

Building Information Modeling to Facilities Information Management and Beyond

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Carolinas HealthCare System



Class summary

Carolinas HealthCare System will review the strategic implementation of Building Information Modeling from project inception to facilities management. The owner team will then explore the benefits of project processes, such as multi-team member collaboration, virtual coordination, and owner BIM standards that help minimize project risk. The owner team will also describe their use of BIM during facilities management, which includes space management, asset management, and virtual documentation. Carolinas HealthCare System will conclude with the BIM program lessons learned and return on investment of their BIM to FIM (Facilities Information Management) implementation.

Key learning objectives

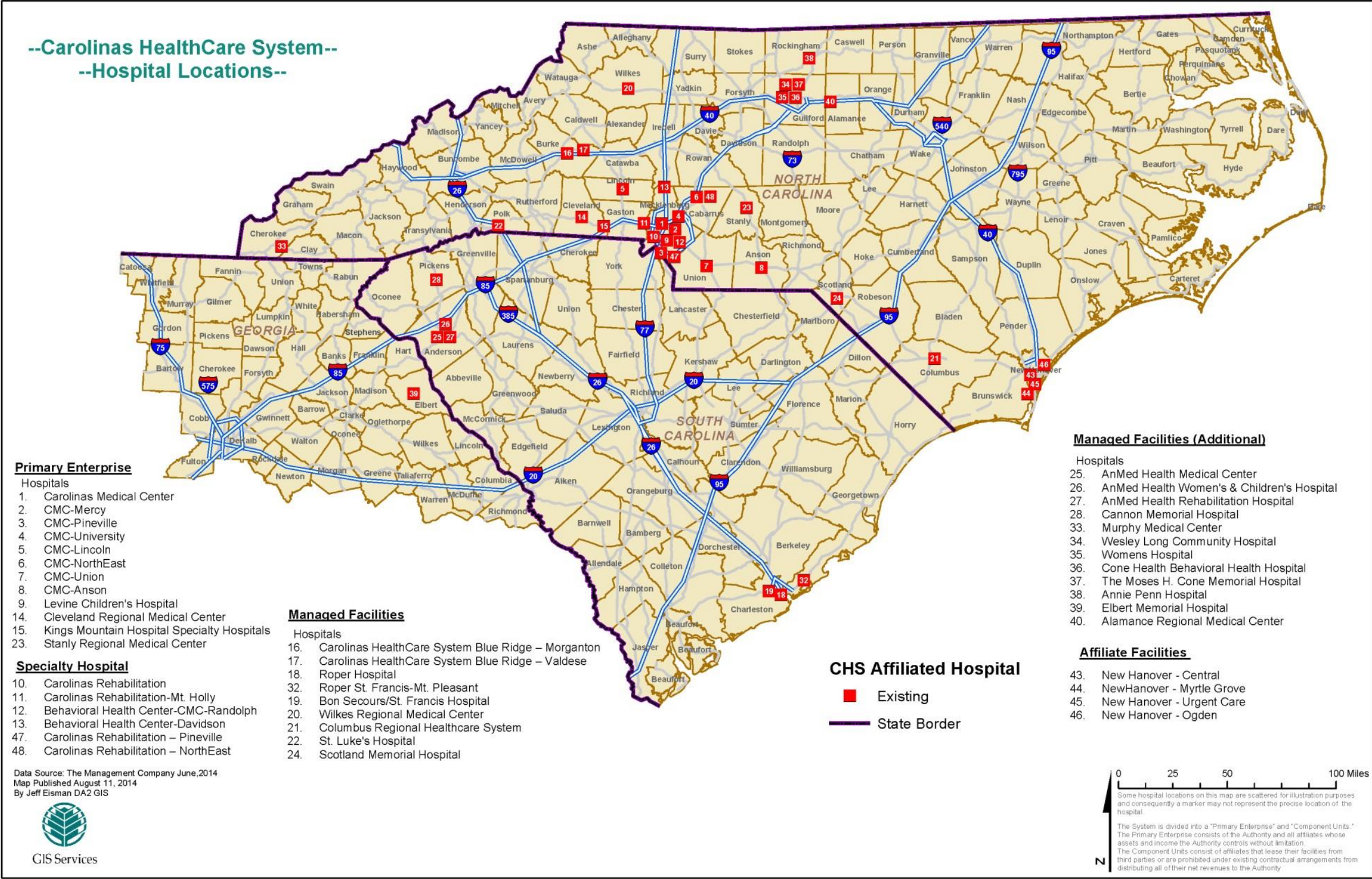
At the end of this class, you will be able to:

- Understand the need for owner BIM contract requirements and the resources needed to assist with compliance
- Understand the use of virtual coordination to minimize rework and shorten planned downtime
- Understand use of virtual documentation for regulatory compliance
- Understand the program ROI and cost avoidance in utilizing BIM for FIM

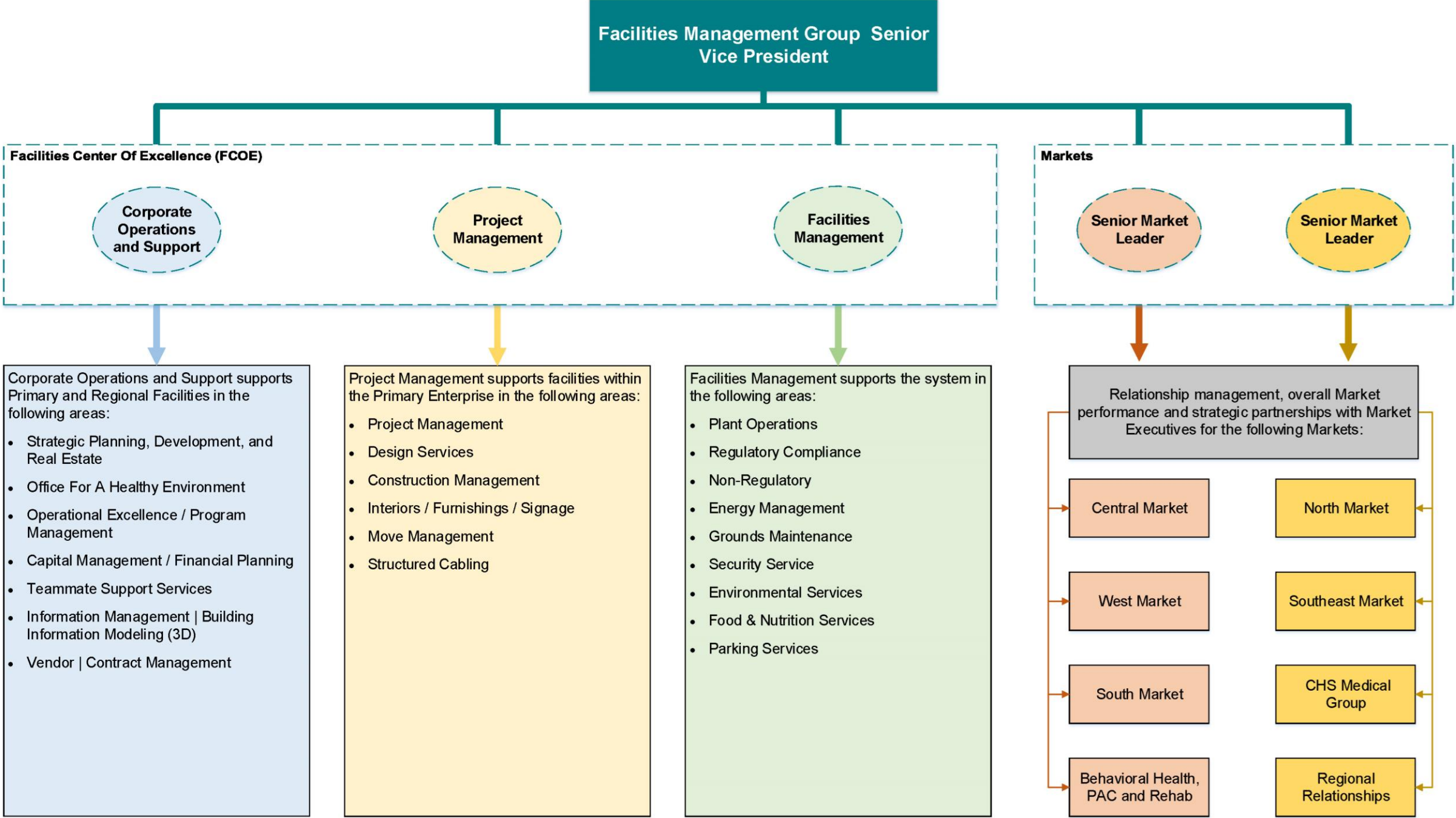
Carolinas HealthCare System Overview



Carolinas HealthCare System



Carolinas HealthCare System



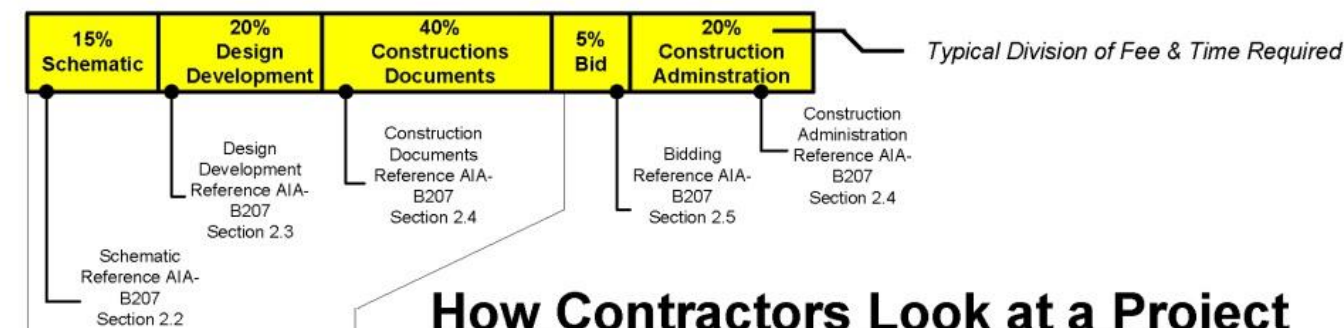
The Value of BIM for Owners



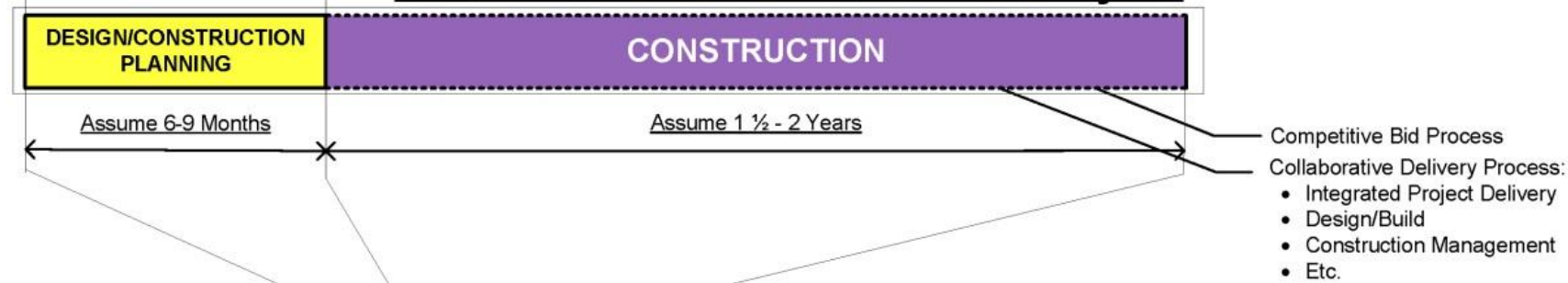
Different Perspectives on BUILDING DESIGN / CONSTRUCTION

June 25, 2013

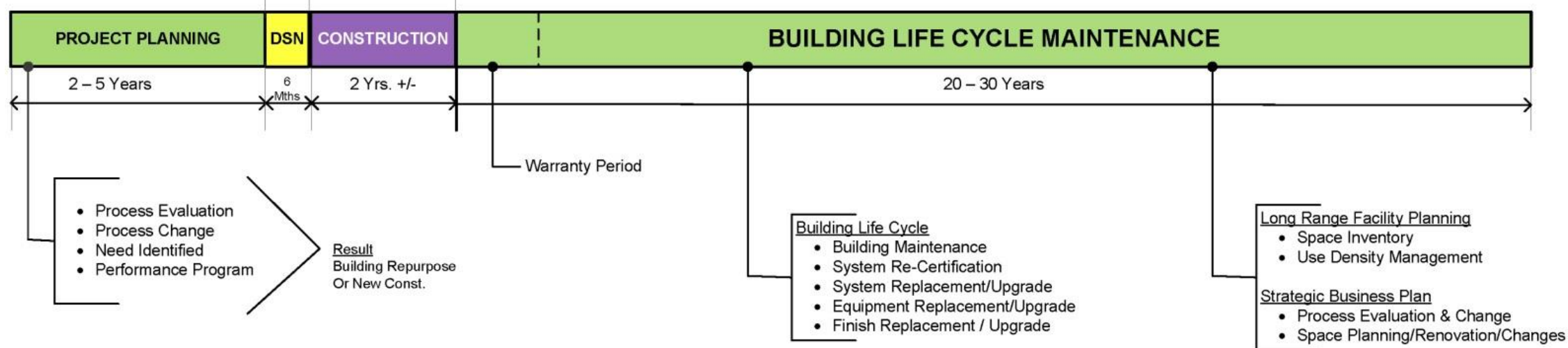
How AE's Look at a Project



How Contractors Look at a Project

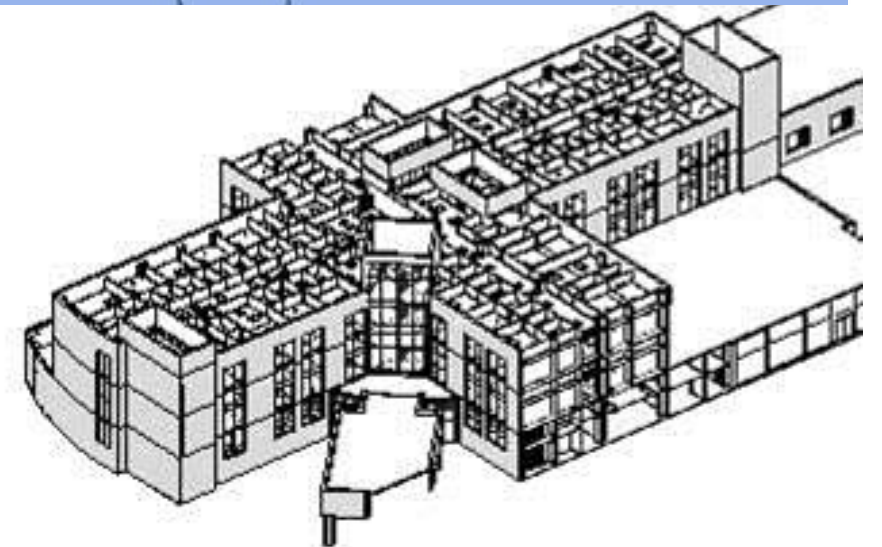


How Institutional Owners Look at a Project



Pilot Project

- 2009 CMC-Lincoln Hospital
 - Contractor Initiated
 - Used only for 3D Clash Detection & Coordination
- Savings Realized
 - Over \$2 Million in Savings – through errors and omissions reductions
 - Opened 4 Months early



Contract Development and Compliance Verification



Contract Development


CHS BIM Requirements Development

- 2010 - Created guidelines & selected projects to pilot requirements
- 2011 - Continued guideline development and pilots
- 2012 - Contracts issued using modified AIA E202 with 3 sub-exhibits



Contract Sub Exhibits

- BIM Execution Plan
- Formatting Requirements
- Content Requirements



i. Construction type; ii. Occupancy(ies); iii. Fire suppression systems.								
6. Code compliance calculations indicating both allowable/required and proposed conditions: a. Height and area; b. Exiting; c. Plumbing fixture count.								
7. Life safety plans: a. Occupant loading; b. Exiting; c. Fire rated walls and partitions clearly identified.								
8. Enlarged floor plans: a. Typical room layouts (as applicable to project type); b. Restrooms / Showers; c. Stairs, ramps, and elevators; and d. Other specialty spaces as appropriate to the proposed design.								
9. Interior / Millwork Elevations;								
10. Door and frame information: a. Schedule (including hardware set assignments); b. Types; and c. Typical head, jamb, and sill details.								
11. Hardware Schedule: a. Generic functions only								
12. Basis of Design: Include in specifications.								
13. Room Finish Schedule (by individual space);								
14. Reflected Ceiling Plans;								
15. Architectural Details (typical);								

Plans;
number sizes;

and

(ble);
locations;
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ocations and sizes); and
edules.
ack confirming compliance with ASHRAE 90.1

), and Weight(s);
ments.

