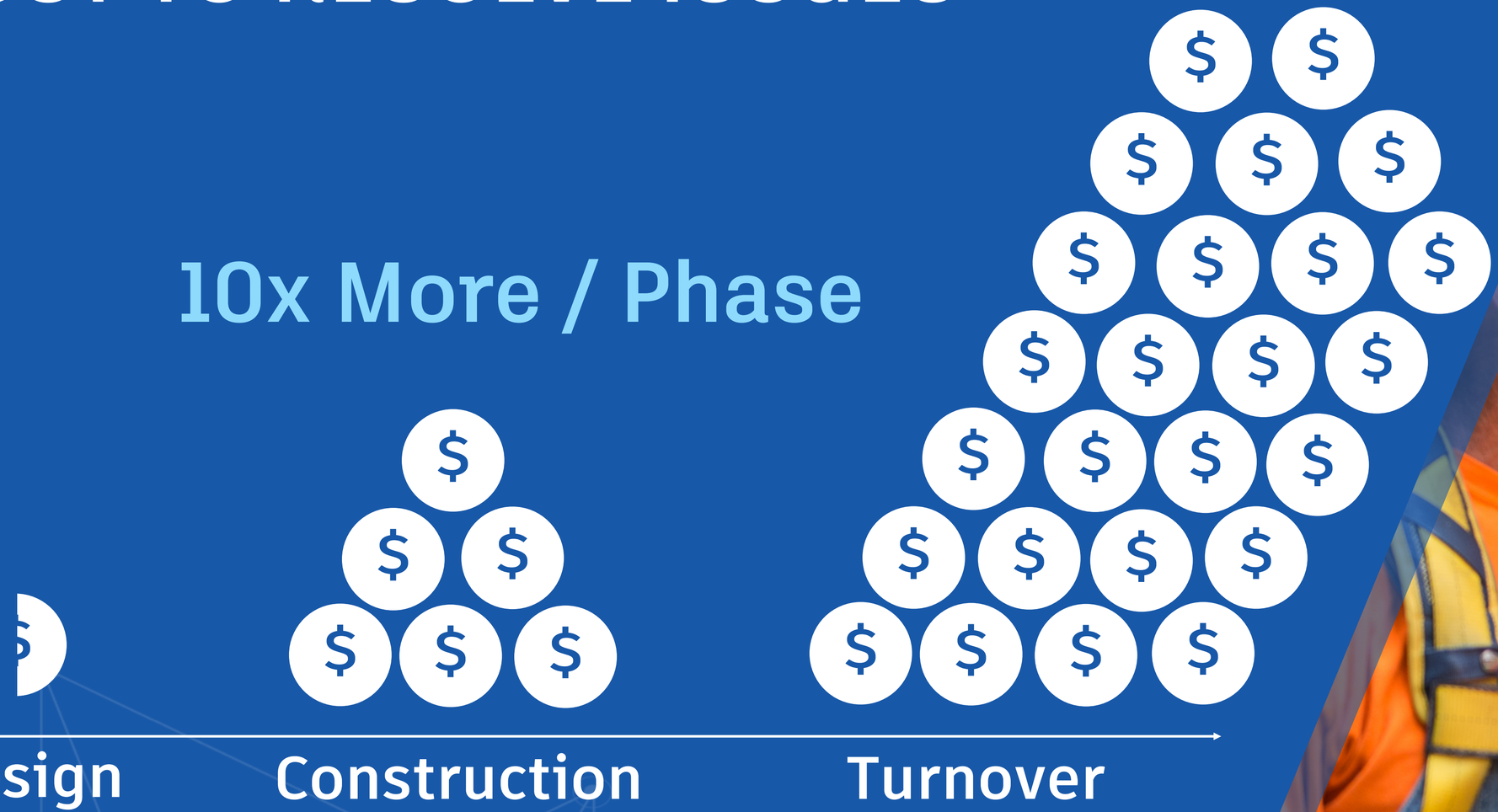
Lack of audit and review processes is a **margin-killing** construction risk

HOW DO WE MITIGATE THE RISK?

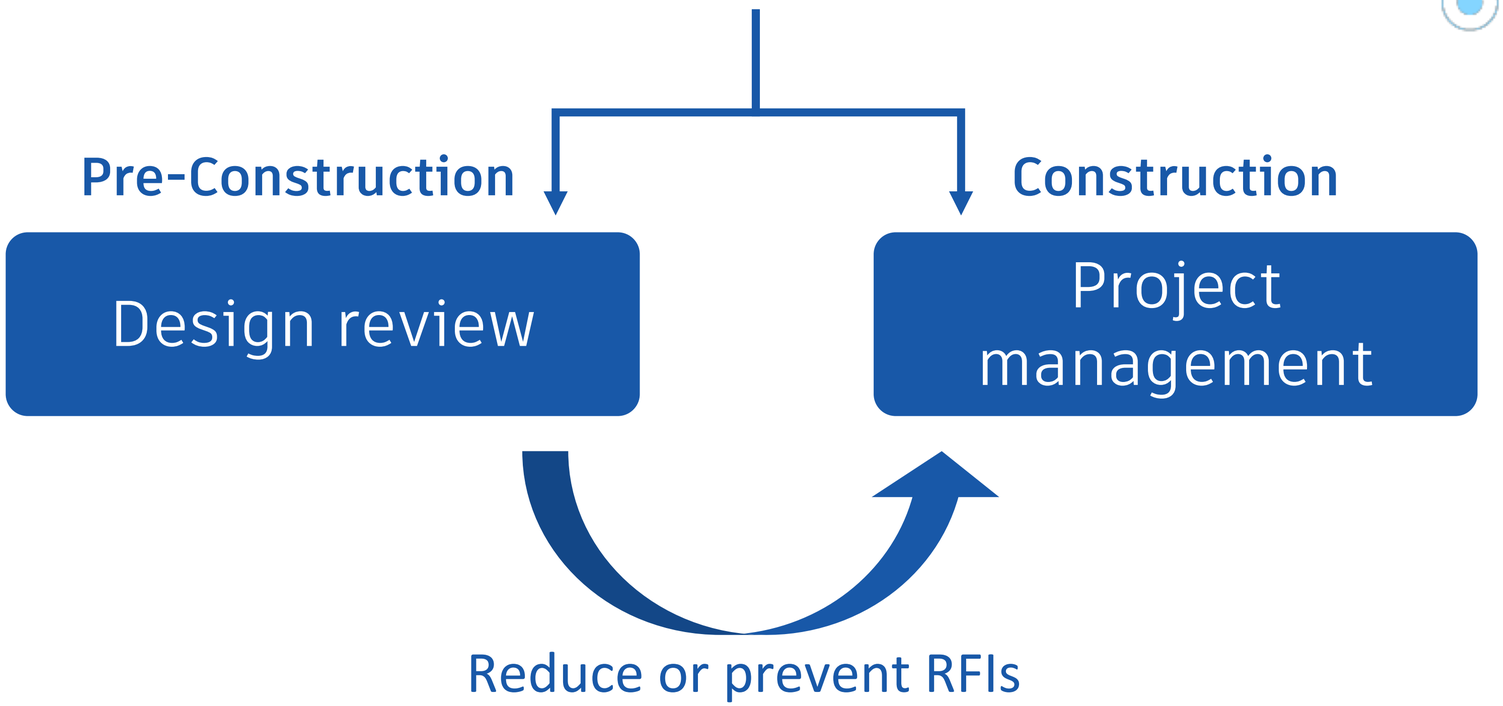
Construction Industry Today

COST TO RESOLVE ISSUES

10x More / Phase



MITIGATING RISK



Industry point of view

Matthew Anderle
BIM Director B+P Americas

AECOM

About myself

Matthew Anderle, AECOM

Building Information Modeling (BIM) Director for the Buildings+Places Americas business line of AECOM. He is a BIM and technology evangelist with over 19 years of experience establishing global BIM workflows and standards around content, computational BIM, interoperability, and BIM consultation as a service. His experience spans over multiple market sectors with emphasis on large healthcare facilities, data centers, aviation, government projects, and science facilities. Mr. Anderle serves AECOM as a leader in the advancement and efficient implementation of BIM processes for a variety of project types. He manages and directs large distributed project teams to successfully implement BIM collaboration workflows, enabling global offices to work as one entity.

“In today's accelerated design and construction climate, information is the new paper, where printed drawings once conveyed our projects, going digital emphasizes data as the foundation of our design. We achieve program certainty and validate constructability by pairing data-centric design tools with risk analytics which positions us to achieve operational certainty.”

Matthew Anderle
AECOM

AECOM is...

The world’s premier infrastructure firm, delivering professional services throughout the project lifecycle.

7 continents

87,000 employees

US$20.2B full-year 2018 revenue

US$6B market cap

#157 Fortune 500

Ranked #1 in Transportation and General Building in Engineering

News-Record’s 2019 “Top 500 Design Firms”

One of Fortune magazine's "World's Most Admired Companies" for the fifth consecutive year

AECOM Imagine it. Delivered.

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Challenges

- Global Presence
- Varied Project Markets
- Distributed Teams
- Complex Model Schemas

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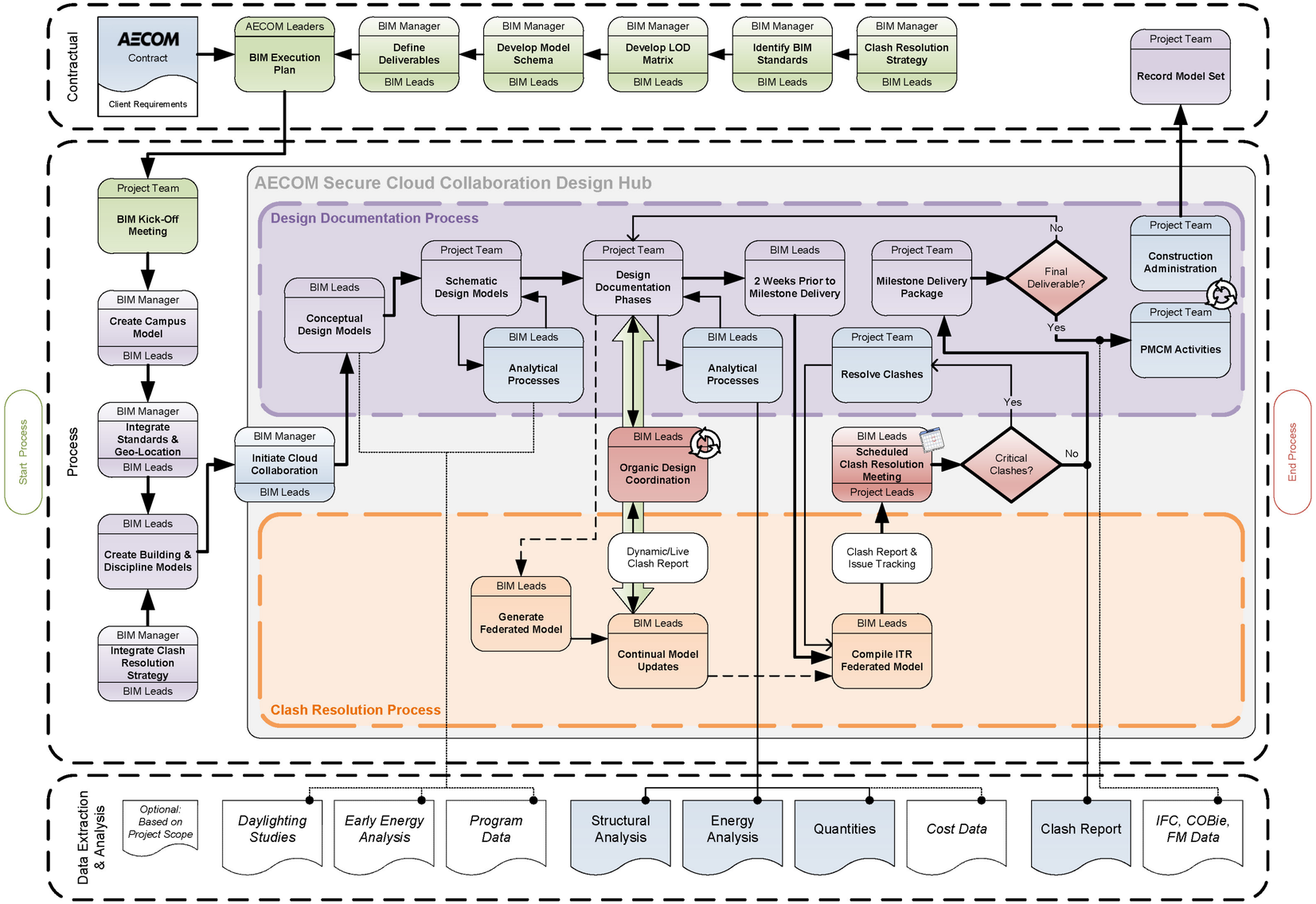
Data Strategy ⇨ Design Certainty

- Geometric Certainty
- Data Certainty
- Cost Certainty

✓ Achieve Operational Certainty

Cloud-Collaboration



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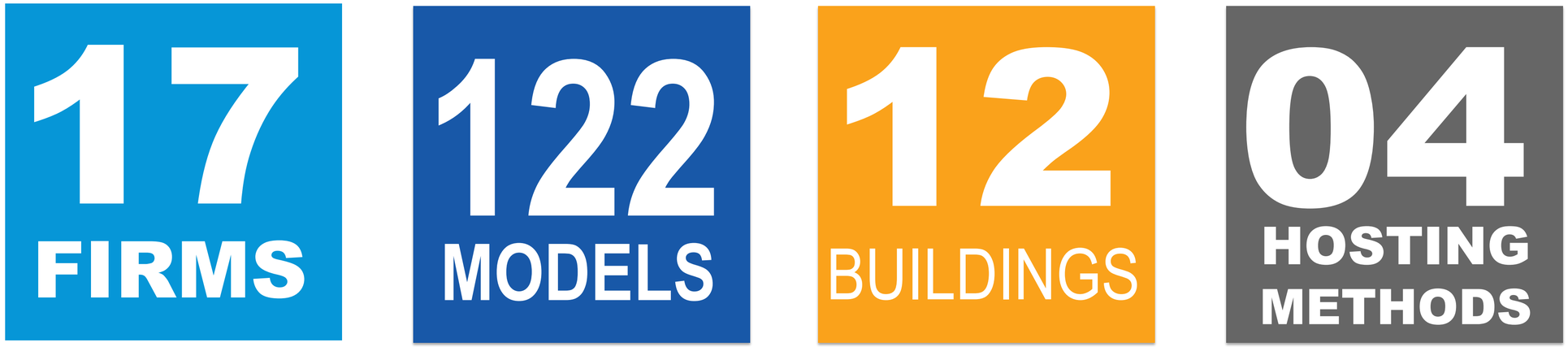
Example Project Complexities

About the Project:
A Joint Venture Team Designing a Medical Center Campus



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About the Project:
A Joint Venture Team Designing a Medical Center Campus

17 FIRMS

Each with different levels of data exchange capabilities, model hosting and experience

300+ unique users including:

- Project Executives
- Discipline Leads
- Quality Managers
- Trade Specialists
- BIM Team
- Specification Writers
- Cost Estimators

A variety of file types including:

- Autodesk Revit
- Autodesk Civil 3D
- Autodesk AutoCAD
- Microsoft Excel
- Microsoft Word
- Adobe InDesign
- Adobe Acrobat
- Bluebeam
- Proprietary software

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About the Project:
A Joint Venture Team Designing a Medical Center Campus

122 MODELS

Model schema organized by:

CAMPUS

BUILDING

DISCIPLINE

SUB-DISCIPLINE

AGGREGATE MODELS

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About the Project:
A Joint Venture Team Designing a Medical Center Campus

12 BUILDINGS

PARKING GARAGE

Multiple Out Buildings

Multiple Out Buildings

Multiple Out Buildings

Multiple Out Buildings

MAINTENANCE BUILDING

HOSPITAL

Central Utility Plant

Laundry Facility

Main Guard Station

PARKING GARAGE

WATER TOWER

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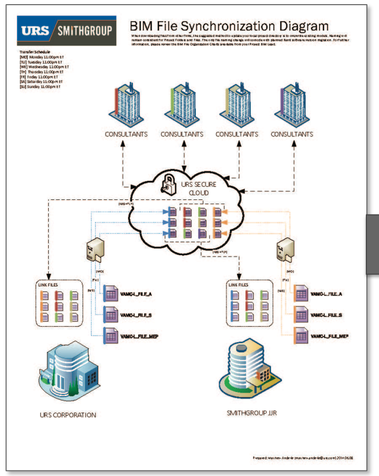
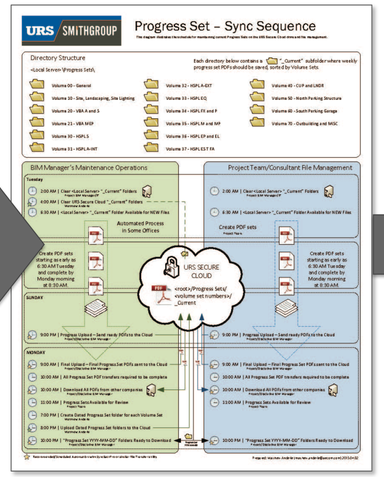
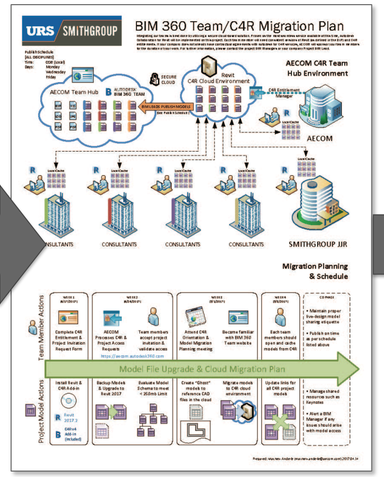
About the Project:
A Joint Venture Team Designing a Medical Center Campus

04 HOSTING METHODS

The duration of the project afforded us the opportunity to leverage several collaboration platforms which culminated in BIM 360 Design







AUTODESK® BIM 360™

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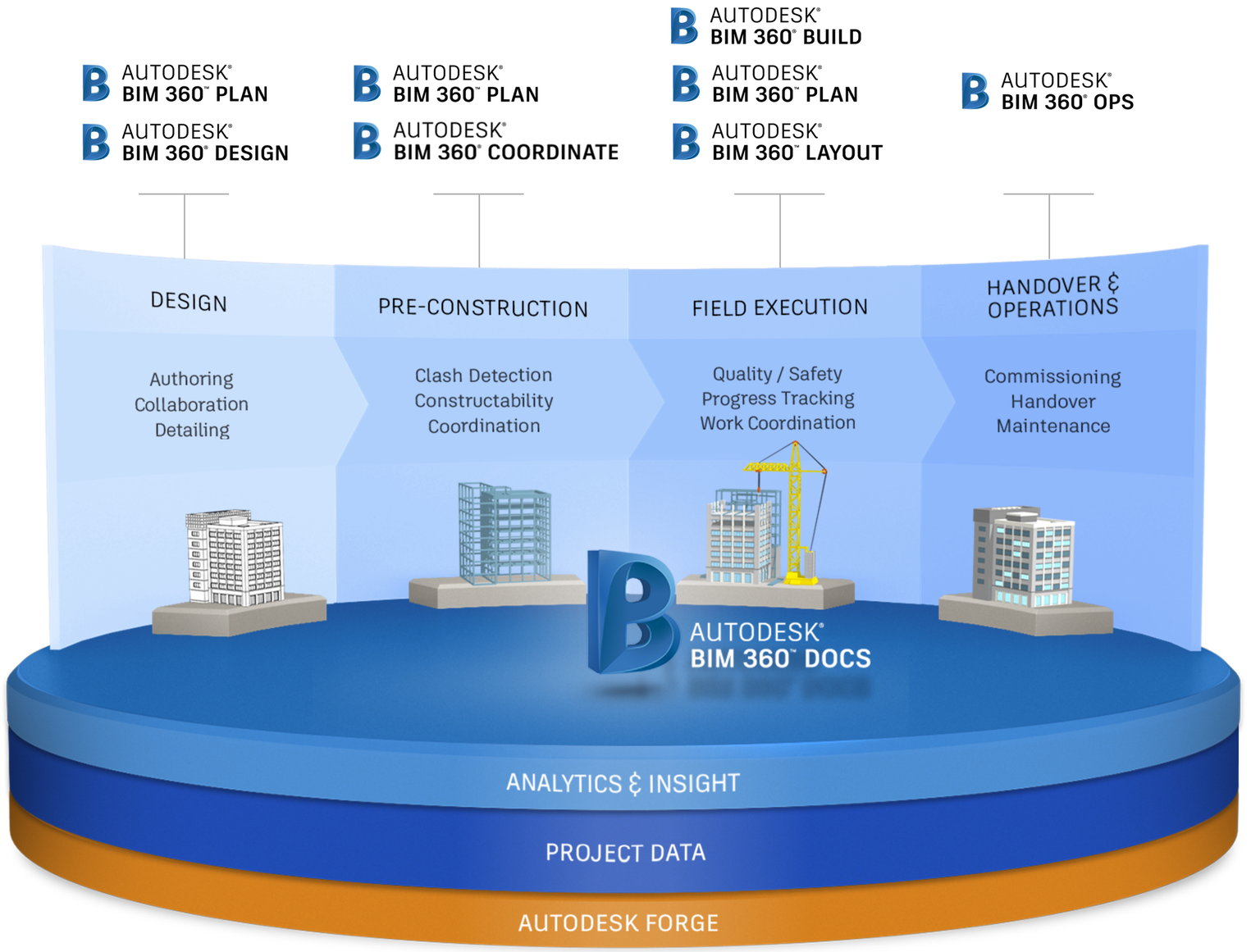
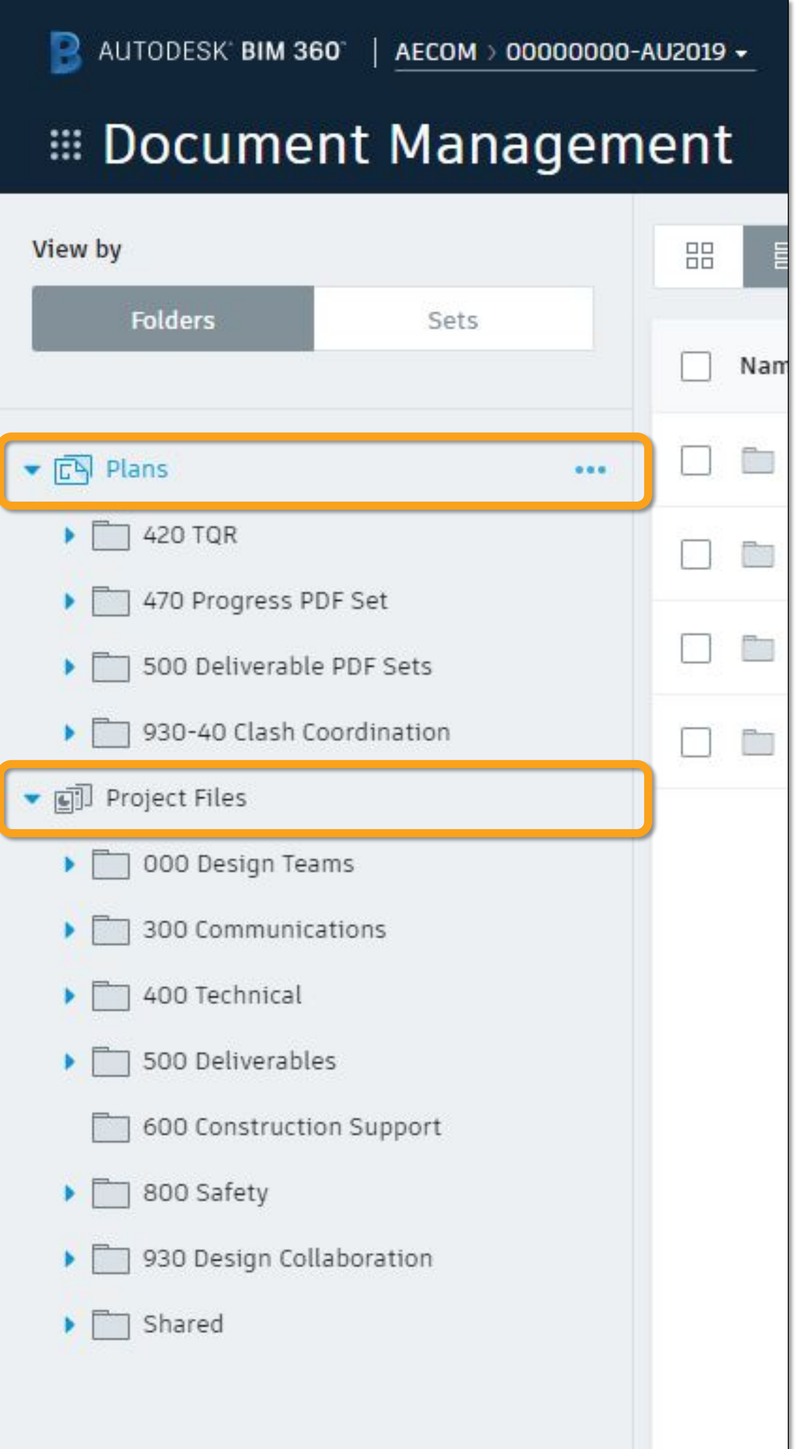
Cloud-Collaboration





Plans vs Project Files

Plans Folder

- Leverage the advanced functionality which extracts their contents into individual views and/or sheets.
- Harvest metadata for review and validation
- Examples include:
  - **Revit Models:** extract into Views and Sheets within the Publish Sets
  - **DWG Files:** extract into model space and paper space views
  - **PDF Files:** extract into individual pages and can extract data

Project Files

- Central repository for Revit models and Microsoft Office 365 documents stored in this directory tree. The integration of both of these software packages allow for live editing in BIM 360 Docs.

