Talk Data to Me: Project Success with BIM 360

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BIM Coordinator and BIM Manager

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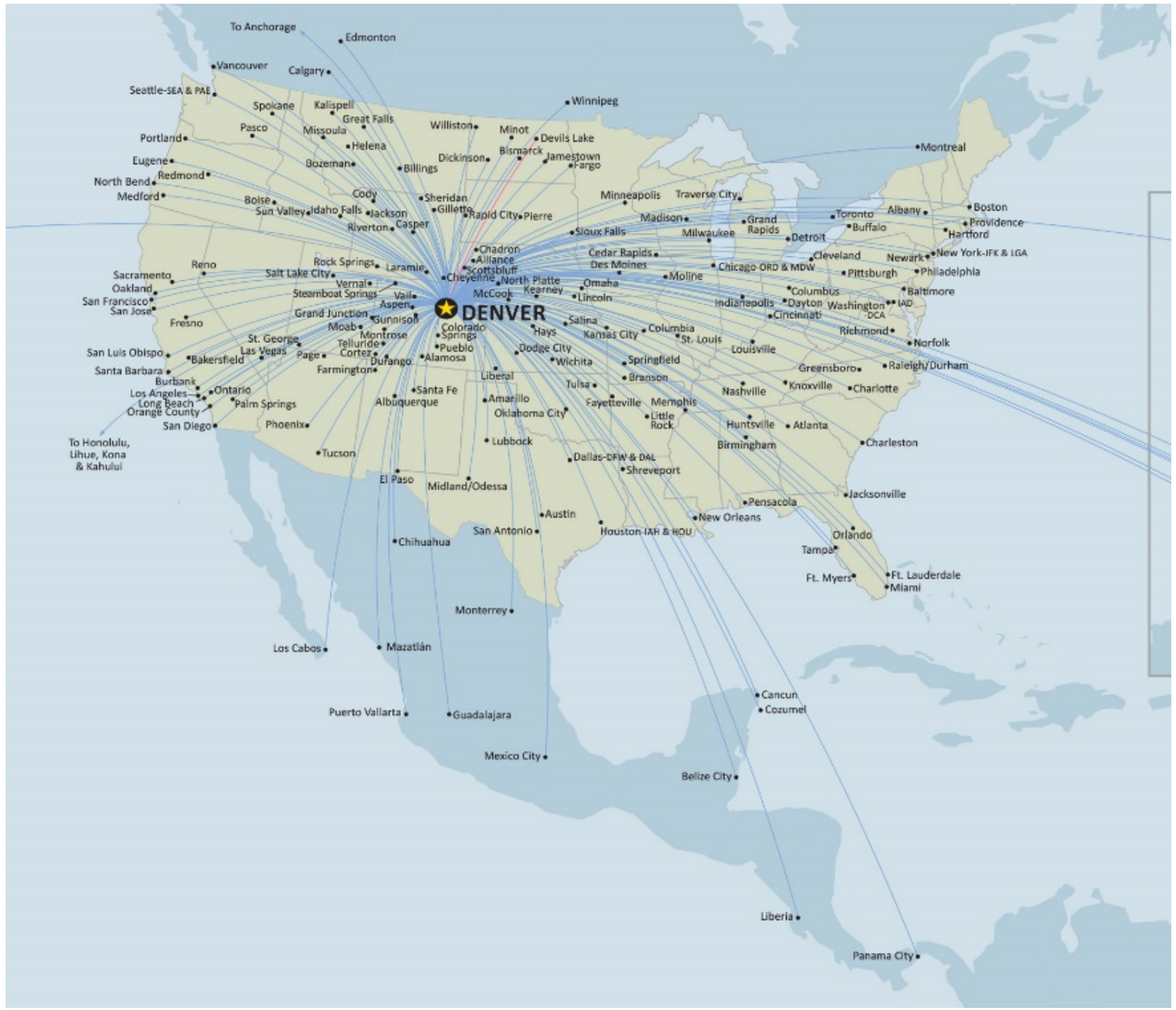
Objectives – DEN Workflow

- BXP (BIM Execution Plan) for large Capital projects
- Create *Project Slice* from Revit to the overall Facility model
- Setup the BIM 360 Team site
- DEN BIM Review process at project submittals at kickoff (30/60/90/100) DEN BIM Model Review Audit form
- At 60% design submittal review Asset data from Revit models and BIM 360 Glue spatial coordination
- At 100% set-up BIM 360 Field and provide Dynamo scripts for model clean-up
- Warranty tracking

DEN

DEN Facility Overview

- Opened in 1995
- U.S. ranking: 6th busiest by passengers
- 34000+ Employees
- 180 Destinations
- 58.3 million passengers in 2016
- Average daily passengers: 159,000 in 2016
- $26 billion economic engine
- 53 square miles