Exhibit BB

Exhibit CC

ARCHITECTURAL								
Item	Details	CSI Task Order #	Level of Development					
			DDs	Author	CDs	Author	Coord	Author
Exterior Wall Systems		82010	300	WMBIA	300	WMBIA	300	WMBIA
Interior Walls/ Partition Types		C1010	300	WMBIA	300	WMBIA	300	WMBIA
Fire Rated Walls		C1010	300	WMBIA	300	WMBIA	300	WMBIA
Equipment (Kitchen, Medical, Other)		E1040	300	WMBIA	300	WMBIA	300	WMBIA
Ceilings		C1090	300	WMBIA	300	WMBIA	300	WMBIA
Stairs/ Elevators/ Escalators	Vendor Drawings for Elevators will be provided.	81080	300	WMBIA	300	WMBIA	300	WMBIA
Doors and Door Frames		C1030	300	WMBIA	300	WMBIA	300	WMBIA
Windows, Glazing, and Curtain Wall		82020	300	WMBIA	300	WMBIA	300	WMBIA
Millwork and Casework		E2010	300	WMBIA	300	WMBIA	300	WMBIA
Roofing	Insulation, sloping, access, and details will be provided by WMBIA.	81030	300	WMBIA	300	WMBIA	300	WMBIA
Furniture	WMBIA Interiors	E2010	300	WMBIA	300	WMBIA	300	WMBIA
Soft Goods	WMBIA Interiors	E2020	300	WMBIA	300	WMBIA	300	WMBIA
Artwork	WMBIA Interiors	E2020	300	WMBIA	300	WMBIA	300	WMBIA
Finishes	WMBIA Interiors	C2010	300	WMBIA	300	WMBIA	300	WMBIA
Ceiling Finishes		C2010	300	WMBIA	300	WMBIA	300	WMBIA

- ii. Sheet size and orientation must match full size hard copy drawings
 - iii. OSR #, facility name & facility address must be on every sheet
 - iv. DWFs must be in .dwf format not .dwt format
 - v. DWF files must follow CHS file naming convention:
 - 1. OSR # Sheet Number-Name of Sheet
 - 2. Ex: 2183377_A.1-First Floor Plan
 - b. 3D Model Views
 - i. All 3D Model view files must follow the following naming convention:
 - 1. OSR#_Facility Name_Facility Number_Discipline.dwf
 - 2. Do not include date or other information in the file name.
 - i. Additional Requirements:
 - 1. View Types
 - a. 3D View without linked files
 - b. 3D view linked with architectural
- object Documentation (*BIM Protocol Exhibit § 2.4.5.1.4*)
item shall be submitted as a separate PDF File and organized per the
ission structure provided by the Owner and shall be named as follows:
i. 000000 Manufacturer_Model #.pdf
i. 000000= 6 digit CSI Masterformat Code
- ase Naming Conventions
- ase information shall be named as follows:
- follow the following naming convention:
#-Project Name-Phase
lude:
ing Conditions
olition, separated into planned project construction phases
Construction, separated into planned project construction phases
- rkset Naming Conventions
- rkset information shall be named according to the standards listed
rksharing will need to be activated for each discipline Revit Model File.
- se will create worksets for their discipline:
(Civil)
itectural (Arch)
tural (Struc)
anical (Mech)
rical (Elec)
bing (Plumb)
ial Systems (Spec)
g to the following building divisions:
nor Site (XS)
nor Envelope (XE)

Resources to Assist with Compliance

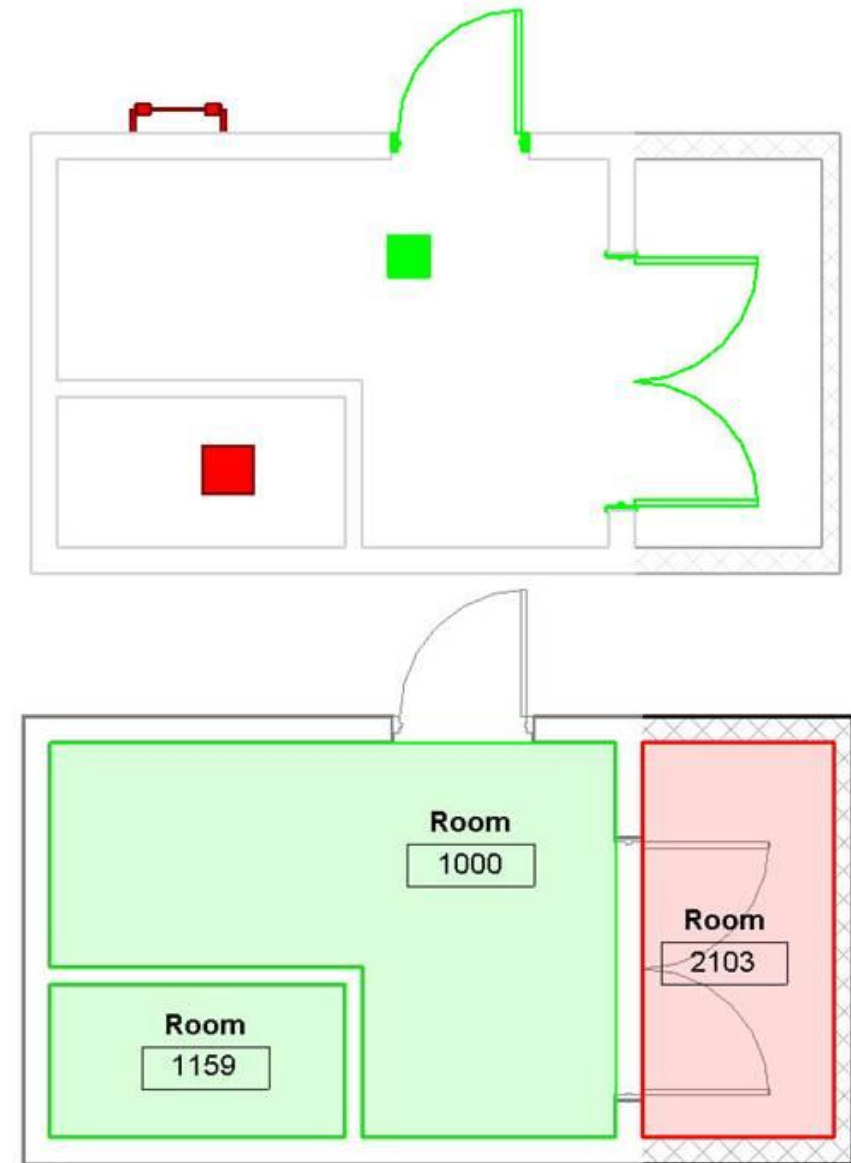
- Revit Templates
- Family Library
- Add-ins (CHS BIM Utilities)

The screenshot shows the CHS Revit Library website. At the top, there are navigation links: BROWSE, PAGE, BIM External 2, BIMformation, and CHS Revit Library. The main header features the Carolinas HealthCare System logo and the word "Home". On the left, a sidebar lists various resources: Libraries, Revit Families, Revit Project Templates, Revit Family Templates, Revit Utility Download, Revit Utility Help, BIM Standards, Revit Family Review, Request a New Revit Family, Revit Views, Revit 2013 Family Catalog, and Team Discussion. Below this list is an "EDIT LINKS" button. The main content area is titled "CHS Revit Library" and includes a description: "This site contains the CHS Revit library which includes Revit templates". Below this, there is a section for "BIM Standards" with buttons for "New", "Upload", and "Share". A table lists various standards, each with a PDF icon and a name:

✓	📄	Name
	📄	B102 Exhibit H - 2016
	📄	CHS Color Standard_2011-05-18
	📄	Closeout Documents
	📄	E202 Exhibit AA BIM Execution Plan 2013
	📄	E202 Exhibit BB - File Content Requirements 2013
	📄	E202 Exhibit CC - Model Deliverable Content Requirements 2013
	📄	E202-IPD - BIM Protocol 2013
	📄	YYYY-MM-DD_Phase

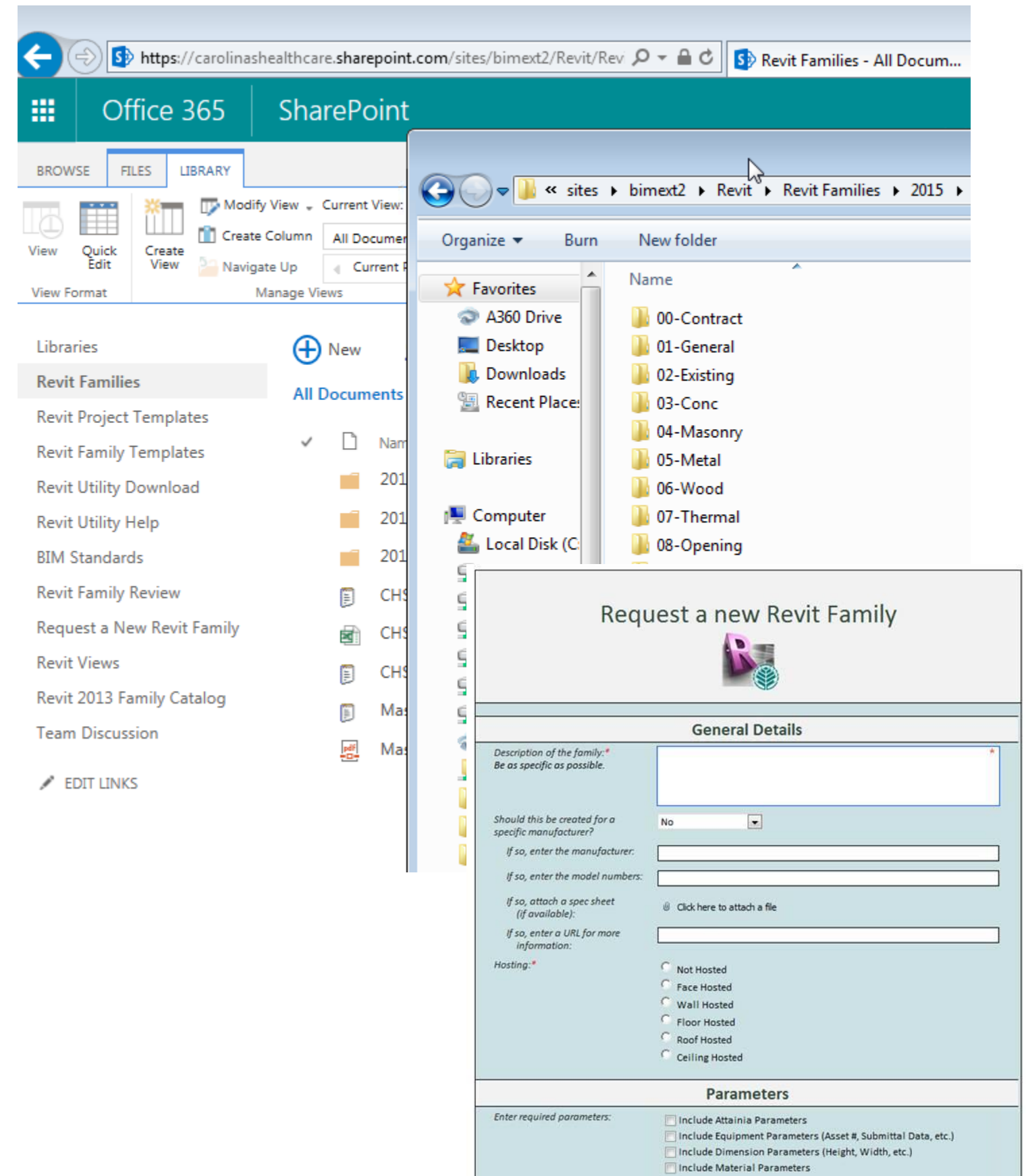
Revit Templates

- Project Templates
 - Architectural, MEP, Structural
- CHS Shared Parameter File
- Review Template
 - Consultants use to visually review model prior to submission
- ***Consistent Formatting of Models***



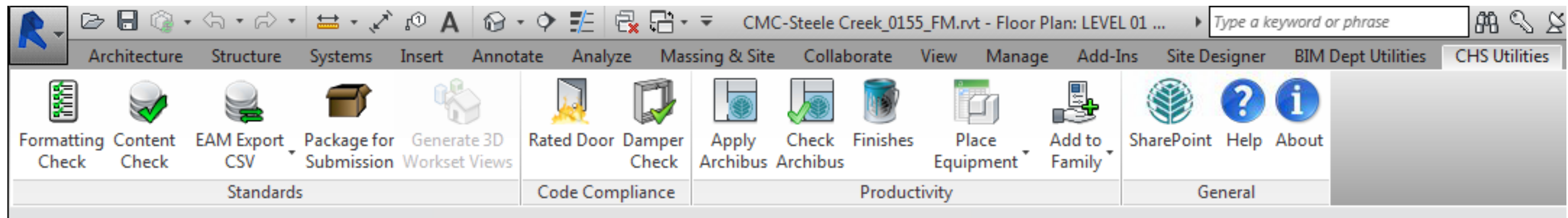
Revit Library

- 1000 Families and growing
- Named and formatted per CHS standards
- Updated regularly on CHS SharePoint Site
- Process to request new family creation

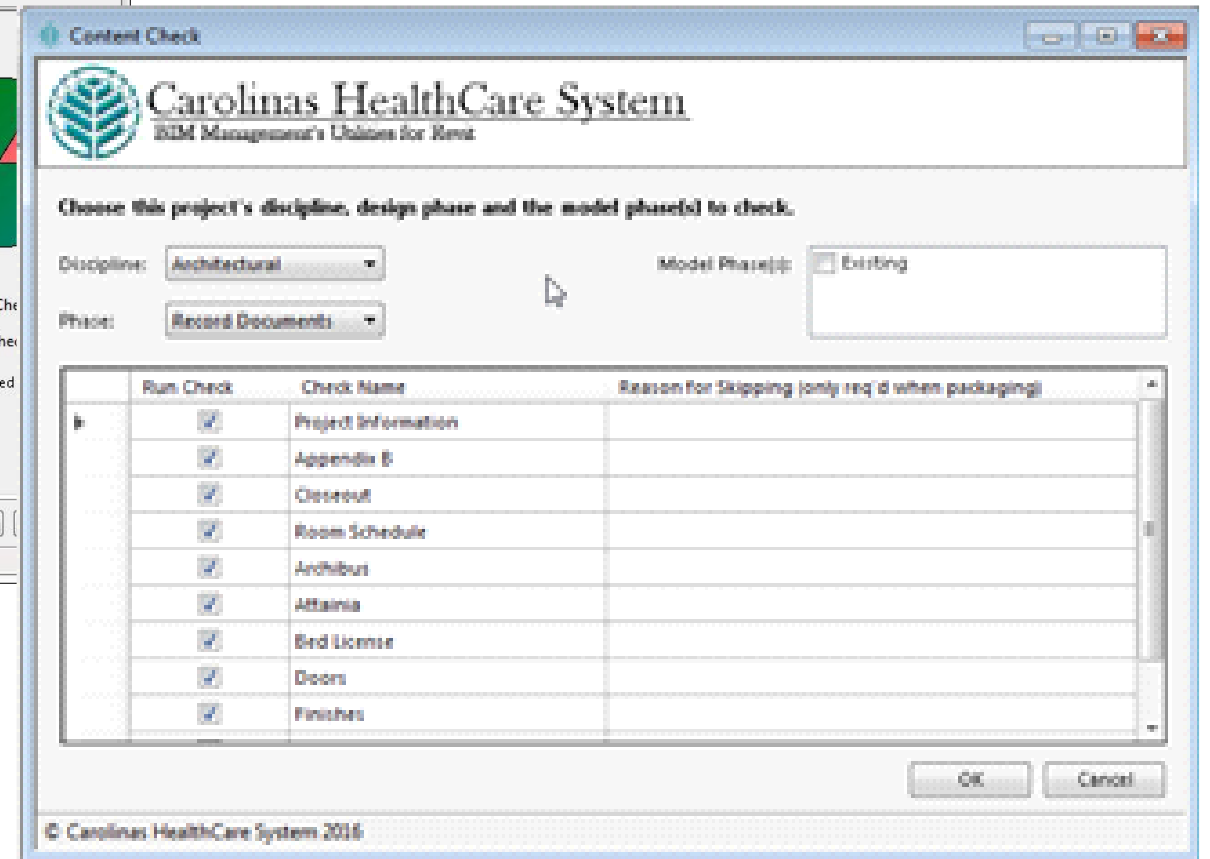
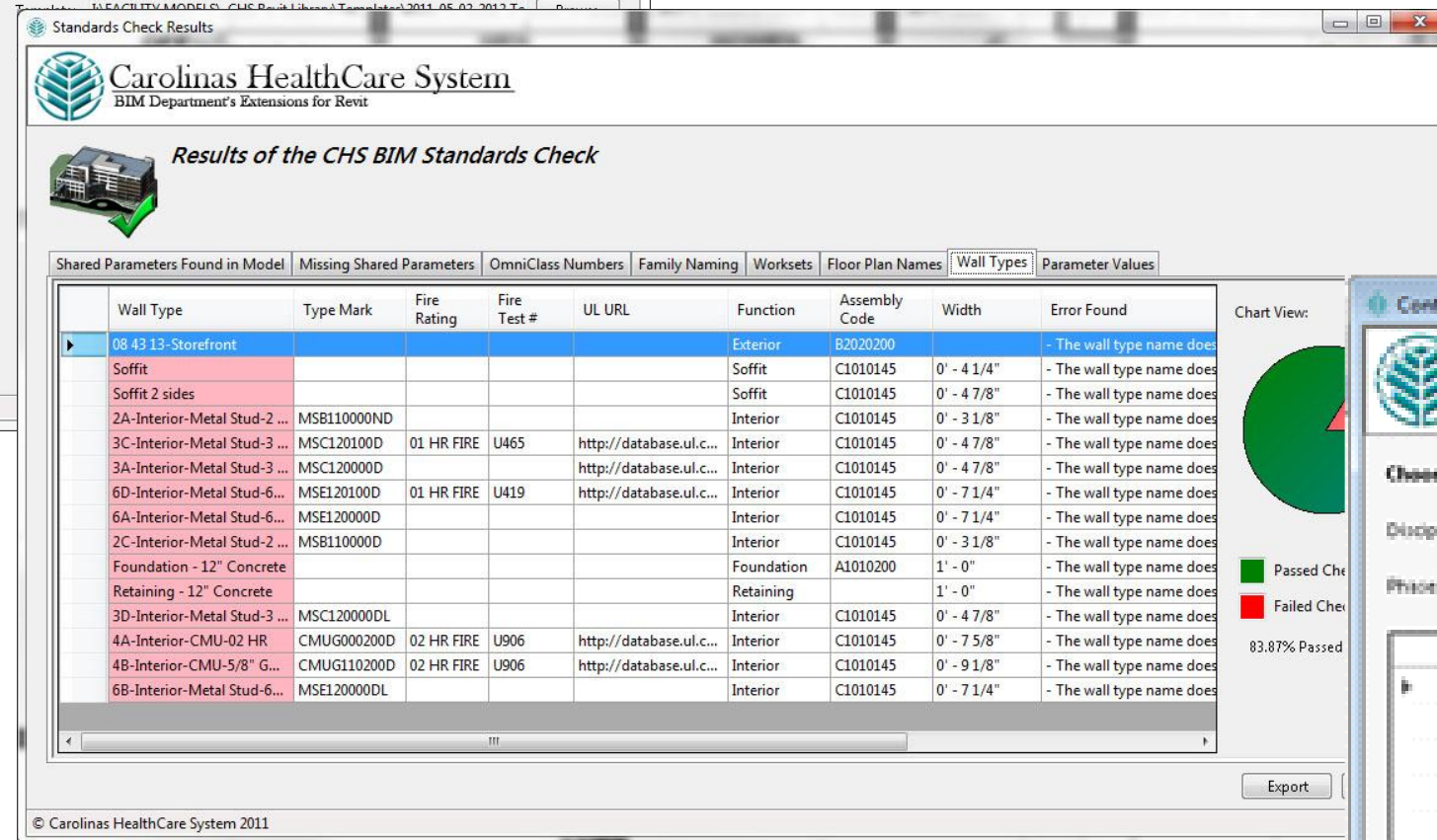
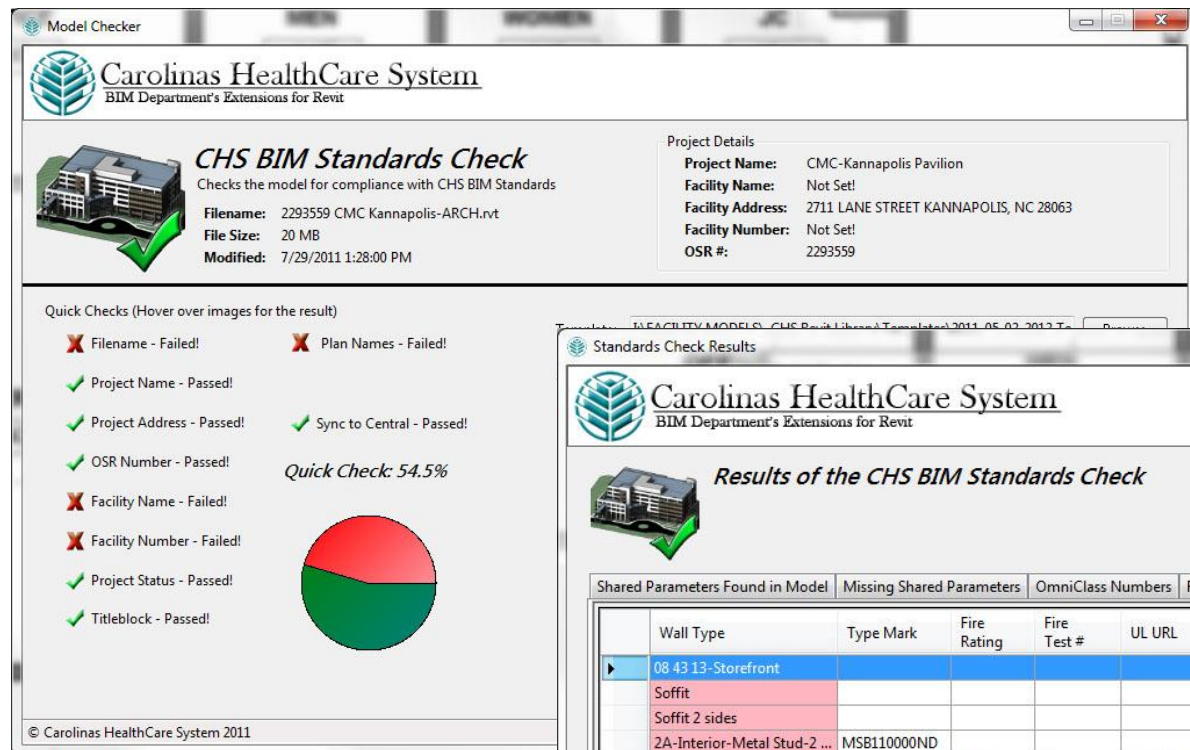


