



# FMD ENERGY UPDATE

# Introduction

- High School Custodial Video
  - FMD Webpage: [http://www.wellesleyma.gov/Pages/WellesleyMA\\_Facilities/whscustodians](http://www.wellesleyma.gov/Pages/WellesleyMA_Facilities/whscustodians)
- Operations Manager (OM) Position
  - Energy Manager becomes OM
  - Begins July 1, 2016

# Agenda

- Quick Facts Review for FMD Buildings
- Electricity and Natural Gas Prices for FY17
- Metered & Normalized Energy Use for FY15
- ECMs Completed, Pending, & Planned
- Preventive Maintenance Program
  
- \* This Entire Presentation will be Uploaded to the FMD Website.

# Agenda

- Quick Facts Review for FMD Buildings
- Electricity and Natural Gas Prices for FY17
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# Quick Facts Review

- Twenty (20) School/Town Buildings
- Total = 1,086,588 GSF
- Heated = 96% and Cooled = 48%
- Staff and Students  $\approx$  6,300
- PCs and iPads  $\approx$  4,000

# Agenda

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# FY17 Energy Prices

Electricity Unchanged at  
\$0.134/kWh

Three-Year Rate Trend		
FY	\$/kWh	% Chg. Base
17	\$0.134	7.2%
16	\$0.134	7.2%
15	\$0.125	Base
Average	\$0.131	

FY17 Rate Breakdown		
Charge	\$/kWh	% Total
Service	\$0.046	35%
Demand	\$0.038	28%
PPA/Cons.	\$0.050	37%
Total	\$0.134	100%

Natural Gas Decreased by 4% to  
\$1.210/therm with 100% Swing!

Three-Year Rate Trend		
FY	\$/therm	% Chg. Base
17	\$1.210	-4.5%
16	\$1.228	-3.1%
15	\$1.267	Base
Average	\$1.235	

FY17 Rate Breakdown		
Charge	\$/therm	% Total
Natural Gas	\$0.299	25%
Transmission	\$0.411	34%
Distribution	\$0.500	41%
Total	\$1.210	100%

\* Prices Do Not Include NGrid  
Local Distribution Costs

# Agenda

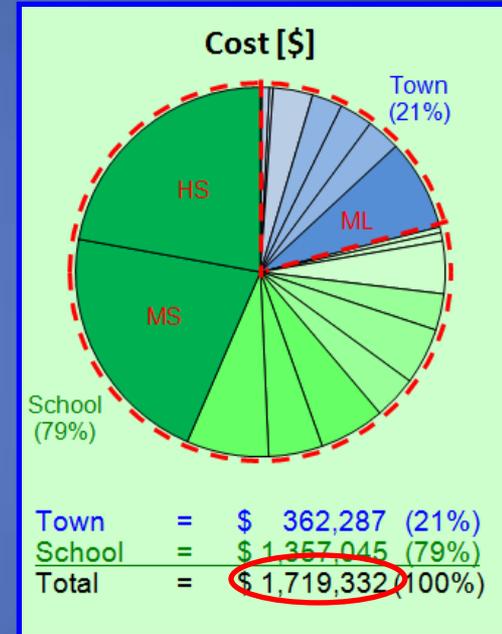
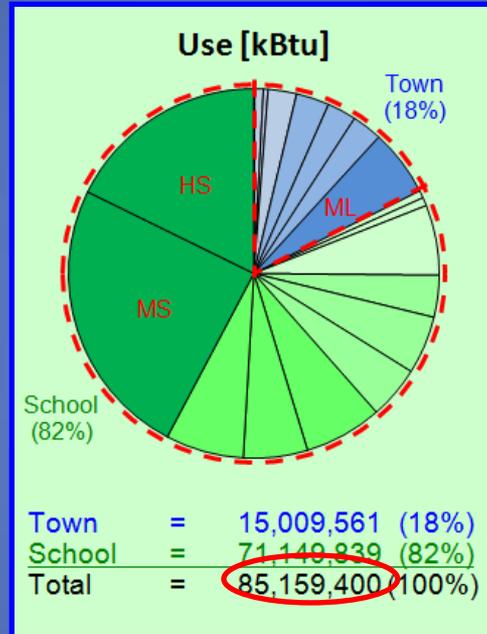
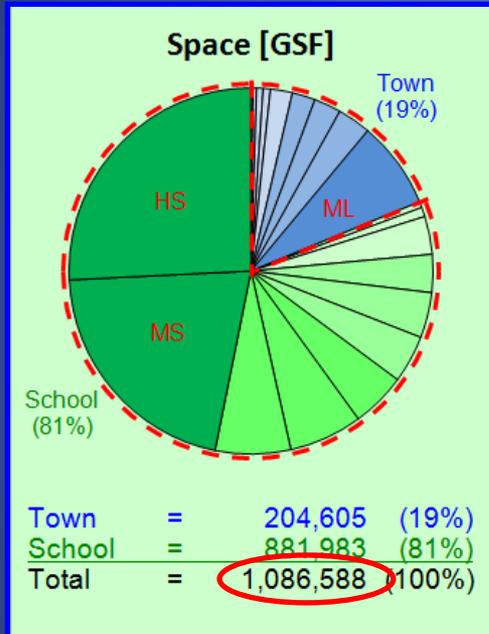
- Quick Facts Review for FMD Buildings
- Electricity and Natural Gas Prices for FY17
- Metered & Normalized Energy Use for FY15
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# FY15 “Metered” (Actual) Energy Use