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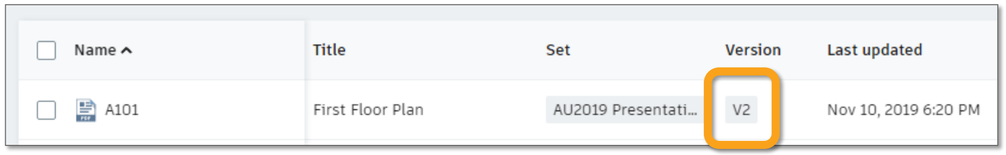
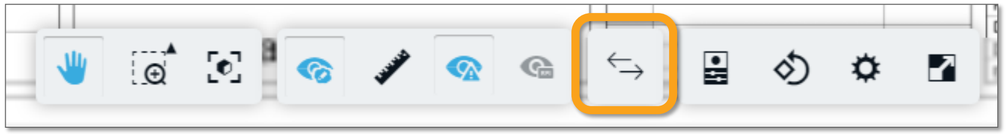
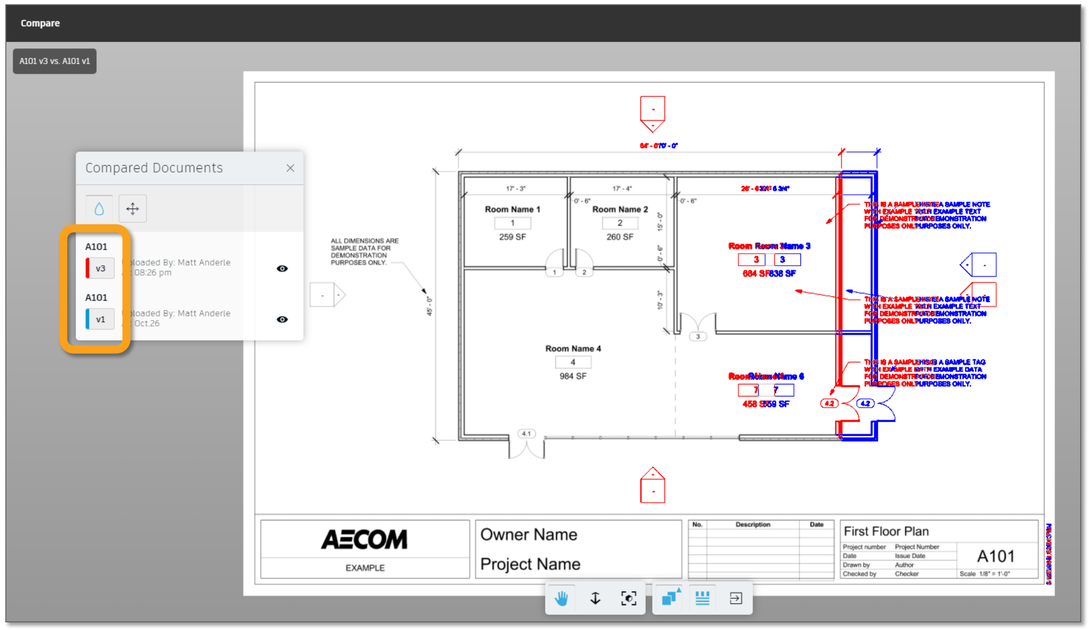
Design Review Tools

Version history is considered significant data

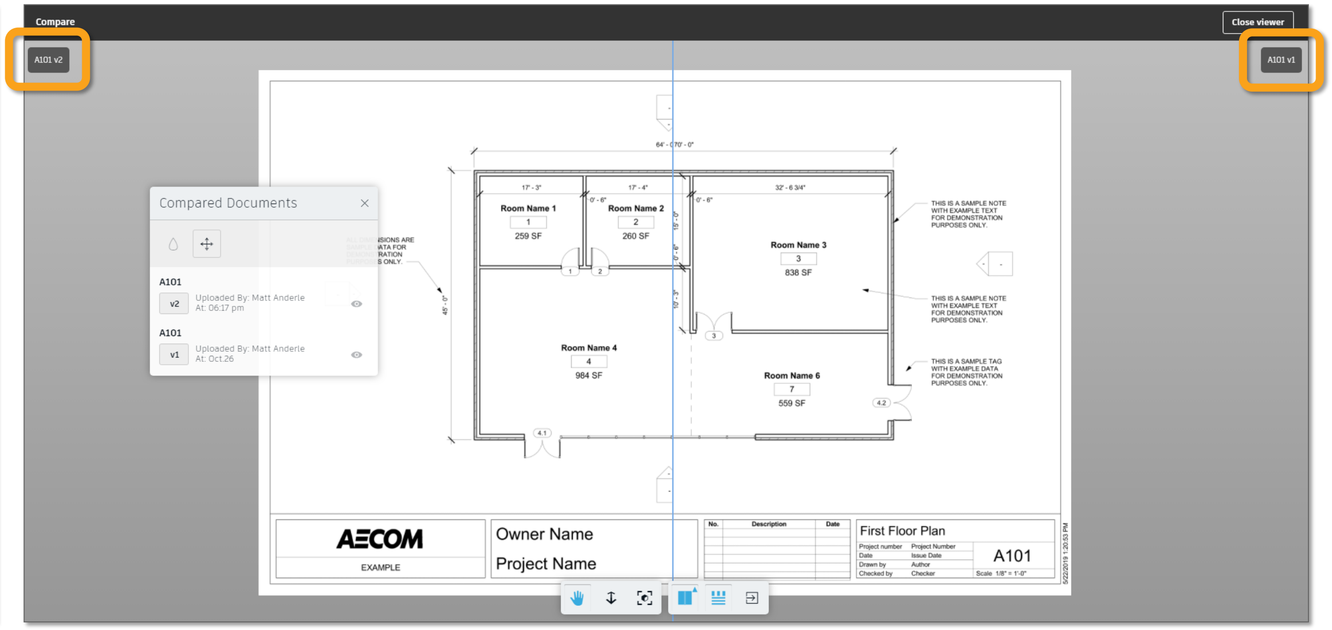


Often comparing versions of information is important





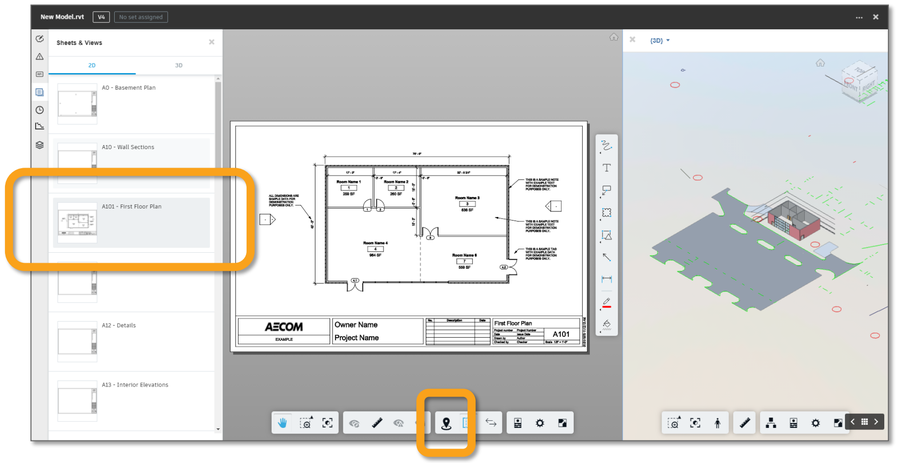
Overlay

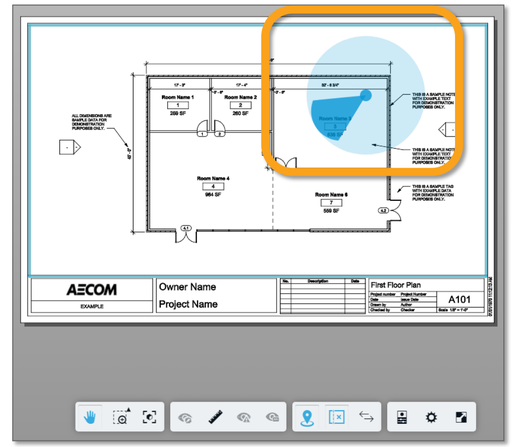


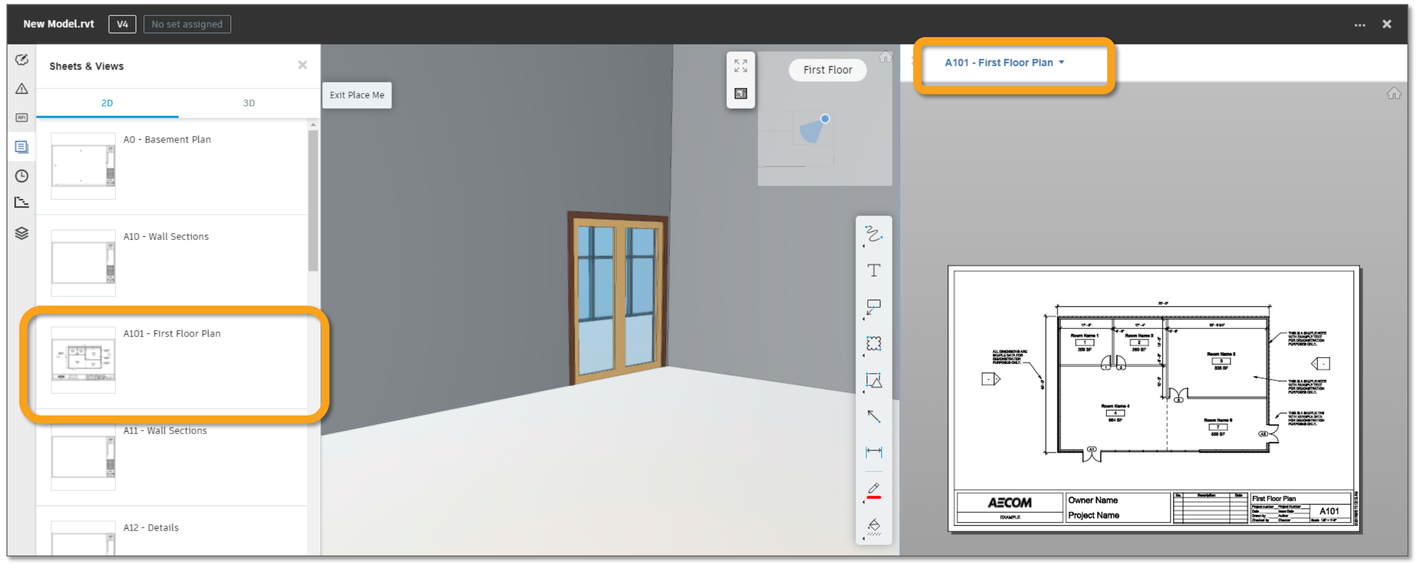
Side by Side

Design Review Tools

- Immersive visual reviews
- The user is placed into the 3D model in First Person Mode
- Provides opportunity to review multiple sources of data simultaneously







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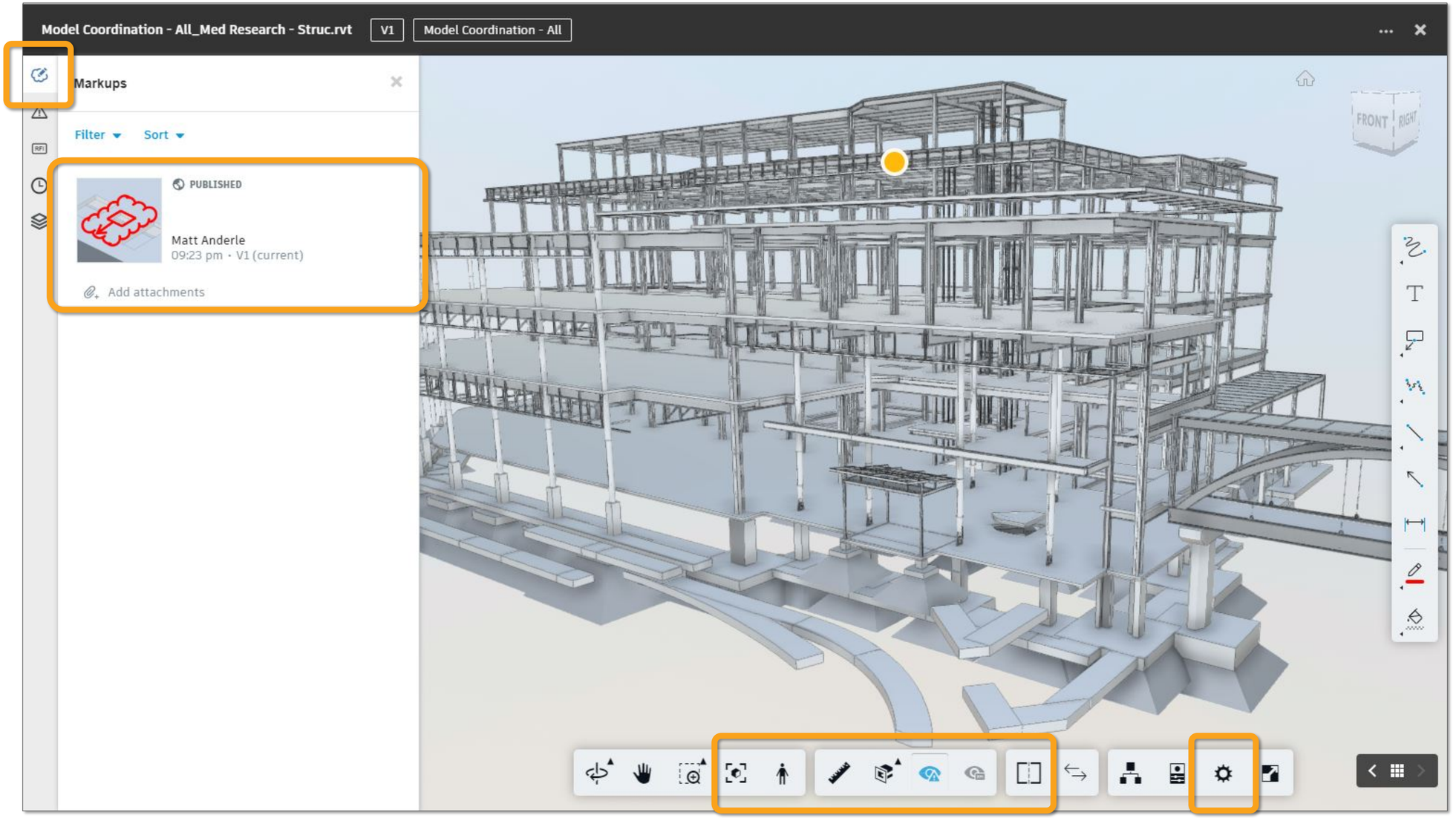
Design Review Tools