CHS BIM Utilities

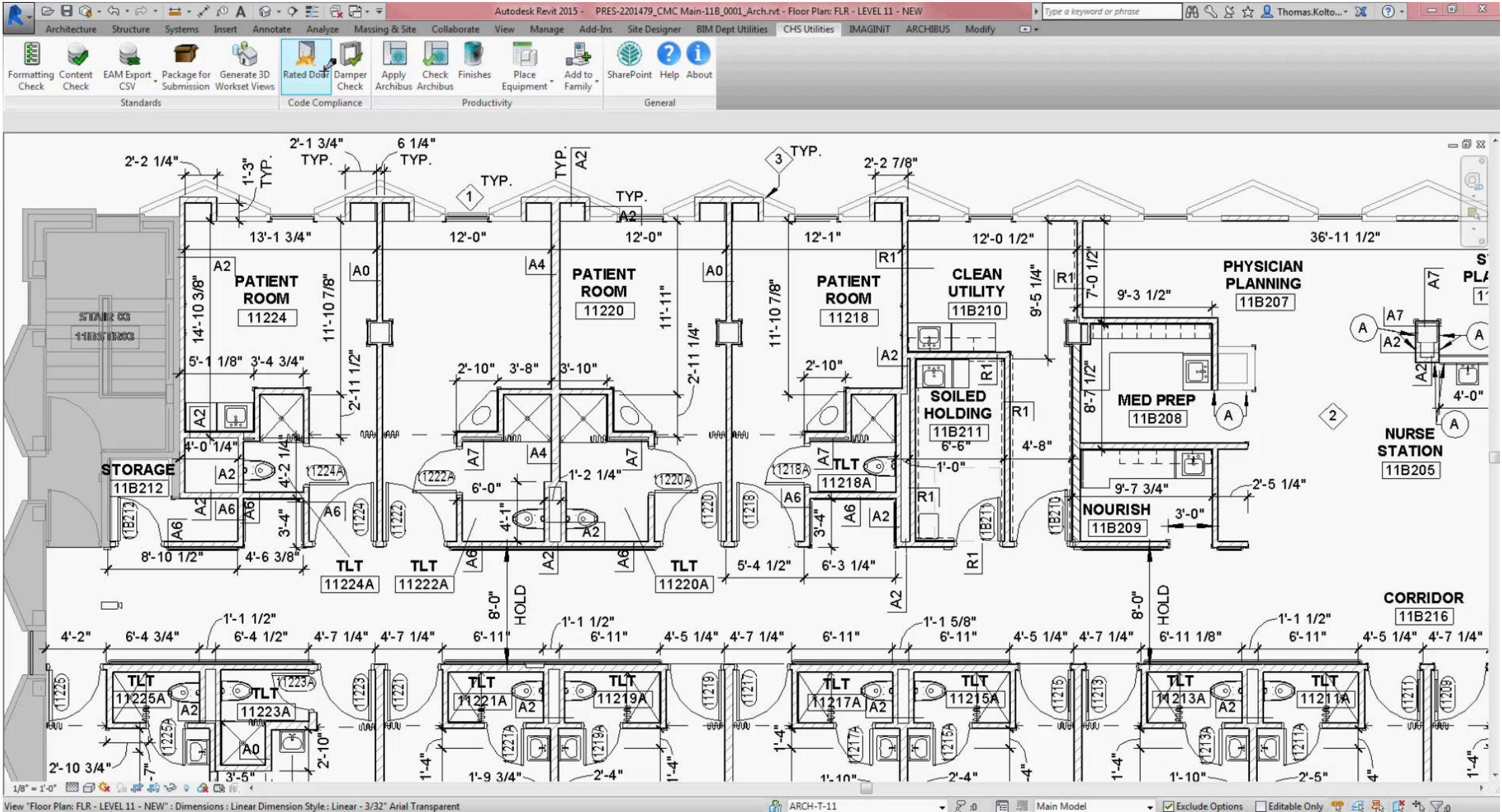
- Standards
 - Formatting Check, Content Check, EAM Export, & Package for Submission
- Code Compliance
 - Rated Door & Damper Check
- Productivity
 - Apply & Check Archibus, Finishes, Place Equipment, & CHS Parameter Add



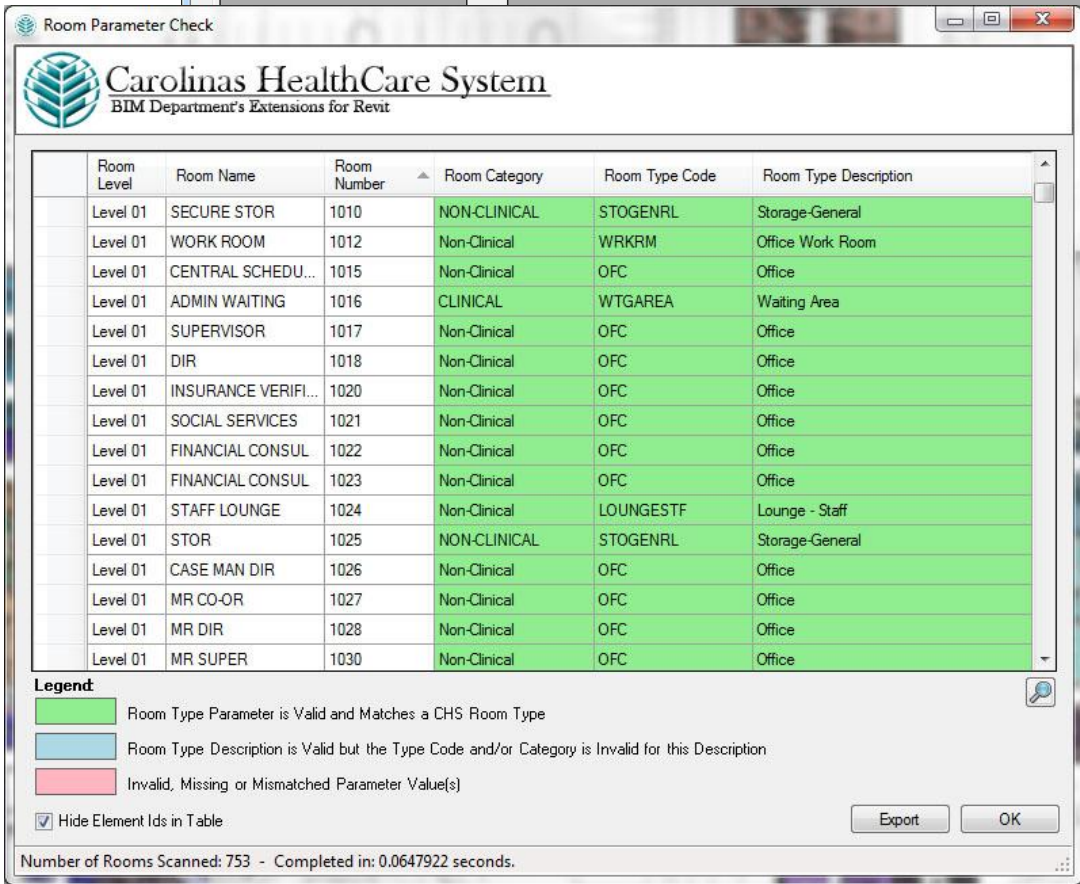
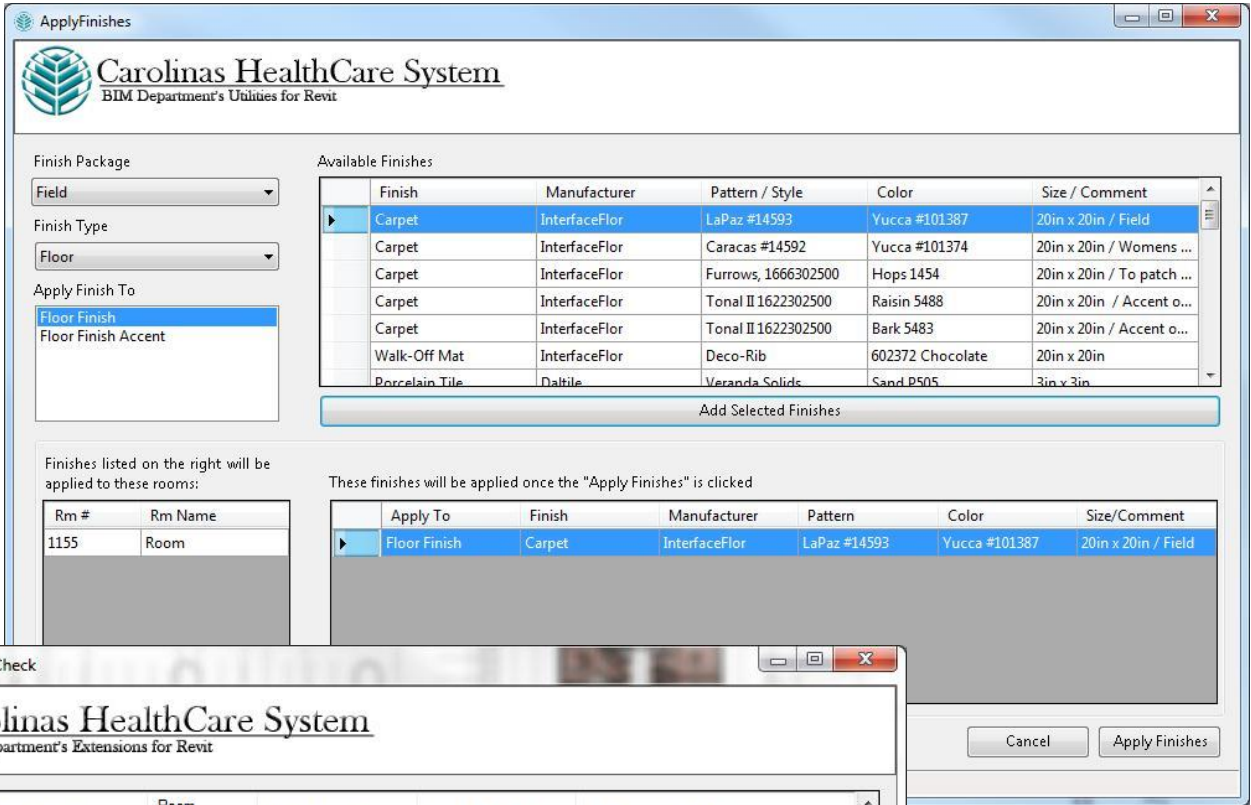
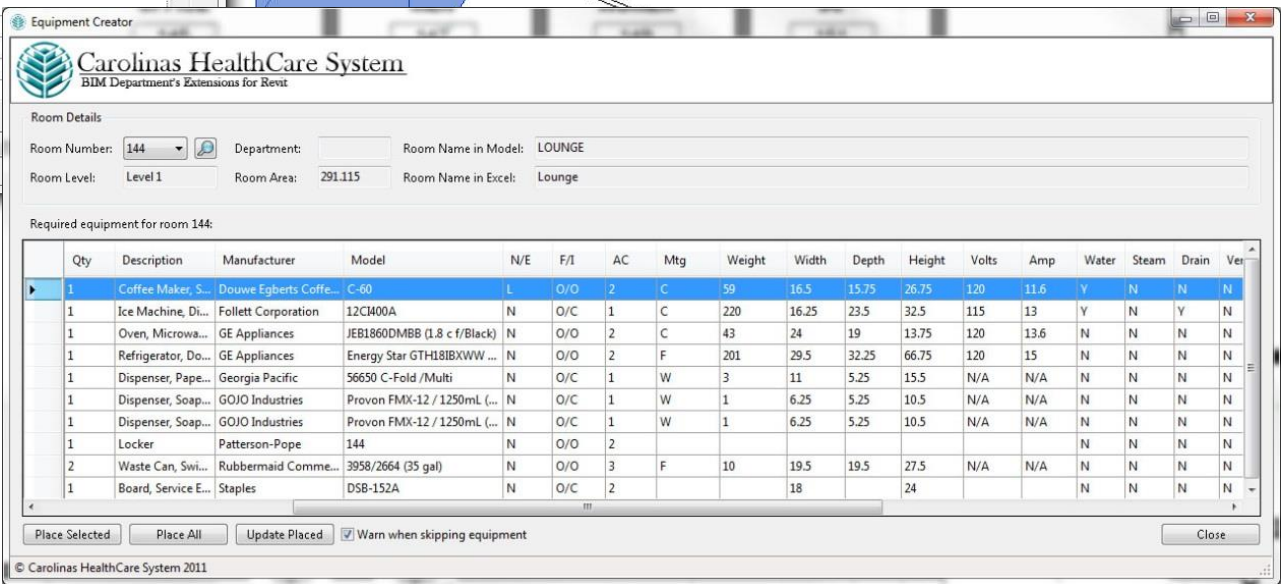
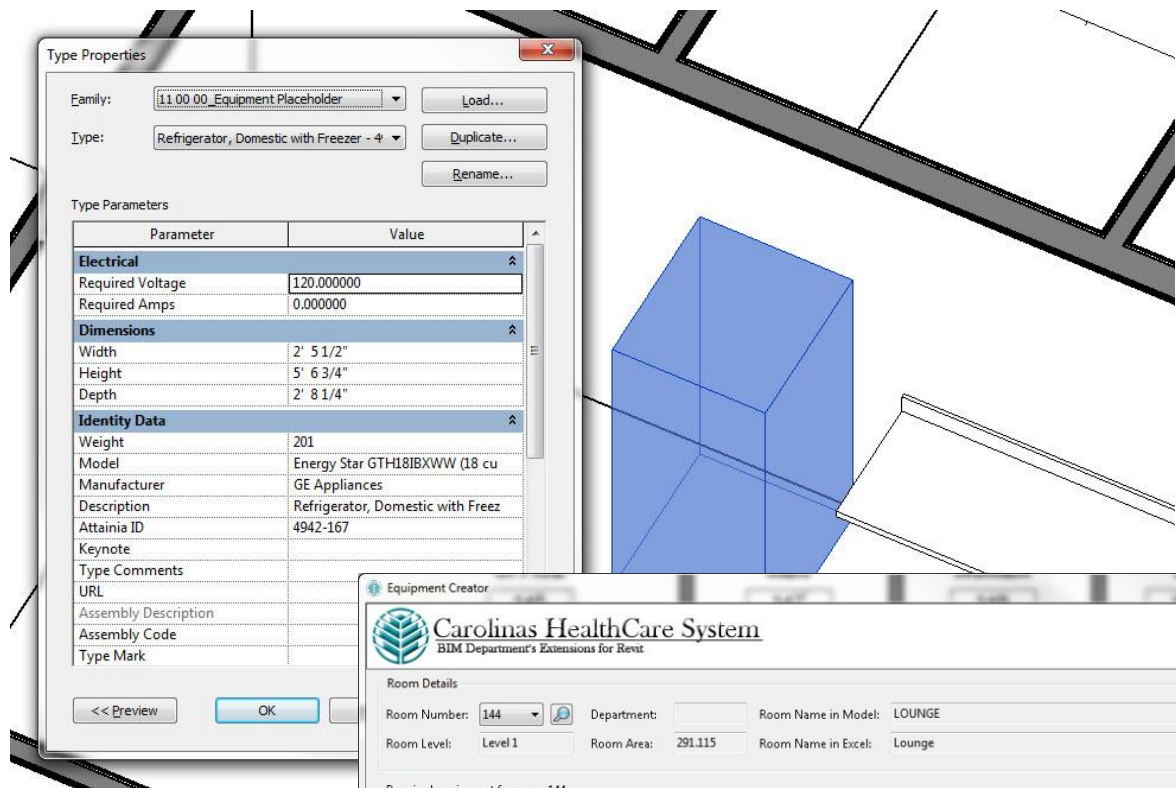
CHS BIM Utilities - Standards