FY15 Metered Energy Use											
Building Metrics			Energy Metrics								
Building	GSF	Total [%]	ELE [kBtu]	NGS [kBtu]	Total [kBtu]	Total [%]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Library Fells	1,872	0%	31,844		31,844	0%	17	\$ 1,167	\$ -	\$ 1,167	\$ 0.62
Bathhouse	3,377	0%	33,311	-	33,311	0%	10	\$ 1,220	\$ -	\$ 1,220	\$ 0.36
FS Central	6,250	1%	129,595	501,000	630,595	1%	101	\$ 4,748	\$ 6,348	\$ 11,095	\$ 1.78
Library Hills	7,000	1%	43,281	302,300	345,581	0%	49	\$ 1,586	\$ 3,830	\$ 5,416	\$ 0.77
Police	21,200	2%	1,369,713	745,900	2,115,613	2%	100	\$ 50,180	\$ 9,451	\$ 59,631	\$ 2.81
FS Main	22,300	2%	603,924	1,854,400	2,458,324	3%	110	\$ 22,125	\$ 23,495	\$ 45,620	\$ 2.05
Warren	26,151	2%	945,806	1,216,700	2,162,506	3%	83	\$ 34,650	\$ 15,416	\$ 50,066	\$ 1.91
Town Hall	32,240	3%	933,933	1,312,300	2,246,233	3%	70	\$ 34,215	\$ 16,627	\$ 50,842	\$ 1.58
Library Main	84,215	8%	3,090,453	1,895,100	4,985,553	6%	59	\$ 113,220	\$ 24,011	\$ 137,231	\$ 1.63
Town	204,605	19%	7,181,861	7,827,700	15,009,561	18%	73	\$ 263,110	\$ 99,177	\$ 362,287	\$ 1.77
Fieldhouse	5,670	1%	71,973	479,800	551,773	1%	97	\$ 2,637	\$ 6,079	\$ 8,716	\$ 1.54
PAWS	9,072	1%	191,345	432,700	624,045	1%	69	\$ 7,010	\$ 5,482	\$ 12,492	\$ 1.38
Hunnewell	36,400	3%	523,629	4,709,500	5,233,129	6%	144	\$ 19,183	\$ 59,669	\$ 78,853	\$ 2.17
Upham	36,500	3%	638,863	2,481,700	3,120,563	4%	85	\$ 23,405	\$ 31,443	\$ 54,848	\$ 1.50
Schofield	43,500	4%	1,271,994	3,051,300	4,323,294	5%	99	\$ 46,600	\$ 38,660	\$ 85,260	\$ 1.96
Hardy	45,900	4%	635,956	3,301,300	3,937,256	5%	86	\$ 23,299	\$ 41,827	\$ 65,126	\$ 1.42
Bates	52,750	5%	1,055,946	4,738,900	5,794,846	7%	110	\$ 38,685	\$ 60,042	\$ 98,727	\$ 1.87
Fiske	70,700	7%	866,512	3,896,700	4,763,212	6%	67	\$ 31,745	\$ 49,371	\$ 81,116	\$ 1.15
Sprague	72,700	7%	2,088,144	3,725,600	5,813,744	7%	80	\$ 76,500	\$ 47,203	\$ 123,703	\$ 1.70
Middle School	228,700	21%	4,278,239	16,624,600	20,902,839	25%	91	\$ 156,735	\$ 210,634	\$ 367,369	\$ 1.61
High School	280,091	26%	7,915,840	7,169,300	15,085,140	18%	54	\$ 290,000	\$ 90,835	\$ 380,835	\$ 1.36
School	881,983	81%	19,538,439	50,611,400	70,149,839	82%	80	\$ 715,799	\$ 641,246	\$ 1,357,045	\$ 1.54
Total	1,086,588	100%	26,720,300	58,439,100	85,159,400	100%	78	\$ 978,909	\$ 740,423	\$ 1,719,332	\$ 1.58
Percent Total			31%	69%	100%			57%	43%	100%	