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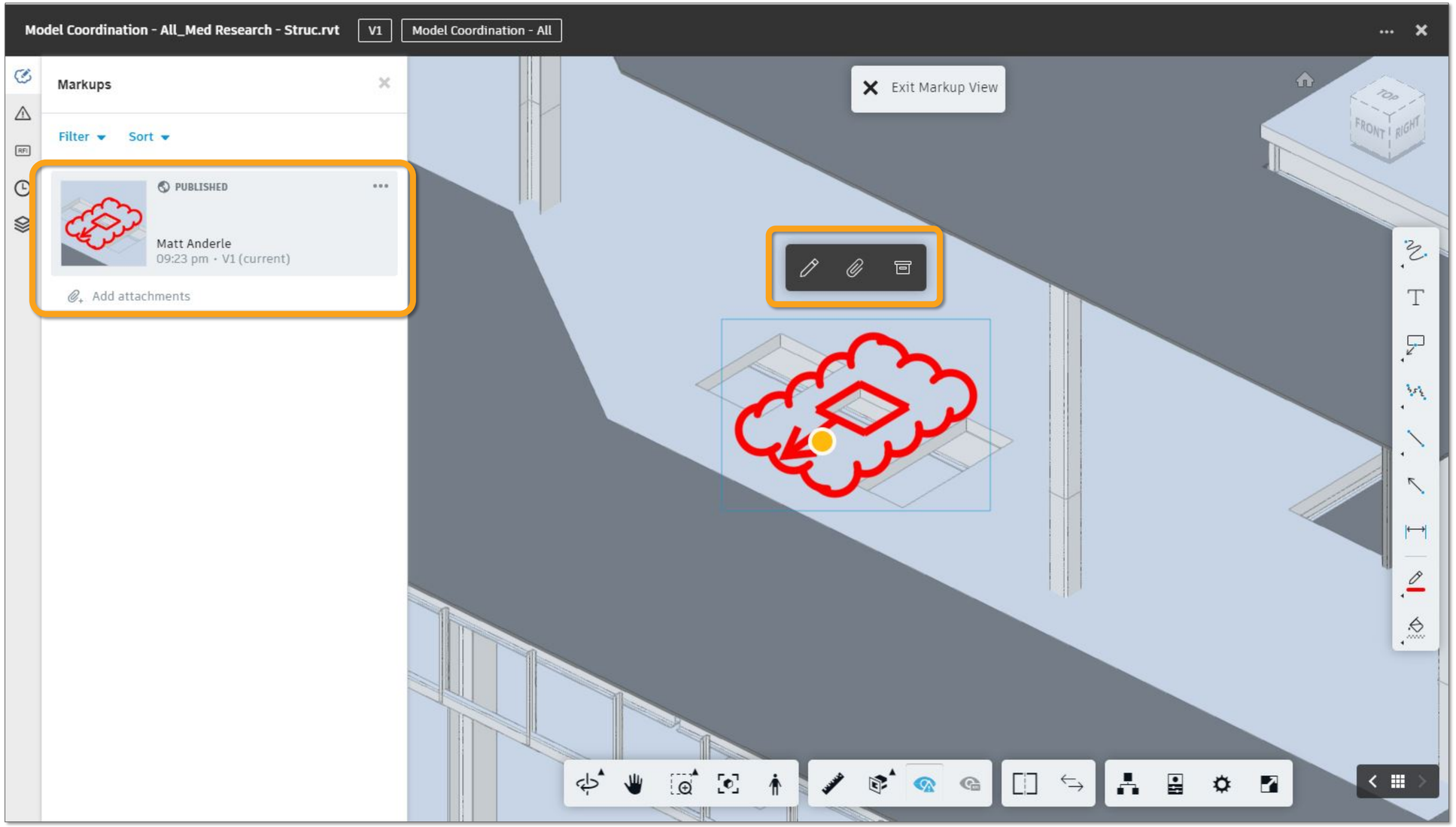
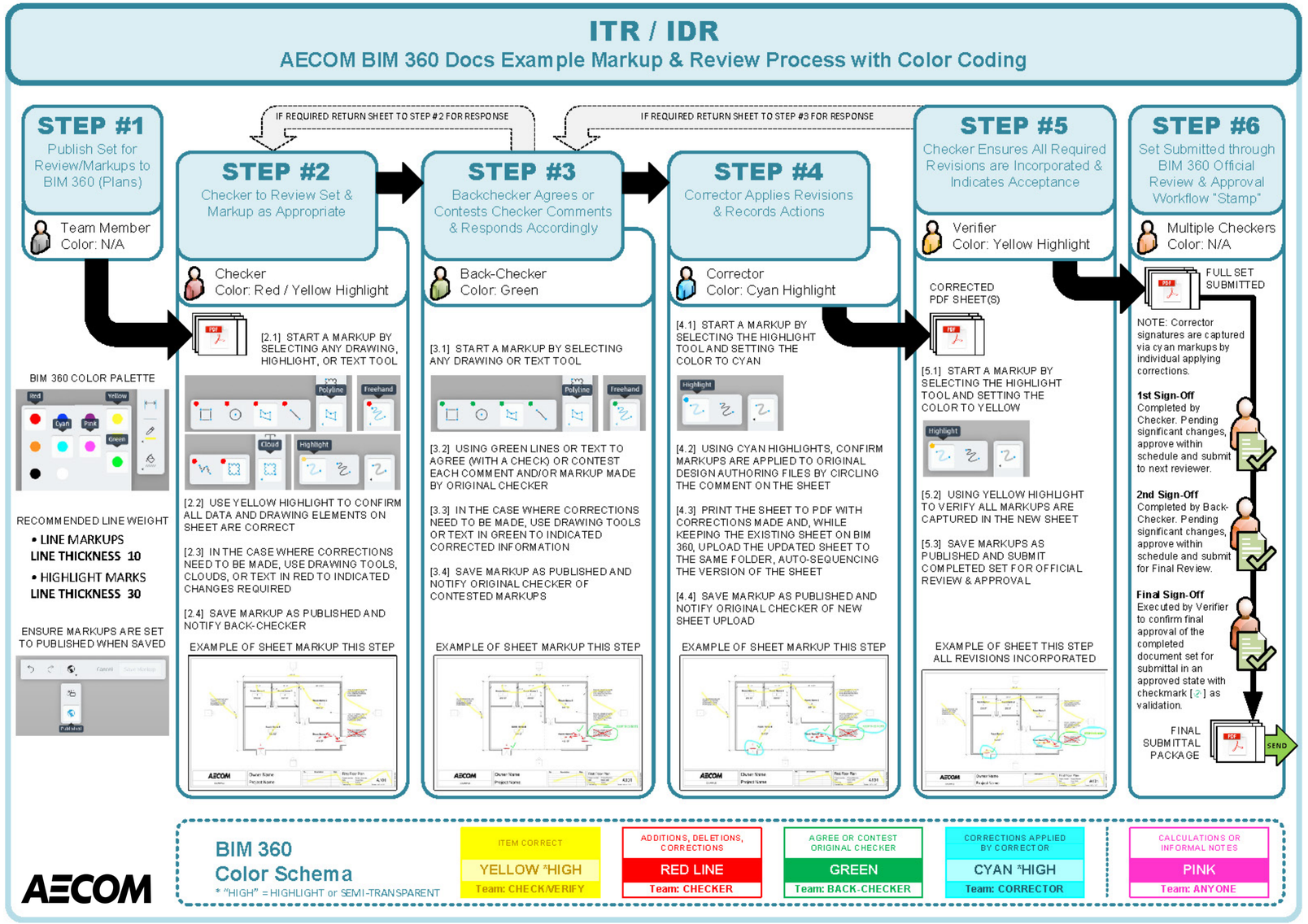
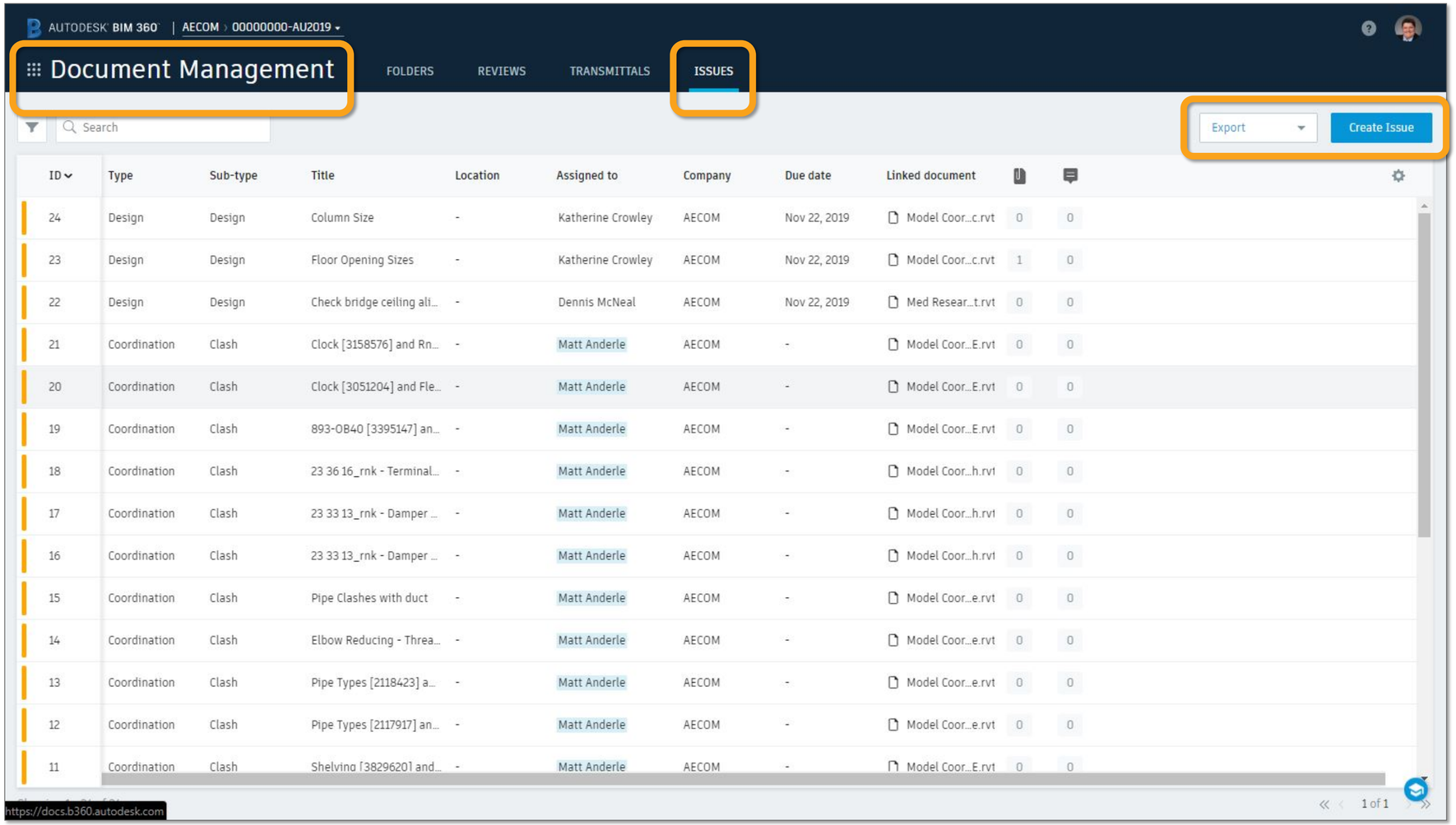
Design Review Tools



Review Workflow



Review Workflow



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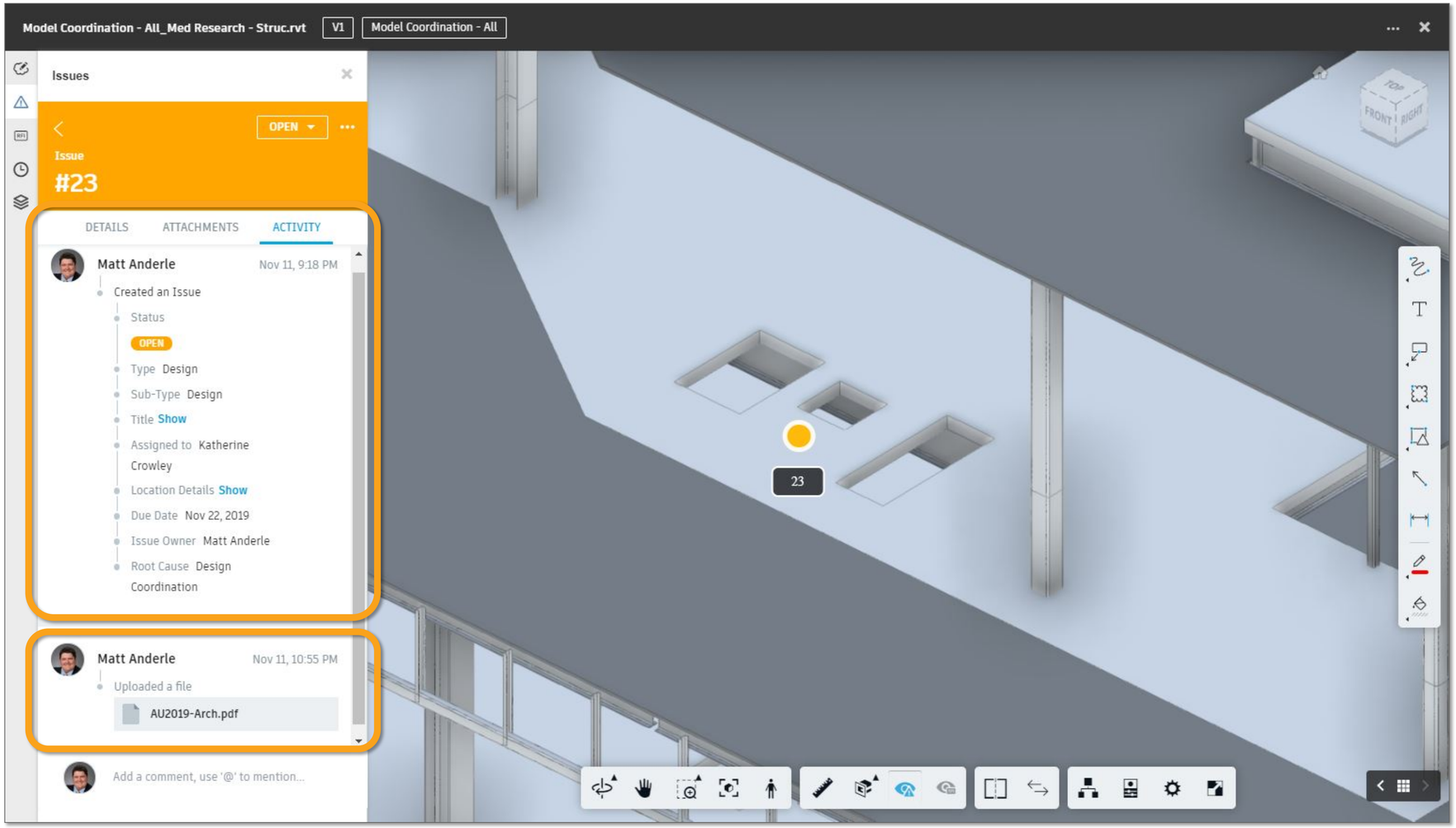
Review Workflow



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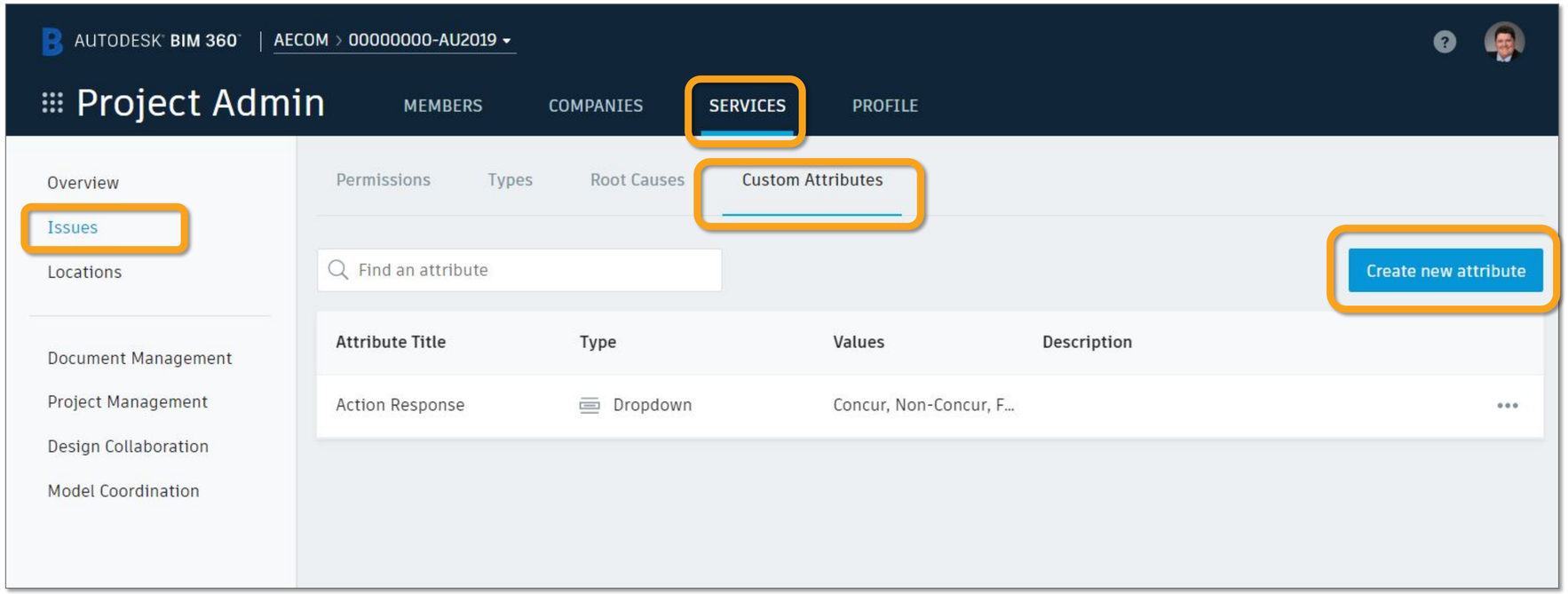
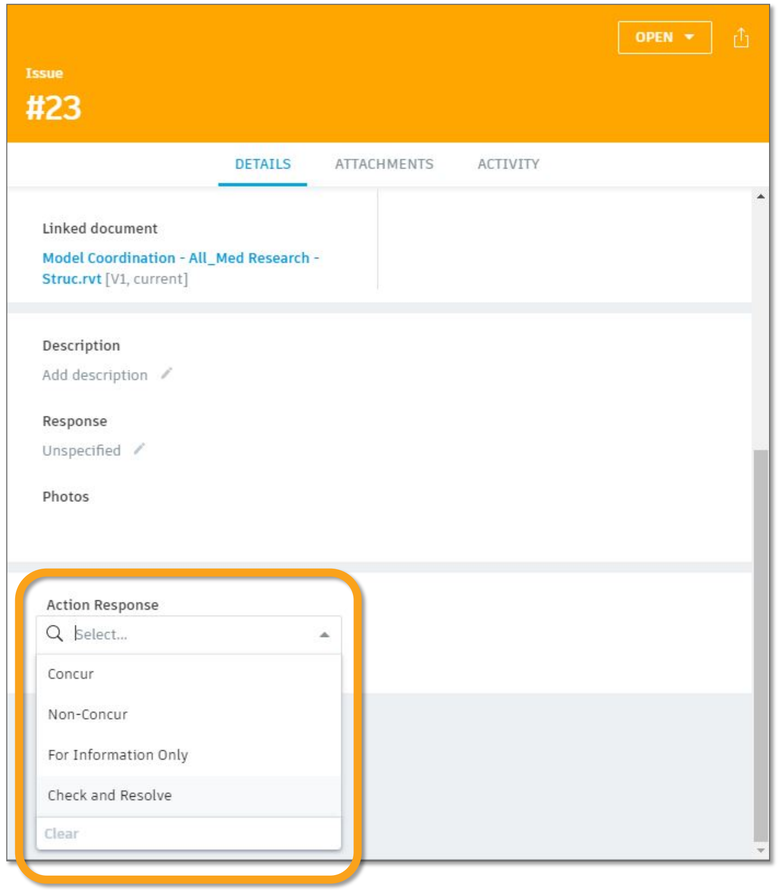
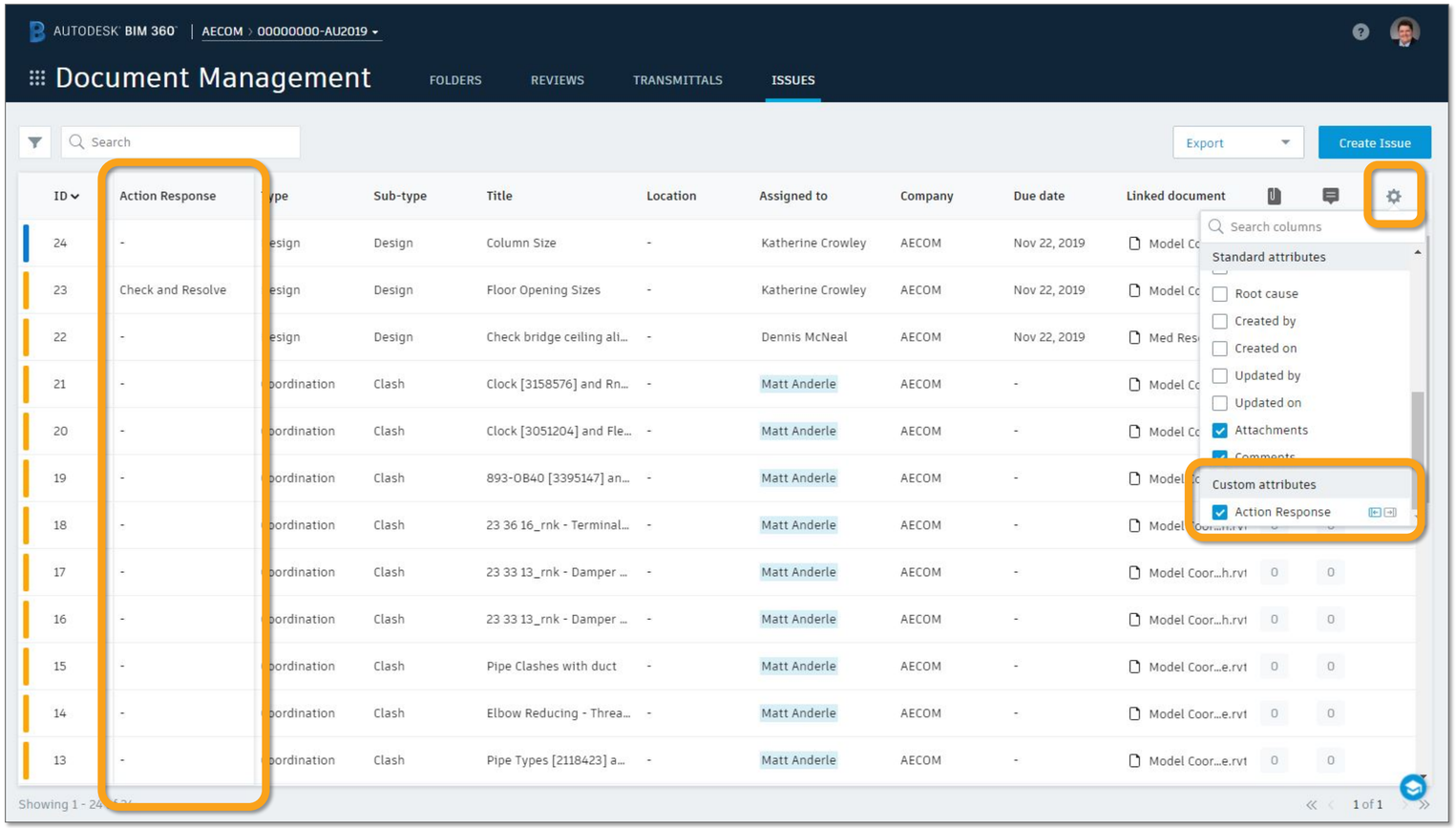
Custom Data Integration



Custom Data Integration





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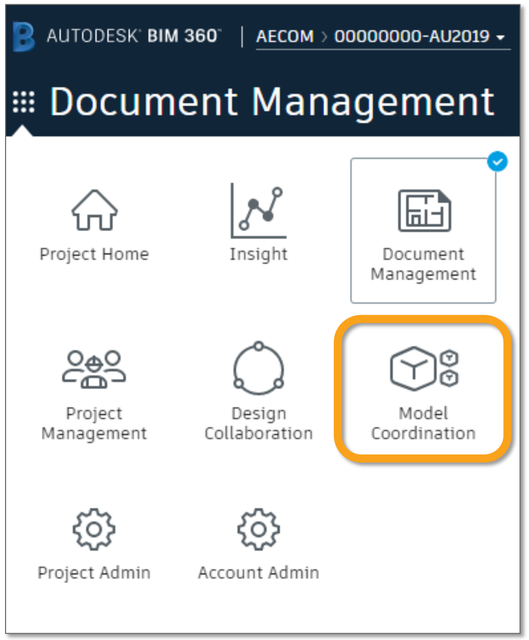
Design Coordination Tracking



