





Campus FM Technology Association

WESTERN MICHIGAN UNIVERSITY

Facilities Management Department

DeVon Miller Building Commissioning Administrator

INTRODUCTION



DeVon C. Miller, CPMP, LEED® AP Building Commissioning Administrator Engineering Division Facilities Management Western Michigan University Phone: (269) 387-8517 Email: <u>devon.miller@wmich.edu</u> DeVon Miller is the Building Commissioning Administrator at Western Michigan University. DeVon is new to Facilities Management but has over 15 years of experience in project management including energy conservation, building automation systems, building commissioning and is a Commissioning Process Management Professional and LEED Accredited Professional with ASHRAE and Green Building Certification Institute (GBCI) respectively. He holds a BS in Mechanical Engineering from Michigan Technological University.

AGENDA



WMU FM

BIM for new construction

BIM for existing buildings



WMU FAST FACTS

Established in 1903

Enrollment 24,294

1,200 acres and 167 buildings

8 million square feet of University space

On-campus residence halls and apartments are able to house 6,400 students

39 miles of sidewalk and 26.5 lane miles of roadway

49 miles of utilities







FM DEPARTMENT ORGANIZATIONAL CHART



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BIM FOR NEW CONSTRUCTION



CAPITAL CONSTRUCTION PROJECTS



BIM PLANNING

Setting expectations

BIM PROJECT EXECUTION PLAN: WHAT'S IN IT?

BIM PROJECT EXECUTION AND STANDARDS GUIDE	BIM PROJECT EXECUTION AND STANDARDS GUIDE Too Western Michigan University Facility Management
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1. PROJECT GOALS / BIM USES

BIM EXECUTION PLAN

1. BIM Goals and uses

പ്പ	PRIORITY (HIGH/ MED/ LOW)	GOAL DESCRIPTION	PROJECT PHASE
	н	Provide WMU a LOD 300 model including Arch, MEP, and Structure for construction	Construction
$\overline{\bigcirc}$	н	Coordinate all disciplines through the design/construction process to reduce RFI's	Construction
Č	м	Reference all building components per the Western Michigan University BIM guideline	Lifecycle
	н	Improve commissioning process by adding equipment information into BIM process	Lifecycle
	н	Improve visualization of design intent using BIM design principles	Design

	x	PLAN	x	DESIGN	x	CONSTRUCT	x	OPERATE
		PROGRAMMING	x	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING MAINTENANCE SCHEDULING
		SITE ANALYSIS	x	DESIGN REVIEWS	х	CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEM ANALYSIS
			x	3D COORDINATION	x	3D COORDINATION	Х	ASSET MANAGEMENT
S S S S S S S S S S S S S S S S S S S			x	STRUCTURAL ANALYSIS	х	DIGITAL FABRICATION	x	SPACE MANAGEMENT / TRACKING
S				LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
\supset				ENERGY ANALYSIS		RECORD MODELING		RECORD MODELING
\leq				MECHANICAL ANALYSIS				
8				OTHER ENG. ANALYSIS				
				SUSTAINABLITY (LEED) EVALUATION				
				CODE VALIDATION				
		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
	X	COST ESTIMATION	X	COST ESTIMATION	X	COST ESTIMATION		COST ESTIMATION

BIM PLANNING

Setting expectations

BIM PROJECT EXECUTION PLAN: WHAT'S IN IT?