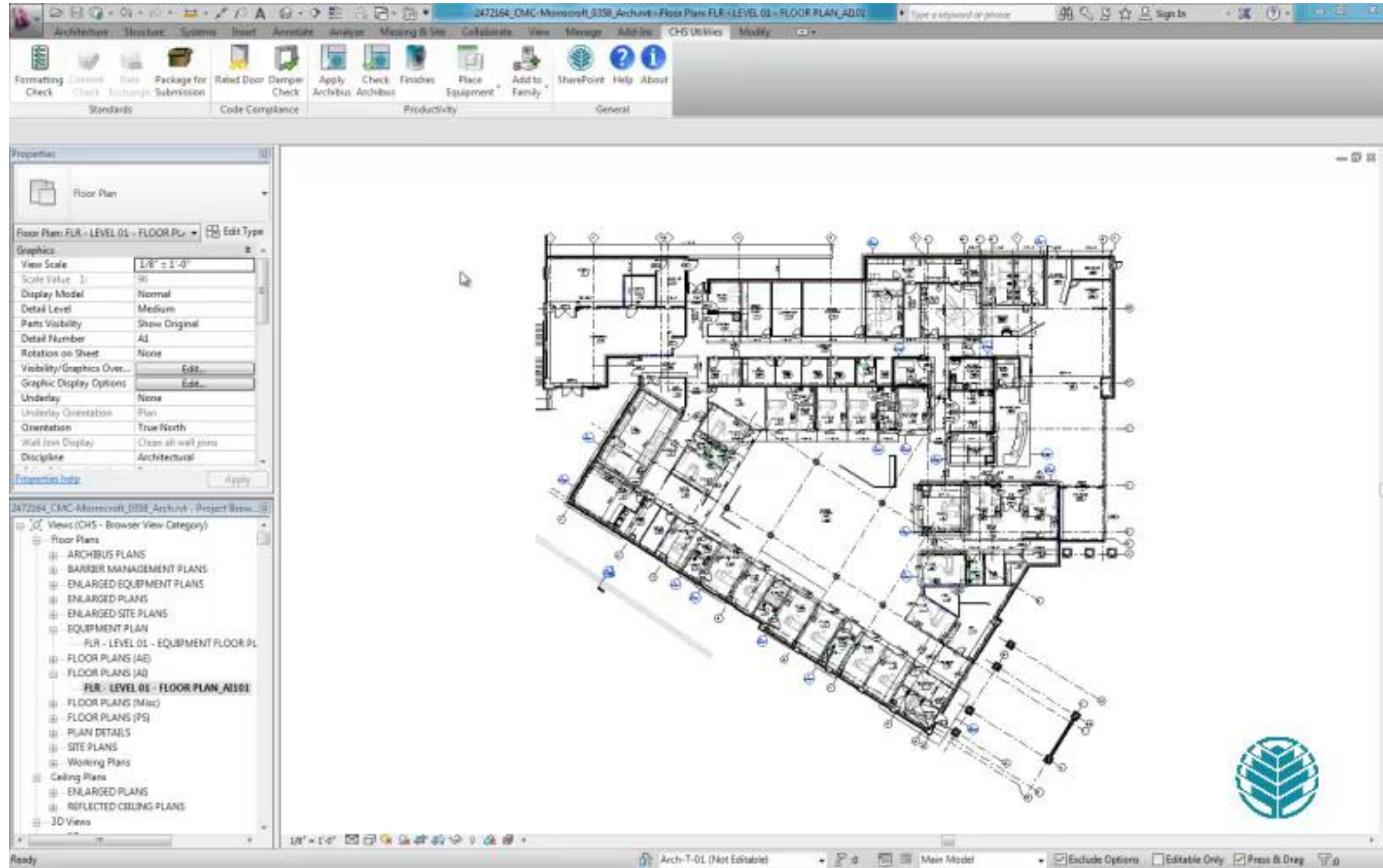
CHS BIM Utilities – Code Checks



CHS BIM Utilities – Productivity




CHS BIM Utilities – Productivity




Submission Review and Scoring

- Review Each Submission at Milestone Phase
 - Run Automated Checks
 - Review Template
 - Standardized Review Checklist
- Reviewed throughout the project in order to:
 - Avoid Rework
 - Avoid Delay in Deliverable
 - Ensure Quality of Model through-out the project



Carolin HealthCare System



Carolin HealthCare System

Project Name: CMC-NE CAC Renovation

OSR #: 2760424

Facility Name: Clinical Services

Facility Number: 0799

CHS Project Manager: Gigi Berg

Submission Phase: Construction Documents

Submission Date: 6/10/2015

Submitted By: WMBA

Project Contact: Tracie Sansavera

Project Type: Revit

Project Scope: 1422.59

Reviewed By: Meghan Ruffo

Review Date: 6/16/2015

Discipline	Firm	Score
Architectural	WMBA	6
MEP	Caveo	5
Structural		N/A
Interior		N/A
Fire Protection		N/A
Civil		N/A

Team Drawing Review Score (0 - 6):

5.5

Resubmission Required:

No

Resubmit By:

N/A

Revit Content Checks

Pass?	Check	Details	Comments
Yes	Model includes all applicable Appendix B information and this information matches what is shown on the Appendix B sheet.	The project information (Manage Tab > Project Information) parameters must include all applicable Appendix B information.	
Yes	Submission includes all applicable Archibus and department information.	This is required for all projects. Department information (Department Number, Department Name & Business Unit) should come from the end user. Use the 'Apply Archibus' and 'Check Archibus' CHS Revit Utilities to enter and then check this information; it should not be entered manually.	
Yes	Rated walls correctly are setup and display wall ratings per CHS Standards	Wall fire ratings must follow the convention set in the CHS template filters (01 HR FIRE, 01 HR FIRE/SMOKE, etc). This ensures all ratings will display correctly per DHSR standards in CHS Barrier Management Plans.	
Yes	Project Scope Area Plan is setup and shows the current project scope. This value must also match what is entered into the eForm.	Using the 'Project Scope' area type in Revit, create an area plan for each level in your project and outline the entire scope. This is required for all projects since this number is used by CHS for reporting.	
Yes	Room finishes have been applied to rooms using the correct shared parameters	Room finishes must be applied to room elements in Revit and finishes must be applied to the CHS Shared Parameters setup in the CHS Revit template.	
Yes	Room numbers follow CHS standards	Reference the CHS Room Numbering / Naming Process	
Yes	Submission meets all Project Phase Deliverable requirements found in the CHS BIM Protocol Exhibit	Reference the Project Phase Deliverable requirements found in the CHS BIM Protocol Exhibit	
Yes	Submission meets all Model Requirements found in the CHS BIM Protocol Exhibit	Reference the Model Requirements found in the CHS BIM Protocol Exhibit	

Contract Development and Compliance Verification

- Define what “BIM” is to CHS
 - *“All drawings and schedules required for design, assessment, review, bidding, and construction shall be extractions from the Project Model”*
 - CHS is requirement a Building **Information** Model – not asking for just 3D drafting
- Clearly State Deliverable Requirements
 - Revit Deliverable
 - Navisworks Deliverable
 - Required content in each model per Milestone Phase
- **Eliminate subjectivity in BIM Process**

Design and Construction



Project Type Specifics

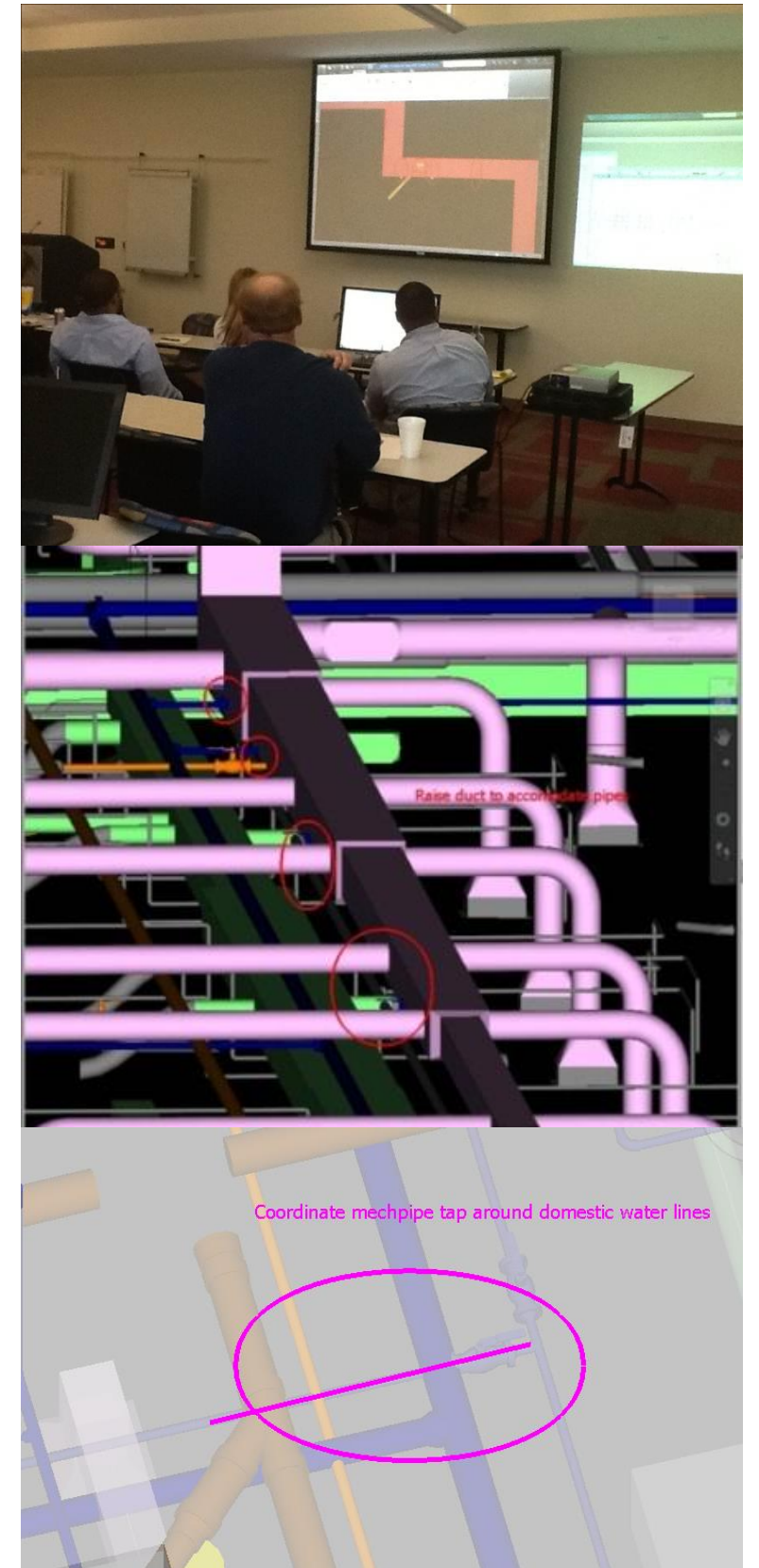
- Not a one-size fits all approach
- Varies by project type and size
 - New Construction vs. Renovation
 - Acute Care, Medical Office, and General Office

Aesthetics Only (Furniture and Finishes)	Provide finish information in Revit Room object. Room objects can be created from lines on top of CAD files or from an existing 3D model	CHS created tool that allows designed to auto-populate fields (manufacturer and model #) which reduces input time by designer. Information is embedded into model and is linked to report on SharePoint for all CHS team members to access	Finish information not located in consistent place – sometimes on drawings and sometimes in the specifications. Finding manufacture and model in this way is time consuming and does not allow us to easily import into an FM system.
MEP Equipment Replacement	Draw new work in 3D Revit	Existing conditions can be 2D CAD reference files, but new work – new ductwork or AHU should be modeled in Revit 3D per CHS standards. This allows us to start to build MEP models for future projects and renovation without adding more work to the project. The teams have to draw this anyway – Revit helps with future projects and maintenance.	Teams could draw everything in 2D, but we would never be able to start to build MEP models for future projects or maintenance.
	Populate required parameters for new equipment (Manufacturer, model number, serial number, and link O&M, submittal, & warranty)	New equipment should meet all of the data parameter requirements as this can be exported into our EAM system and used for maintenance. On equipment replacement projects this is typically a handful of elements.	Team could not populate the information and the models would be 3D representations only which is not Building Information Modeling.
CERP	Draw new work in 3D Revit	Existing conditions can be 2D CAD reference files, but new work – new ductwork or AHU should	Teams could draw everything in 2D, but we would never be able



Collaborative Delivery

- Aiming for a more dynamic process – teams tend to fall back on traditional delivery methods
- Currently using Collaborate for Revit on 5 large projects – with over 100 Revit users total (25 per project)
 - Easy set-up
 - Owner monitored collaboration – more insight into the process
 - Seeing more positive collaboration between design and constructing team
- Goal is to have construction documents and shop drawings at the end of the design phase.



Partnership with Local Code Enforcement

COLLABORATION WITH CODE ENFORCEMENT AND NC BOARD OF ARCHITECTURE

The team worked with local code enforcement (AHJ) to pilot BIM technology for code review. The local code enforcement team were involved from conceptual design through project completion, creating a collaborative environment for reviewing code issues. The code review team had access to the cloud hosted models and drawings and could review issues in real-time. The code reviewers created a time of reviewers and inspectors to review the coordination model as a virtual inspection to document construction issues prior to physical construction. The BIM Execution Plan included the code reviewers time as well as time for virtual inspections in the model development work-flow.

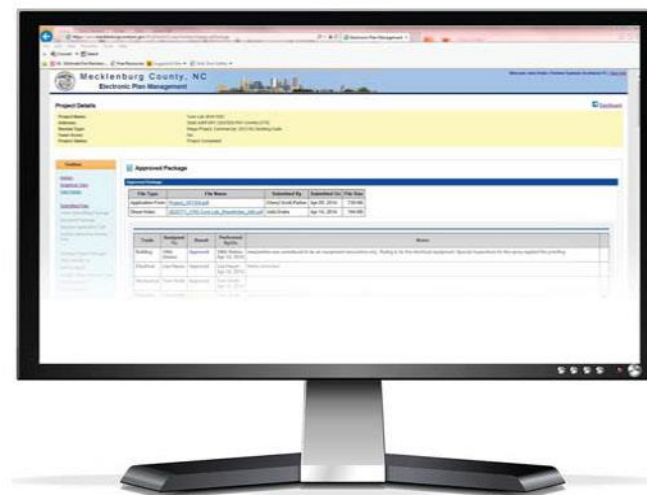
The local code review also piloted the use of tablets for field inspections. Inspections all carried laptops and were able to pull up the latest drawings from the team cloud to provide mark-ups and check review status.



Core Lab utilized the pilot program for digital review using Building Information modeling. The collaborative effort of this review on all trades, in conjunction with having the 3d model helped bring to light critical issues such as exiting issues and the ratings required to hold up the second floor Electrical switch gear room. By all trades of reviewers and design team collaborating on the various issues this decreased review time and expedited this project through to permitting. The use of the 3d model was crucial in identifying these items upfront in plan review and not after construction in the field during inspection.

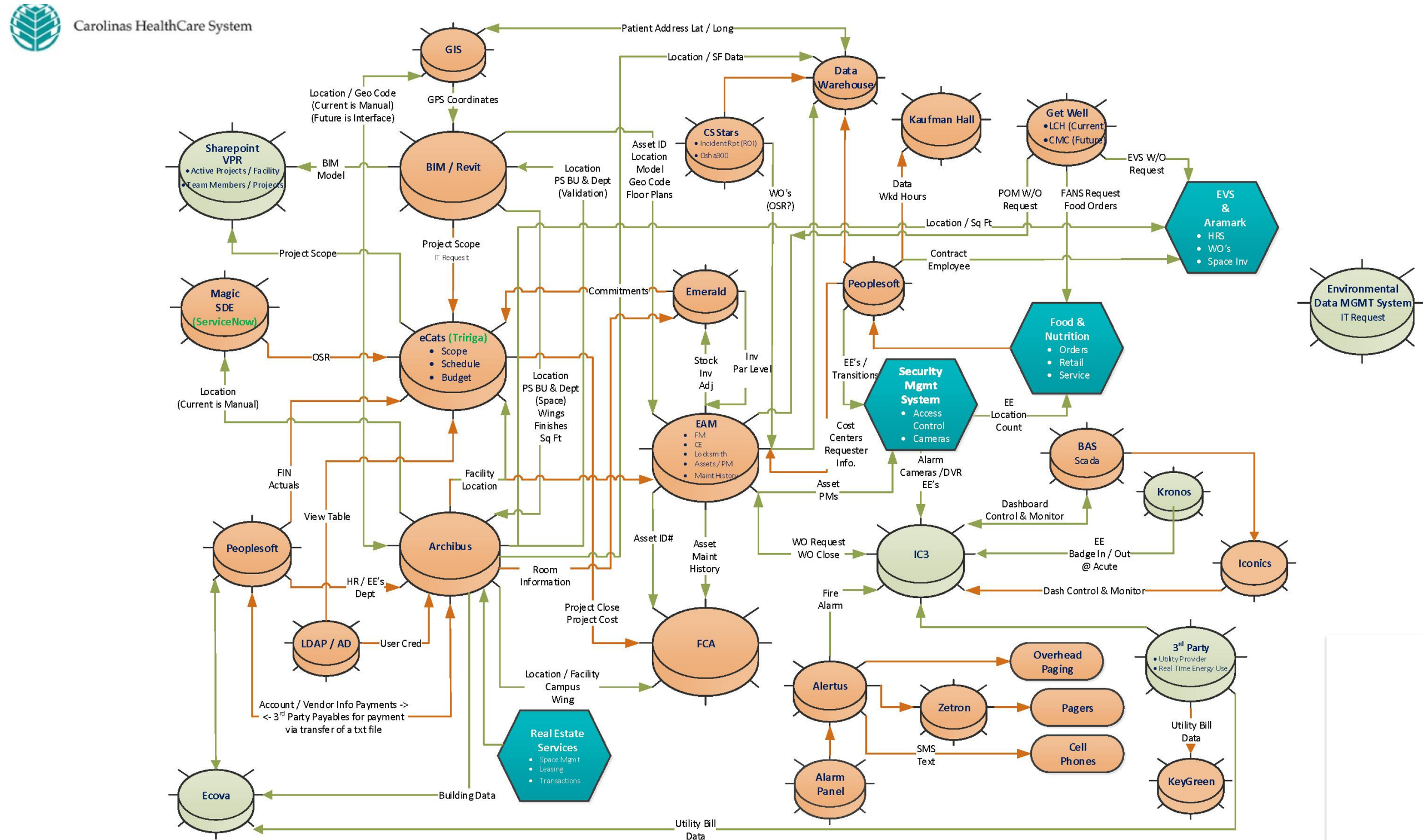


James Bartel,
Mecklenburg County Code enforcement

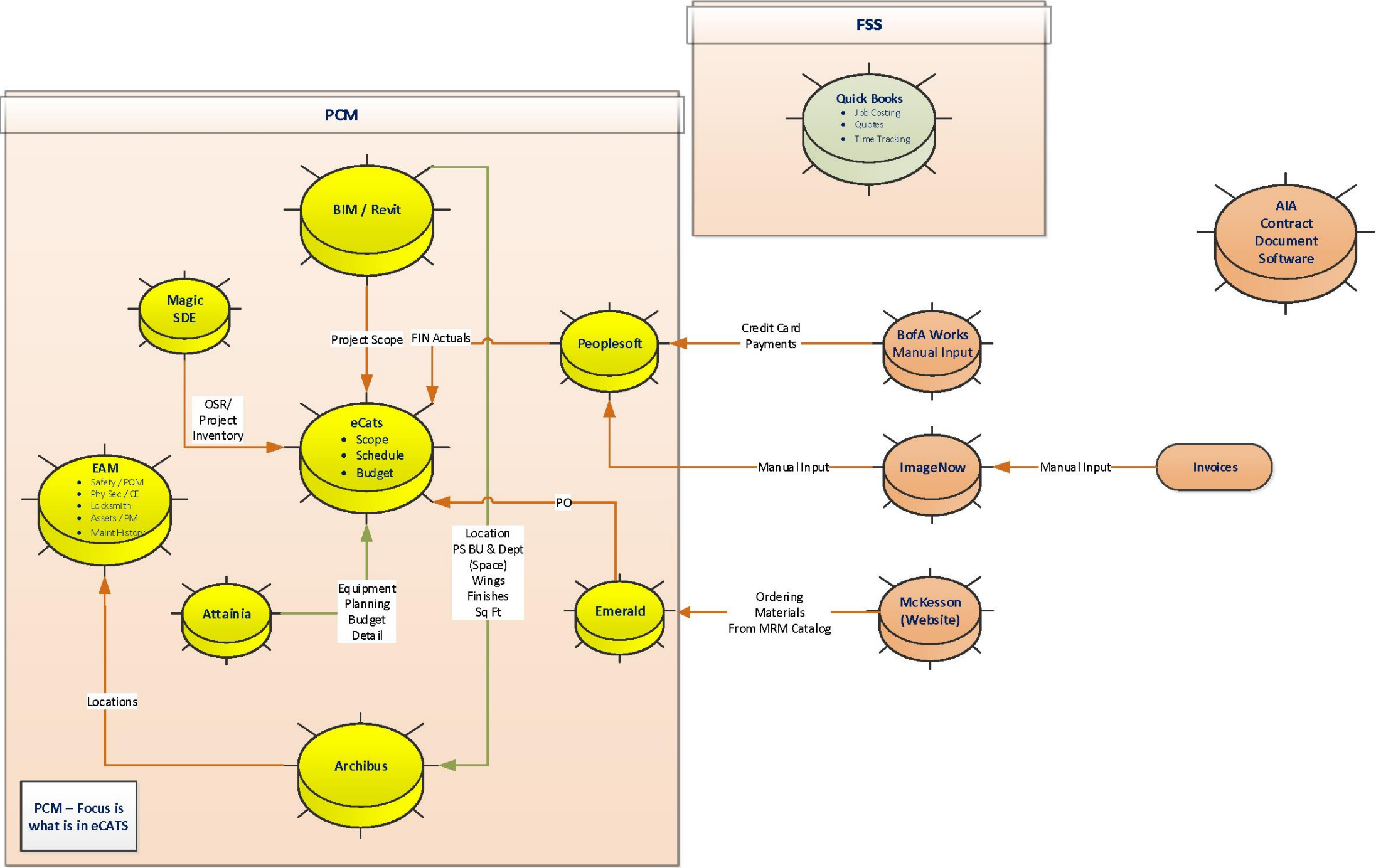


Facilities Information Management

Facilities Information Management Strategy



Facilities Information Management Strategy



Virtual Documentation

Virtual Plan Room: Cost effective method to distribute Information from BIM across enterprise in user friendly format

- CHS uses SharePoint 365 (Hosted on Microsoft Cloud)
 - Houses non-Revit documentation
 - O&M Manuals, Submittals, and Warranties
 - Houses Archive Drawings (dating back to 1930)

Virtual Plan Room – Internal Users:

- Each Facility has own sub-site
- Publish Revit Data to facility homepage – Area, Building Code Information, Finish Schedule
- Contains Floor Plans, life safety drawings, Bed License submissions and regulatory compliance documents published from Revit.
- Some drawings contain hyperlinks to O&M, Submittals, Warranties, and Photos

Virtual Plan Room – Outside Consultants:

- Publish Standards and Requirements for External A/E/C Access
- Digital Closeout Process
- Revit Templates and Family Library

Virtual Documentation

Homepage Example

0748_CMC-Kannapolis_...