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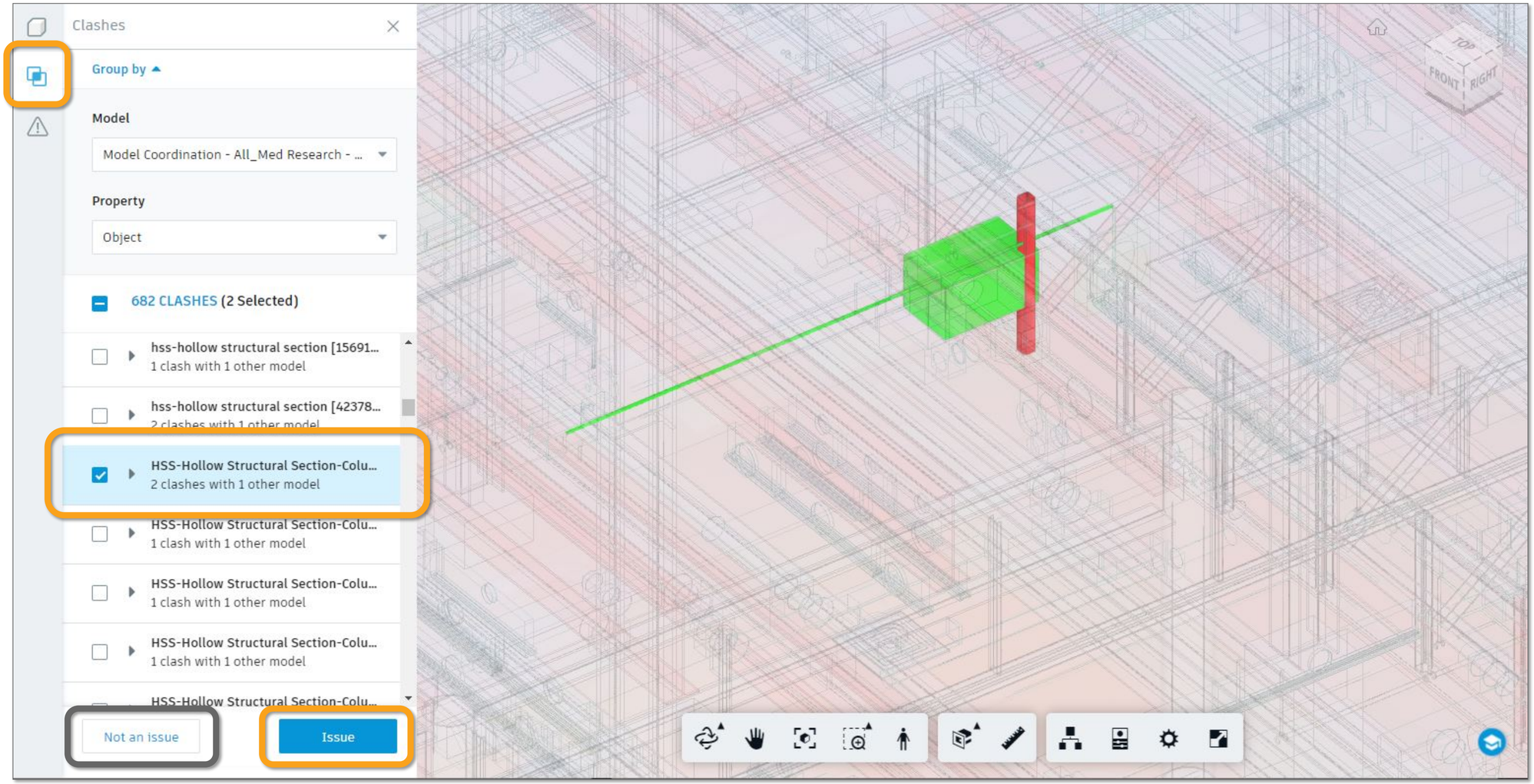
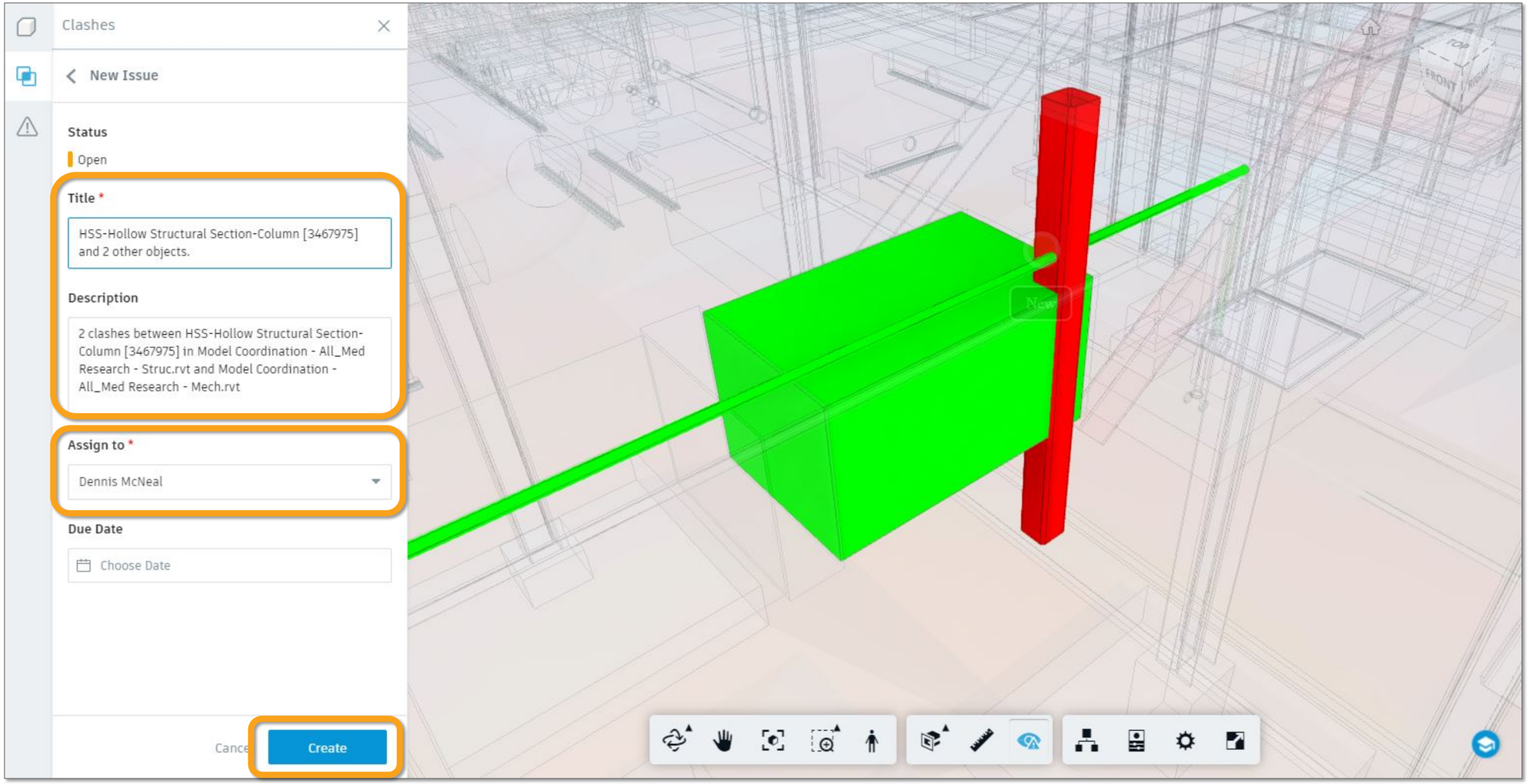
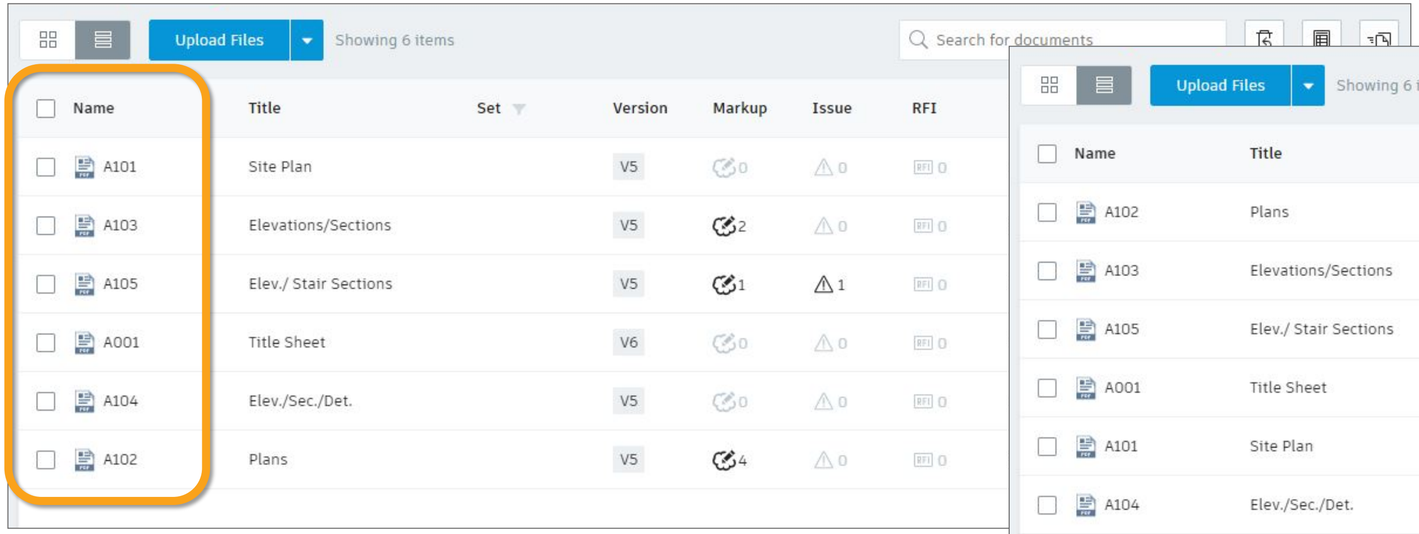
Design Coordination Tracking

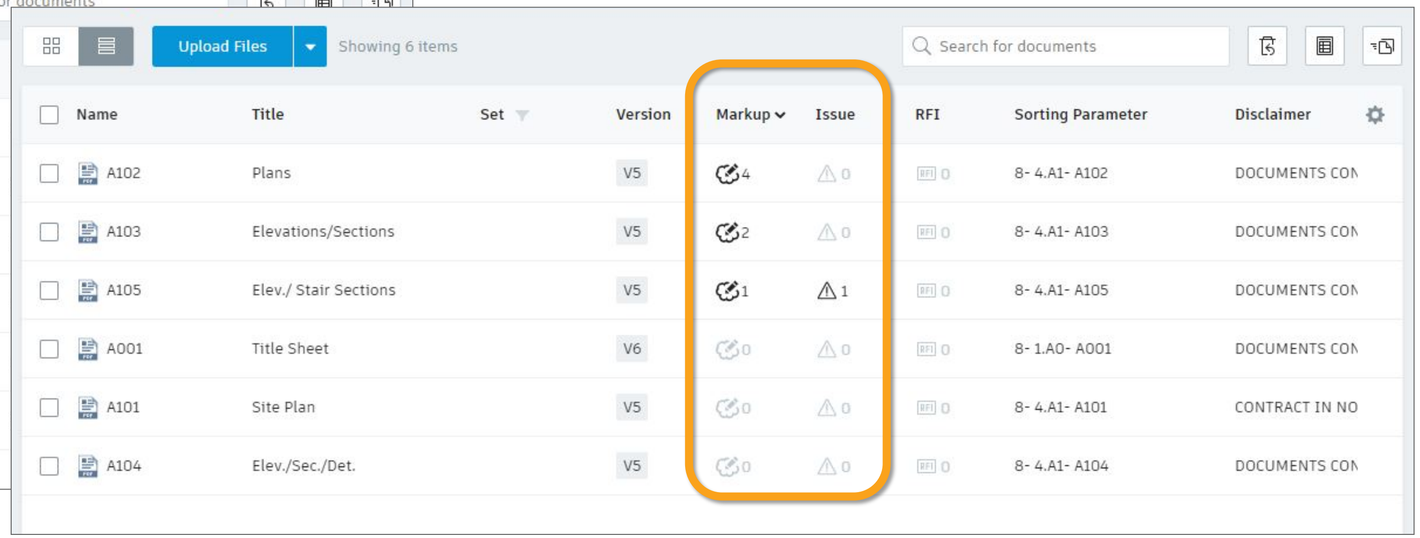


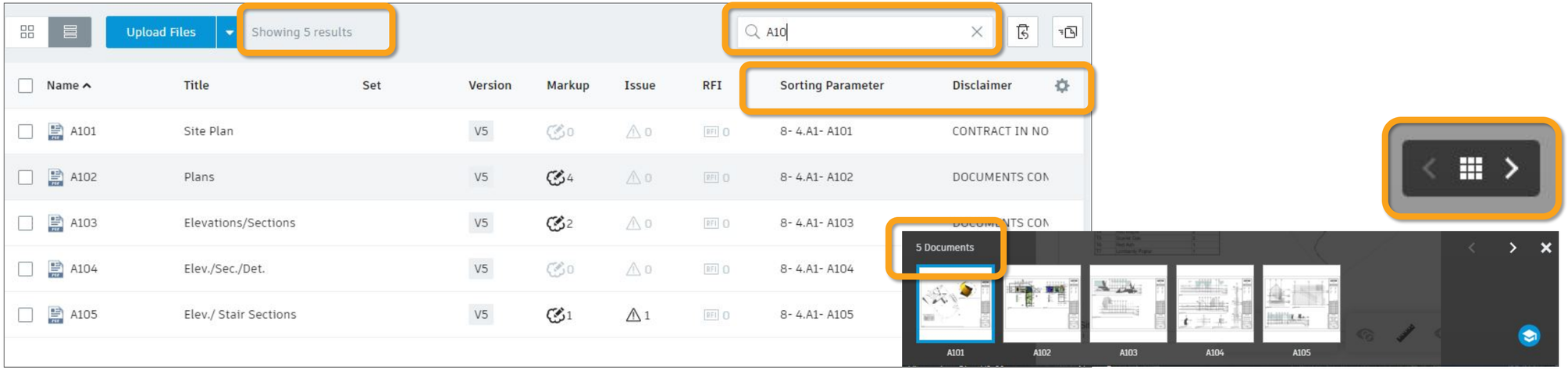
Design Coordination Tracking



Design Coordination Tracking

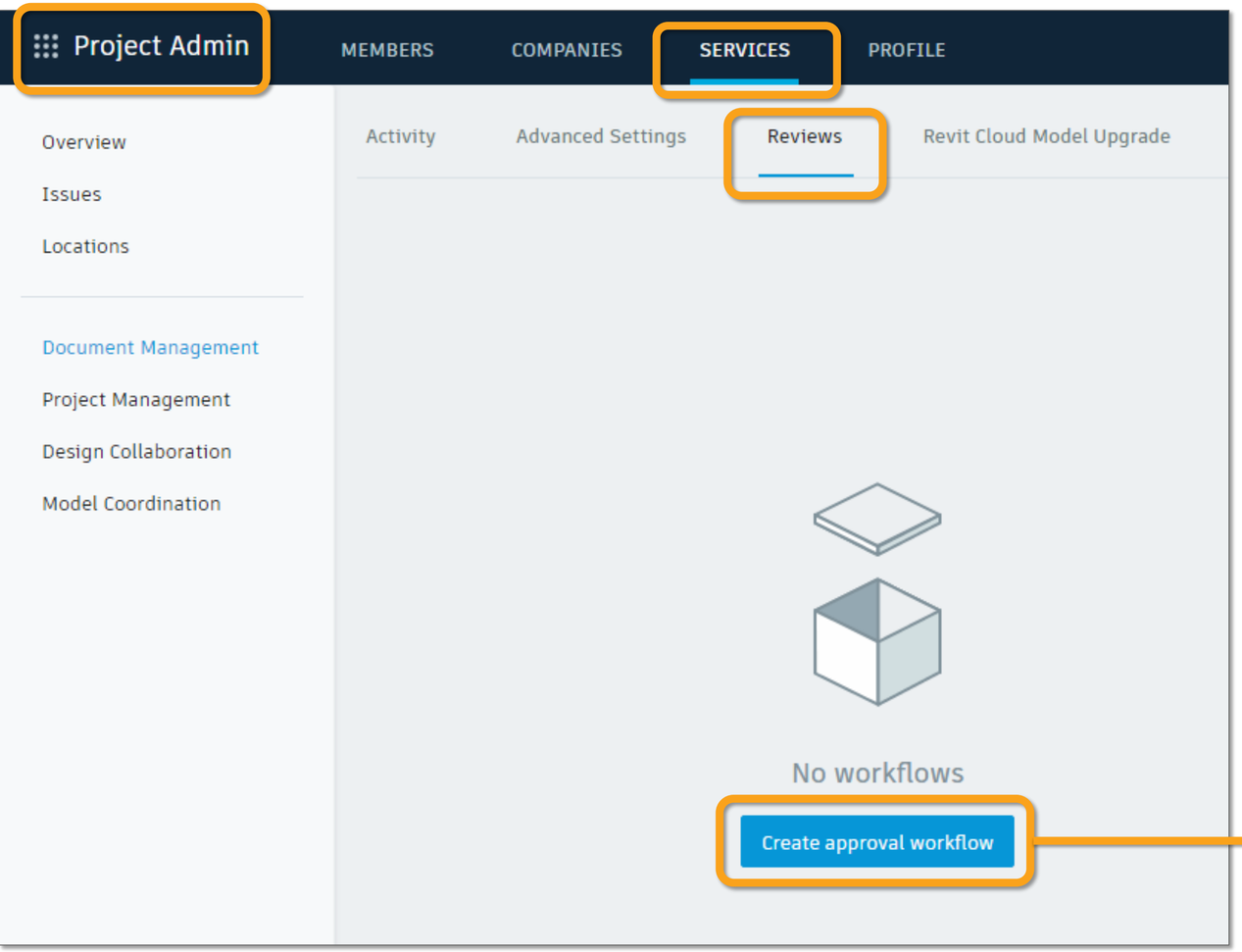


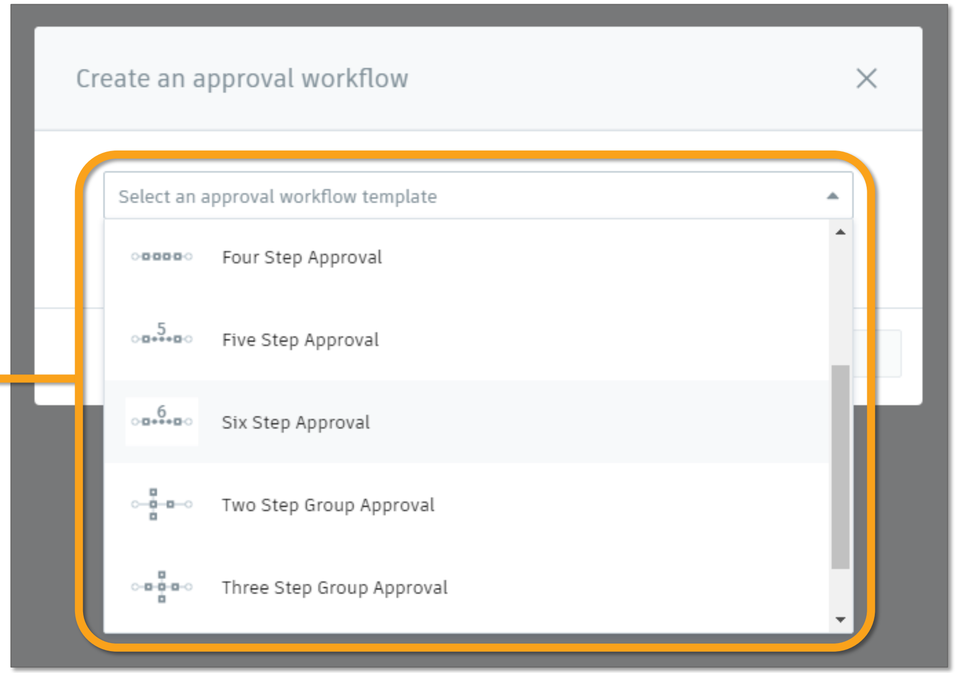




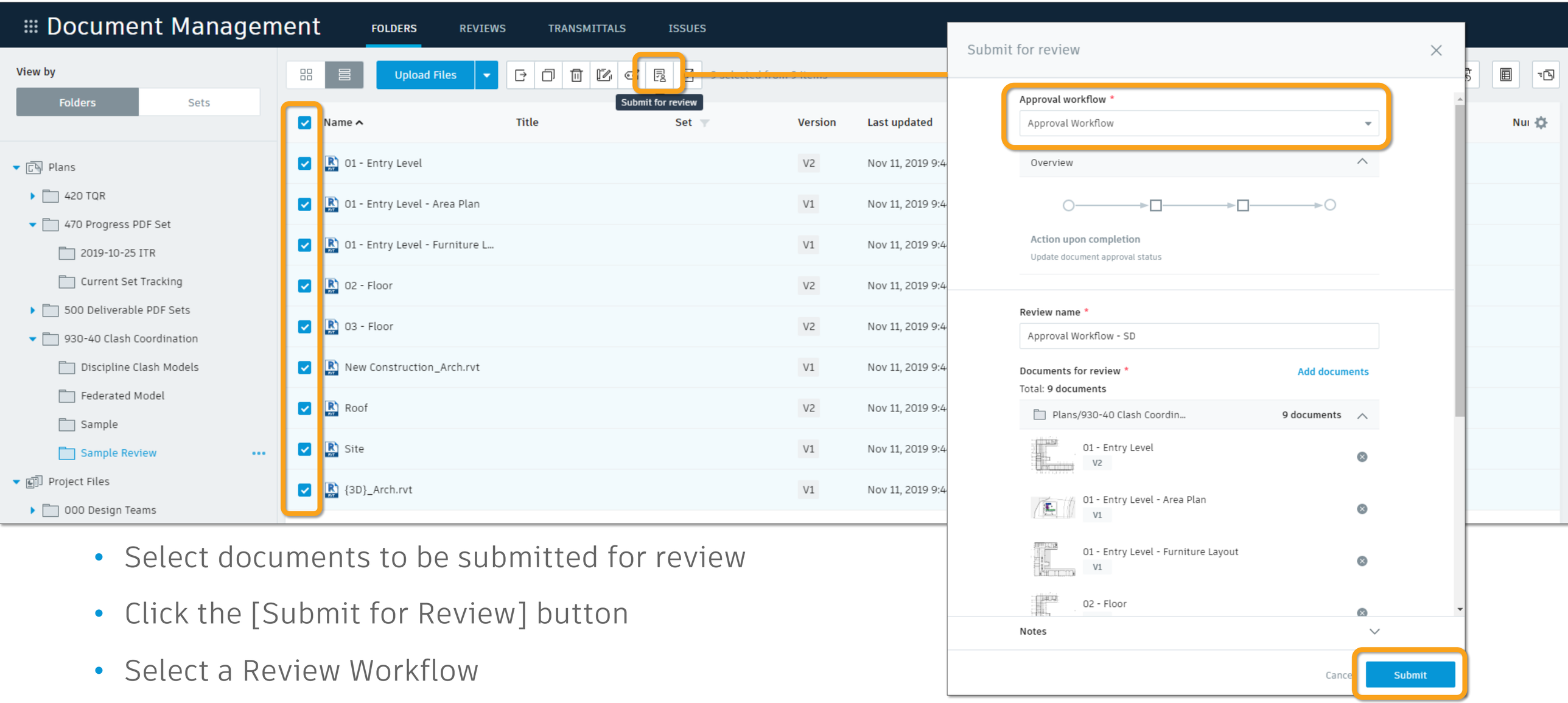
Approval Workflow

- BIM 360 Design provides a variety of workflows – including linear or group – to meet team needs
- Democratizing review process to improve team engagement with design