SECTI	ON D: PROJEC	T GOALS	BIM USES													
1. M	ejor BIM Goals B	Objectives						SECTION G: CO	LLABORATION	N PROCEDURES						ł
			64× 640	1000			A10.07 8-10	1. Collaboration	Strategy							
2000	HE LENT						PROFEST PRAJE	All BIM collab	oration will happ	en using the Western	Michigan Univers	ity's designat	ted coll	boration site. I	Project te	*
		svide WMU a	100 300 model including An	a, 109	and Structure for construct	**	Construction	members will	be required to	uplead information	per the BIM pr	oject model	and do	cument deliver	y schedule	1
	H	automatic all	foculines through the desig	n/64444	uction process to reduce \$7		Construction	2. BIM Coordina	tion Meeting P	rocedures						
		and the set	engeenperant breider e		tinformation into BM source		Literate									
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								BIM REQUIREME	NTS KICK-OFF	PROGRAMMING	ONCE	WMU	AL/CO	10	WMU	
2. Mi	endatory Uses of	BIM Model	e include					BIM EXECUT DEMONST	ION PLAN RATION	PROGRAMMING	ONCE	RESPON	NSIBLE P	ARTY	WMU	
		1.00				1.00		DESIGN COO	IDINATION	00/50/00	BI-WEEKLY	RESPON	SIGLE P	AKTY	WMU	
A	PLAN	x	DESIGN	X	CONSTRUCT	X	EUROPERATE	CONSTRUC	TABILITY	CONSTRUCTION	BUNEEVIN	esserve		ARTY	-	
	PROGRAMMING	*	DESIGN AUTHORING		CONTRACTOR EXTERN		EDEDUNE	COORDIN	LATION	Companyoritory						
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		x	30-COORDINATION	X	30 COORDINATION	X	ADDET MANAGEMENT									
		x	ITRUCTURAL ADALITIE	X	DISTAL FABRICATION	X	SPACE MANAGEMENT / TRACOME	3. Model & Doc	ument Delivery	Schedule of Inform	nation Exchange	for Review,	Coordin	ation, Submission	a and Appro	-
			USHTING ANALYSIS		30 CONTROL AND PLANNING		DEADER PLANNES	RECEMATION	FRE	PLE	ONE-TIME or	OUE DATE	M00	MODE	FLE	
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						-		so batkeuton	CONSTRUCTOR	STE	80	80	T	AD/T	NWC	
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- 1. PROJECT GOALS / BIM USES
- 2. COLLABORATION PROCEDURES: HOW OFTEN TO SHARE? HOW?

BIM EXECUTION PLAN

2. Collaboration Procedures: how often to share? How?

BIM Coordination <u>Meeting Procedures</u>

Meeting type	Project stage	Frequency	Participants	Location
BIM REQUIREMENTS KICK-	PROGRAMMING	ONCE	WMU/AE/CONST	wмu
BIM EXECUTION PLAN DEMONSTRATION	PROGRAMMING	ONCE	RESPONSIBLE PARTY	WMU
	DD/SD/CD	BI-WEEKLY	RESPONSIBLE PARTY	WMU
CONSTRUCTABILITY COORDINATION	CONSTRUCTION	BI-WEEKLY	RESPONSIBLE PARTY	WMU
LIFECYCLE BIM PLANNING	CONSTRUCTION	AS-NEEDED	RESPONSIBLE PARTY	WMU

BIM PLANNING

Setting expectations

BIM PROJECT EXECUTION PLAN: WHAT'S IN IT?



- 1. PROJECT GOALS / BIM USES
- 2. COLLABORATION PROCEDURES: HOW OFTEN TO SHARE? HOW?
- **3. FILE NAMING CONVENTION**

BIM EXECUTION PLAN

3. File naming convention

145_struct_03455.steel frame north elevation_approved_2010 11



BIM PLANNING

Setting expectations

BIM PROJECT EXECUTION PLAN: WHAT'S IN IT?



- 1. PROJECT GOALS / BIM USES
- 2. COLLABORATION PROCEDURES: HOW OFTEN TO SHARE? HOW?
- **3. FILE NAMING CONVENTION**
- 4. TECHNOLOGY INFRASTRUCTURE REQUIREMENTS

BIM EXECUTION PLAN

4. Technology infrastructure requirements

Project participants must have certain <u>software</u> in order to **participate** in the BIM process.



BIM PLANNING

Setting expectations

BIM PROJECT EXECUTION PLAN: WHAT'S IN IT?