Submissions - All Items

Office 365

Newsfeed OneDrive Sites Ruffo, Megh

BROWSE PAGE

SHARE FOLLOW

Pictures

Facility Documents

Active Projects

Archive

Archibus Plans

Facility Management Data

Lists

Discussions

EDIT LINKS

Facility Information

Facility:	CMC-Kannapolis
Facility Number:	0748
Facility Address:	2711 Lane Street Kannapolis, NC 28083
Gross Building Areas (SF)	
INTERIOR	25,525.90
EXTERIOR	26,395.45
ROOF	28,347.13
Site Areas (SF)	
SITE	622,664.15

Plaza_1314_FM.rvt - Sheet: ... - START... Type a keyword or phrase

Generate Edit Family Sync Publish to Upgrade Import Zone Valve Pipe Elev Import Export

Publish to SharePoint

Publish all content to SharePoint

Publishes all sheets and the FM Spreadsheet to the facility's SharePoint site.

Carolina's HealthCare System

Appendix B Information

Code Enforcement Jurisdiction	City of Kannapolis / Cabarrus County
Building Data	
Construction Type	II-B
Sprinklers	Yes
Sprinkler Code	NFPA 13
Standpipes	Yes
Standpipe Class	Wet
Fire District	No
Building Height	26' - 0"
High Rise	No
Mezzanine	No
Occupancy	
Primary Occupancy	Business
Secondary Occupancy	
Special Occupancy	
Mixed Occupancy	No
Life Safety System Requirements	
Emergency Lighting	Yes
Exit Signs	Yes
Fire Alarm	Yes
Smoke Detection Systems	Yes
Panic Hardware	Yes

Excel Online - FM Spreadsheet

Edit in Excel Comments Download a Copy Print

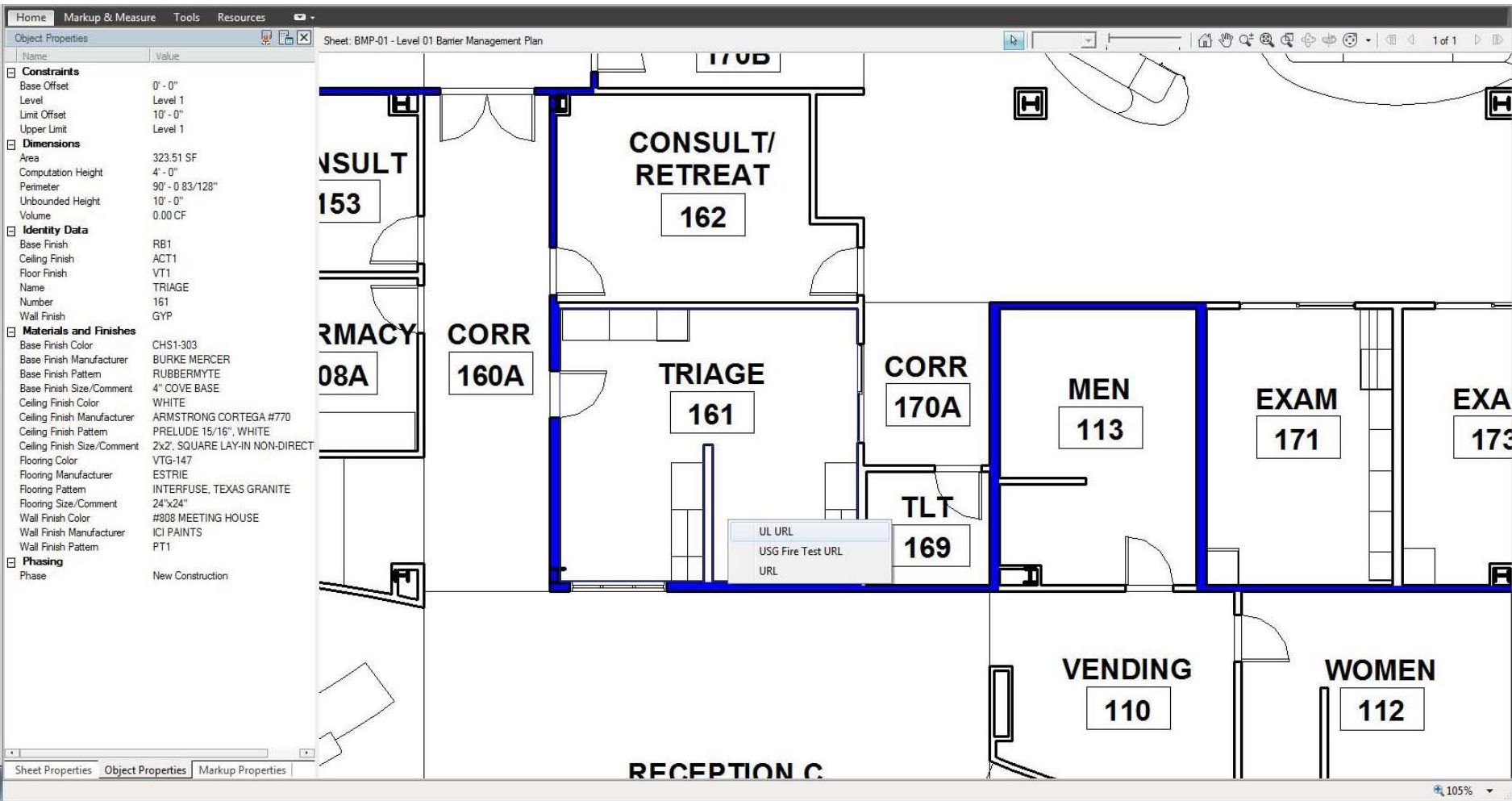
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Level	Number	Name	Base Finish	Base Finish Manu	Base Finish Color	Base Finish Size/Comme	Floor Finish						
Level 01	101	WC STOR	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	102	VESTIBULE	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	103	FP RISER	RB1	BURKE MERCER	RUBBERMYTE	CHS1-303	4" COVE BASE						
Level 01	104	CORR	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	105	RECEPTION A	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	106	RECEPTION B	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	107	LOBBY	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	108	WORK RM II	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	108A	PHARMACY	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	109	RECEPTION C	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							
Level 01	110	RECEPTION D	WB1			PLAIN SLICED, WHITE BIR STAINED TO MATCH PL-1 1/4" EASED TO							

Change Log Appendix B Room Schedule Finish Schedule Sheet List

COUNT: 100 HELP IMPROVE OFFICE

Virtual Documentation

■ Barrier Management Plans



ME/showpage.html?name=BXUV.U465&ccnshorttitle=Fire+Resistance+Ratings+--+ANSI/UL+263&objid=10743

carolinas.org

Search

More >>

Get more Add-ons

UL ONLINE CERTIFICATIONS DIRECTORY

Home Quick Guide Contact Us UL.com

Design No. U465

BXUV.U465
Fire Resistance Ratings - ANSI/UL 263

[Page Bottom](#)

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Listed or Classified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered as Classified, Listed, or Recognized.

Fire Resistance Ratings - ANSI/UL 263

[See General Information for Fire Resistance Ratings - ANSI/UL 263](#)

Design No. U465

March 19, 2012

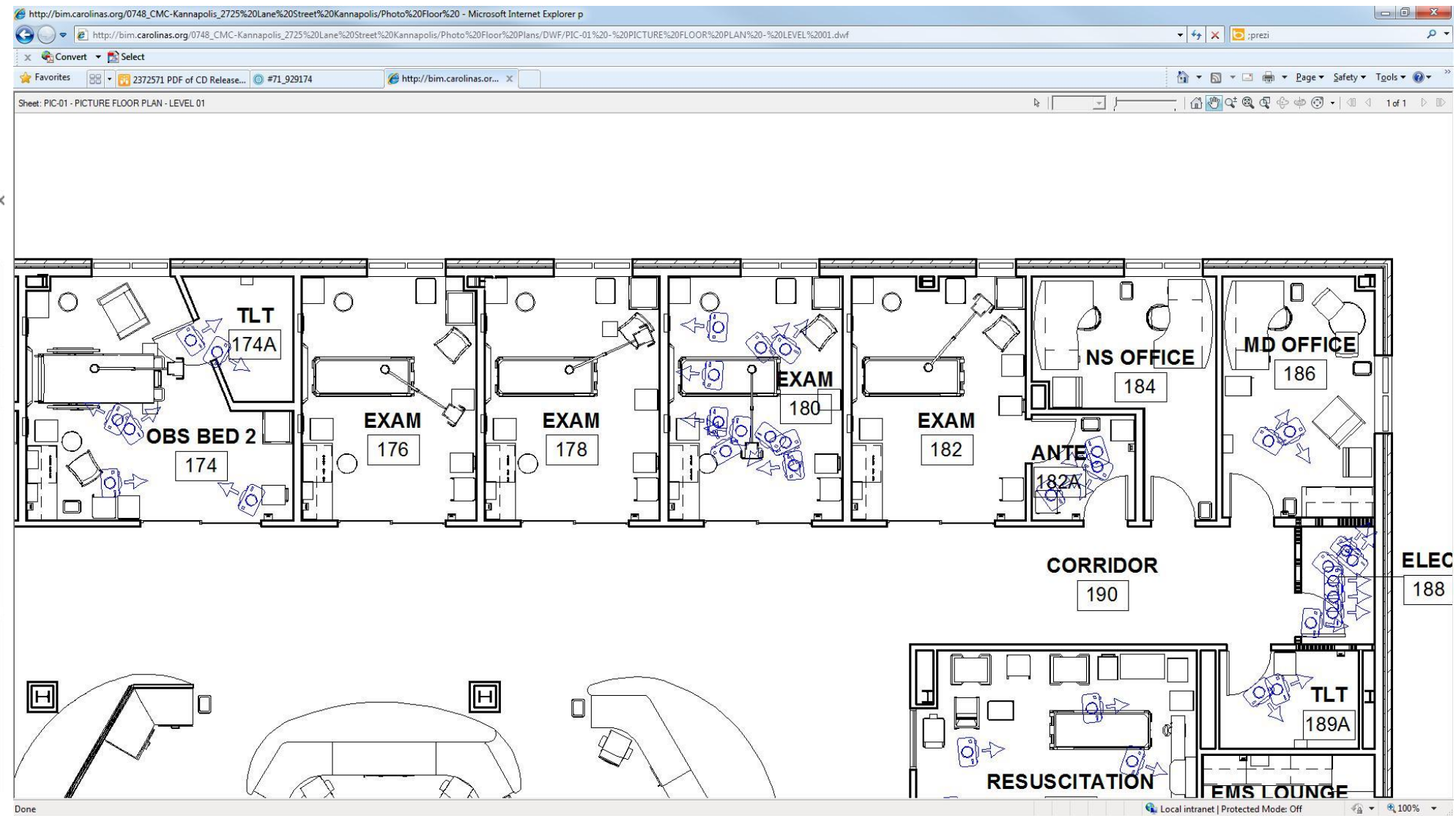
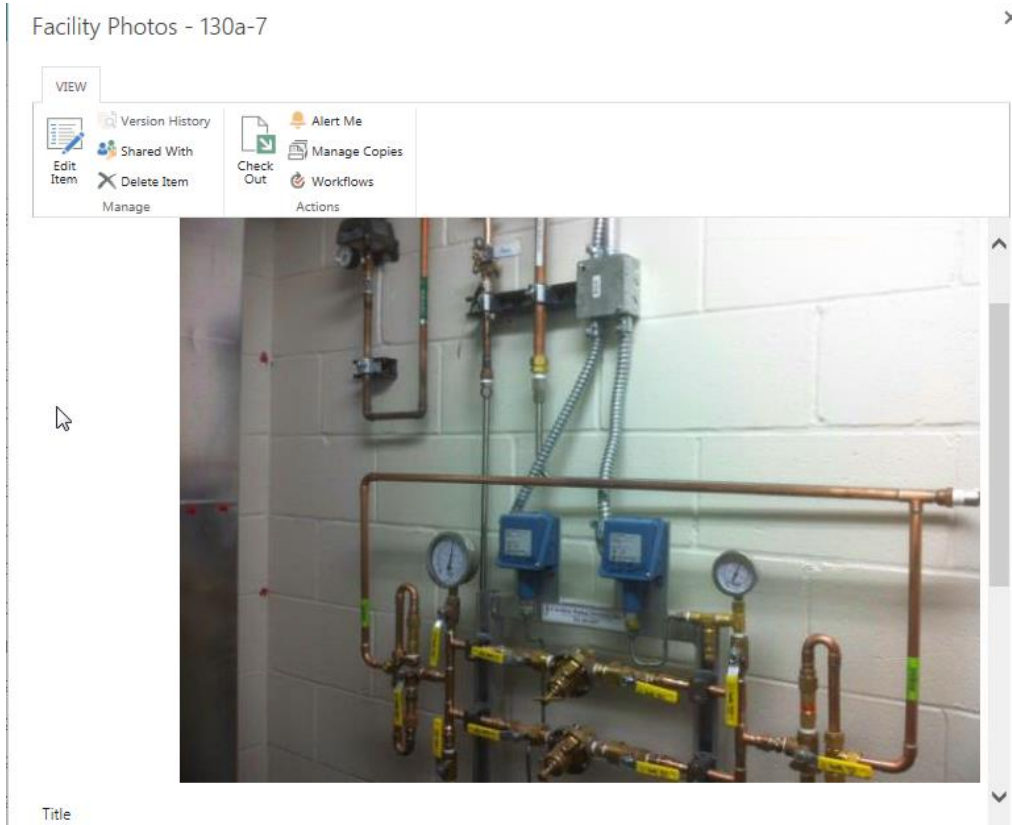
Nonbearing Wall Rating - 1 HR.

The diagram shows a cross-section of a wall assembly. It includes a concrete foundation, a concrete floor, and a concrete ceiling. The wall assembly consists of a concrete core with insulation on both sides. The insulation is labeled with numbers 2, 3, 4, and 5. The wall is shown between two concrete columns. The diagram is a technical drawing showing the internal structure of the wall.