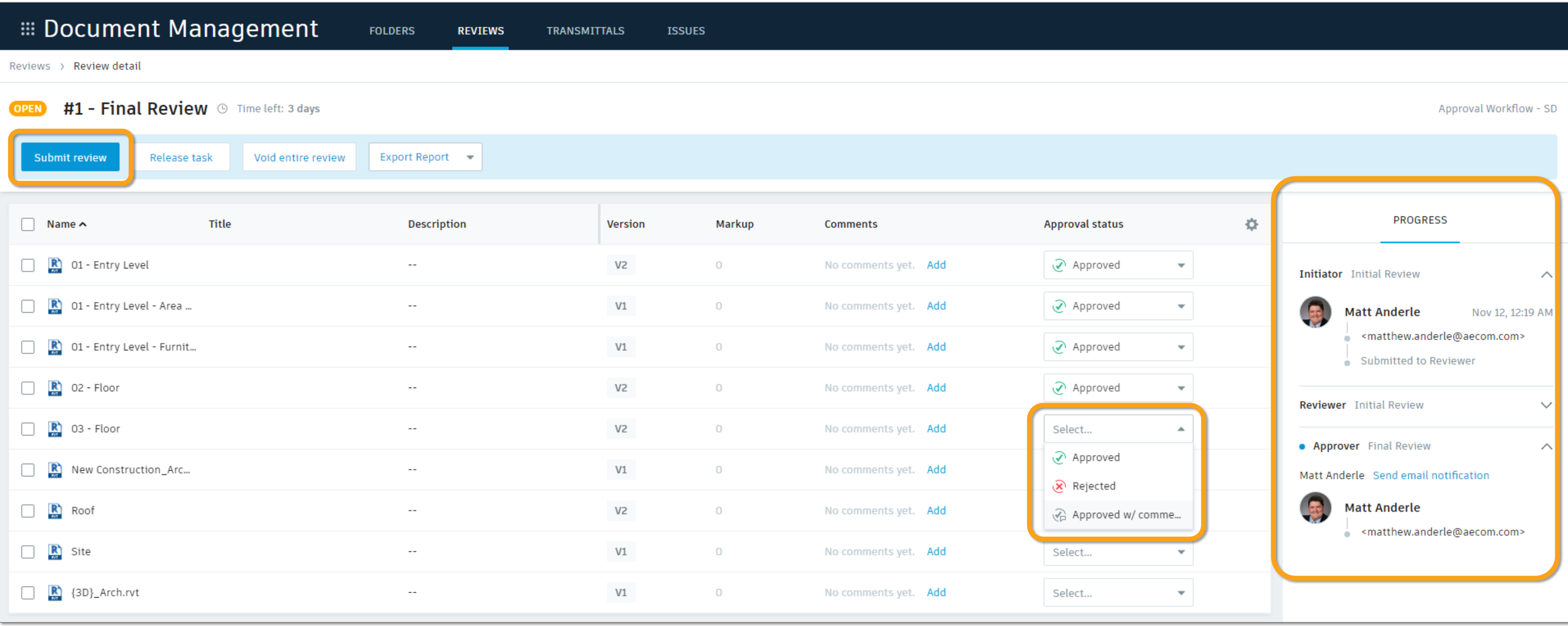


Approval Workflow

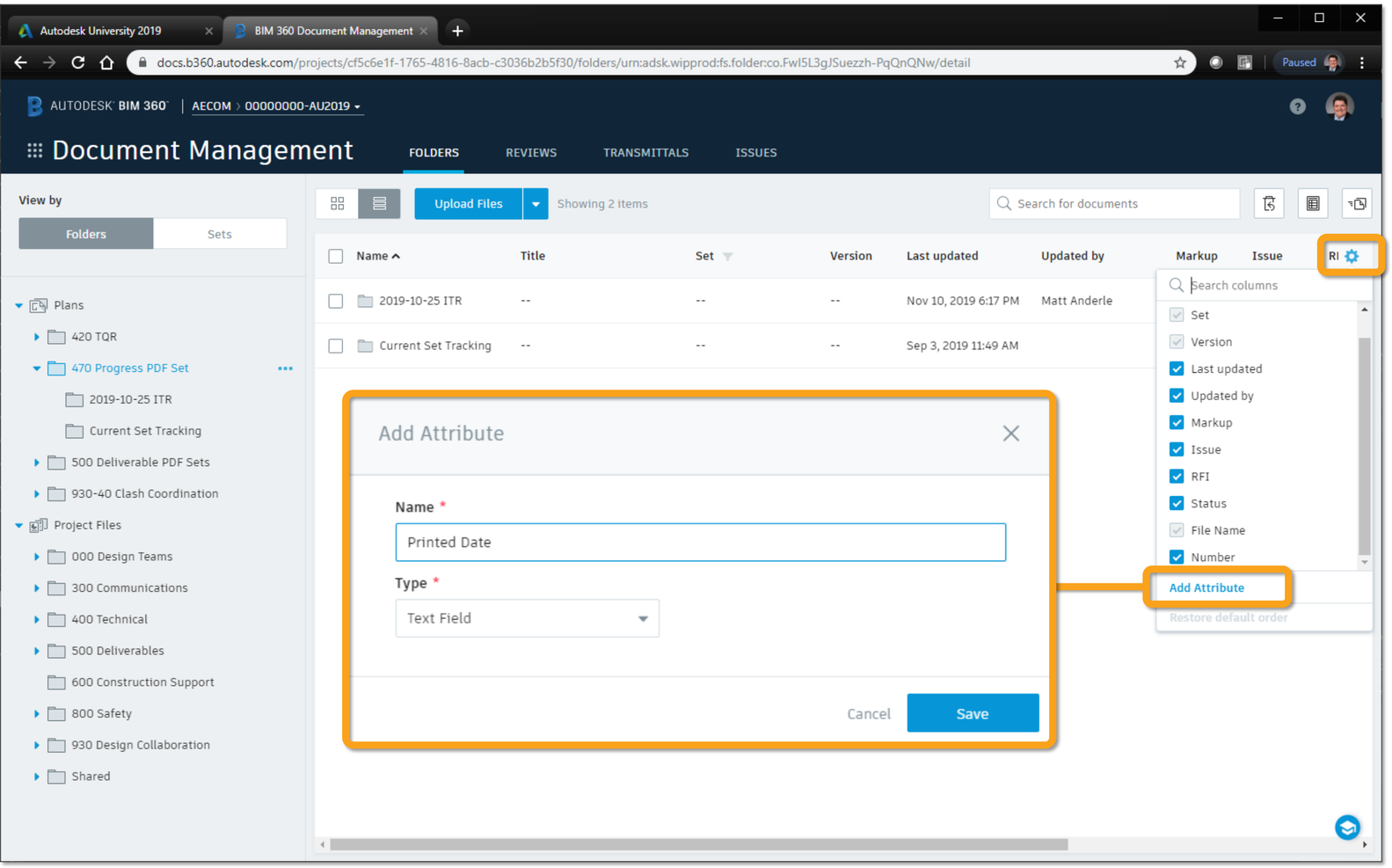


- Select documents to be submitted for review
- Click the [Submit for Review] button
- Select a Review Workflow

Approval Workflow

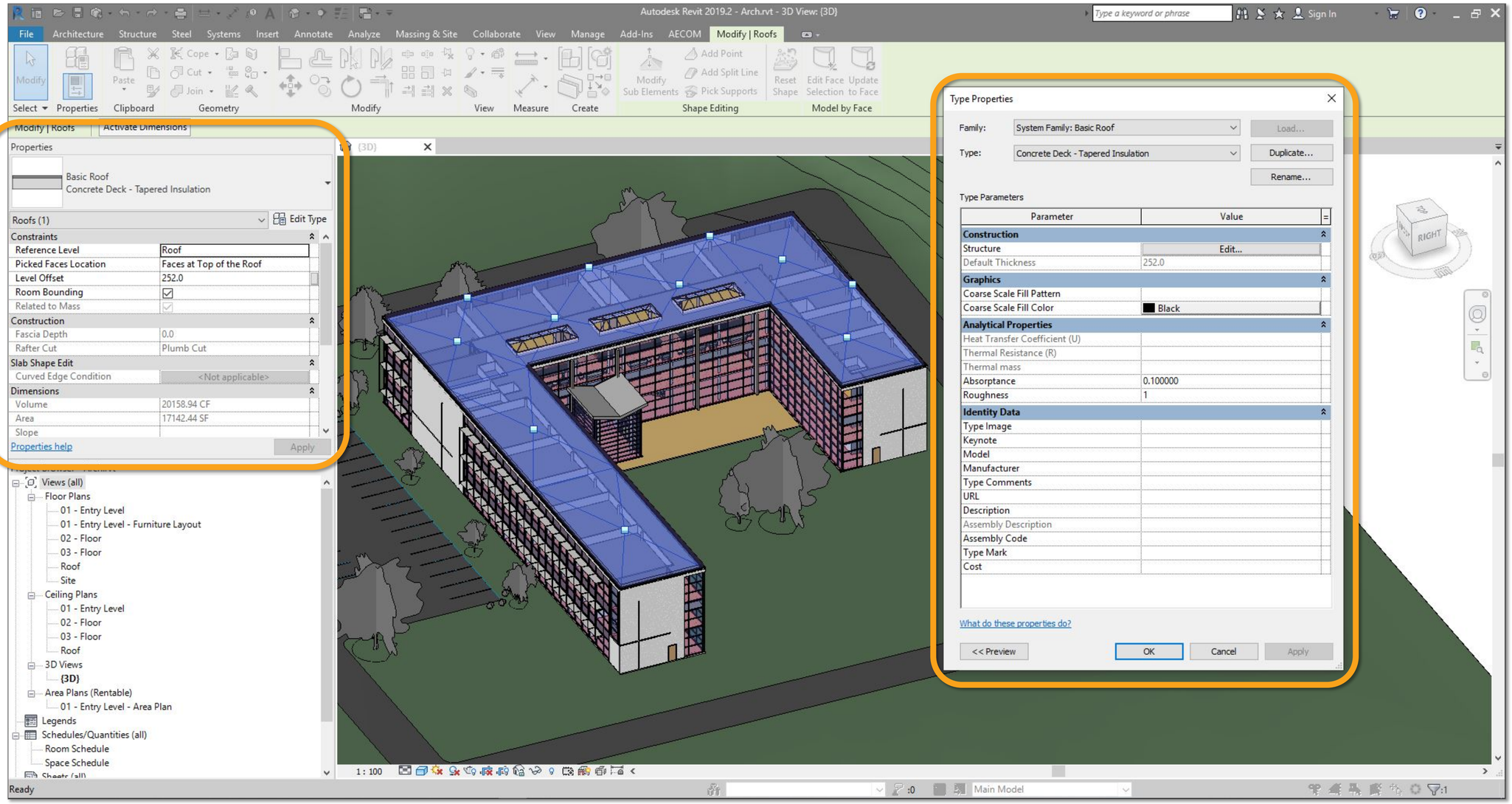


Harvesting Metadata



- We add Metadata to our folder list via custom attributes
- Information extracted directly from plan sheets brings forward data in a visible, searchable, and sortable review exercise

Data Connectivity



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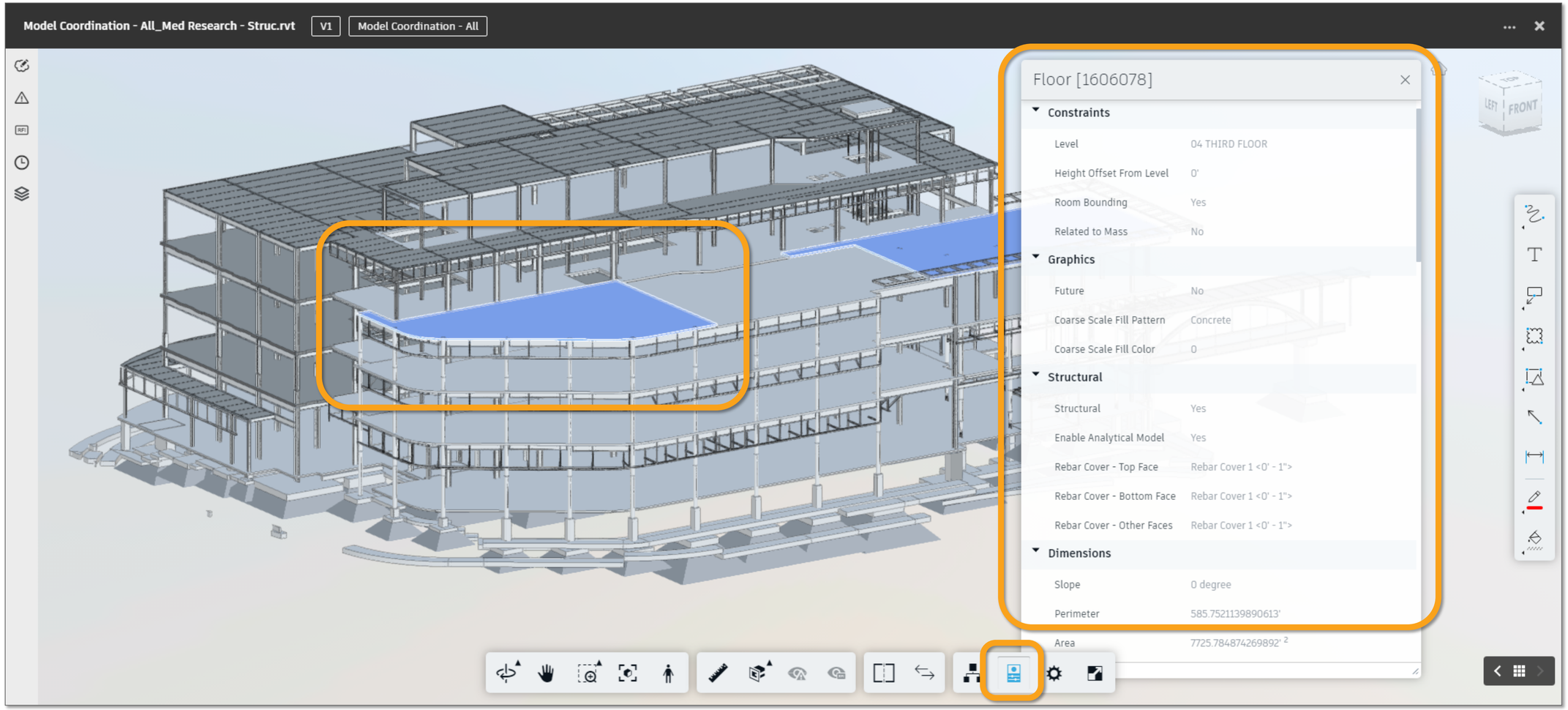
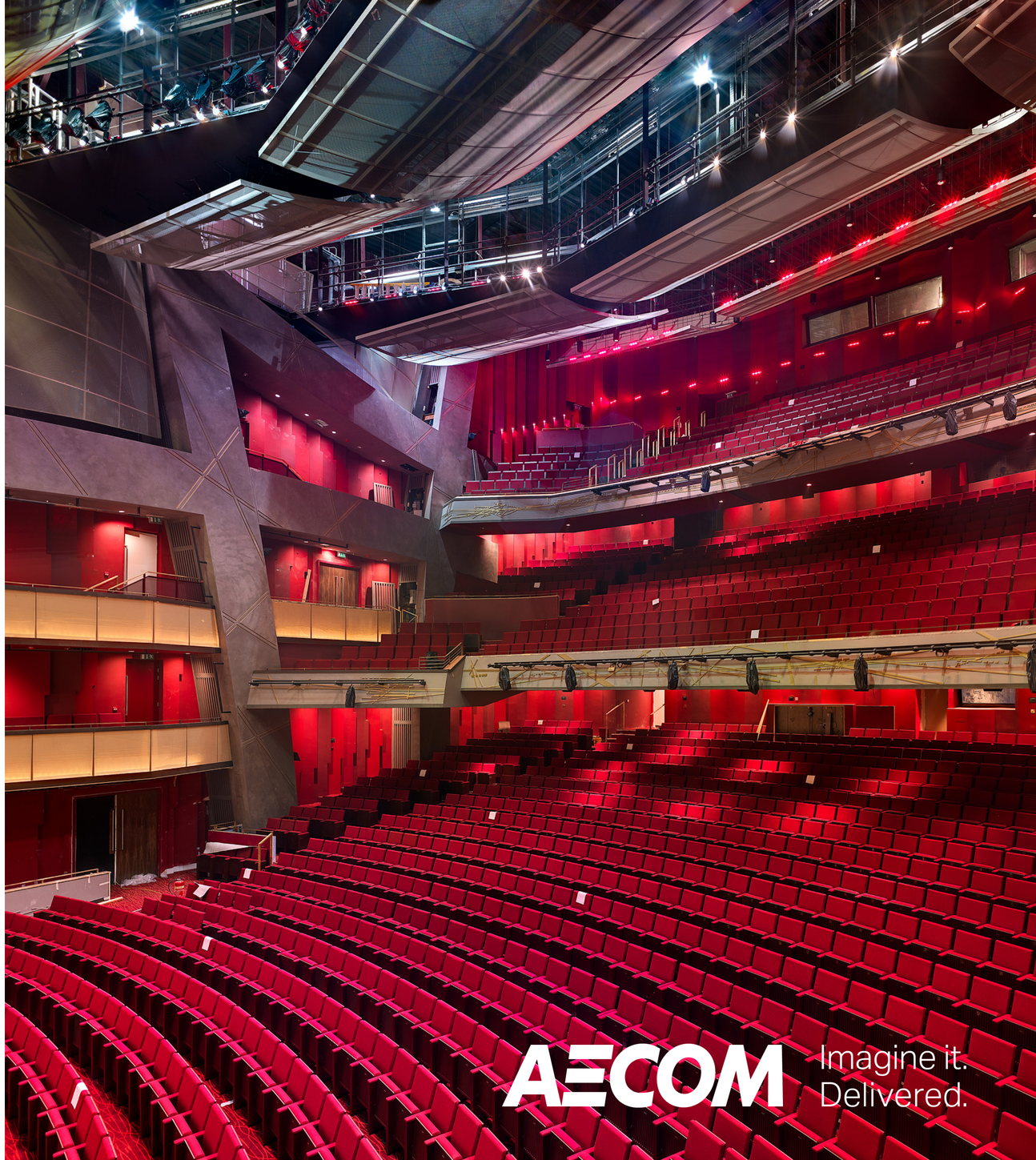
Data Connectivity



“Metadata is the Rosetta Stone of the 21st century.”

Matthew Anderle, AECOM



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Transformative Successes

AUTODESK® BIM 360® DESIGN

AUTODESK® REVIT®

AUTODESK® CIVIL 3D®

AUTODESK INFRAWORKS 360

AUTODESK® NAVISWORKS®

FORGE

assemble

Dynamo

AECOM Add-Ins

3rd Party Add-Ins

Transformative Successes

Primary Client Information
Name: Owner

Client Contract #:
Client Project #:
Client Project Manager:
Client BIM Manager:
Client Website:

Secondary Client Information
Name:

Client Contract #:
Client Project #:
Client Project Manager:
Client BIM Manager:
Client Website:

Contractor Information
Name:

Contractor Contract #:
Contractor Project #:
Contractor PM:
Contractor BIM Mngr:
Contractor Website:

Project Information

Project #: 00000000
Project Issue Date: 2019-01-02
Project Status: DEPLOYMENT
Project Address: GLOBAL

REVIT MODEL ANALYTICS

SAMPLE DATA

BIM Deliverables & Integration

Authoring Models	Facility Management Data
Clash Reports	4D (Scheduling)
COBie	5D (Cost)
Quantity Take-Offs	6D (As-Built)

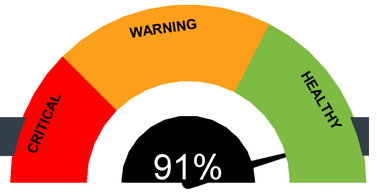
SAVE VIEW
2/18/2019 5:22:52 PM

BIM 360://AECOM Model Analytics/Revit Model Analytics.rvt

Disclaimer

Resource Links

MODEL HEALTH

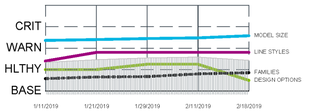


STEADY

MODEL METRICS	OK	MODEL SIZE	258 MB
MODEL SETUP	OK	EXTRA VIEWS	33 %
UTILIZATION	OK	ELEMENTS	363698
ELEMENTS	OK	USERS	9
BEST PRACTICES	OK	RECORDS	182
REFERENCES	OK	LATEST	2/18/2019

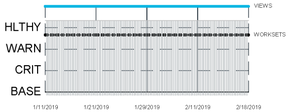
MODEL METRICS

MODEL SIZE	WARNING
FAMILIES	OK
DESIGN OPTIONS	OK
LINE STYLES	OK



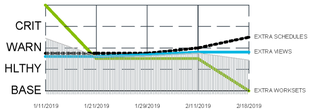
MODEL SETUP

VIEWS	OK
WORKSETS	OK



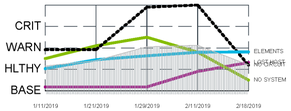
UTILIZATION

EXTRA VIEWS	OK
EXTRA SCHEDULES	WARNING
EXTRA WORKSETS	OK



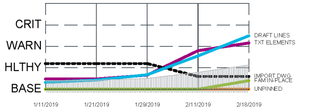
ELEMENTS

ELEMENTS	OK
NO CIRCUIT	OK
NO SYSTEM	OK
LOST HOST	OK



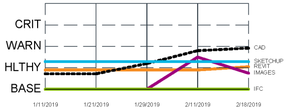
BEST PRACTICES

DRAFT LINES	WARNING
IMPORT DWG	OK
FAM IN-PLACE	OK
TXT ELEMENTS	WARNING
UNPINNED	OK



REFERENCES

SKETCHUP	OK
CAD	OK
IFC	OK
IMAGES	OK
REVIT	OK



Information presented on this dashboard is populated by the AECOM Model Analytics Add-In. The Add-In automatically runs in the background when you open, close, or save a model. You can selectively run intermittent updates to the database by Pushing Analytics. Additional information is available on the Revit Metrics Dashboard which also populates the data presented in this view. Both are launched from the AECOM toolbar. All contents of this dashboard and the Revit Analytics Engine are proprietary to AECOM. Do not use, copy, reprint, or distribute (in part or whole) without permission from AECOM.