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Bioleanconing Biolean	DESIGN AUTHORING	MEP	RevitMEP	2054	DESIGNAUTHORING	MEP	Pevit MEP	2014
 Benefit Angeler Ander Sterner A	DESIGN AUTHORING	MEP	AUTOCAD MEP	2014	DESIGNAUTHORING	MD	AUNICAD MEP	2014
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- 1. PROJECT GOALS / BIM USES
- 2. COLLABORATION PROCEDURES: HOW OFTEN TO SHARE? HOW?
- **3. FILE NAMING CONVENTION**
- 4. TECHNOLOGY INFRASTRUCTURE REQUIREMENTS
- 5. DELIVERY STRATEGY & LOD LEVEL OF DEVELOPMENT

BIM EXECUTION PLAN

5. Delivery Strategy & LOD — Level of Development



LOD 100 Conceptual Modeling "Guesstimate"



LOD 200 General Modeling "Specify it"



LOD 300 Accurate Modeling & Shop Drawings "Buy it"



LOD 400 Fabrication & Assembly "Build or Install it"



LOD 500 M & O "Maintain it"



BIM EXECUTION PLAN

Building information model requirements Lifecycle BIM

Specific list of Information (parameters) required to be attached to the BIM model



WHAT IS NEW?

The "BIG ROOM" process



WHAT IS NEW?

BIM for interferences "Clash detections"

BIM COORDINATION REPORT

PROJECT: WMU NEW RESIDENCE HALL BUILDING: 175 LEVEL: FIRST, HOUSE B, HOUSE C WEEK: 07/03/14

	BIM COC	RDINATION TEAM			Total Numbe	of Clashes Found:	1 161
NAME	COMPANY	COMPANY TYPE	CONTACT NO.	EMAIL	Total Humbe	or olusiles i oulid.	1,101
Kristen Schleick	Lord Aeck Sargent	Architect	(734) 827-3929	kschleick@lordaecksargent.com			110 200 100
Taimoor Khan	Miller-Davis	Construction Manager	(269) 345-3561 EXT. 243	tkhan@miller-davis.com	Total Number	of Clashes Resolved:	1,086
Matt Voster	RW Lapine/ EPI	HVAC & Plumbing	(269) 978-4150	mvoster@eng-plus.com			
Scott Garberick	Circuit Electric/ Tower Pinkster	Electrical	(269) 343-6133 EXT. 753	sgarberick@towerpinkster.com			
Dennis Scott	Total Fire Protection	Fire Protection	(616) 735-2300 EXT. 7833	dscott@totalfire.biz			
Andy Eustice	Kerkstra	Precast & Steel	(616) 301-1281	aeustice@kerkstra.com			





BIM FOR EXISTING BUILDING







PRINTS TO 3D MODEL

From Simple floor plans to 3D: Revit Modeling



TIMELINE: 2011-2013

138 Existing buildings modeled in 3D Revit

- White-box empty rooms
- Windows & doors location
- Generic library
- Highly detailed exteriors
- <u>NO MEP</u>

CONNECTING THE DOTS FOR EXISTING BUILDINGS Adding Maintainable Mechanical Equipment In BIM College of Health and Human Services

ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM Types of equipment and parameter



ADDING MAINTAINABLE MECHANICAL EQUIPMENT IN BIM Types of parameter



20 years of maintenance experience with 9 shops and 110 skilled tradespeople

Misc Motors	Connection V Su	b Assemblies	Comments V Contr	actor 🚶	Part Reference	Repair Cent
Tag #	022RECH1		Building Asse	×.	Active	×.
Description:	Refrigeration Chiller 1	- Campus Se	Leased		Out of Service	
Model #:	WHRO20CE		Service Contrac		BMP	
Serial #:	5SC0716100		Risk Level	3		121
Location ID:	022-1314		Type Desc	Chiller	-	
Facility Name:	Western Michigan Un	iversity	Subtype Desc	Electri	c - Scroll	
Building Name:	Campus Services Bui	ding	Vendor Name			
Floor Code:			Manufacturer	McQua	зу	
Area #:	1314	1	Account #			
Department:			System	HVAC		
egulatory Category			Subsystem			
wner's Department:			Status			
Parent Tag #: Alternate Tag #:		СММ	AS-TMA E)AT	ABASE	
Device #:						
ttached to Vehicle:		>	100 parc	ame	eters	
Date Purchased:						
Date Purchased: Purchase Order #			Last Certified			
Date Purchased: Purchase Order #: Life Expectancy:			Last Certified Last Calibration			