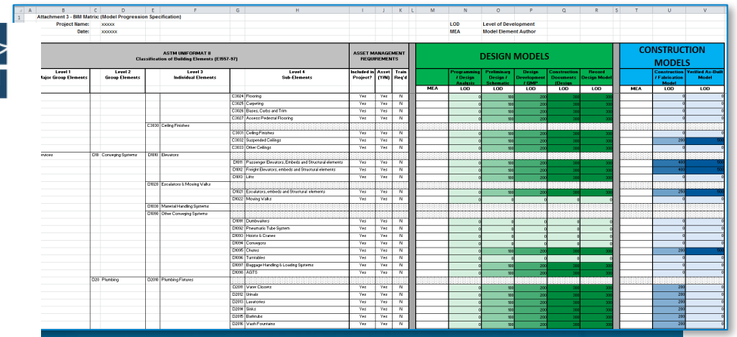


DEN Flight Map

WORKFLOW

BXP – BIM Execution Plan

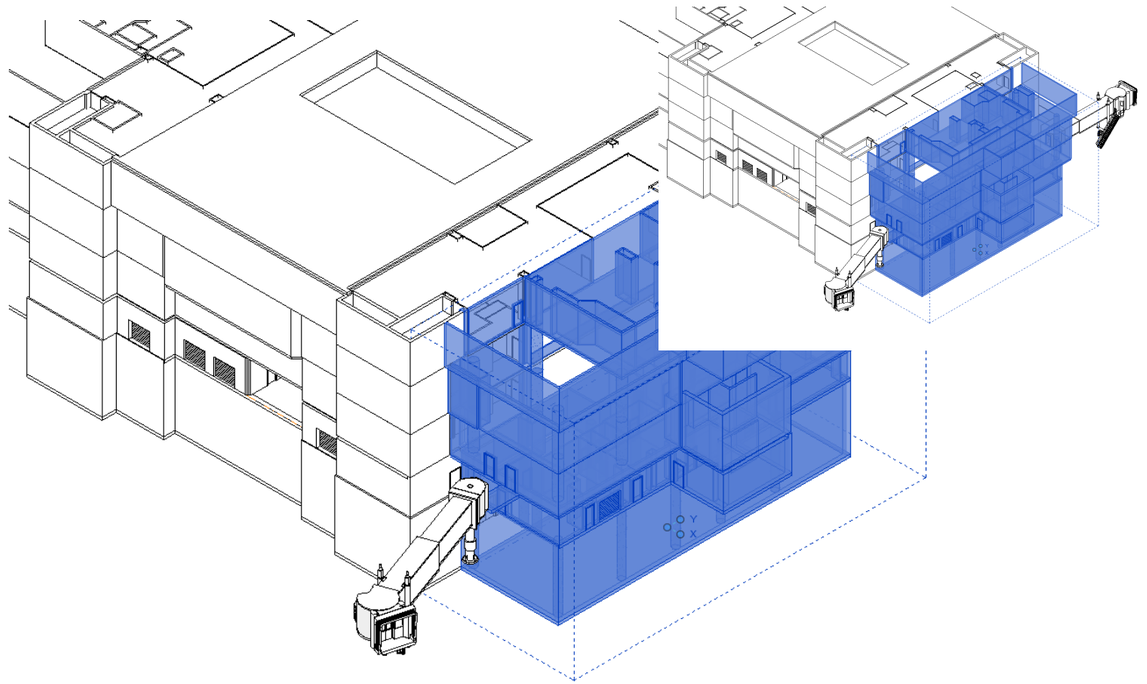
- Clearly defines responsibilities by consultant, and set by a legal contract document
- Binds BIM requirements
- Project Goals/ BIM users by name and establishes model ownership
- BIM Process Design
- BIM & Facility Data Requirements



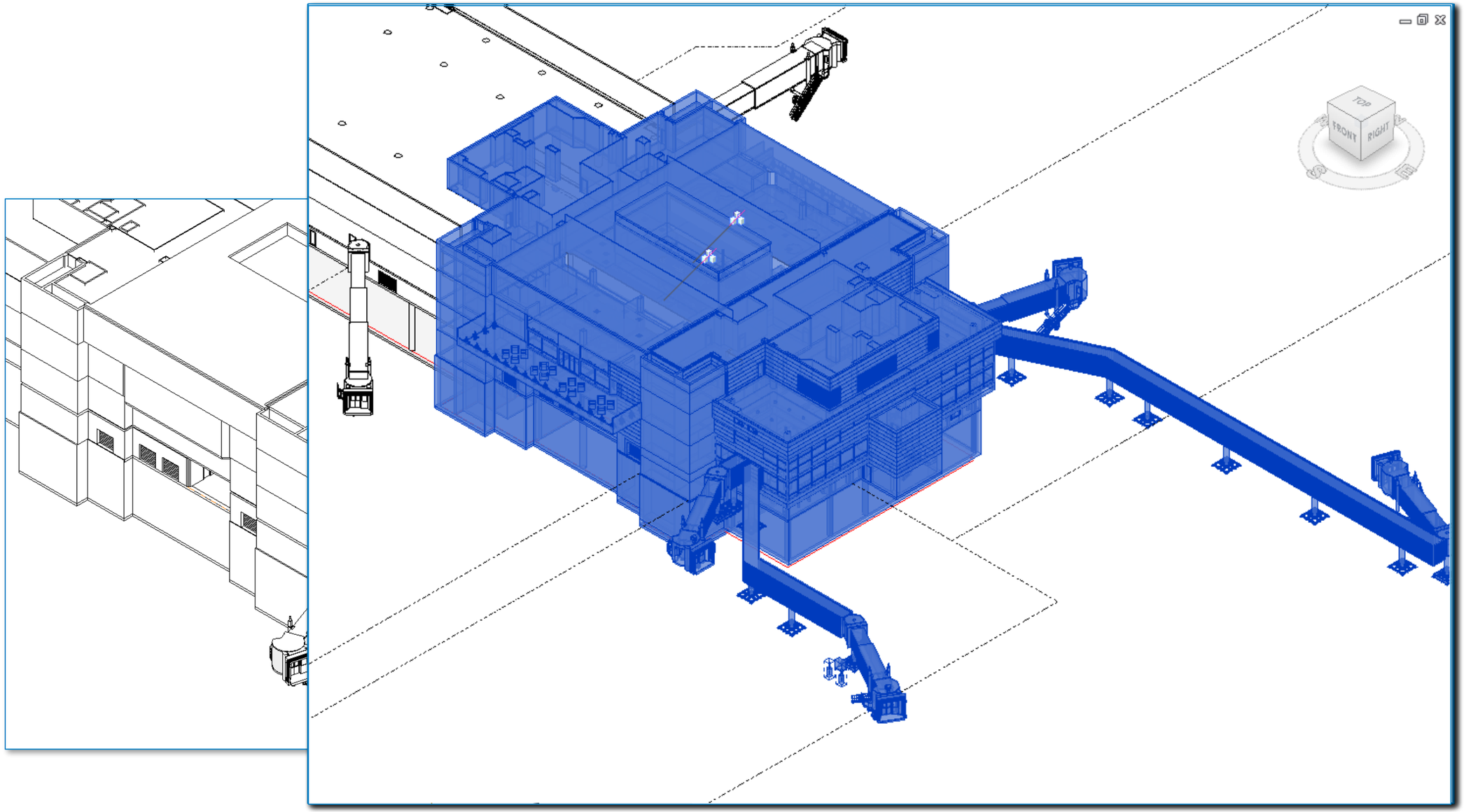
PROJECT SLICE

Project Slice

- Define Scope in Model
- Create Model Group
- Convert Group to Linked Model
- Transfer Project Standards/Views/ Families
- Project Magic Happens!
- Bind Link
- Cleanup