AECOM

Transformative Successes

Leveraging Data

- Using Forge API to process the data in our BIM 360 hub
- Building data lakes rich with information harvesting everything from an element within a model up to a holistic view of projects across the company
- We present this data forward to the user in the form of dashboards and reports
- Developing Machine Learning strategies to better evaluate the data and improve our process and position our teams to achieve **Design Certainty**

Industry point of view

Aaron Phillips
Director of Virtual Design and Construction

DANIS

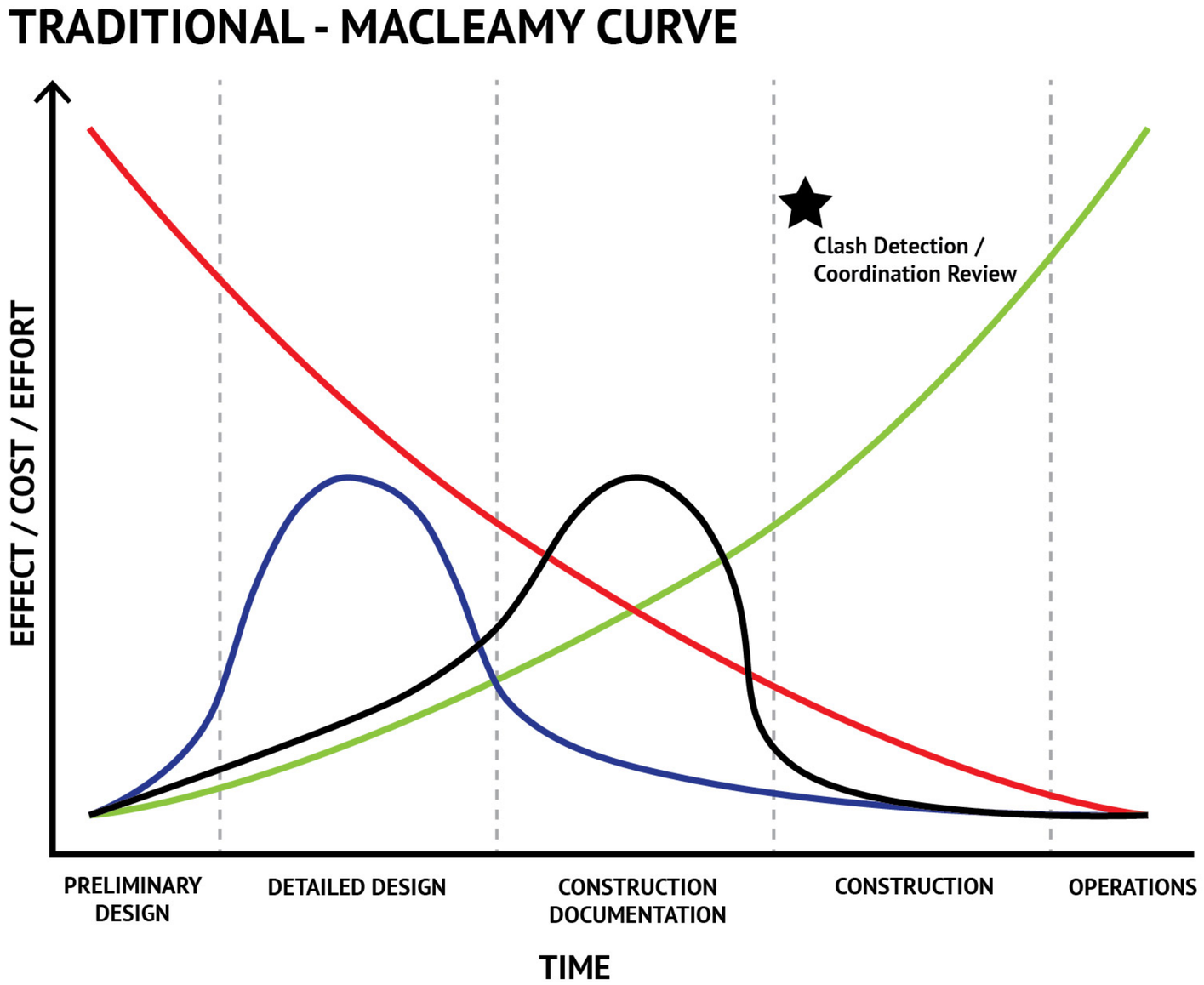
Aaron Phillips

- 17 Years AE
- 6 Years @ Danis
- Design/Build
- Large Campus Owners
  - Indiana University BIM Guidelines & Standards
  - US Central Command BIM Guidelines & Standards
- Autodesk International BIM Experience Award

DANIS

- MIDWEST
  - Cincinnati, OH
  - Columbus, OH
  - Dayton, OH
- CAROLINAS
  - Raleigh, NC
- SOUTHEAST
  - Jacksonville, FL
- $600MM Under Construction
- 600+ Employees (400+ Field Staff)
- Founded in 1916

CHALLENGES



- Design timeline focused
- Doesn’t represent newer project delivery models
- Delayed construction team involvement

CHALLENGES

- Cost and time of an RFI
- Understanding trends within the data
- Where are the real problems
- Reactive verse Proactive
- BIM 360 Field projects set up right before construction starts

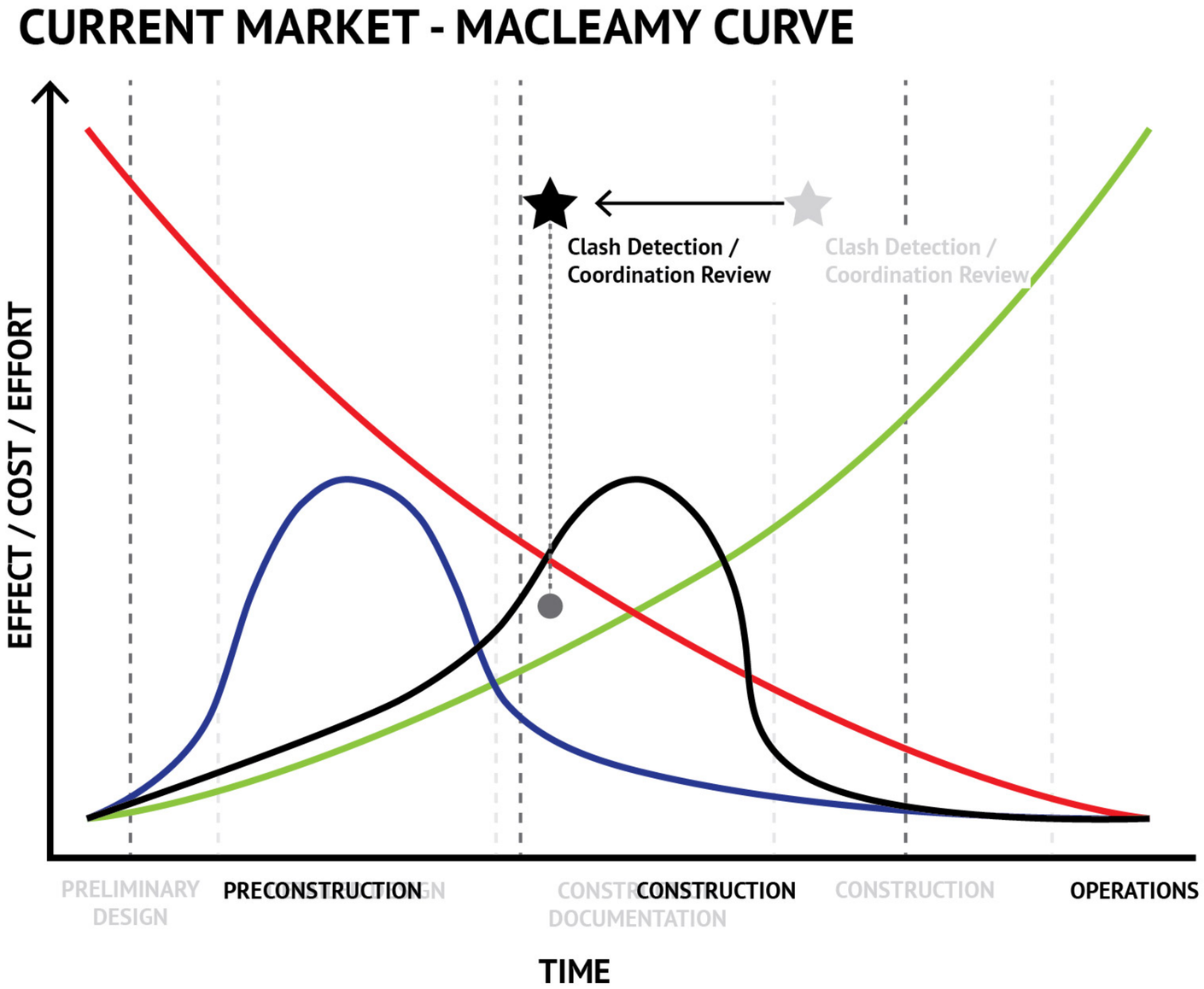
DATA FROM BIM 360 FIELD

RFI 015	Elevator Numbering	Danis B
RFI 016	Top of Concrete Column ElevationsPlease review drawings S1.04, S1.05, and S1.06 containe	Danis B
RFI 017	Bottom of Base Plate ElevationsStructural drawings and sections do not provide enough inf	Danis B
RFI 018	Beam ReactionsSee attachment SK003 which contains drawings S1.04, S1.05, S1.06, S1.07, S1	Danis B
RFI 019	Elevations of Marked Platforms1) Structural sections do not provide top of steel elevation o	Danis B
RFI 020	Bearing Plate SizeRefer to drawings S1.04, S1.05, S1.06.....The typical bearing plate is called	Danis B
RFI 021	Thickness of End PlateReference Sheet S3.01Refer to Typical Beam Bearing Perpendicular D	Danis B
RFI 022	Lintel Sizes and Lintel NumbersPlease advise lintel sizes and lintel numbers for the cloude	Danis B
RFI 023	Bearing PL Underside & Clip L ConnectionsIf we follow the Typical Top of Concrete Column I	Danis B
RFI 024	Area L Grid LinesPlease provide dimensions in clouded areas on sheet S1.02 to locate Area	Danis B
RFI 025	Radius of Rolled TubesPlease see clouded areas on sheet S6.011) Provide the radius and th	Danis B
RFI 026	Roof Opening Sizes and LocationsOn the attached Sheet A1.04, please provided all clouded	Danis B
RFI 027	Unit Weight Requirements for Light Weight Concrete	Danis B
RFI 028	Door and Interior Windows at Garage Elevator Lobby 009	Danis B
RFI 029	Door Opening 112A	Danis B
RFI 030	Wood Door Finish Clarifications	Danis B

ANALYSIS OF BIM 360 FIELD DATA

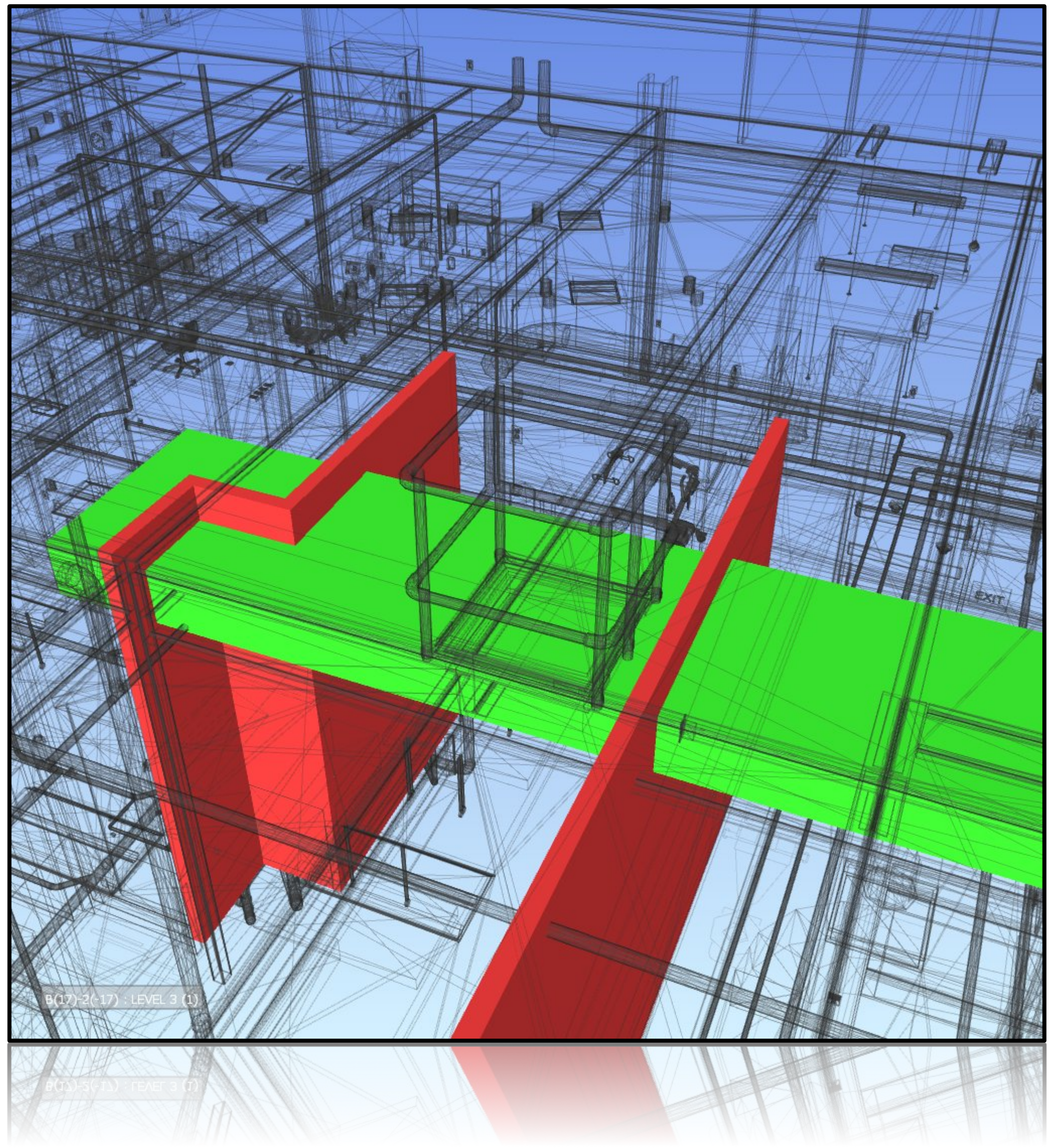
Month	January					February				March			
Week Number	W 75	W 76	W 77	W 78	W 79	W 80	W 81	W 82	W 83	W 84	W 85	W 86	W 87
Week Start Date	12/31/17	1/7/18	1/14/18	1/21/18	1/28/18	2/4/18	2/11/18	2/18/18	2/25/18	3/4/18	3/11/18	3/18/18	3/25/18
Opened RFI's that Week	4	6	6	4	5	4	6	9	2	0	0	0	0
Open RFI's that Month	25					21				0			
Closed RFI's that Week	3	3	2	5	1	16	2	7	1	0	0	0	0
Closed RFI's that Month	14					26				0			
Total Active RFI's Open that Month	81					76				76			

NEW NORM



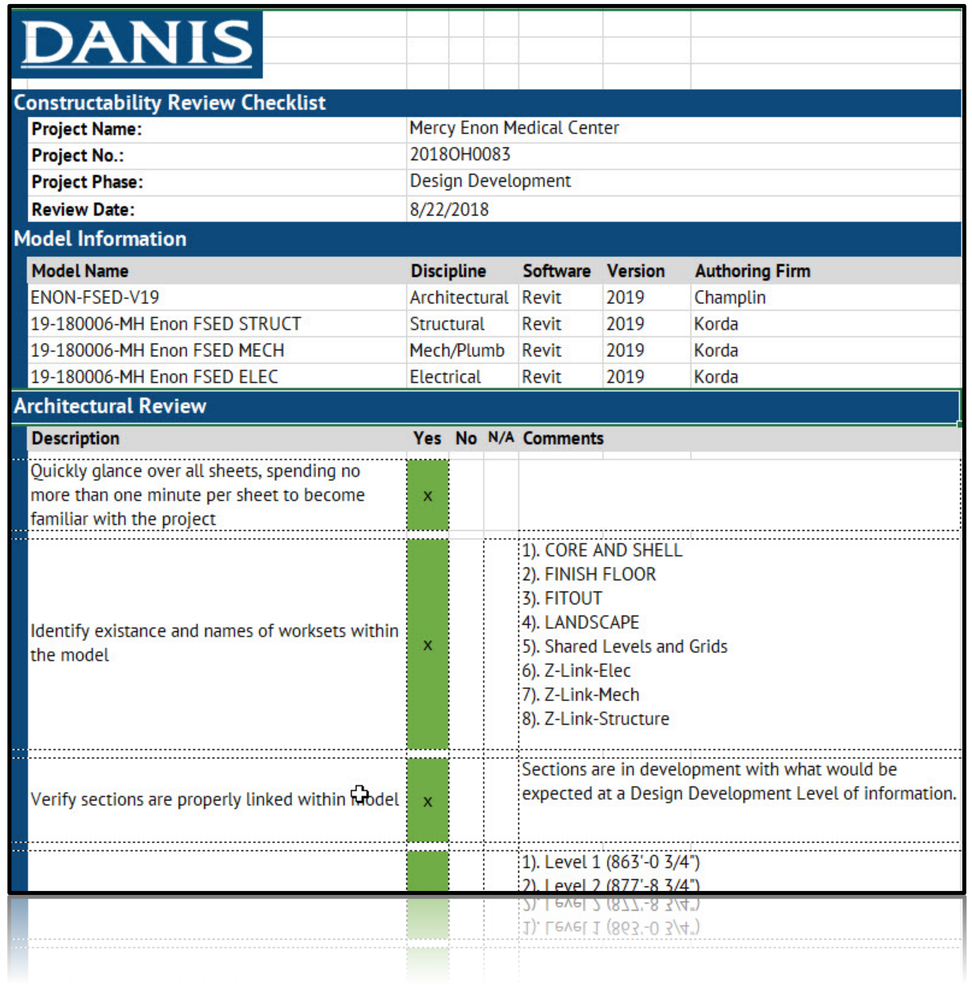
- Preconstruction services
- Construction is phased & starts earlier
- Getting to a better place on the curve

EARLY DESIGN REVIEWS



- Design Development Review
- Formalized coordination with comments
- Early communication to design team
- Specifically tailored to VDC Lessons Learned

EARLY DESIGN REVIEWS



DANIS

Constructability Review Checklist

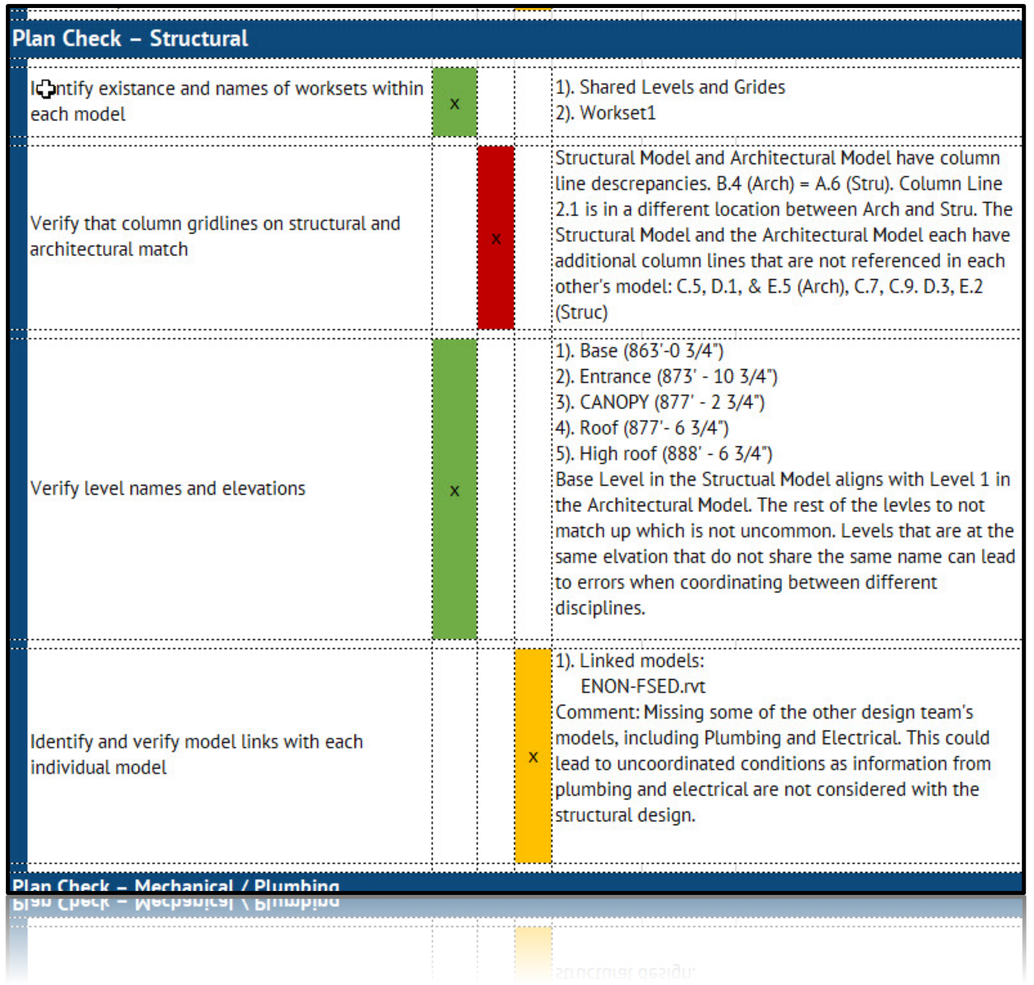
Project Name:	Mercy Enon Medical Center
Project No.:	2018OH0083
Project Phase:	Design Development
Review Date:	8/22/2018

Model Information

Model Name	Discipline	Software	Version	Authoring Firm
ENON-FSED-V19	Architectural	Revit	2019	Champlin
19-180006-MH Enon FSED STRUCT	Structural	Revit	2019	Korda
19-180006-MH Enon FSED MECH	Mech/Plumb	Revit	2019	Korda
19-180006-MH Enon FSED ELEC	Electrical	Revit	2019	Korda

Architectural Review

Description	Yes	No	N/A	Comments
Quickly glance over all sheets, spending no more than one minute per sheet to become familiar with the project	x			
Identify existance and names of worksets within the model	x			1). CORE AND SHELL 2). FINISH FLOOR 3). FITOUT 4). LANDSCAPE 5). Shared Levels and Grids 6). Z-Link-Elec 7). Z-Link-Mech 8). Z-Link-Structure
Verify sections are properly linked within model	x			Sections are in development with what would be expected at a Design Development Level of information.
				1). Level 1 (863'-0 3/4") 2). Level 2 (877'-8 3/4")