BIM PARAMETERS 20 parameters

WMU SUBTYPE DESC WMU TYPE DESC DESCRIPTION WMU TAG # WMU LOCATION WMU_MANUFACTURER WMU_MODEL # WMU SERIAL # WMU_FILTER SIZE WMU FILTER QUANTITY WMU_MOTOR ID WMU_MOTOR MODEL # WMU_MOTOR SERIAL # WMU MOTOR HP WMU_MOTOR FRAME WMU_BEARING/COUPLING SIZE WMU BELT NAME WMU BELT SIZE wmu belt quantity

Field Validation and TMA Data Update

				Building N	ame is equal to Schneider Hall			
List#	Tag #	Type Name	Sub Type Name	Location ID	Sub Location	Manufacturer Name	Model #	Serial #
1	083CACOM1	Air Compressor	Control Air	083-SB05	Northeast corner of room - left unit	Pureflow		
2	083CACOM2	Air Compressor	Control Air	083-SB05	Northeast corner of room - right unit	Pureflow		3543-458-443
3	083AHAHU1	Air Handling Unit	Air Handler	083-SB05		Buffalo Forge	480 BB	89315451
4	083AHAHU2	Air Handling Unit	Air Handler	083-SB05		Buffalo Forge	405	89315453
5	083AHAHU3	Air Handling Unit	Air Handler	083-SB05		Buffalo Forge	405	89315454
6	083AHAHU4	Air Handling Unit	Air Handler	083-SB05	Carrier	Buffalo Forge	480 BB	89315452
7	083AHAHU5	Air Handling Unit	Air Handler	083-1460		Buffalo Forge		89315455
8	083CWCH1	Chiller	Electric - Centrifugal	083-SB05		Trane	CVHE032	L89H02893
9	083CWCH2CP3	Chiller	Electric - Centrifugal	083-SB05		Trane	CVHE032	L89H02840
10	083CWCH3	Chiller	Steam Absorption	083-SB05	South end of room	Thermax - USA	SS30CCU	10
11	083CWCH4	Chiller	Steam Absorption	083-SB05	South end of room	Thermax - USA	S530CCU	9
12	083SCCR1CP1	Condensate Equipment	t Condensate Pump	083-SB05	West End of Room		52CR-25-30	0D7040 47036
13	083SCCR1CP2	Condensate Equipment	t Condensate Pump	083-SB05	West End of Room	Bell & Gossett	52CR-25-30	0D7040 47036
14	083CTCET1	Cooling Tower	Air Cooled	083-EXTR	Southeast corner - near loading dock	Marley	2200 13530	10042804-A1-NC8407BG-11
15	083CTCET2	Cooling Tower	Air Cooled	083-EXTR	Southeast corner - near loading dock	Marley		10042804-A1-NC8407BG-11
	Receive	e Building T hent Report	MA	083-EXTR 083-EXTR 083-EXTR 083-CU-3010 083-CU-3020 083-ROOF-PM 083-SB05 083-SB05 083-SB05	Southeast corner - near los Near loading dock - ins Near loading dock - ins Near loading dock - ins Access from Electrical Access from Electrical			
								30

BIM Equipment Report

Position BIM equipment model



Creation of the Equipment Library

DOWNLOADED FROM THE INTERNET (Manufacturer, Forums etc.)