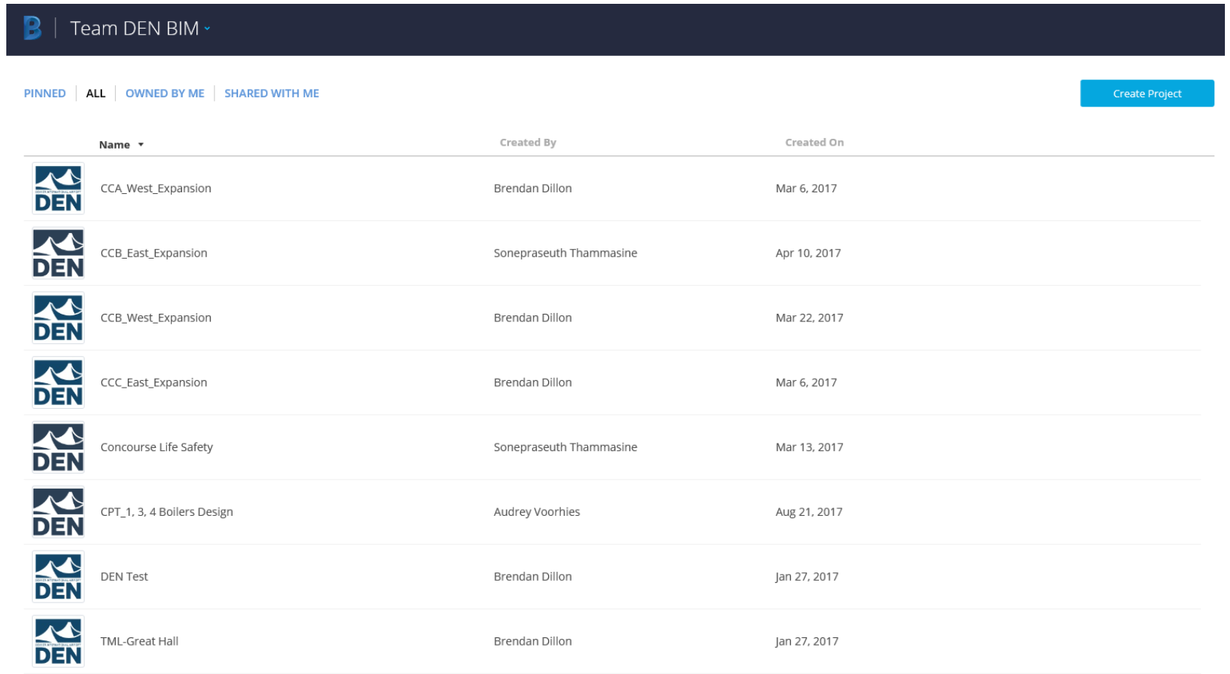
Project Slice

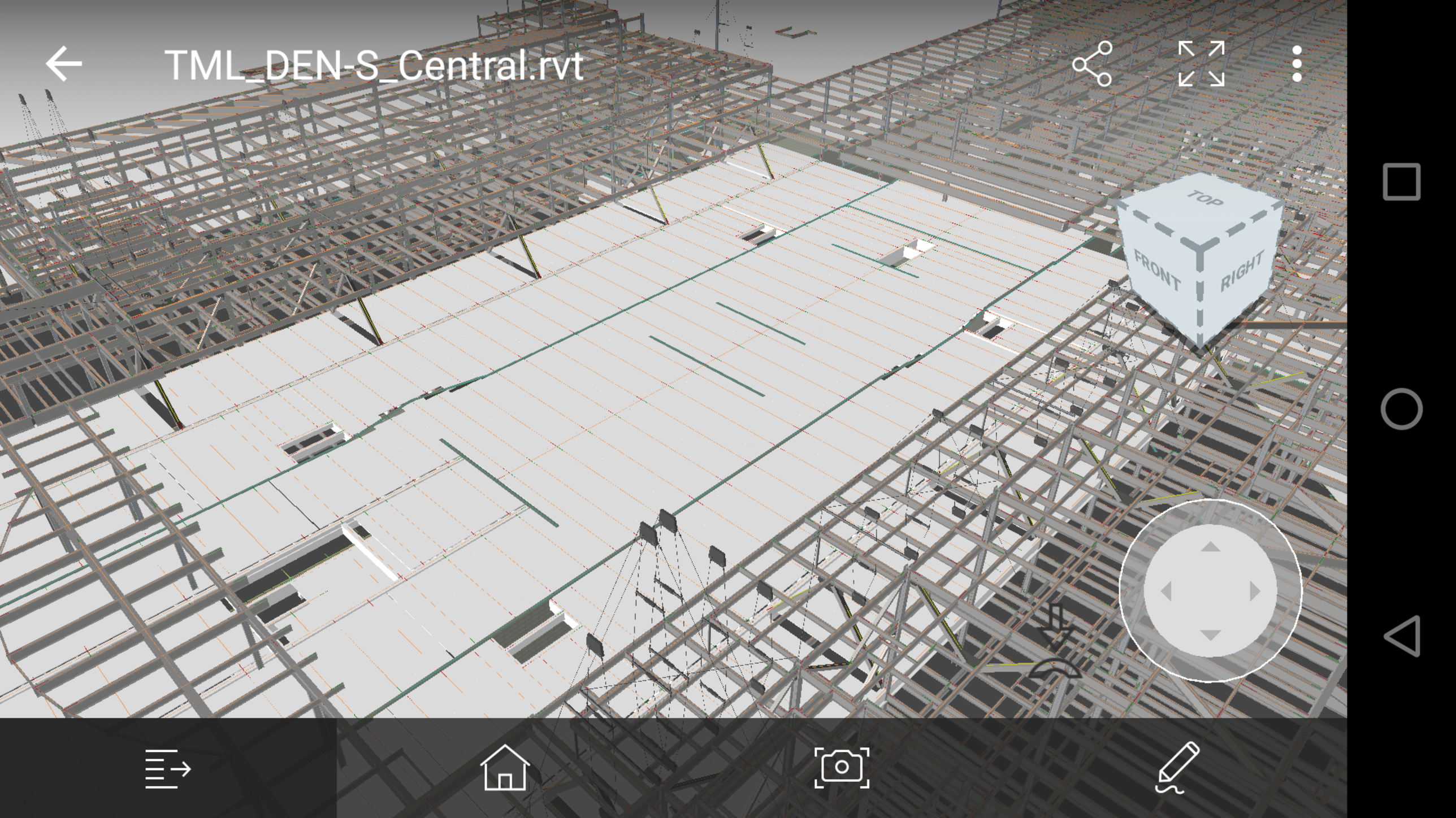


BIM 360 Team

BIM 360 Team

- Collaborate with C4R (Collaboration for Revit)
- Access to model progress outside of the BIM group
- Design review
- More efficient workflow with off-site consultants
- Mobile / tablet access
- Create markups

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TOP
FRONT
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DEN BIM Review