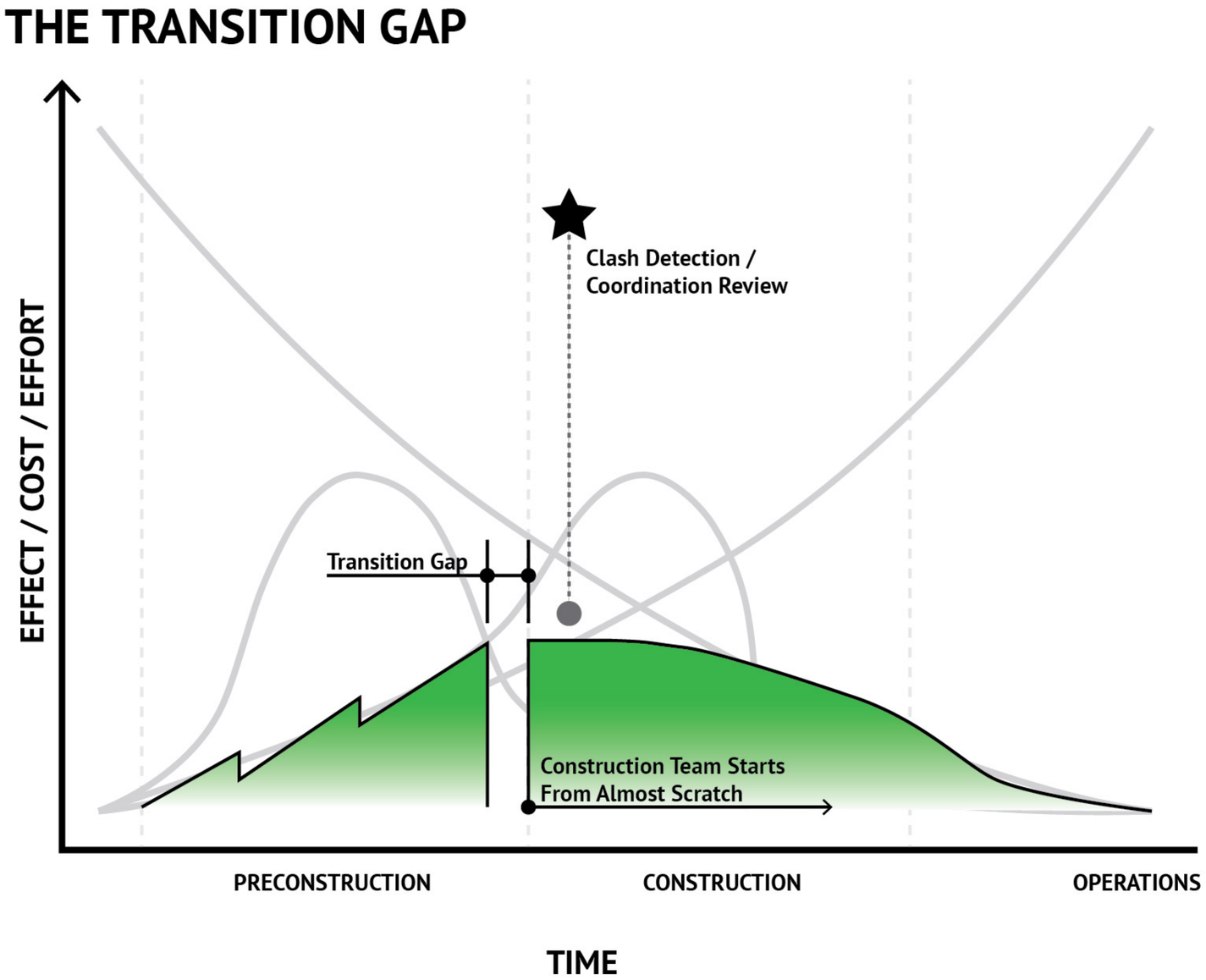
Plan Check – Structural

Identify existance and names of worksets within each model	x		1). Shared Levels and Grides 2). Workset1
Verify that column gridlines on structural and architectural match		x	Structural Model and Architectural Model have column line descrepancies. B.4 (Arch) = A.6 (Stru). Column Line 2.1 is in a different location between Arch and Stru. The Structural Model and the Architectural Model each have additional column lines that are not referenced in each other's model: C.5, D.1, & E.5 (Arch), C.7, C.9. D.3, E.2 (Struc)
Verify level names and elevations	x		1). Base (863'-0 3/4") 2). Entrance (873' - 10 3/4") 3). CANOPY (877' - 2 3/4") 4). Roof (877'- 6 3/4") 5). High roof (888' - 6 3/4") Base Level in the Structual Model aligns with Level 1 in the Architectural Model. The rest of the levles to not match up which is not uncommon. Levels that are at the same elvation that do not share the same name can lead to errors when coordinating between different disciplines.
Identify and verify model links with each individual model		x	1). Linked models: ENON-FSED.rvt Comment: Missing some of the other design team's models, including Plumbing and Electrical. This could lead to uncoordinated conditions as information from plumbing and electrical are not considered with the structural design.

Plan Check – Mechanical / Plumbing

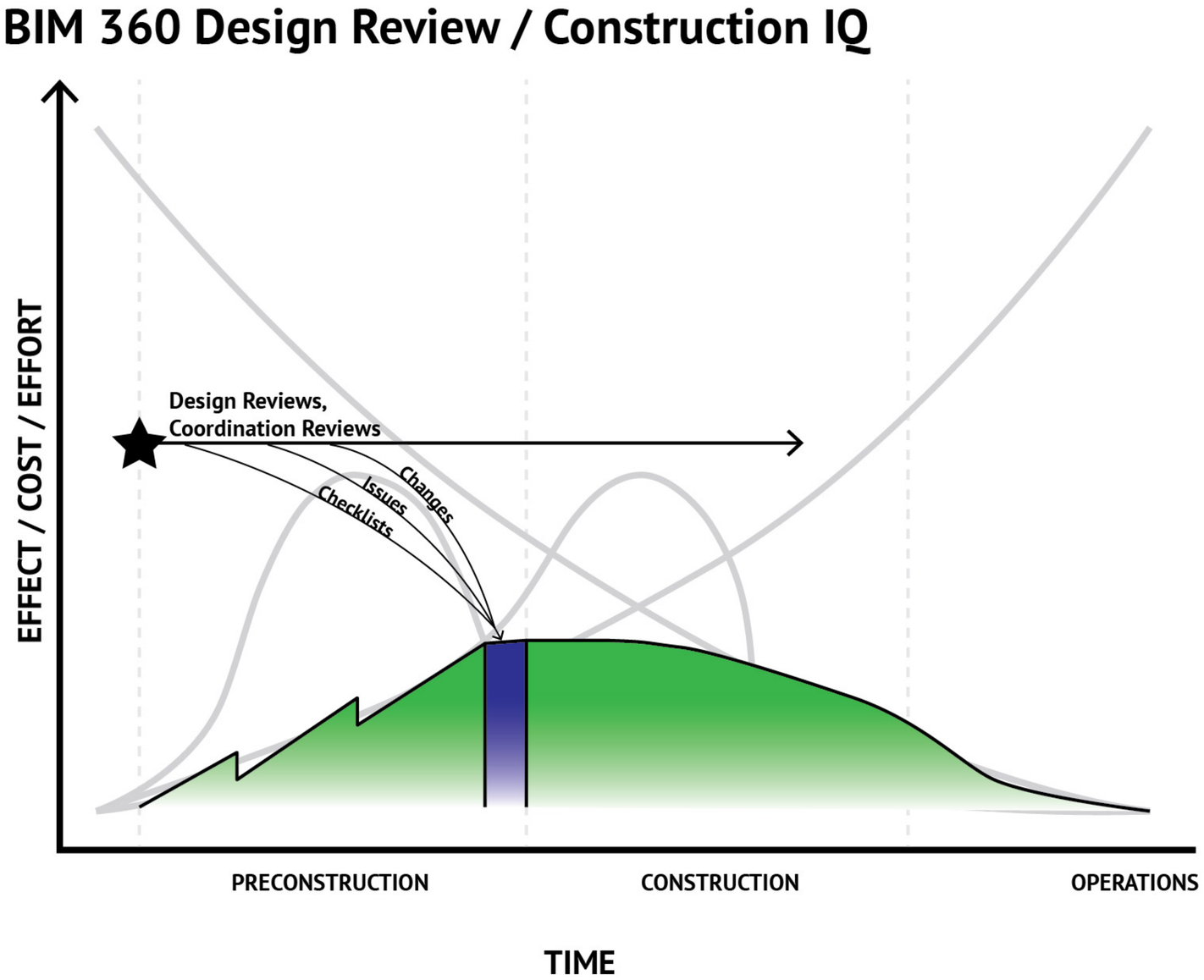
- Tracked in Excel spreadsheet
- Version tracking and sharing are Issues

PRECONSTRUCTION TO CONSTRUCTION



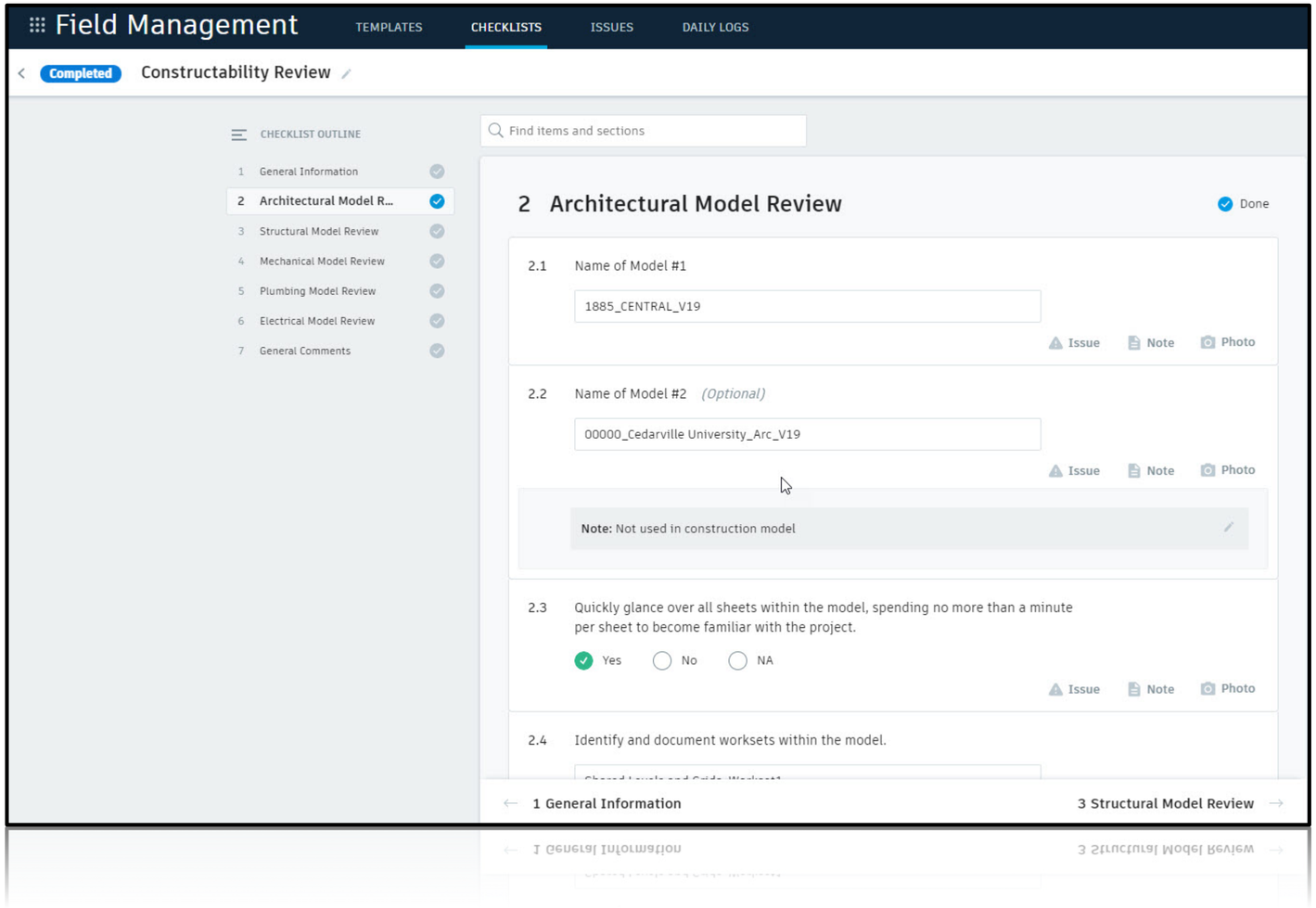
- Preconstruction group builds data & knowledge
- Onboarding construction team creates transition gap

PRECONSTRUCTION TO CONSTRUCTION



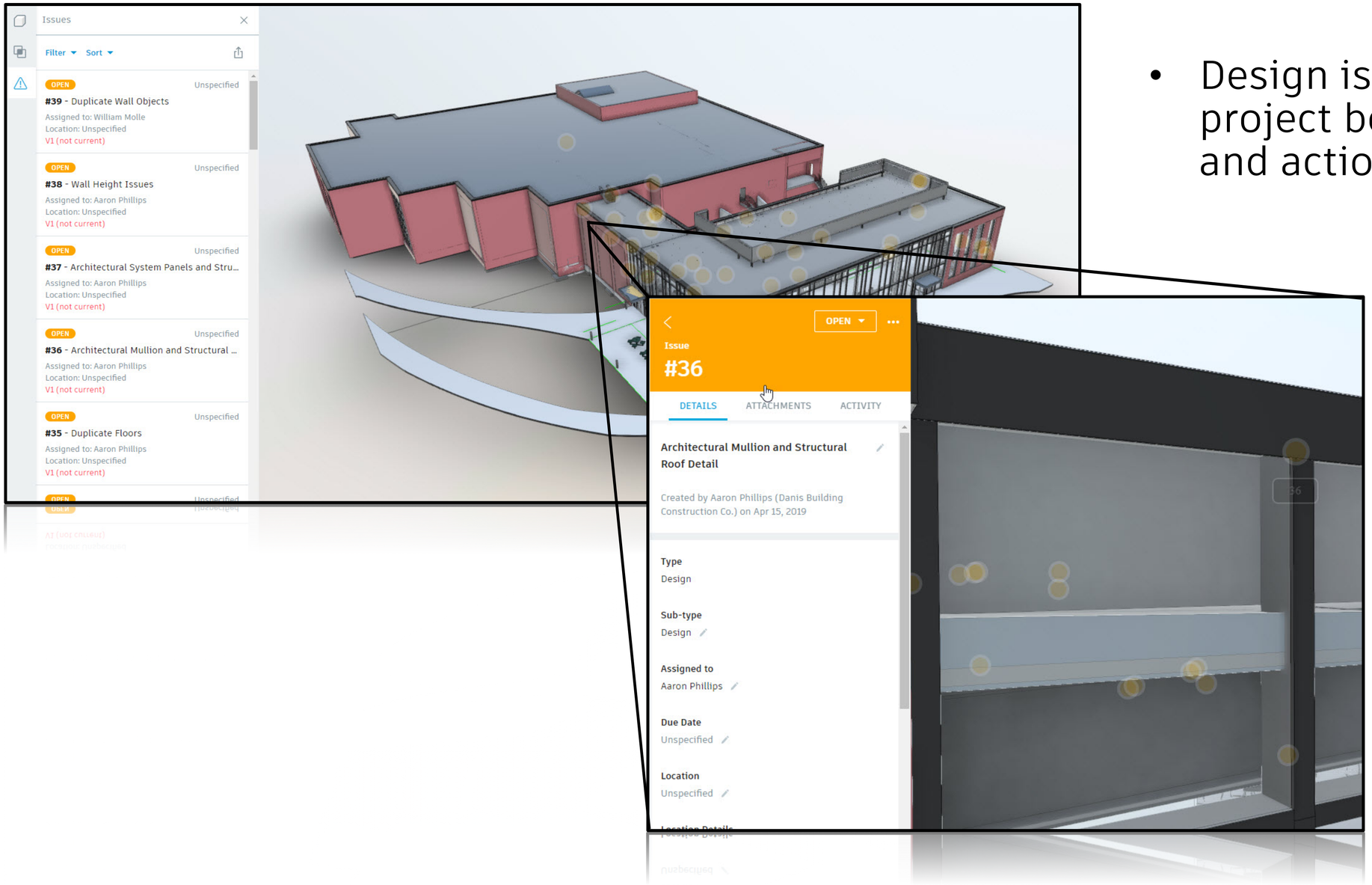
- Impactful issue tracking
- Creates early actionable information
- Everyone deals from the same deck

BRIDGING THE GAP – FORMALIZED DESIGN REVIEW



- Constructability Reviews occur in BIM 360
- Issues are tracked and always stay with the project
- Creates a record review that can be referenced later in the project

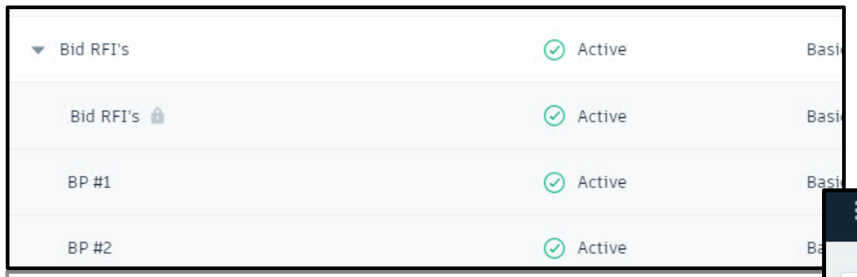
BRIDGING THE GAP – CREATE EARLY UNDERSTANDING

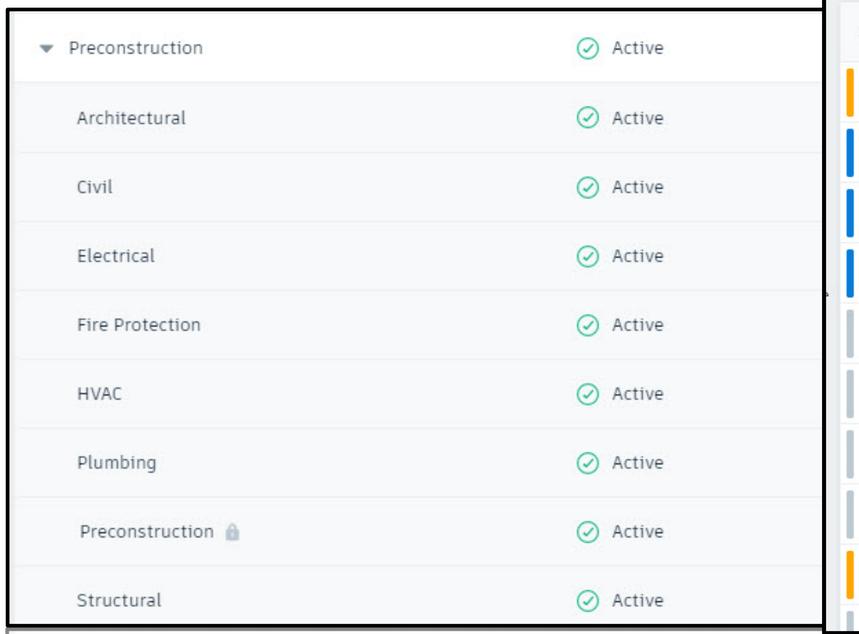


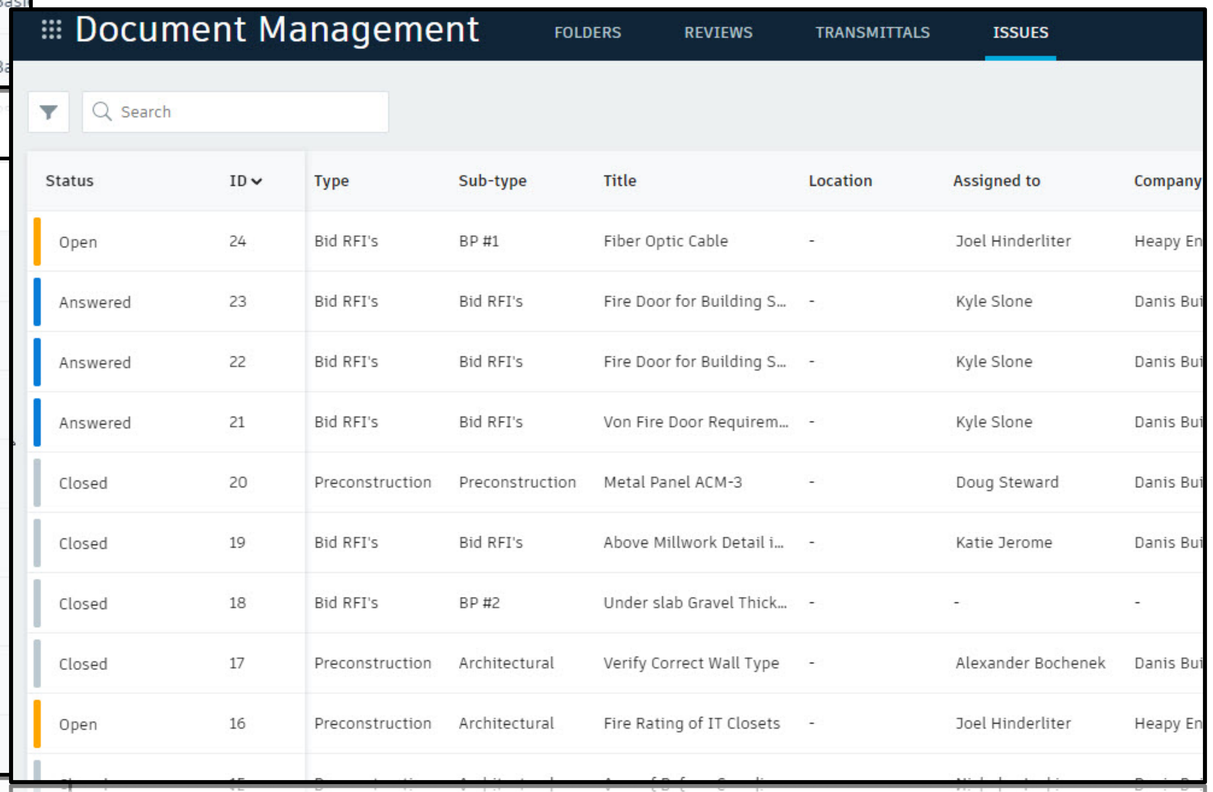
- Design issues early in the project become trackable and actionable

BRIDGING THE GAP – TRACK AND MEASURE

- Create issue types and subtypes that support your internal teams







High risk design review issues

Which issues do I focus on first?

DANIS

Constructability Review Checklist

Level 1

Level 1 Collisions are reported collisions that are considered critical to the design and construction process. These collisions have been assigned the highest priority and should be rectified within the model as soon as possible.