Virtual Documentation

- Linked Photos



Virtual Documentation

- Security Device Plans



Security Device Schedule Level 02						
Mark	Security ID #	Type	Room: Number	Room: Name	Room: Department	Room: Department #
262	290-1-01	CR	02STR10	STAIR 10	VERTICAL	VERTICAL
263	289-1-01	CR	2344NS	NURSE STATION	NSG - ICU	524500
264	289-2-01	CR	C2346	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
265	298-2-00	CR	C2390	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
266	298-6-00	CR	C2390	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
267	299-2-00	CR	C2390	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
268	289-3-01	CR	C2390	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
269	289-4-00	CR	C2388	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
270	289-2-00	CR	C2388	CORRIDOR	BASE BUILDING AREAS	BASEBLDG
271	289-5-01	CR	C2387	CORRIDOR	BASE BUILDING AREAS	BASEBLDG



Space Management

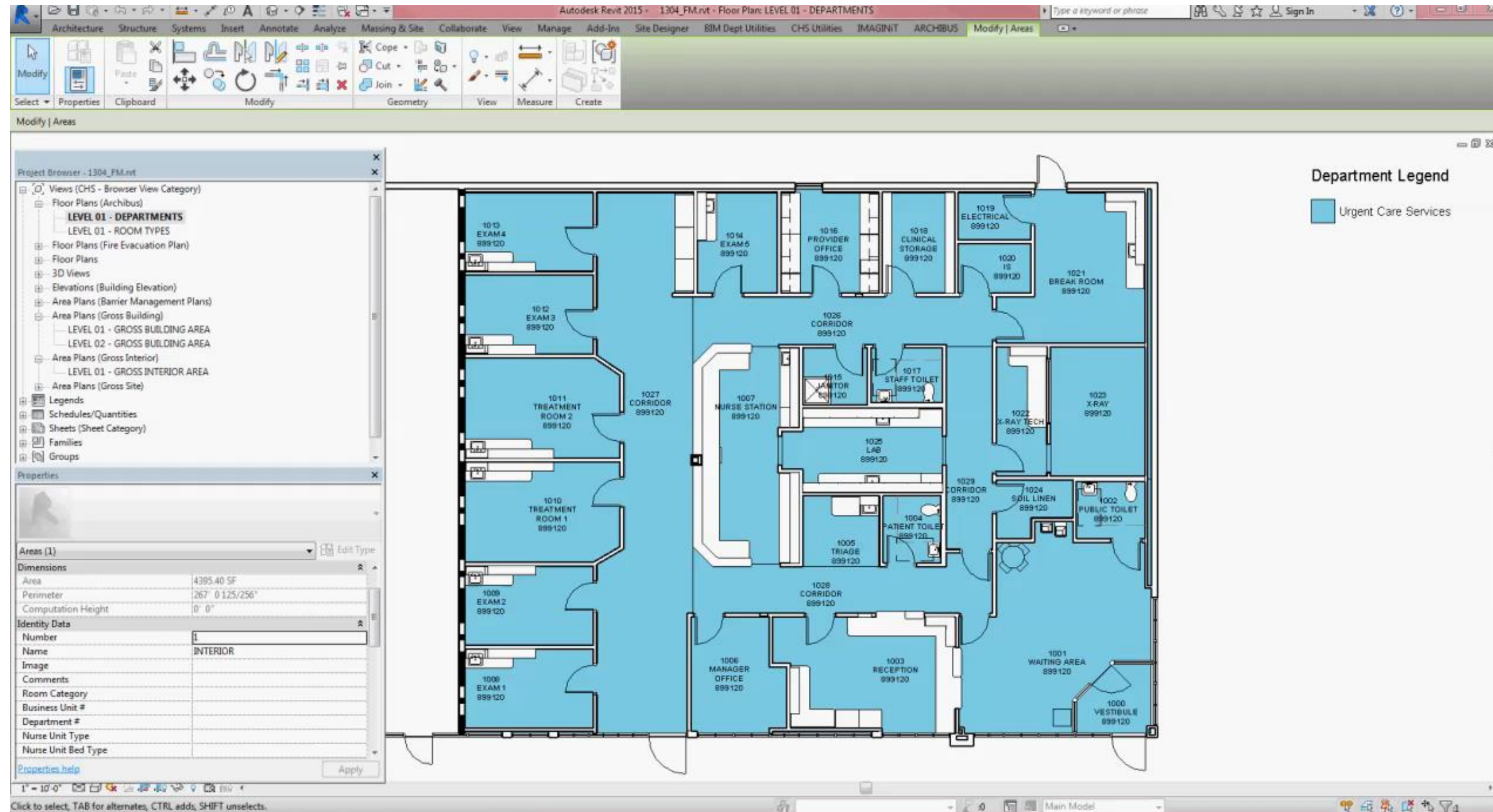
- Archibus is the system of record for space and lease management
 - Off the shelf add-in that creates bi-direction integration with Revit
 - Revit pushes room name, room number, and area data into Archibus
 - Department information is looked up in Archibus and linked to models
 - Initial push is from Revit, but data is managed in Archibus and synced back to Revit weekly
 - Physical backgrounds also published to web browser for interactive drawings



Archibus Revit Interface

Revit to Space Management Integration

- Cataloging data from Revit to Archibus



Space Management

- Interactive Web Based Drawings / Area Calculator

SqFt Calculator

Filter Show Clear i

Building Code Business Unit Code Room Category
Floor Code Department Code Room Type

Floors i

<input type="checkbox"/> Building	<input type="checkbox"/> Floor	<input type="checkbox"/> Name
<input type="checkbox"/> 0070	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> 0070	01	10620 Par
<input checked="" type="checkbox"/> 0070	02	10620 Par

Panel Print | Highlights: Departments Labels: Departments **Legend** i

No records to display.

10620 PARK ROAD_0070_FM-LEVEL 02

SqFt by Room XLS i

Building Code	Floor Code	Room Code	Business Unit Code	Expense Department	Department Name	Room Area ft ²
0070	02	218-01	PINE400	VACANT	Vacant Area	369.40
0070	02	218-02	PINE400	VACANT	Vacant Area	60.08
0070	02	218-03	PINE400	VACANT	Vacant Area	213.73
Total						2328.8

Space Management

- Data Reporting in Archibus

ARCHIBUS

TKOLTO01 Sign Out Help

Find a form or report

Space Planning & Management

Space Allocation

Data Reporting

Table Data Views and Exports

All Campus Data

All Property Data

All Building Data

All Wing Data

All Floor Data

All Suite Data

All Room Data

All Parcel Data

All Lease Data

All Option Data

All Recurring Cost Data

All Actual Cost Data

Business Objects (Building/Site)

Recurring Cost Info with Address

Business Objects (Building/Site)

Refresh

DOCX

XLS

Business Unit Code	Department Code	Region Code	Latitude	Longitude	Site Code	Site Name	Composite SF	Ext. Gross Area ft ²	Int. Gross Area ft ²	Rentable Area ft ²	Usable Area ft ²
		CENTER CITY	35.203511700000000000	-80.838455000000000000	CMC	Carolinas Medical Center	1,978,582.77	1,978,582.77	1,745,101.59	1,595,267.03	949,421.57
		CENTER CITY	35.191887000000000000	-80.803739000000000000	CHSR	CHC-Randolph	151,301.24	149,900.17	91,388.34	87,987.38	55,901.12
		CENTER CITY	35.201552000000000000	-80.838540000000000000	CMC	Carolinas Medical Center	130,346.62	227,546.12	126,275.80	124,024.73	84,152.20
		WEST	35.263158000000000000	-81.029815000000000000	CRMH	CR-Mount Holly	47,702.79	98,808.38	45,699.03	45,699.03	33,647.35
1017	677500	CENTER CITY	35.202592000000000000	-80.839962000000000000	CMC	Carolinas Medical Center	40,441.43	48,902.90	38,661.95	36,642.81	31,645.59
1017	679600	CENTER CITY	35.203142000000000000	-80.839418000000000000	CMC	Carolinas Medical Center	73,009.91	85,939.15	70,185.47	65,507.14	54,897.52
1017	679600	CENTER CITY	35.203642000000000000	-80.840108000000000000	CMC	Carolinas Medical Center	67,517.02	67,517.02	65,351.49	62,380.89	57,931.40
1017	679600	CENTER CITY	35.203297000000000000	-80.840138000000000000	CMC	Carolinas Medical Center	48,799.47	48,799.47	47,459.19	45,156.19	39,905.29
1017	679190	CENTER CITY	35.203610000000000000	-80.840948000000000000	CMC	Carolinas Medical Center	8,443.12	8,443.12	8,005.32	8,005.32	6,155.58
		CENTER CITY	35.210454000000000000	-80.820711000000000000	CHSM	CHC-Mercy	569,066.00	569,066.00	463,306.00	436,741.60	270,660.82
		CENTER CITY	35.306741000000000000	-80.747059000000000000	CHSU	CHC-University	276,328.62	276,328.62	267,774.03	258,322.78	154,923.78
1017	673000	CENTER CITY	35.204930000000000000	-80.838033000000000000	CMC	Carolinas Medical Center	242,145.81	242,145.81	233,835.12	225,377.64	207,119.22
1017	675000	LAKE NORMAN	35.438668000000000000	-80.866938000000000000	CHSHV	CHC-Huntersville	124,694.45	124,694.45	121,348.47	118,153.66	98,590.93
1017	676500	CENTER CITY	35.200068000000000000	-80.838528000000000000	CMC	Carolinas Medical Center	42,286.23	42,286.23	40,596.89	40,586.47	38,316.00
1017	666110	CENTER CITY	35.205780000000000000	-80.838816000000000000	CMC	Carolinas Medical Center	193,928.44	193,929.46	189,259.40	182,729.85	161,289.15
		SOUTH	35.091763000000000000	-80.871394000000000000	CHSP	CHC-Pineville	479,288.19	479,288.19	477,988.25	460,383.26	298,779.17
1017	666170	CENTER CITY	35.212966000000000000	-80.633289000000000000			58,976.00	62,745.92	60,311.94	56,861.35	44,879.55
		LAKE NORMAN	35.393932000000000000	-80.842772000000000000	HONH	Huntersville Oaks Nursing Home	112,604.81	112,604.81	107,951.85	107,951.85	80,902.78
1017	666810	NORTHEAST	35.436441000000000000	-80.603347000000000000	CHSNE	CHC-NorthEast	119,376.70	119,376.70	115,647.69	110,856.29	97,023.81
1017	679600	CENTER CITY	35.203066000000000000	-80.839612000000000000	CMC	Carolinas Medical Center	15,009.62	15,009.62	14,555.61	13,809.57	11,242.18
		CENTER CITY	35.204518000000000000	-80.839432000000000000	CMC	Carolinas Medical Center	27,859.00	0.00	0.00	0.00	0.00
		CENTER CITY	35.203500000000000000	-80.839027000000000000	CMC	Carolinas Medical Center	8,090.00	0.00	0.00	0.00	0.00
		CENTER CITY	35.202297000000000000	-80.839843000000000000	CMC	Carolinas Medical Center	12,711.00	0.00	0.00	0.00	0.00
1	601700	CENTER CITY	35.204679000000000000	-80.840534000000000000	CMC	Carolinas Medical Center	664,855.10	664,855.10	664,855.10	659,481.83	658,835.33
1017	679360	SOUTH	35.092716000000000000	-80.866173000000000000			21,572.00	23,408.59	22,574.99	22,201.30	21,361.43
		CENTER CITY	35.205210000000000000	-80.839695000000000000	CMC	Carolinas Medical Center	388,394.79	388,394.79	381,330.99	377,898.45	377,041.67
1017	679370	SOUTH	35.091884000000000000	-80.866648000000000000			4,550.00	4,155.04	3,927.27	3,927.27	3,497.93
1017	678005	SOUTHEAST	34.982766000000000000	-80.549242000000000000			4,551.00	4,843.96	4,543.48	4,543.48	4,387.61
							2,380.00	0.00	0.00	0.00	0.00
1017	678000	CENTER CITY	35.205332000000000000	-80.747838000000000000	CHSU	CHC-University	35,531.00	39,685.43	38,800.48	37,526.15	33,380.35

Lease Admin: Department Report

Refresh

CHS Buildings (in Archibus)

Building Code: 0[233] 1[97] All[530]

Refresh

DOCX

XLS

Building Code	Building Name	Address 1
0001	Carolinas Medical Center	1000 Bly
0002	CHS-Behavioral Health - Charlotte	501 Billir
0003	Carolinas Rehabilitation	1100 Bly
0004	CR-Mount Holly	275 Beat
0005	Research Office Building	1540 Gar
0006	Cannon Research Center	1000 Bly
0007	Medical Education Building	1000 Bly

Floors by Building

Building Code: 0[0] All[0]

Refresh

Floor Name	Floor Code	Building Code
Floor 01	01	0006
Floor 02	02	0006
Floor 03	03	0006
Floor 04	04	0006
Floor 05	05	0006
Floor 06	06	0006
Crawl Space	CS	0006
Roof Area	RF	0006

Rooms by Floor

Building Code: 0[51] All[51]

Refresh

DOCX

XLS

Building Code	Floor Code	Room Code	Room Name	Room Type	Room Area ft ²	Business Unit Code	Department Code
0006	04	417	SCOPE RM.	STOEQUIP	87.67	12	260012
0006	04	418	STORAGE	STOGENRL	46.20	12	260012
0006	04	419	RESEARCH LAB	RESLAB	289.72	12	260012
0006	04	419A	MICROTOME	RESLAB	110.28	12	260012
0006	04	419B	STORAGE	STOGENRL	51.73	12	260012
0006	04	440	VEST.	CORRIDOR	46.26	12	260012
0006	04	440A	DARK ROOM	DRKRM	87.61	12	260012
0006	04	440B	DARK ROOM	DRKRM	143.07	12	260012
0006	04	425	RESEARCH LAB	RESLAB	490.60	12	260015
0006	04	426	RESEARCH LAB	RESLAB	479.66	12	260017
0006	04	427	RESEARCH LAB	RESLAB	524.89	12	260017
0006	04	428	ANTE	ANTERM	48.38	12	260017
0006	04	428A	STORAGE	STOGENRL	49.33	12	260017
0006	04	428B	STORAGE	STOGENRL	72.22	12	260017
0006	04	428C	STORAGE	STOGENRL	48.12	12	260017
0006	04	420	RESEARCH LAB	RESLAB	426.13	12	260017
0006	04	421	RESEARCH LAB	RESLAB	97.59	12	260017
0006	04	422	RESEARCH LAB	RESLAB	421.99	12	260017
0006	04	423	RESEARCH LAB	RESLAB	229.04	12	260017
0006	04	404	OFFICE	OFC	156.95	12	260017
0006	04	405	OFFICE	OFC	156.95	12	260017
0006	04	402	OFFICE	OFC	156.95	12	260017
0006	04	403	OFFICE	OFC	156.95	12	260018
0006	04	401	OFFICE	OFC	172.90	12	260018
0006	04	411	RESEARCH LAB	RESLAB	496.74	12	260018
0006	04	437	JANITOR	STOHSKPNG	15.85	12	BASEBLDG
0006	04	438	PUMP RM.	ELECRM	19.86	12	BASEBLDG
0006	04	442	CORRIDOR	CORRIDOR	673.25	12	BASEBLDG
0006	04	450	CONNECTOR	CORRIDOR	909.79	12	BASEBLDG
0006	04	400	LOBBY	LOBBY	122.03	12	BASEBLDG
0006	04	424	ELEC / IS ROOM	ELECRM	78.09	12	BASEBLDG
						12.209.83	

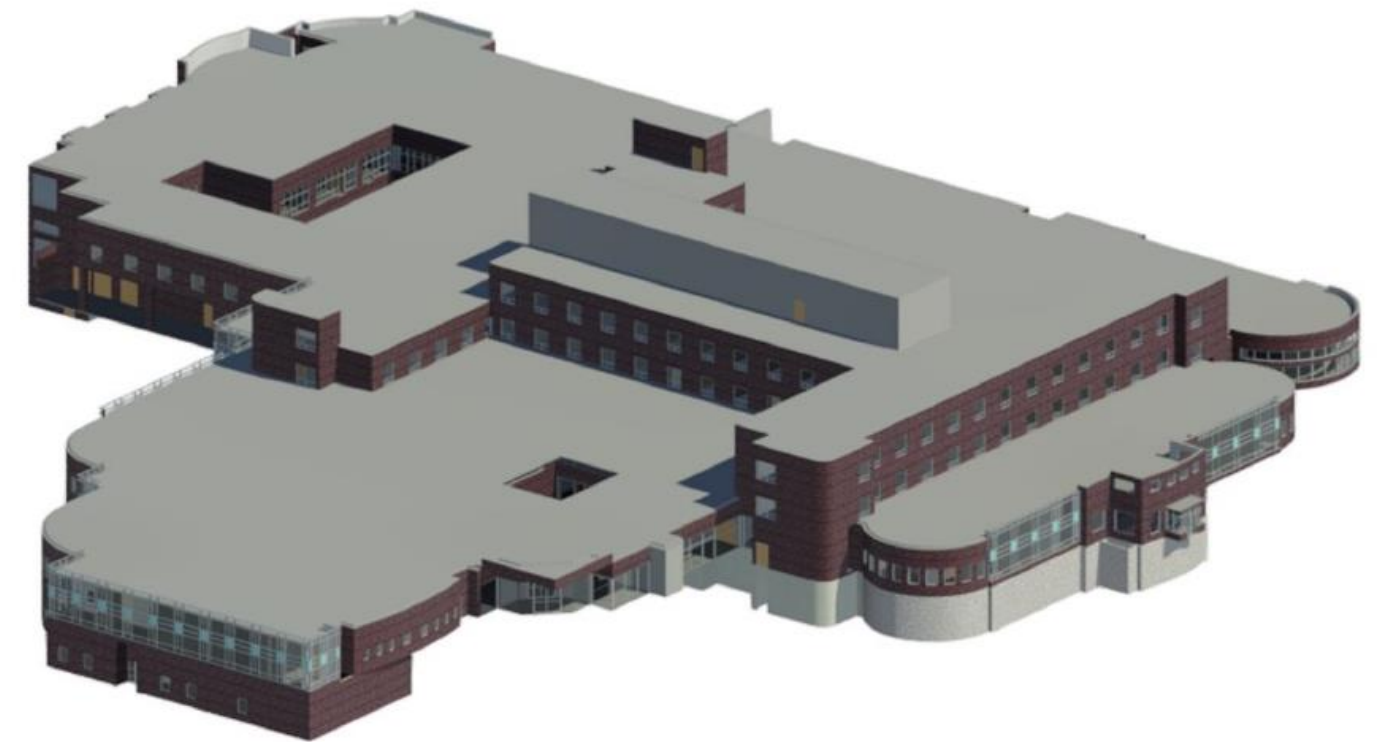
AUTODESK UNIVERSITY 2016

AUTODESK

Converting Existing Facilities

- Current State:
 - Over 17 million SF in Primary Enterprise
 - 15.8 million SF linked with Revit connected to Archibus
 - Only 1 remaining facility in conversion process
 - Converting all CAD to Revit -
 - Review information needed for space management – walls, doors, columns, windows.
 - BIM Savvy users – better quality, no training required
 - Look at level of detail required – fabrication level model not needed
- For facilities where CAD existed but not connected to Archibus (no SF reports) – Revit process twice as fast as CAD polyline
- For new facilities that follow CHS BIM requirements – time reduced from 40 hours to 1 hour enter into system