DEN BIM Model Review Audit – Project Process

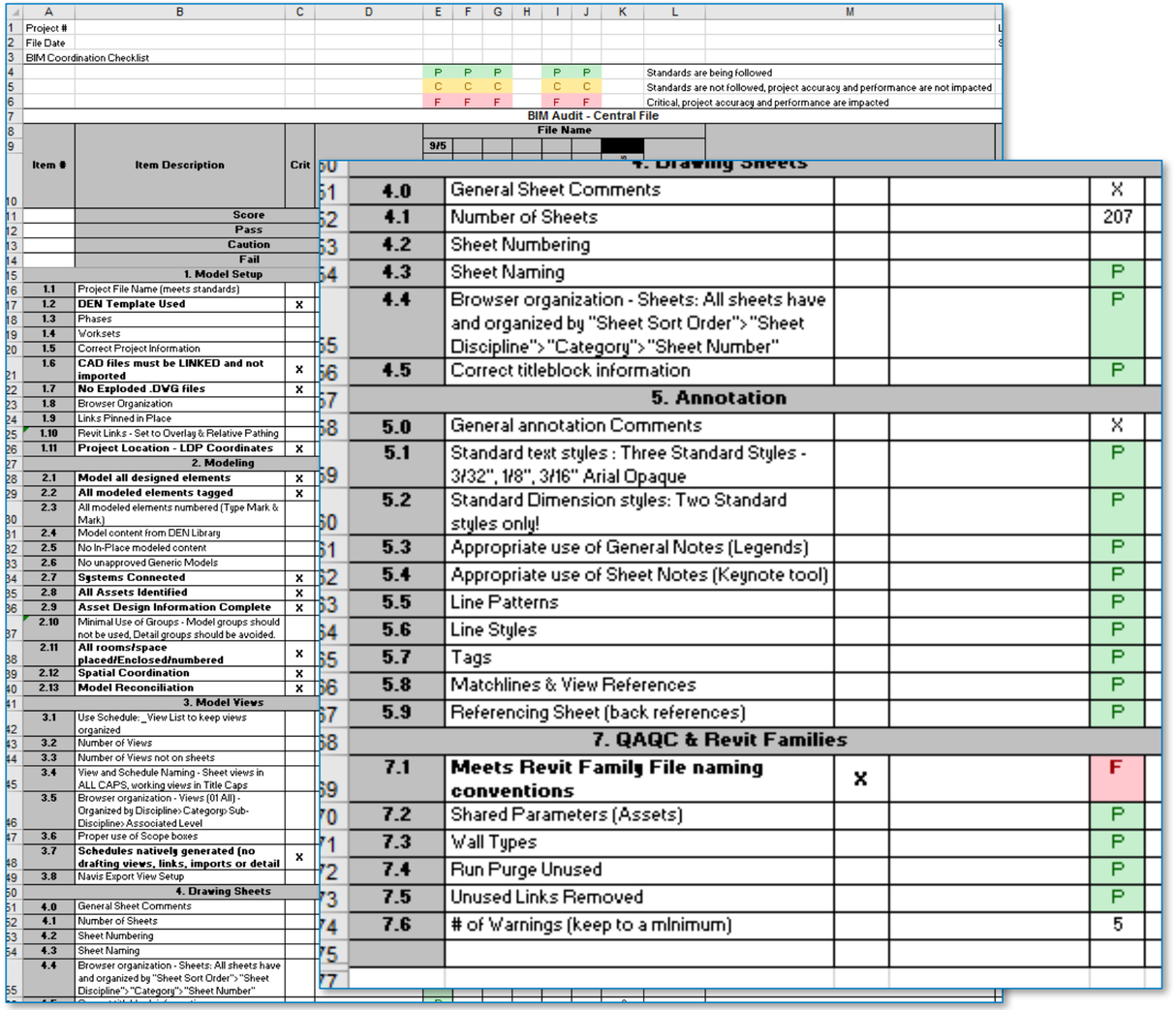
- Kickoff 30/60/90/100
- Interim Reviews
- Leveraging past model reviews for future reviews

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1												1.2 DEN Template used	1.6 CAD files must be LINKED and not imported	1.7 No Exploded .DWG files	1.11 Project Location - LDP Coordinates	2.1 Model all designed elements	2.2 All modeled elements tagged correctly	2.7 Systems Connected	2.8 All Assets Identified	2.9 Asset Design Information Complete	2.11 All rooms/space placed/Enclosed/numbered	2.12 Spatial Coordination	2.13 Model Reconciliation	3.7 Schedules natively generated (no drafting views, links, imports or detail groups)	7.1 Meets Revit Family File naming conventions
2	Project	Consultant	Prime	DISC	Date	REV	BIM Coo	PM	PKG	OA Grade	Crit Grade	54%	71%	75%	75%	63%	75%	25%	6%	6%	0%	####	####	50%	63%
3									100	50%	29%	1	2	2	2	0	0	0	0	0	0	na	na	0	0
4									100	67%	58%	1	2	1	2	2	2	2	0	0	0	na	na	0	2
5									100	67%	46%	0	2	2	2	2	2	1	0	0	0	na	na	0	0
6									60	0.65	75%	2	1	2	2	2	2	na	1	1	na	na	na	0	2
7									90	80%	63%	2	2	2	2	1	2	0	0	0	0	na	na	2	2
8									30	68%	70%	0	2	2	2	2	2	0	na	na	0	na	na	2	2
9									30	80%	70%	2	2	2	0	2	2	0	na	na	0	na	na	2	2
10									100	64%	50%	1	2	1	2	0	2	na	0	0	0	na	na	2	1
11									100	84%	71%	2	2	2	2	2	2	1	0	0	0	na	na	2	2
12									90	78%	63%	2	0	2	2	2	2	1	0	0	0	na	na	2	2
13									30	0%	0%	0	0	0	0	0	0	0	na	na	0	na	na	0	0
14									30	0%	0%	0	0	0	0	0	0	0	na	na	0	na	na	0	0
15									90	95%	82%	2	2	2	2	2	2	na	0	0	2	na	na	2	2