2 MODELED IN REVIT (Custom made such as air handlers)



From mechanical drawings

From pictures



Equipment Parameters Schedule



Create a Mechanical Equipment Schedule on Revit



Plugging equipment in the model (Mechanical Room, Schneider Hall)



Equipment Info

Properties	×		
Absorption Chiller - Sin 975 Tons	gle Stage - 975-1350 Ton	CMMS-BIM	
Mechanical Equipment (1)		Matching Parameter	
Constraints	* *		
Level	Sub Basement		
Host	Floor : Generic - 12"		
Offset	0' 0"		
Text	*		
WMU_COMPONENT TYPE			
WMU_LOCATION			
WMU_MANUFACTURER			
WMU_MODEL #			
WMU_SERIAL #			
WMU_TMA #	I La E		
WMU_SUBTYPE DESC			
WMU_TYPE DESC			5
DESCRIPTION			
WMU_TAG #	083CWCH4		
WMU_LOCATION			
WMU_MANUFACTURER			
WMU_MODEL #			
WMU_SERIAL #			
WMU_FILTER TYPE			
WMU_FILTER SIZE			
WMU_MOTOR MODEL #			
WMU BELT NAME			
WMU BELT SIZE			

Summary

TIMELINE: 2014 - 2016



CONNECTING THE DOTS FOR EXISTING BUILDINGS



College of Health and Human Services

CONNECTING THE MODEL TO OUR CMMS-TMA

Overall View – Moving Data Between Data Silos



CONNECTING THE MODEL TO OUR CMMS-TMA

Connecting to Revit and TMA: the Revit tool

REVIT ADD-IN "WebTMA Interface"