Converting Existing Facilities

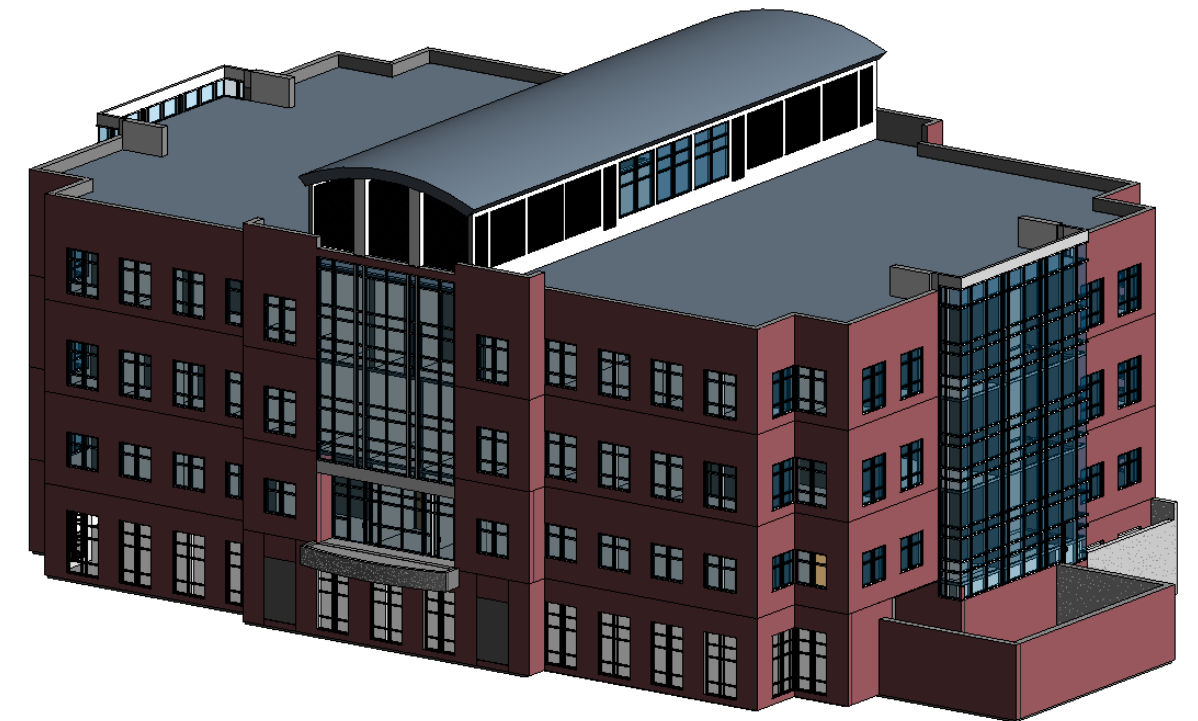
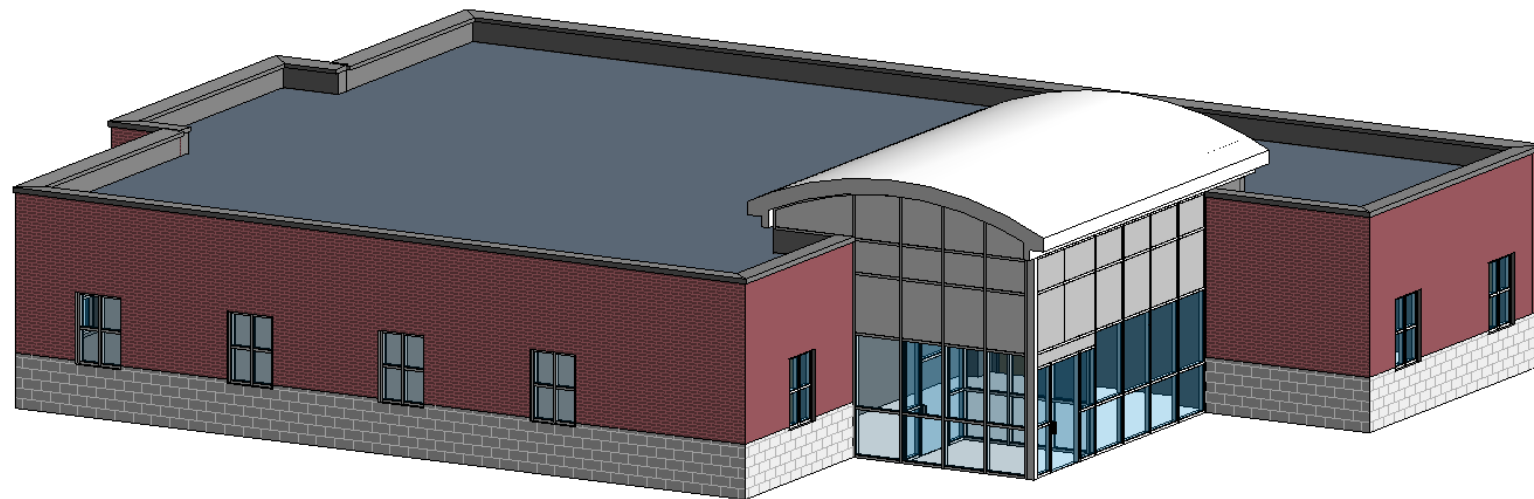
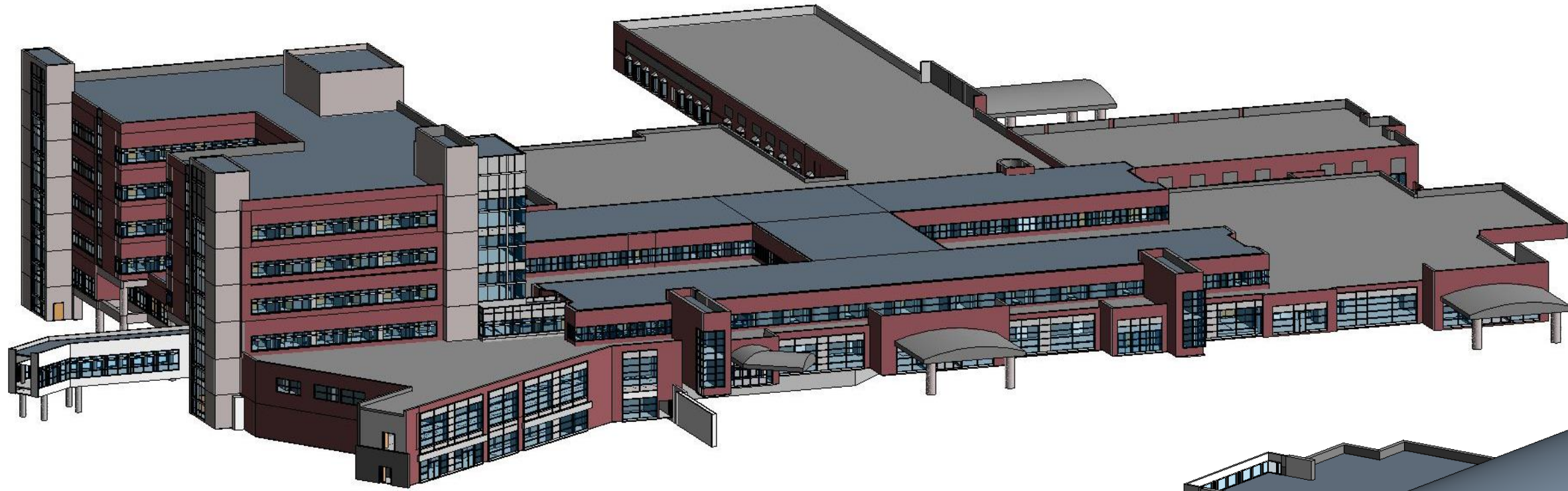


Stanly Regional Medical Center

For some facilities – the model was created from paper drawings and field measuring

Converting Existing Facilities

- Example of facilities converted from CAD to Revit
- Shows the amount of detail needed for square footage calculations



Asset Management

Asset Management / CMMS (Computerized Maintenance Management System)

- Current State:
 - Revit to CMMS integration with custom created Excel export for data transfer:
 - Asset information is automated instead of field surveyed and manually entered.
 - BIM team reviews data quality – using automated checks from Revit Add-ins.
 - Excel Export can be used to collect data and import data back into the model.
- Goals / Best Practice:
 - Review the information requirements for your healthcare system. Look at type and quantity of data needed. Not all project data may be needed for Facilities Management.
 - Review how information is collected. User friendly interfaces and familiar platforms help ensure data is easy to collect - Excel to Revit can be a time saver.
 - Make the process applicable and consistent to all project types (new, renovated, large, small)
 - Exported data can be used to feed CMMS system to help build capital budgeting and forecasting. (facility systems and equipment replacements)

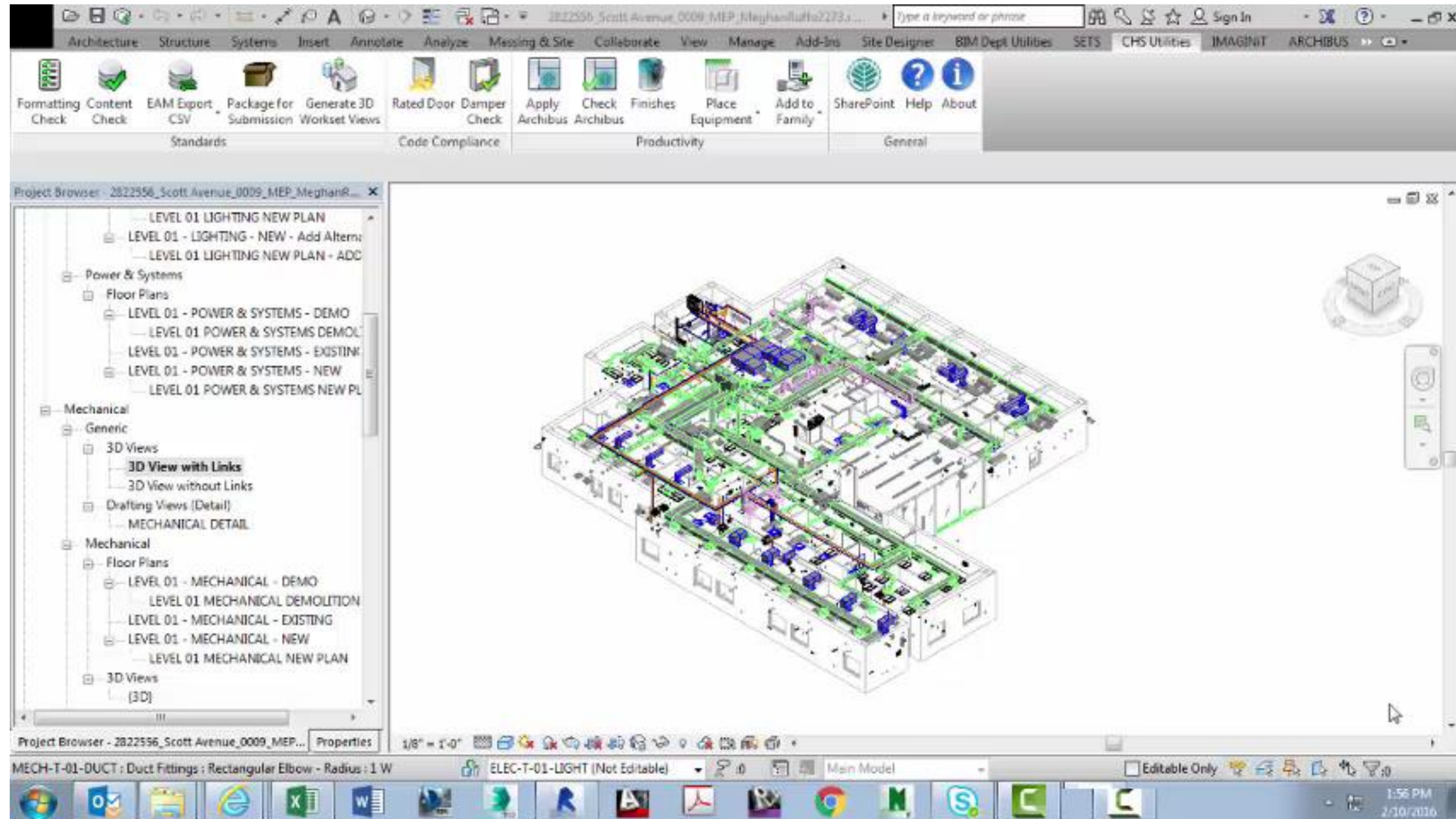
Asset Management

View of data export & custom add-in within Revit

The image displays the Autodesk Revit interface with a focus on the Asset Management (EAM) add-in. The top portion shows a data table with columns for OmniClass Number, Family and Type, Phase, Asset Tag, OSR #, Facility N, Floor Co, Room Nu, Room Name, Manufacturer, Model, Serial Number, Submittal Data, and O&M Manual. Below the table, a 3D model of a room is visible, featuring a desk, chair, and lighting fixture. A 'Type Properties' dialog box is open, showing parameters for a 'Stereo OR Light-880'. On the right, the 'EAM Export CSV' and 'EAM Import Excel' buttons are highlighted. A tooltip for 'EAM Import Excel' explains its function: 'Import an Excel spreadsheet of assets' and 'Imports an Excel file and updates elements in the model with information from the spreadsheet.' The bottom right corner shows the 'Sheet: STARTING VIEW' and 'Graphics' settings.

OmniClass Number	Family and Type	Phase	Asset Tag	OSR #	Facility N	Floor Co	Room Nu	Room Name	Manufacturer	Model	Serial Number	Submittal Data	O&M Manual
23.75.70.17.27	238219_FCU: FCU-2 A	New Construction	0	2426824	1317	01	1001	ENTRY VESTIBULE	Trane	FC, FF		238219_FCU-UNT-SVX07D-EN.pdf	238219_FCU-UNT-SVX
23.80.70.11.21	265100_EXIT SIGNS_###: Standard	New Construction		2426824	1317	01	1001	ENTRY VESTIBULE	NEW STAR #620 MAX SERIES				
23.80.70.11.21	265100_EXIT SIGNS_###: Standard	New Construction		2426824	1317	01	1002	WAITING	NEW STAR #620 MAX SERIES				
23.80.70.11.21	265100_EXIT SIGNS_###: Standard	New Construction		2426824	1317	01	1002	WAITING	NEW STAR #620 MAX SERIES				
23.80.70.11.21	265100_EXIT SIGNS_###: Standard	New Construction		2426824	1317	01	1002	WAITING	NEW STAR #620 MAX SERIES				
23.80.70.11.21	265100_EXIT SIGNS_###: Standard	New Construction		2426824	1317	01	1002	WAITING	NEW STAR #620 MAX SERIES				

Asset Management



Asset Management

CMMS – FM/POM Maintenance Management – CMS Dashboard

The screenshot displays the CMS Custom Maintenance Software interface. The top navigation bar includes the Carolinas HealthCare System logo, the title 'CMS CUSTOM MAINTENANCE SOFTWARE', and user information 'Welcome, Robert S Dodson • Log Out'. The facility is set to '10 - Carolinas Rehabilitat' and the status is 'Available'.

The left sidebar contains a 'Quick Search' bar and a 'Navigation' menu with options: MyCMS, Work Orders, Assets, Procedures, Users, Reports, Admin, Materials, Filing Cabinet, Companies, Projects, and Support.

The main content area is divided into several sections:

- Work Order:** Displays details for Work Order Number 6688575, created on 1/31/2016 at 10:12 PM. The 'Work Order Description' is highlighted with a red circle and labeled 'Work Order Description'. It includes fields for Common Problems, Requestor Name, Requestor Email, Requestor Comments, Cost Center, Status (Cancelled), Priority (P3 - Routine), Category (Preventive Maintenance), Trade (Maintenance Tech), Location (CR-Mount Holly), and Location Detail (1116-PROCEDURE).
- Procedures/Rounds:** Displays a list of procedures. The 'PM Procedure' is highlighted with a red circle and labeled 'PM Procedure'. It includes a table with columns for Name, Start Date, Hours, and Billable.
- Assets:** Displays a list of assets. The 'Asset Number and Description' is highlighted with a red circle and labeled 'Asset Number and Description'. It includes a table with columns for Asset No., Description, and a 'Select Asset' dropdown.
- Location:** Displays a list of locations. The 'Location' is highlighted with a red circle and labeled 'Location'. It includes a table with columns for Name, Start Date, Hours, and Billable.

The bottom section contains 'Linked Work Orders' and 'Attachments'.

Asset Management

CMMS – FM/POM Asset Management – CMS Dashboard

The screenshot displays the CMS Custom Maintenance Software interface. The main dashboard features a table of assets with columns for Asset Number, Asset Description, Last PM Completed, Next PM Due, Segment, Status, Category, Location, and Location Detail. A red circle highlights the 'List Assets' button in the top right corner. Below the main table, a 'Work Order History' window is open, showing a list of work orders with columns for WO#, Description, and Type. A red circle highlights the 'Work Order History' title. To the right, a 'Time Stamp Data' window is open, displaying a table of timestamps, users, objects, events, and details. A red circle highlights the 'Time Stamp Data' title. On the left, a 'Search' window is open, showing a search form with fields for Asset Number, Asset Description, Manufacturer, Model Number, Serial Number, Cost Center, Status, Category, System Classification, Pick #, Trade, Location, Location Detail, Warranty Start Date, Warranty End Date, and Life Expectancy. A red circle highlights the 'Search' title. Below the search form, an 'Asset Description' window is open, showing a detailed view of an asset. A red circle highlights the 'Asset Description' title.

List Assets

Asset Number	Asset Description	Last PM Completed	Next PM Due	Segment	Status	Category	Location	Location Detail
111982	LIGHT, EMERGENCY	2/15/2016 12:00:00 AM	3/1/2016 12:00:00 AM	10 - Carolinas Rehabilitation	Active	Electrical System - Lighting - Task Light	CR-Mount Holly - 01	1117-HOLDING
111983	LIGHT, EMERGENCY	2/15/2016 12:00:00 AM	3/1/2016 12:00:00 AM	10 - Carolinas Rehabilitation	Active	Electrical System - Lighting - Task Light	CR-Mount Holly - 01	1117-HOLDING
111984	LIGHT, EMERGENCY	2/15/2016 12:00:00 AM	3/1/2016 12:00:00 AM	10 - Carolinas Rehabilitation	Active	Electrical System - Lighting - Task Light	CR-Mount Holly - 01	1117-HOLDING

Work Order History

WO#	Description	Type
6688590	_LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)	Preventive Maintenance
6688575	_LIGHT, EMERGENCY - TASK BATTERY BACKUP (ANNUAL)	Preventive Maintenance Reportable
6664656	_LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)	Preventive Maintenance
6639473	_LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)	Preventive Maintenance
6614682	_LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)	Preventive Maintenance
6591300	_LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)	Preventive Maintenance