5					C	C	C			C	C		Standards are not followed, project accuracy and performance are not impacted	
6					F	F	F			F	F		Critical, project accuracy and performance are impacted	
7	BIM Audit - Central File													
8					File Name									
9					9/5									
10	Item #	Item Description	Crit	Reference	Example	30% CD	60% CD	90% CD	100% CD	FACILITY	Total Fails	Details	Comment	
11		Score			70%	n/a	n/a	n/a	n/a	n/a	70%			
12		Pass			32	0	0	0	0	0	32			
13		Caution			0	0	0	0	0	0	0			
14		Fail			14	0	0	0	0	0	14			
15		1. Model Setup												
16	1.1	Project File Name (meets standards)			P						0			
17	1.2	**DEN Template Used**	x		F									
18	1.3	Phases			P									
19	1.4	Worksets			P									
20	1.5	Correct Project Information			P									
21	1.6	**CAD files must be LINKED and not imported**	x		F						6			
22	1.7	**No Exploded .DWG files**	x		F						6			
23	1.8	Browser Organization			P									
24	1.9	Links Pinned in Place			P									
25	1.10	Revit Links - Set to Overlay & Relative Pathing			P									
26	1.11	**Project Location - LDP Coordinates**	x		F									
27		2. Modeling												
28	2.1	**Model all designed elements**	x		F						1			
29	2.2	**All modeled elements tagged**	x		F									
30	2.3	All modeled elements numbered (Type Mark & Mark)			P									
31	2.4	Model content from DEN Library			P									
32	2.5	No In-Place modeled content			P									
33	2.6	No unapproved Generic Models			P									
34	2.7	**Systems Connected**	x		F									
35	2.8	**All Assets Identified**	x		F									
36	2.9	**Asset Design Information Complete**	x		F									
37	2.10	Minimal Use of Groups - Model groups should not be used, Detail groups should be avoided.			P									
38	2.11	**All rooms/space placed/Enclosed/numbered**	x		F									
39	2.12	**Spatial Coordination**	x		F									
40	2.13	**Model Reconciliation**	x		F						1			
41		3. Model Views												
42	3.1	Use Schedule: _View List to keep views organized			x	x	x	x	x	x			The Schedule: _View List schedule will allow you to view a complete list of all views in the model and organize them quickly	
43	3.2	Number of Views			238									
44	3.3	Number of Views not on sheets			87									
45	3.4	View and Schedule Naming - Sheet views in ALL CAPS, working views in Title Caps			P						0			
46	3.5	Browser organization - Views (01 All) - Organized by Discipline> Category> Sub-Discipline> Associated Level			P						0			
47	3.6	Proper use of Scope boxes			P									
48	3.7	**Schedules natively generated (no drafting views, links, imports or detail**	x		F									
49	3.8	Navis Export View Setup			P						0			
50		4. Drawing Sheets												
51	4.0	General Sheet Comments			x	x	x	x	x	x				
52	4.1	Number of Sheets			207									

DEN BIM Model Review Audit – Overview

- 47 Total Line Items
  - Model Setup, Modeling, Model Views, Drawing Sheets, Annotation, Revit Families & QAQC
- 18 **Critical Items**
- Asset Data Requirements
- Pass / Fail / Caution



| | | |

Critical Model Requirements – Facilities

- 1.1 DEN Template used
- 1.3 Phasing
- 1.6 CAD files must be LINKED and not imported
- 1.7 No Exploded .DWG files
- 1.11 Project Location – LDP Coordinates
- 2.1 Model all designed elements
- 2.2 all modeled elements tagged correctly
- 2.7 Systems Connected
- 2.9 All Rooms / Spaces
- 2.10 Spatial Coordination
- 2.11 Model Reconciliation
- 3.1 All Assets Identified
- 3.2 Asset Design Information Complete
- 4.6 Schedules natively generated (no drafting views, links, imports or detail groups)

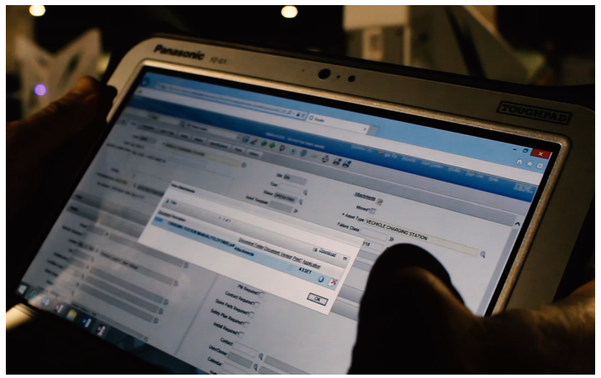
Critical Model Requirements – Civil

- DEN Templates used
- Project Location – LDP coordinates
- Model all designed elements as objects: (panels, manholes, pipes, etc.)
- Used required layers, DEN and FAA
- Use Object Data Tables per FAA
- System Networks Connected
- All Assets Identified
- Spatial Coordination
- Model Reconciliation
- Schedules (Tables) natively generated (no drafted schedules)

ASSETS

Asset Management Overview

- Maximo and data systems administrators for AIM
- Maintenance planning support
- Facility condition assessment program
- Warranty and commissioning
- Division KPI analysis, audit and support
- BIM & Civil CAD support airport wide



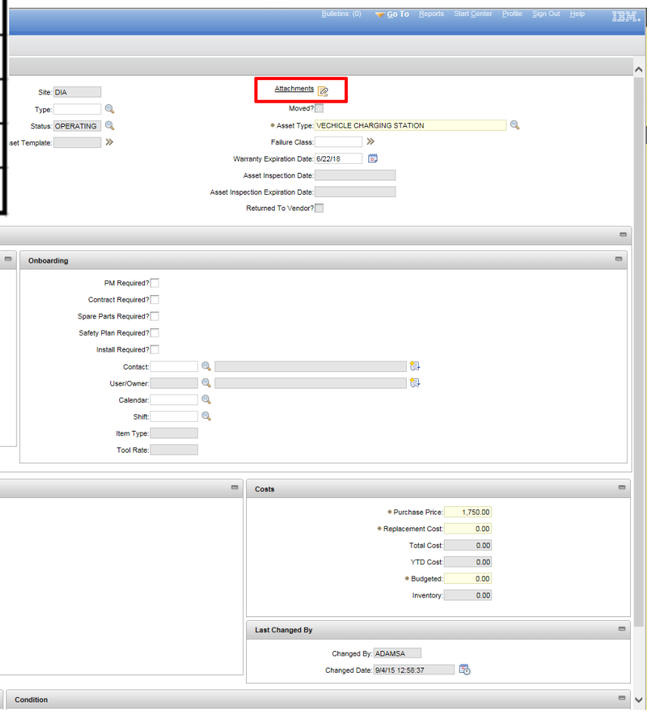
Asset Data Requirements

- What DEN defines as an Asset is broken down and specified by DEN Asset Type and DEN Functional Area in the attached Appendix C, of the Design Standard Manual. Assets must be identified by the 60 percent deliverable. In general, these asset types include but are not limited to:
  - Airfield panels
  - Electrical Equipment/Runway lighting
  - Manholes, drainage, and conveyance structures
  - Mechanical Equipment and Fixtures
  - Plumbing Equipment and Fixtures
  - Water line equipment and

Asset Data Requirements

- Asset Information
  - Location (door label) QR code
  - Asset Type
  - Manufacturer
  - Model
  - Serial Number
  - Etc.

Asset ID	
QR Code	
Description	AHU3
Location	PTC_03_17W_322
Asset Type	AIR HANDLING UNIT
Functional Area	HVAC
Status	Designed
Manufacturer	
Model	
Serial #	
Purchase Price	
Install Date	
Expected Life	
Condition	
Warranty End Date	
Vendor	



Asset Data Requirements

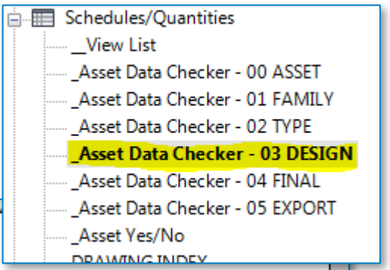
- Assets Identified at 60%
- Asset Information by 90%
- Schedules built into the DEN template
- DEN Asset Types and Functional Area listed in BIM Design Standard Manual

402.2 Asset Data

Asset data is generated throughout the project process by multiple parties. When a party adds new data, they are also responsible for validating the existing data associated with that Asset. Below are the fields required for the successful population and execution of the DEN Asset Management program.