Logging in from Revit



Logging in from WebTMA

CONNECTING THE MODEL TO OUR CMMS-TMA

Exchanging Data BIM/TMA- Importing and Exporting



CONNECTING THE MODEL TO OUR CMMS-TMA Importing from TMA to Revit

The Results

From this... To this

										V	Category		Identif	ier		Parent		Error		
2. BUG.G.B.B	· · P A	8 · ? E		083_BIM_Mech Roo	m Asset_LVL200_20	0121116 - Schedul	e: Mechanical Eq	uipment Schedule	2	V	Mechanical	Equipment	083CA	COM2	S	ub Basemen	t			
Architecture Structure Syste	ems insert A	innotate Analyz	ce massing or si	tte Collaborate Vie	w Manage A	od-ins Modity	Modify Schedi	ne/Quantities			Mechanical	Equipment	083CA	COM1	S	ub Basemen	1			
15											Mechanical	Equipment	0834H	AHU5	1	460		-	 	
Modify WebTMA Interface											Machanical	Equipment	00341	ALLIECEE		400			 	
Select • WebTMA	_	_	_		_	_	_	_			Iviecnanical	Equipment	USJAH	AHUSSES		460			 	
Modify Schedule/Quantities											Mechanical	Equipment	083AH	AHU5RF5	1	460			 	
roperties X										V	Mechanical	Equipment	083CW	CH1	S	ub Basemen	t			
Schoolula -	A	В	С	D	E	F	G	н			Mechanical	Equipment	083CW	CH2	S	ub Basemen	t			
Hind School	WMU_SUBTYPE	D WMU_TYPE DES	C DESCRIPTION	WMU_TAG #	WMU_LOCATION	N WMU_MANUFAC	F WMU_MODEL #	WMU_SERIAL	t W1/		Mechanical	Equipment	083CW	CH3	S	ub Basemen	ł		 	
ichadula Machanical E - Ha Edit Type	Control Air	Air Compresso	Control Air Com	083CACOM2	083-SB05	Pureflow													 	
chedule mechanicare CE can tipe	Control Air	Air Compresso	Control Air Com	083CACOM1	083-5805	Pureflow					Mechanical	Equipment	083CW	/CH4	S	ub Basemen	t.			
View Template	Air Handler	Air Handling Un	Air Handling Un	083AHAHUS	083-1460	Buffalo Forge	4	89315455	Aer		Marchael	E	00000	CD1CD1	0	1 D				
View Template	Supply Fan	Fan	Supply Fan 5 -	083AHAHU5SF5	083-1460	Buttaio Forge	20105022			v	Mechanical	Equipment	08350	LRICPI	5	ub Basemen	i			
view ivame Mechanical Equip	Flactric - Centri	Chiller	Chiller 1 (Centr	06340400465	083.5805	Trane	C1/HE032	1.80H02803		172	Machanical	Equipment	00000	01002	c	h Pasaman				
Dependency Independent	Electric - Centri	Chiller	Chiller 2 (Centr	083CWCH2	083-5805	Trane	CVHE032	1.89H02840			Mechanical	Equipment	00330	GRIGEZ	3	ub basemen	•			
'hasing R	Steam Absorpt	Chiller	Chiller 3 (Steam	083CWCH3	083-5805	Thermax - USA	SS30CCU	10			Mechanical	Equipment	08301	CET3	1	evel 2				
Phase Filter Show All	Steam Absorpt	Chiller	Chiller 4 (Steam	083CWCH4	083-SB05	Thermax - USA	S530CCU	9			- Moonanioari	Equipmont	00001	0210		01012			 	
Phase Existing	Condensate Pu	Condensate Eq	Condensate Pu	083SCCR1CP1	083-SB05		52CR-25-30	0D7040 47036		1	Mechanical	Equipment	083CT	CET2	L	evel 2				
Other X	Condensate Pu	Condensate Eq	Condensate Pu	083SCCR1CP2	083-SB05	Bell & Gossett	52CR-25-30	0D7040 47036											_	
Fields Edit	Air Cooled	Cooling Tower	Cooling Tower	083CTCET3	083-EXTR	Marley		10042804-A1-												Export
Filter Edit	Air Cooled	Cooling Tower	Cooling Tower	083CTCET2	083-EXTR	Marley		10042804-A1-												
Sorting/Grouping Edit	Air Cooled	Cooling Tower	Cooling Tower	083CTCET1	083-EXTR	Marley		10042804-A1-											 	
Formatting Edit	Gear Box	Cooling Tower	Gear Box 1 - C	083CTCET1GB1	083-EXTR	Marley	2200 13199	C68424 5.50		10		15	0100 1100							
Appearance Edit	Gear Box	Cooling Tower	Gear Box 1 - C	063CTCET2GB1	083-EXTR	Marley	2200 13198	000424 5.50				0	DUP-1195	M21A 1031403	X1110	50				
	Exhaust Eag	Eac.	Exhaust Eas 1	003010213001	003-EATR	maney	2200 13400	000424 0.00				0	000-1100	M21A 1031403	Anno	00 =				
	Exhaust Fan	Eac	Exhaust Eap 2	02344552	083.011.2020							0								
	Exhaust Fan	Fan	Exhaust Fan 3	0830HEF3	083 POOF PM	ODEENHECK	GB 14.7	89/05/063				0	DUP 1051		-					