Mech. Ductwork / Piping v. Arch. Ceilings
Plum. Piping v. Arch. Ceilings
Mech. Ductwork / Piping & Plum. Piping v. Arch. Rated Walls (For coordination of dampers and other mechanical equipment needs)
Mech. Ductwork / Piping & Plum. Piping v. Stru. Framing
MEP Equipment & Fixtures v. Arch. Walls
MEP Equipment & Fixtures v. Stru. Framing
MEP Equipment, Fixtures & Devices v. MEP Equipment, Fixtures & Devices
Mech. Ductwork / Piping v. Plum. Piping

Level 2

Level 2 Collisions are reported collisions that are considered important to the design and construction process. These collisions have been assigned a greater priority and should be rectified during project meetings during design.

Stru. Framing v. MEP Equipment, Fixtures & Devices
Mech. Ductwork / Piping & Plum. Piping v. Elec. Equipment, Fixtures & Devices
Mech. Ductwork / Piping v. Arch. Floors & Stru. Floors
Arch. Casework v. Elec. Equipment, Fixtures & Devices
Arch. Furnishings v. Elec. Equipment, Fixtures & Devices
Stru. Framing v. Arch. Specialty Equipment

Level 3

Level 3 Collision are reported collisions that while are considered important to the correctness of the model will generally be changing on a regular basis throughout the design and construction process. These collisions have been assigned a lower level of priority and should be rectified before the phase submission of the models.

ADA Clearance v. Arch. Doors, Furnishings, Walls, & Casework
Plum. Piping vs. Elec. Equipment, Fixtures & Devices
Plum. Piping vs. Mech. Equipment, Fixtures & Devices
Arch. Casework v. Arch. Walls & Stru. Walls

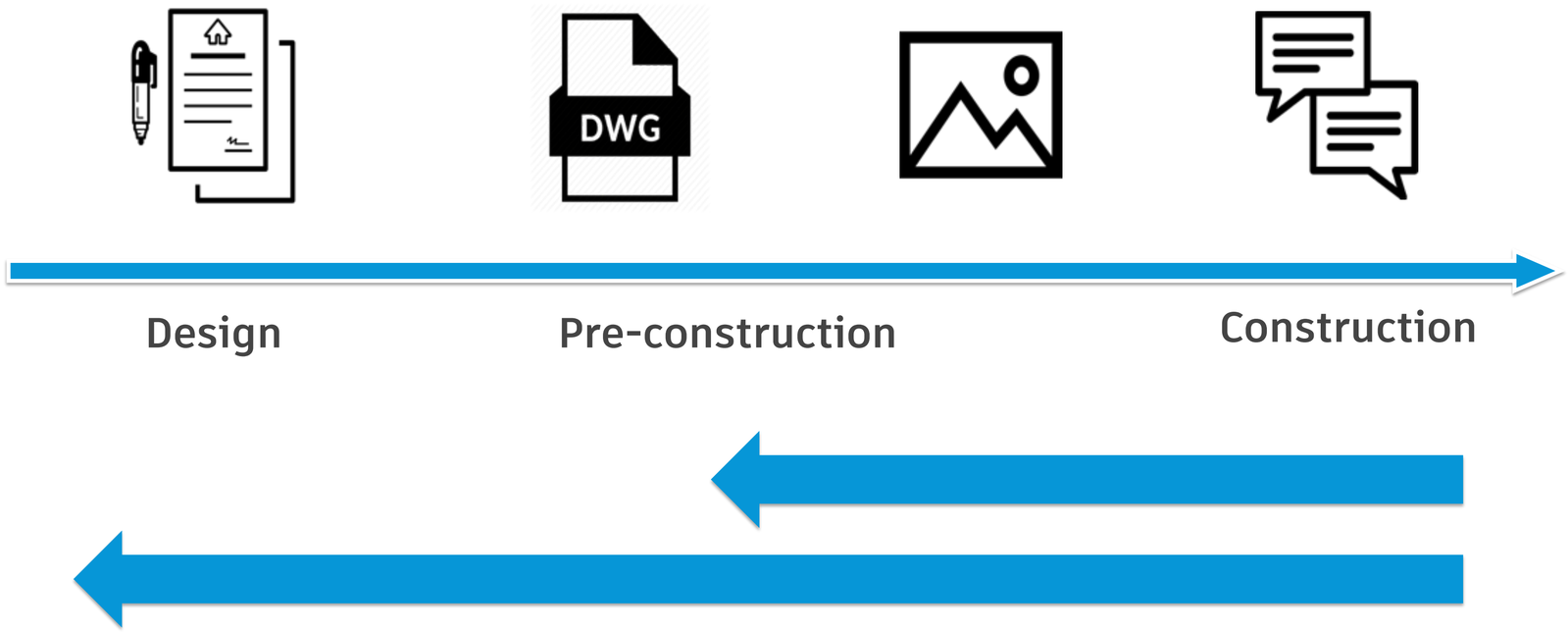
- Priorities are set by lessons learned efforts from past projects
- Project type dictates high design risk issues

“We see that our investments in technology are paying off as we are able to deliver higher quality projects, leading to stronger relationships with our clients, said ***Troy Erbes, Senior Vice President at Danis.*** Our next step is to utilize the data generated from all of our technology to further improve efficiency and safety across all of our projects.”

CONSTRUCTION IQ

Design Risk Management

LEARNING FROM PAST & APPLY TO FUTURE

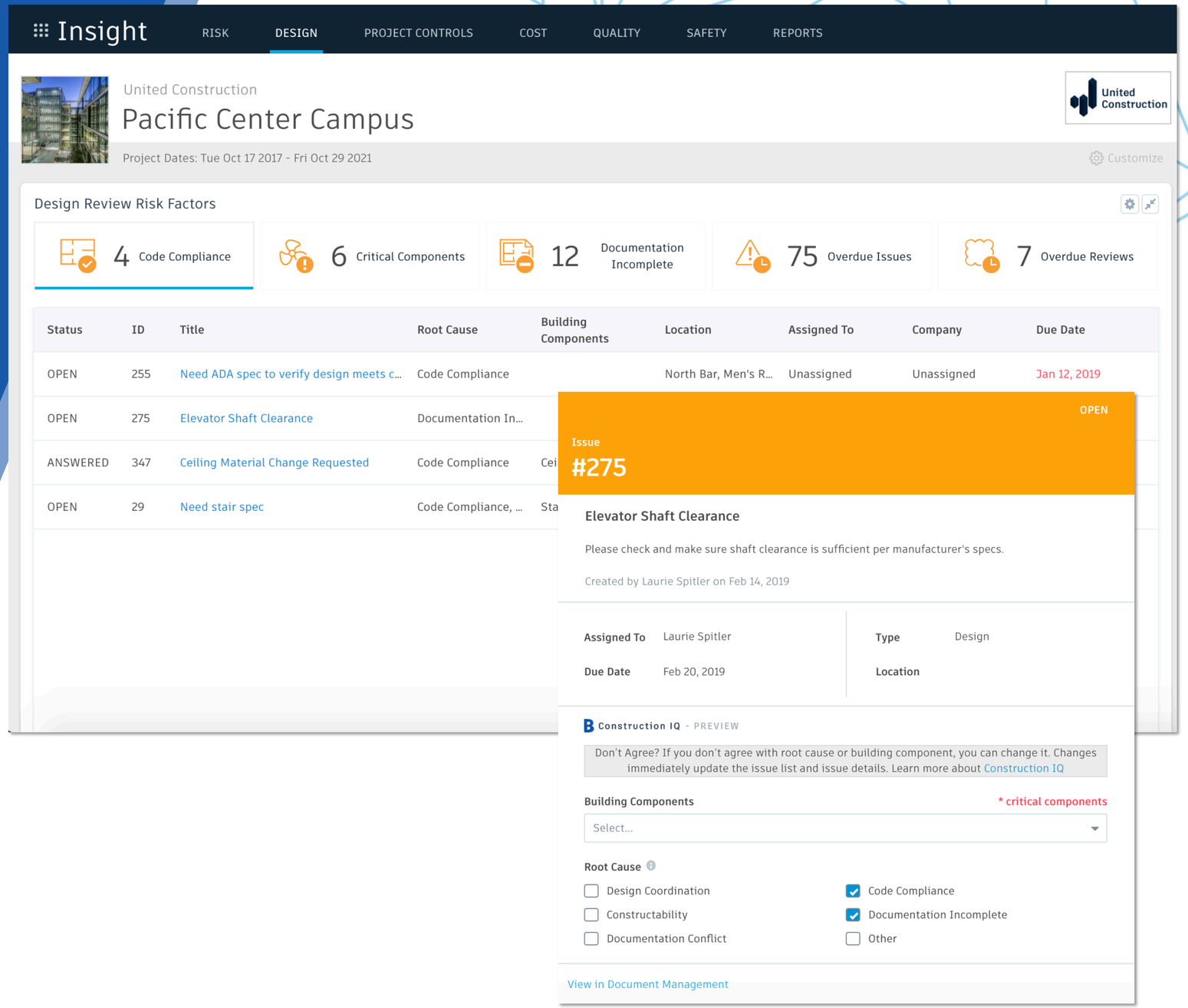


Push knowledge learned from data upstream

DESIGN RISK MANAGEMENT

Harness the power of machine learning to predict high risk

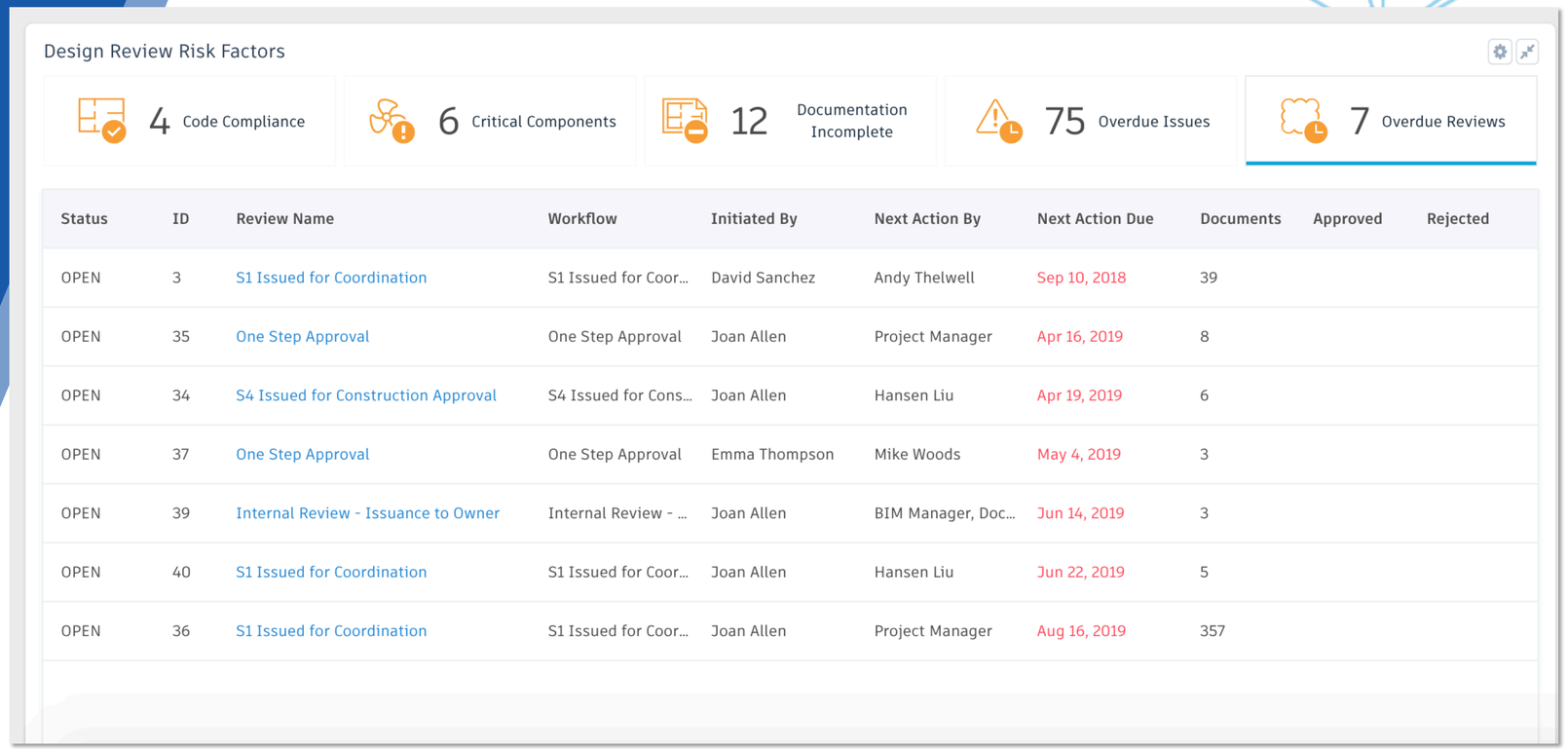
- Code Compliance Design Issues
- Critical Building Components
- Document Errors and Omissions



DESIGN RISK MANAGEMENT

Take immediate action to resolve overdue issues & reviews

- Overdue Issues
- Overdue Reviews

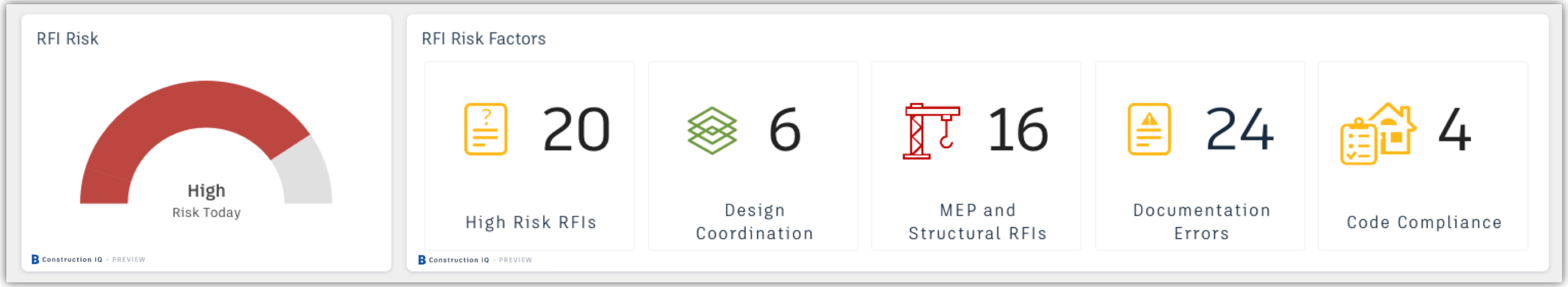


Status	ID	Review Name	Workflow	Initiated By	Next Action By	Next Action Due	Documents	Approved	Rejected
OPEN	3	S1 Issued for Coordination	S1 Issued for Coor...	David Sanchez	Andy Thelwell	Sep 10, 2018	39		
OPEN	35	One Step Approval	One Step Approval	Joan Allen	Project Manager	Apr 16, 2019	8		
OPEN	34	S4 Issued for Construction Approval	S4 Issued for Cons...	Joan Allen	Hansen Liu	Apr 19, 2019	6		
OPEN	37	One Step Approval	One Step Approval	Emma Thompson	Mike Woods	May 4, 2019	3		
OPEN	39	Internal Review - Issuance to Owner	Internal Review - ...	Joan Allen	BIM Manager, Doc...	Jun 14, 2019	3		
OPEN	40	S1 Issued for Coordination	S1 Issued for Coor...	Joan Allen	Hansen Liu	Jun 22, 2019	5		
OPEN	36	S1 Issued for Coordination	S1 Issued for Coor...	Joan Allen	Project Manager	Aug 16, 2019	357		

Research

PROJECT MANAGEMENT: PRIORITIZE RFIs & PREVENT COST

- What disciplines drive RFIs in my project?
- What are the Root Causes of RFIs in my projects?



AI RECOMMENDED RISK MITIGATION ACTIONS

<asdfas>

- <asdfasdf>
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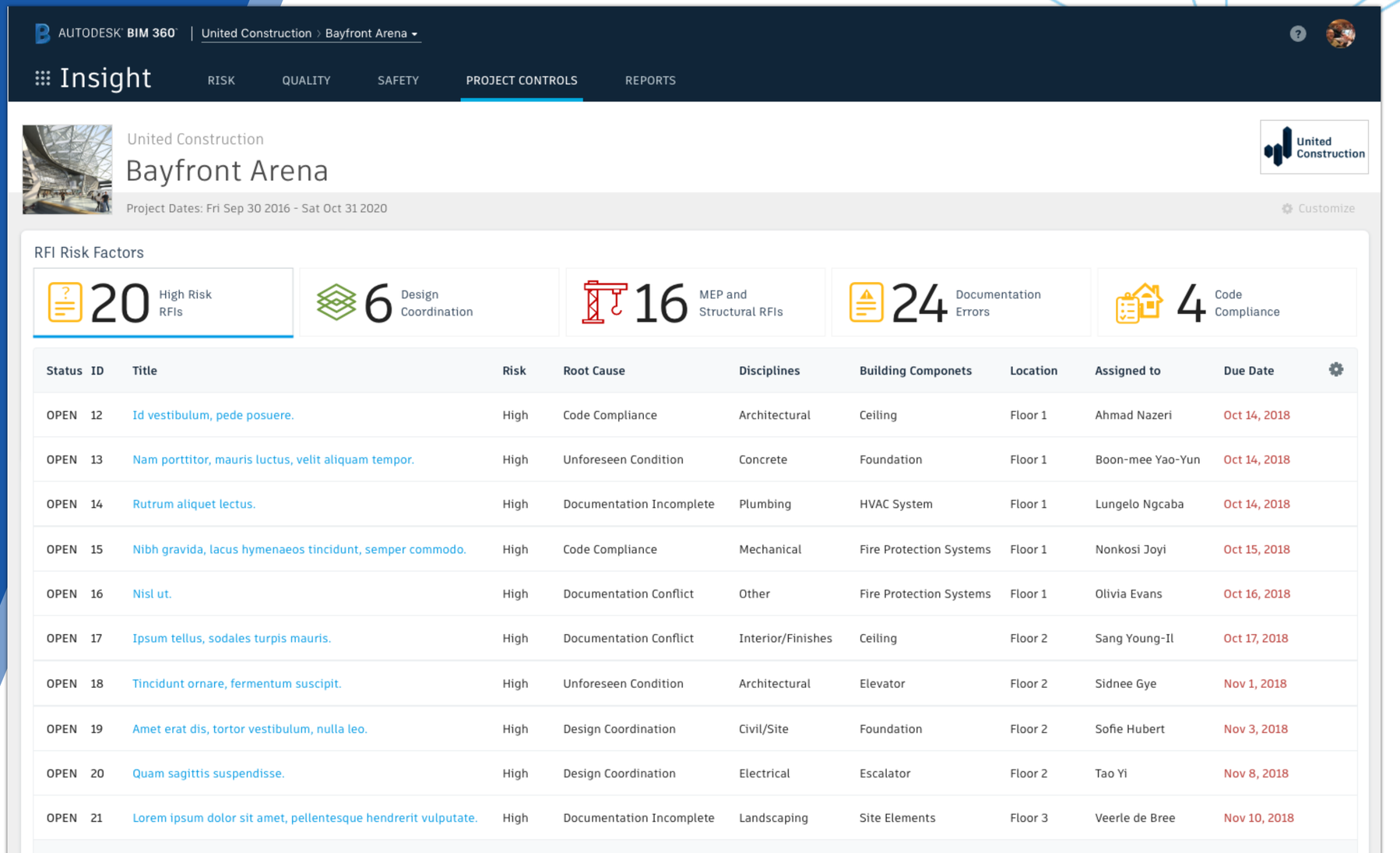

Status	ID	Title	Risk	Root Cause	Disciplines	Building Componets	Location	Assigned to	Due Date
OPEN	12	Id vestibulum, pede posuere.	High	Code Compliance	Architectural	Ceiling	Floor 1	Ahmad Nazeri	Oct 14, 2018
OPEN	13	Nam porttitor, mauris luctus, velit aliquam tempor.	High	Unforeseen Condition	Concrete	Foundation	Floor 1	Boon-mee Yao-Yun	Oct 14, 2018
OPEN	14	Rutrum aliquet lectus.	High	Documentation Incomplete	Plumbing	HVAC System	Floor 1	Lungelo Ngcaba	Oct 14, 2018
OPEN	15	Nibh gravida, lacus hymenaeos tincidunt, semper commodo.	High	Code Compliance	Mechanical	Fire Protection Systems	Floor 1	Nonkosi Joyi	Oct 15, 2018
OPEN	16	Nisl ut.	High	Documentation Conflict	Other	Fire Protection Systems	Floor 1	Olivia Evans	Oct 16, 2018
OPEN	17	Ipsum tellus, sodales turpis mauris.	High	Documentation Conflict	Interior/Finishes	Ceiling	Floor 2	Sang Young-Il	Oct 17, 2018
OPEN	18	Tincidunt ornare, fermentum suscipit.	High	Unforeseen Condition	Architectural	Elevator	Floor 2	Sidnee Gye	Nov 1, 2018
OPEN	19	Amet erat dis, tortor vestibulum, nulla leo.	High	Design Coordination	Civil/Site	Foundation	Floor 2	Sofie Hubert	Nov 3, 2018
OPEN	20	Quam sagittis suspendisse.	High	Design Coordination	Electrical	Escalator	Floor 2	Tao Yi	Nov 8, 2018
OPEN	21	Lorem ipsum dolor sit amet, pellentesque hendrerit vulputate.	High	Documentation Incomplete	Landscaping	Site Elements	Floor 3	Veerle de Bree	Nov 10, 2018

MORE ON CONSTRUCTION IQ @ AU 2019

- **CS321348 - Construction IQ for Design Review: Reducing RFIs and costly issues in Construction**

  Time: Thursday, Nov 21, 8:00 - 09:00AM **Location**: San Polo 3404, Level 3

- **CS324010 - Industry Panel: Forge, Connected Data, Machine Learning, and Predictive Insights**

  Time: Thursday, Nov 21, 8:00 - 09:00AM **Location**: Marcello 4503, Level 4

- **CS323692 - Autodesk Construction Solutions: Managing Risk Through Prediction and Analytics**

  Time: Tuesday, Nov 19, 10:30 - 12:00PM **Location**: Delfino 4103, Level 4

- **CS322274 - From Fee Erosion to Fee Enhancement: Manage Your RFIs Using AI**

  Time: Tuesday, Nov 19, 8:00 - 09:00AM **Location**: Lando 4205, Level 4

- **Idea Exchange - Using AI to Enhance Measurements within Drawings**

  Time: Wednesday, Nov 20, 3:30-6PM **Location**: Idea Exchange Booth - T03-E

Visit the BIM 360 Resource Center
https://qrgo.page.link/h8ytU

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