By the 60 percent Deliverable, all DEN assets must be identified using the Asset Yes/No schedule and Asset Yes/No - Mass - Fire Alarm Zones.

By the 90 percent Deliverable, all DEN assets must have the following information entered by the design team in the BIM model using the fields required in the DSM. This information must be maintained as current through the remainder of the project and the data made accessible to the builder through the DEN Autodesk BIM 360 Field platform. This data can be checked in the Revit models using the DEN Revit template in the Schedule _Asset Data Checker - 03 DESIGN and _Asset Data Checker - 03 DESIGN-Zone Masses.



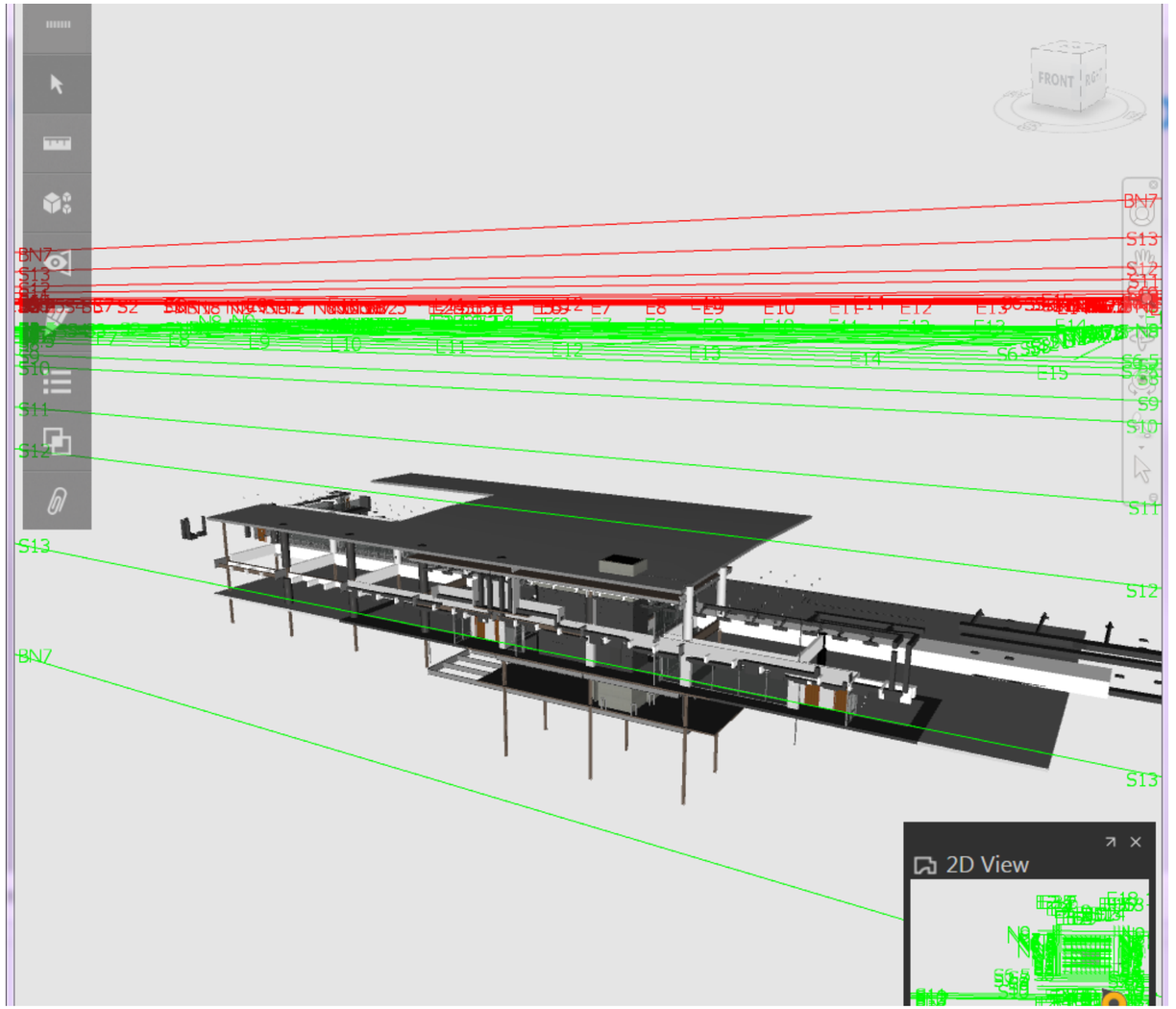
<_Asset Data Checker - 03 DESIGN>

A	B	C	D	E	F	G
	90% DESIGN DELIVERABLE					
Asset?	Family	Mark	ASSET_ASSETTYPE	Functional Area	Location	Status
Level 1						
☑	232123-SUMPPUMP-Elevator	SP-1/2	INDUSTRAIL SUMP PUMP	PLUMBING	FAIL	OPERATING
☑	233416-CNTFAN-Rectangular Inline Direct Drive	SF-2	EXHAUST FAN	HVAC		OPERATING
☑	238239-UNTHTR-Cabinet Electric	UH-1	CABINET UNIT HEATER	HVAC	PKG_01_18E_03	OPERATING
☑	238239-UNTHTR-Cabinet Electric	UH-2	CABINET UNIT HEATER	HVAC	PKG_00_18E_00	OPERATING