roperties help Apply	Return Fan	Fan	Return Fan 1 -	083AHAHU19F1	083-5805	GREENHECK	66.AFSW.3.C	89105064				0	DUP-1243	VK284T70P702		25				
1 113 J	Return Fan	Fan	Return Fan 2 -	0834H4HU2RF2	083-5805	GREENHECK	66-AFSW-3-C	89105065				0	DUP-1291	Theorem		20				
roject Browser - 083_BIM_Mech Room ×	Return Fan	Fan	Return Fan 3 -	083AHAHU3RE3	083-5805	GREENHECK	66-AFSW-3-C	89105067				0	DUP-1324	V/256TTDR702		20				
a 'O' Views (all)	Return Fan	Fan	Return Fan 4 -	083AHAHU4RF4	083-5805	GREENHECK	66-AFSW-3-C	89105065				0	DUP-1342	VK284TTDR70	net extra the local test	25				
E Floor Plans	Return Fan	Fan	Return Fan 6 -	083AHRF6	083-5805	GREENHECK	BSQ-HP-30-50	89105062				0			-					
Faves W.P.	Air Handler	Air Handling Un	Air Handling Un	083AHAHU1	083-SB05	Buffalo Forge	480 BB	89315451	MW45 S		24 X 24 X 12	24	MULTI	MULTI	MULTI	MULTI				
Lovel 1	Air Handler	Air Handling Un	Air Handling Un	083AHAHU2	083-SB05	Buffalo Forge	405	89315453	MW45 S		24 X 24 X 12	20	MULTI	MULTI	MULTI	MULTI				
Level 2	Air Handler	Air Handling Un	Air Handling Un	083AHAHU3	083-SB05	Buffalo Forge	405	89315454	MW45 S		24 X 24 X 12	20	MULTI	MULTI	MULTI	MULTI				
Level 2	Air Handler	Air Handling Un	Air Handling Un	083AHAHU4	083-SB05	Buffalo Forge	480 BB	89315452	MW45 S		24 X 24 X12	24	MULTI	MULTI	MULTI	MULTI				
Level 3	Supply Fan	Fan	Supply Fan 1 -	083AHAHU1SF1	083-SB05	Buffalo Forge						0	DUP-1409	5K53644 905		60				
- Site	Supply Fan	Fan	Supply Fan 2 -	083AHAHU2SF2	083-SB05	Buffalo Forge			MW45 S		24 X 24 X 12	20	DUP-1521	5K5326		50				
Sub Basement	Supply Fan	Fan	Supply Fan 3 -	083AHAHU3SF3	083-SB05	Buffalo Forge						0	DUP-1586	5K537		50				
T.O. Level 2	Supply Fan	Fan	Supply Fan 4 -	083AHAHU4SF4	083-SB05	Buffalo Forge						0	DUP-1632			60				
T.O.S.	Supply Fan	Fan	Outside Air Su	083AHSF1	083-SB05	GREENHECK	BCF-212-15-T	1251867 1107	Aeroplea	st	20 X 25 X 2	4	DUP-1459	4						
Ceiling Plans	Chilled Water C	Pump	Circulating Pum	083CWCH1-4CP15	083-SB05	Bell & Gossett	VSX-VSC-9.62	C129128-02 F1				0	15-80393							·
Eaves W.P.	Chilled Water C	Pump	Circulating Pum	083CWCH1-4CP16	083-SB05	Bell & Gossett	VSX-VSC-9.62	C129128-01 F1				0	DUP-156-							
Level 1	Chilled Water C	Pump	Circulating Pum	083CWCH1CP4	083-SB05	Bell & Gossett	1510 5BC 8-7/	1579650				0	4-265784	EM2515T-G	2	20				
Level 2	Chilled Water C	Pump	Circulating Pum	083CWCH2CP3	083-SB05	Bell & Gossett	1510 5BC 8-7/	1579651				0	3-265779	EM2515T-G	Z12050					
Level 3	Chilled Water C	Pump	Circulating Pum	083CWCH4CP13	083-5805	Bell & Gossett	1510 BF 94BC	C129129-02E1				0	13-79714							
Sub Parament	Chilled Water C	Pump	Circulating Pum	083CWCH3CP14	083-S805	Bell & Gossett	1510 BF 94BC	C129129-01E1				0	14-79714			15				
TO Level 2	Cooling Tower	Pump	Circulating Pum	083CTCET1-3CP12	083-SB05	Bell & Gossett	VSX-VSCS 11.	C129126-02 F1				0	12-78039							
T.O. Level 2	Cooling Tower	Pump	Circulating Pum	083CTCET1-3CP11	083-5805	Bell & Gossett	VSX-VSCS 11.	C129126-01 F1				0	UUP-152-	FUDFART O	7100000000					
	Cooing Tower	Pump	Circulating Pum	003CTCE11-3CP1	003-5805	Dell & Gossett	VSUS 11 BFL	1435364				0	DUP-16-2	EM2539T-G	2120503012	2 40				
B 3D Views	Cooing Tower	Pump	Circulating Pum	DOSCICETT-3CP2	003-5805	Der & Gossett	VOUS 11 BF L	1400005				0	2-200/5/	EM20391-G	2120503017	2 40				
3D Ductwork	Domestic Hot	Pump	Circulating Pum	USSUNDHWM1CP10	063-5805	Della Gossett						0								
3D Piping	Heating Water	Pump	Circulating Pum	022000000000000000000000000000000000000	003-3805	Des à Gossett	20.11.20 PE	157062				0	DUD 24.1			20 *				
1016-1	4	(+ omp	, or colouring rum	1 section A neuer	1 000-0000	III	1 3 3 - 1 1 - 370 BF	1.37302					100-04-1			120				