Time Stamp Data

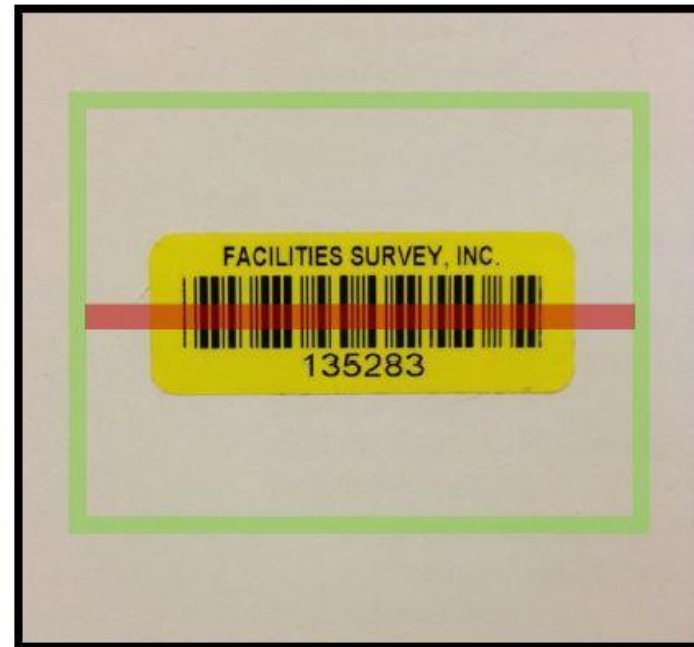
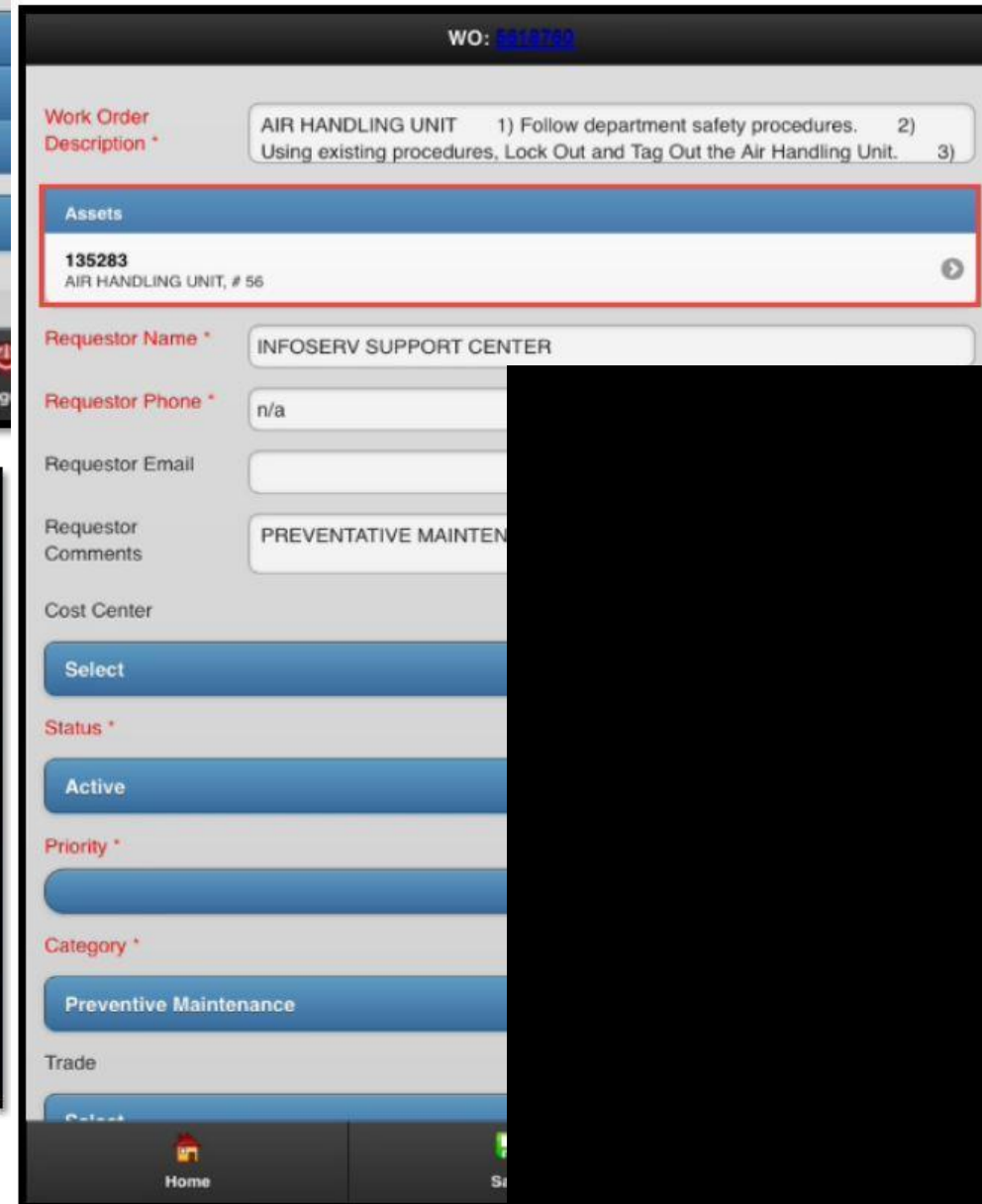
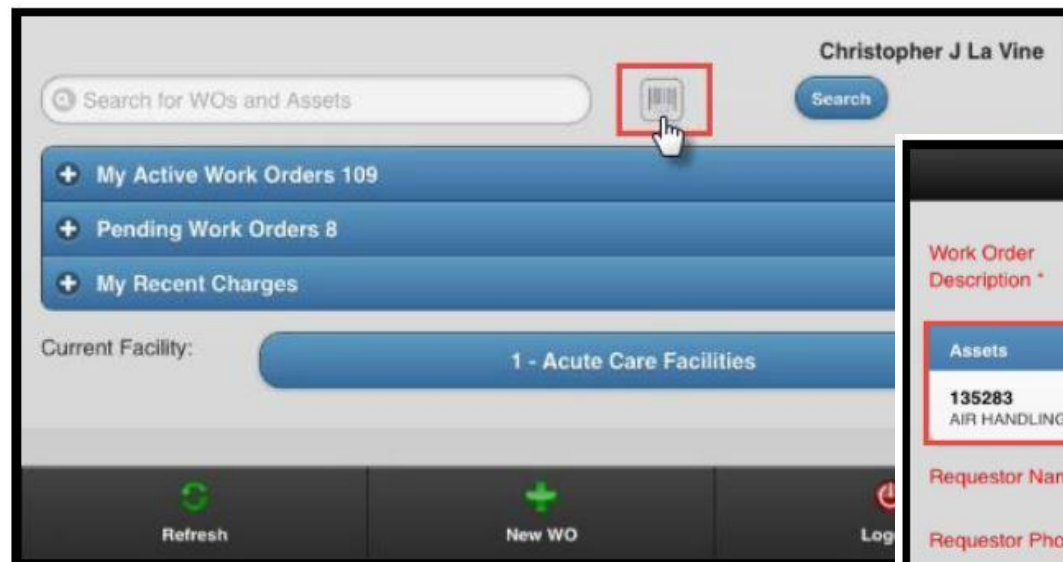
Timestamp	User	Object	Event	Detail
2/15/2016 7:51:36 AM	Robert S Dodson	Procedure	Removed	• _LIGHT, EMERGENCY - TASK BATTERY BACKUP (ANNUAL)
9/21/2015 10:37:12 AM	Lorraine Knox	Asset	Modified	• Notes changed from "Vendor: Camp Elect, Equipment Size - 6 PORTFOLIO: LD6A-20-DL3-ERM6A20-840-6LM L-LI Holding 1117-Mark 65" to "Vendor: Camp Elect, Equipment Size - 6, Downlight PORTFOLIO: LD6A-20-DL3-ERM6A20-840-6LM L-LI Holding 1117-Mark 65"
9/21/2015 10:35:48 AM	Lorraine Knox	Asset	Modified	• Notes changed from "Vendor: Camp Elect, Equipment Size - 6 PORTFOLIO: LD6A-20-DL3-ERM6A20-840-6LM L-LI Holding 1117-Mark 65" to "Vendor: Camp Elect, Equipment Size - 6 PORTFOLIO: LD6A-20-DL3-ERM6A20-840-6LM L-LI Holding 1117-Mark 65"
9/21/2015 10:29:11 AM	Lorraine Knox	Procedure	Added	• _LIGHT, EMERGENCY - TASK BATTERY BACKUP (ANNUAL)
9/21/2015 10:27:12 AM	Lorraine Knox	Procedure	Removed	• _LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)
9/21/2015 10:27:01 AM	Lorraine Knox	Procedure	Added	• _LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)
9/21/2015 10:25:34 AM	Lorraine Knox	Procedure	Added	• _LIGHT, EMERGENCY - TASK GENERATOR BACKUP (MONTHLY)
9/21/2015 10:24:21 AM	Lorraine Knox	User-defined Field	Modified	• Capital Asset set to 'No'.
9/21/2015 10:24:21 AM	Lorraine Knox	User-defined Field	Modified	• OSR set to 'EXPENSE'.

Search

Asset Description

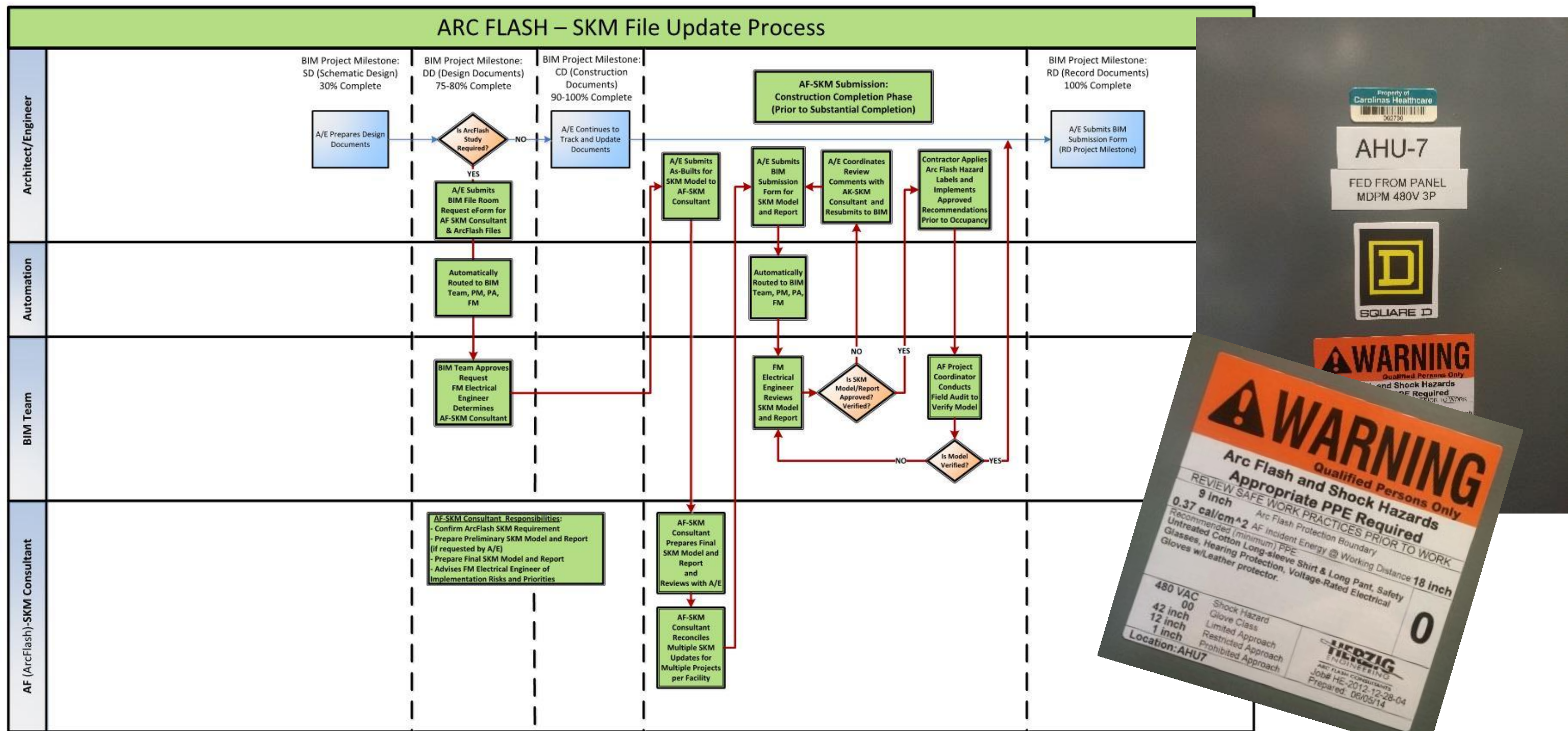
Asset Management

CMMS – FM/POM Asset Management – Mobile Device Application



Supplemental Documentation

ArcFlash - SKM File Management thru BIM Process



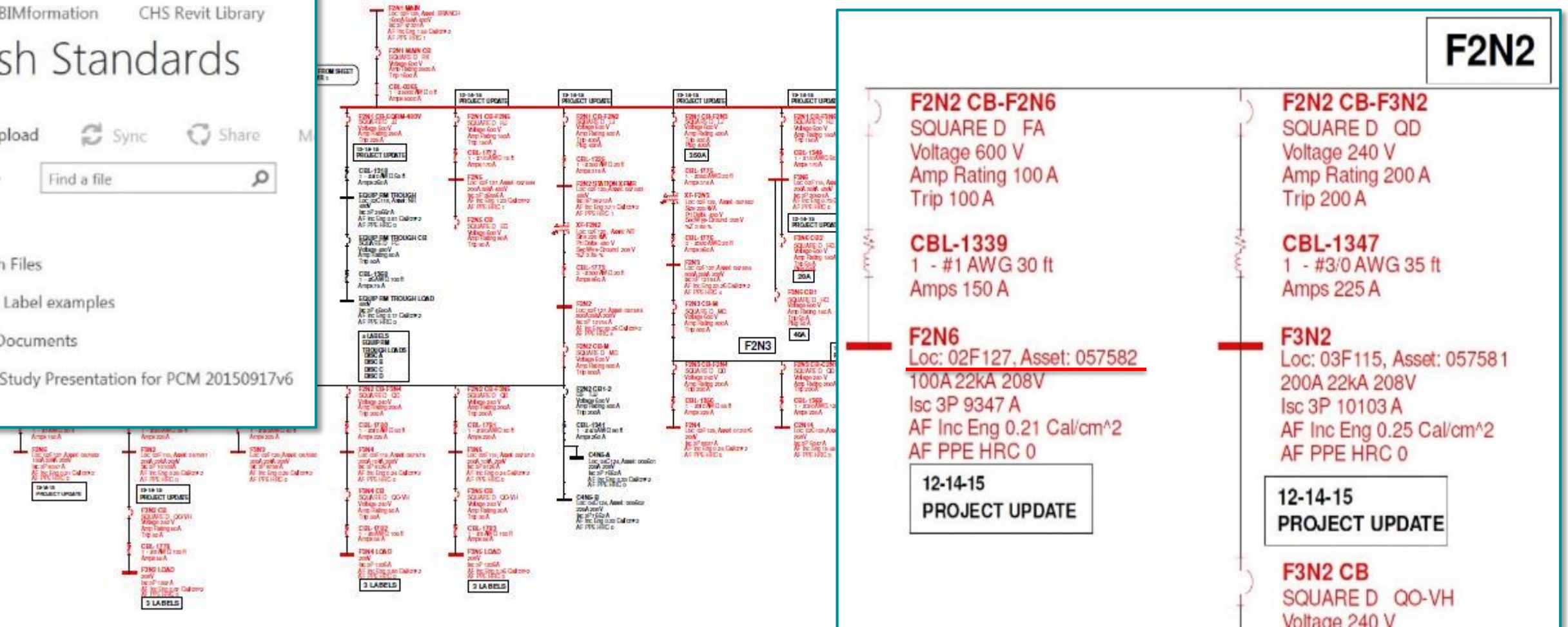
Supplemental Documentation

ArcFlash – Reports and One-line Diagrams

- BIM External 2 – SharePoint Site Access

Carolinas HealthCare System

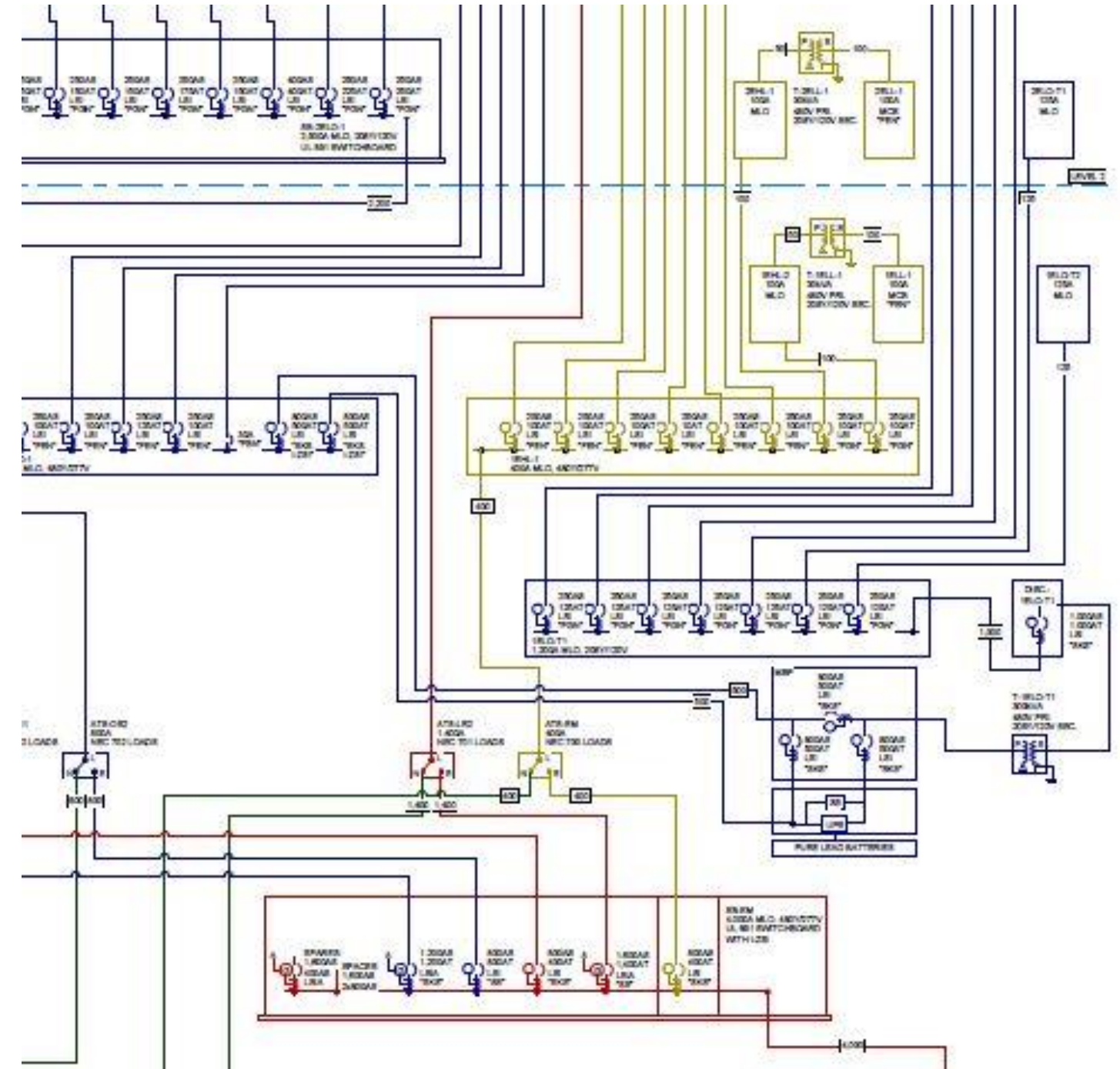
CMC - Carolinas Medical Center
Charlotte, North Carolina



Supplemental Documentation

Master Facility Electrical Riser Diagrams – BIM Process 2017

- A/E uses CHS Single-Line Diagram Revit Template available on the BIM SharePoint Site.
- Diagrams are color coded per CHS/DHSR compliance standards.
- A/E submits Final Master Facility Single-Line Diagram at Record Documentation Closeout Phase.
- CHS BIM and FM-POM Team review submission.



Conclusion

BIM Program Return on Investment

- The CHS BIM Program has demonstrated the following values:
- Project and Construction Management
 - 25% Error and Omission reduction on BIM projects (from 2.2% to 1.66%) Approximate value is \$500K on 2013 capital project value of \$100M
- Virtual Plan Room
 - 500K Reduction in reimbursable costs over 5 years
- Space Management
 - Annual labor savings of \$30K due to reduction in FTE hours entering SF data
- Asset Management
 - Annual savings of \$45K due reduction in FTE hours in EAM data entering
- Total annual CHS benefit from the overall BIM Program has exceeded \$1.7M over the last five years.
- Award Recognition: The CR-NE project was awarded a 2014 Honorable Mention for BIM in Facilities Management from the National AIA Technology in Architectural Practice Committee

Contact Information

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Questions



How did I do?

- Your class feedback is critical. Fill out a **class survey** now.
- Use the AU mobile app or fill out a class survey online.
- Give feedback after each session.
- AU speakers will get feedback in real-time.
- **Your feedback results in better classes and a better AU experience.**