BIM 360 Glue

Spatial Coordination

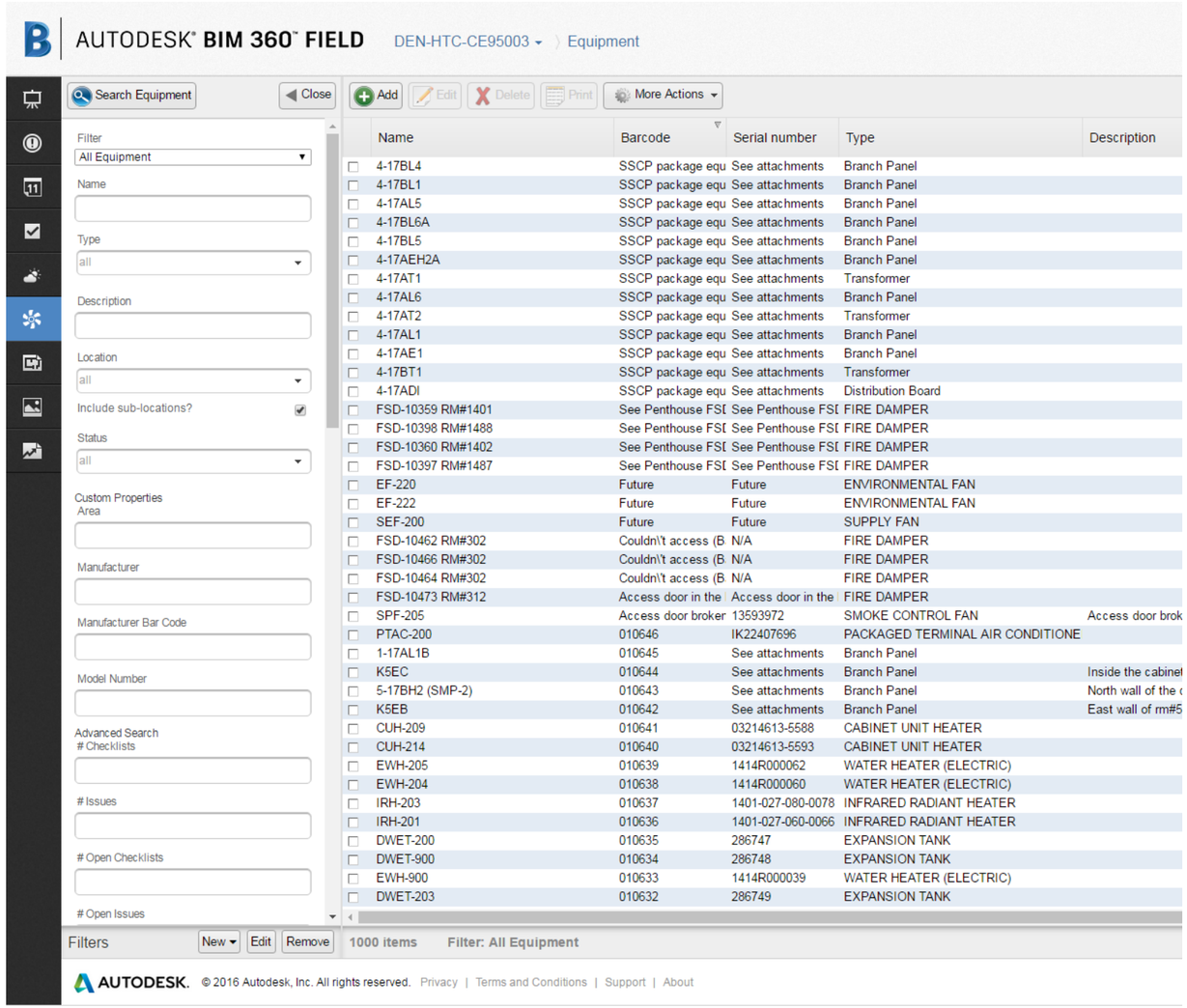
- Coordination begins prior to 60% CD (or equivalent)
- Coordination meetings run by the lead designer
- Attended by and with feedback from DEN BIM and Project Manager
- Coordination must be finished by 100% CD
- Signoff by DEN required



BIM 360 Field

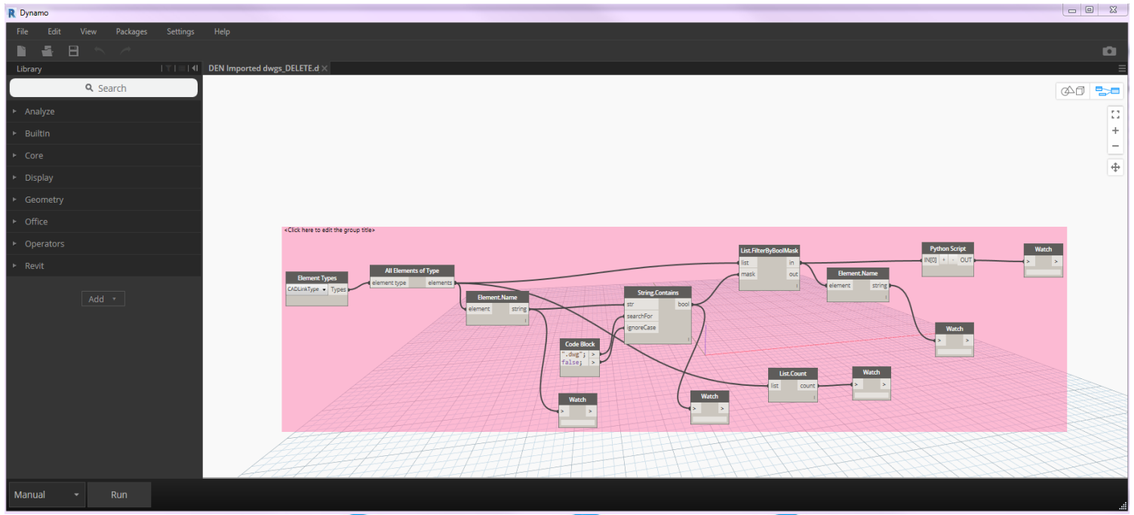
BIM 360 Field

- Asset Equipment List
- Populated as Equipment is installed
- Verified by Inspectors
- Additional DEN uses of Field