WebTMA Items/Locations: wmu bim

Template Equipment - WMU

Building 083 - Schneider Hall

Load

CONNECTING THE MODEL TO OUR

LIMIN D-IMA Importing from TMA to Revit Individualized Equipment Data

Properties		×
Absorption Chiller - Si 975 Tons	ngle Stage - 975-1350	Ton 🗸
Mechanical Equipment (1)	• 88	Edit Type
Constraints		* *
Level	Sub Basement	
Host	Floor : Generic - 12"	· •
Offset	0' 0"	
Text		*
WMU_LOCATION		083-SB0
WMU_MANUFACTURER		Thermax
WMU_MODEL #		S530CCU
WMU_SERIAL #		9
WMU_SUBTYPE DESC		Steam A
WMU_TYPE DESC		Chiller
DESCRIPTION		Chiller 4
WMU_TAG #	083CWCH4	083CW0
WMU_FILTER TYPE		******
WMU_FILTER SIZE		
WMU_FILTER QUANTITY		0
WMU_MOTOR ID		CH4-/80
WMU_MOTOR MODEL #		
WMU_MOTOR SERIAL #		
WMU_MOTOR HP		
WMU_MOTOR FRAME		
WMU_BEARING/COUPLING SIZE		
WMU_BELT NAME		
WMU_BELT SIZE		
WMU_BELT QUANTITY		0

CONNECTING THE MODEL TO OUR CMMS-TMA REVIT 📥 🧮 TMA Exporting from Revit to TMA

TMA schedule



Revit schedule

В

Fan

Fan

Chiller

Chiller

Chiller

Chiller

Cooling Tower

Cooling Tower

Cooling Tower

Cooling Tower

Fan

Fan

Fan

Fan

Fan

A

Control Air

Control Air

Air Handler

Supply Fan

Return Fan

Electric - Centri

Electric - Centri

Steam Absorpt

Steam Absorpt

Condensate Pu

Condensate Pu

Air Cooled

Air Cooled

Air Cooled

Gear Box

Gear Box

Gear Box

Exhaust Fan

Exhaust Fan

Exhaust Fan

Return Fan

Return Fan





PREVIOUS WORK ORDER FLOWCHART



NEW WORK ORDER FLOWCHART



EFFICIENCY IMPROVEMENT

Efficiency improvement with BIM for skilled trades [Mechanical Equipment]



TAKEAWAYS - NEW CONSTRUCTION

✓ CREATE **BIM GUIDELINE**

✓ **PSA AGREEMENT:** GET IT IN THE CONTRACT!

✓ KICKOFF MEETING: SET EXPECTATIONS FOR ALL THE PARTIES INVOLVED

✓ DETERMINE **GATEKEEPER**

✓ BIM IS A LIVING DOCUMENT

TAKEAWAYS — EXISTING BUILDINGS

- ✓ 3D models for existing building do not need to be highly detailed, LOD 100-200
 - Define maintainable equipment and its parameters:
 use tradespeople's experience and operation manuals as reference
 - Audit your CMMS data in the field while locating your maintainable equipment
 - If equipment 3D models are not available on the web, create them using your construction documents or measurements
 - ✓ Connect CMMS and BIM models
 - ✓ Define standards for BIM-TMA data management

WESTERN MICHIGAN UNIVERSITY



Thank you!

Questions