Resources & Model Clean-up

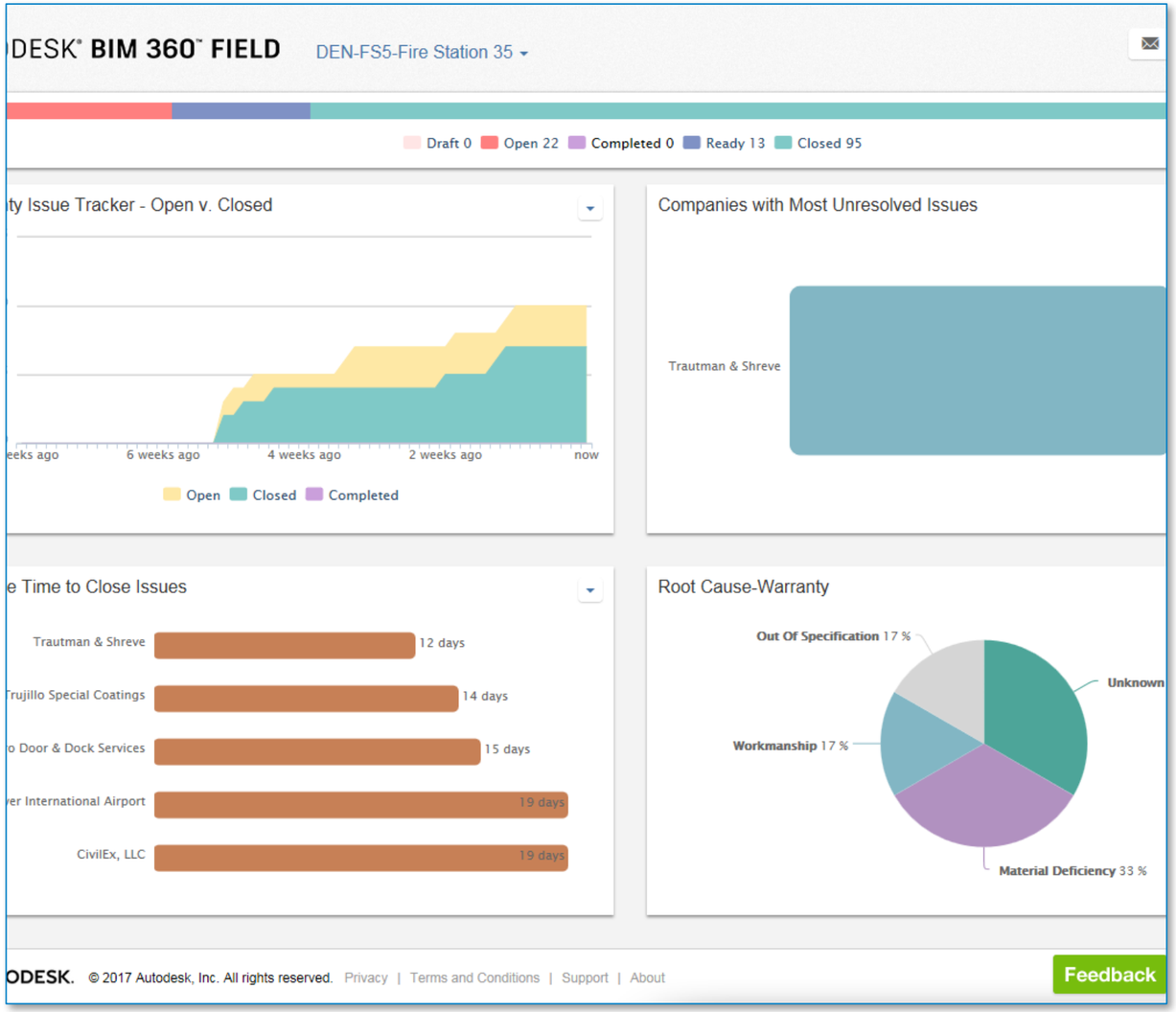
- Provide consultants with resources
  - **Kit of Parts** which include: templates, families, titleblocks, shared parameter file
  - Dynamo Scripts for model cleanup
    - Imported AutoCAD files
    - Imported Line Patterns



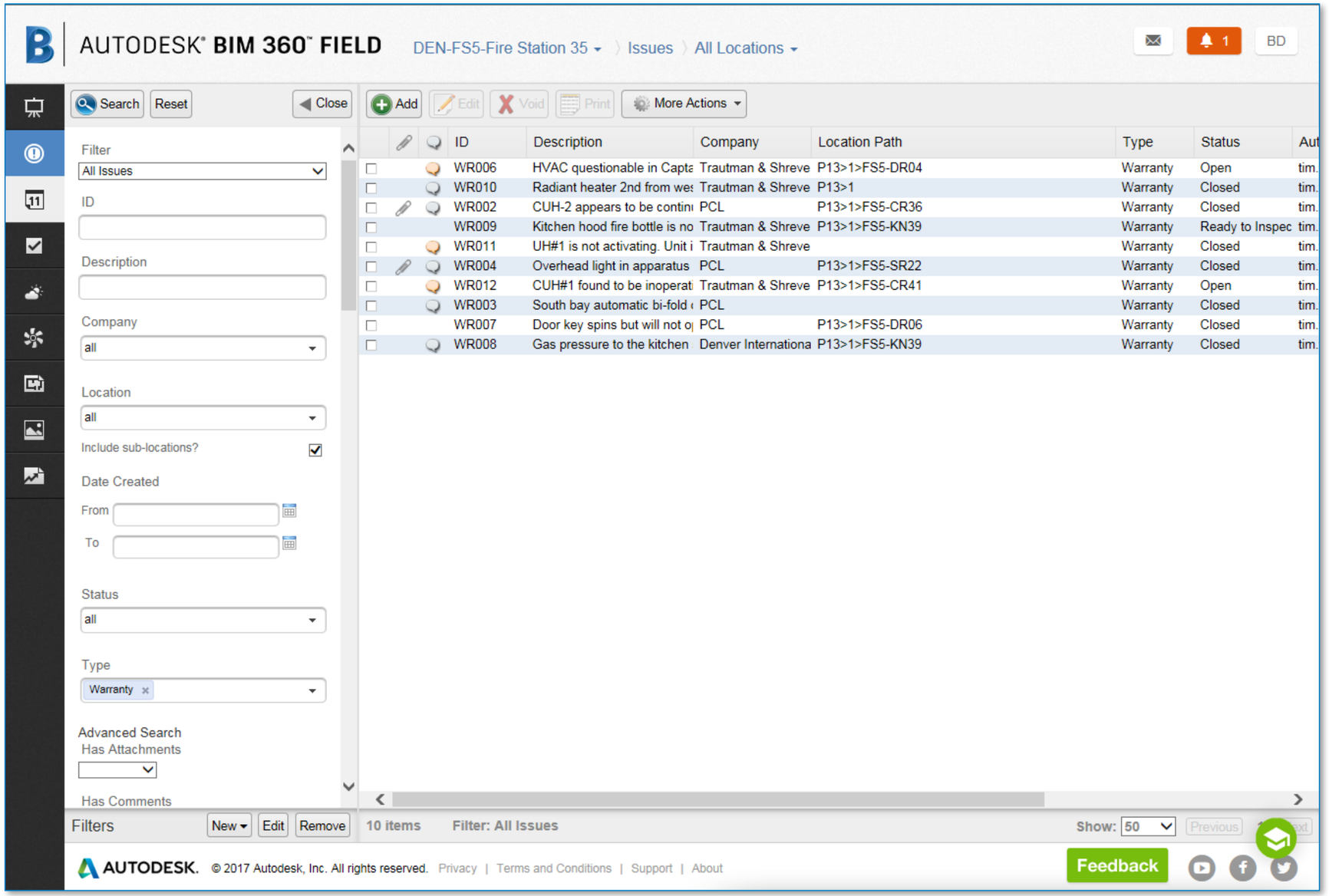
Warranty Tracking

Warranty Tracking

- Final inspections done with Field
- Asset Data Finalized
- Construction
  - Final Formatted O&Ms
  - Asset Data Finalized
- DEN
  - Final Data load to IBM Maximo



Warranty Tracking



Thank you!!
&
Questions
&
Raffle

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