Note: Average ELE rate = \$0.125/kWh and NGS rate = \$1.267/therm.

# FY15 "Metered" Energy Use



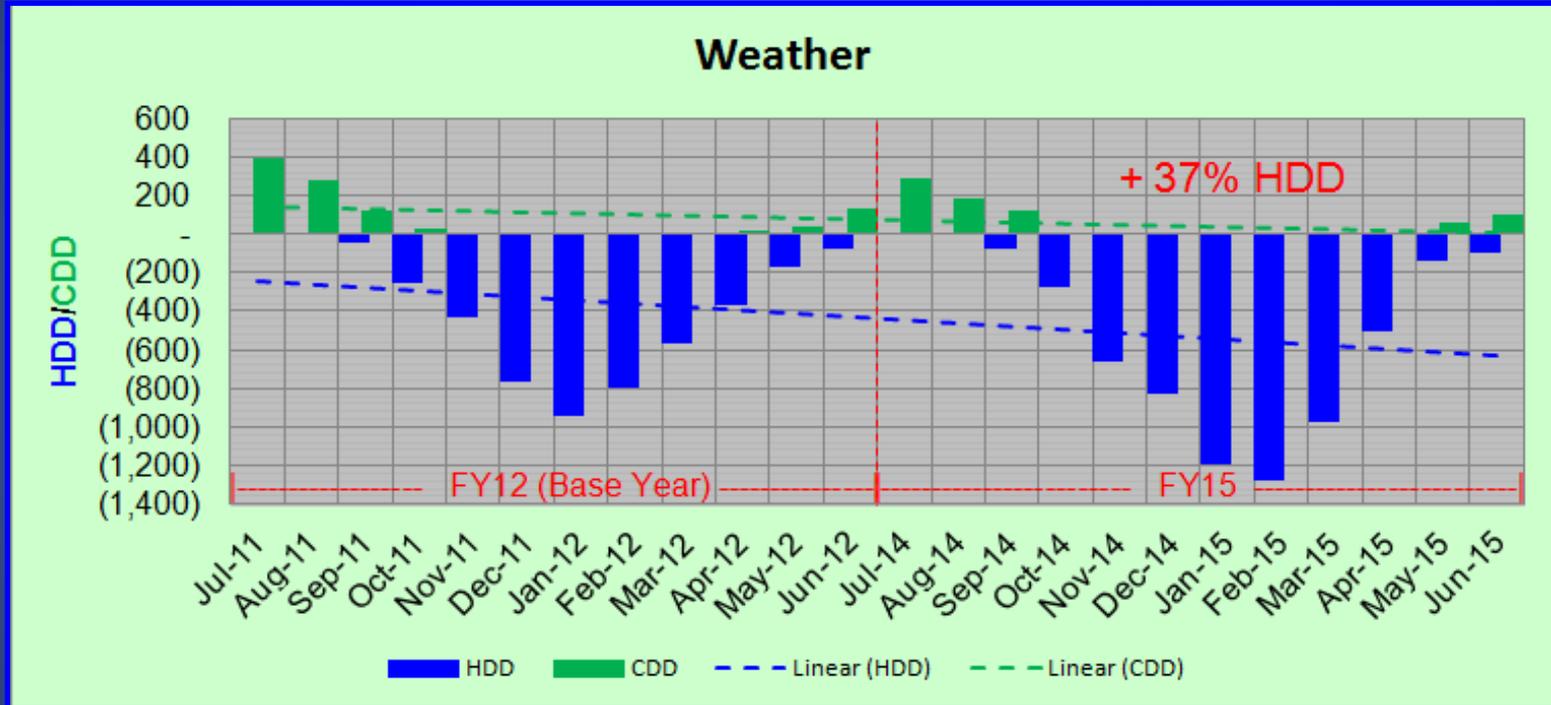
# FY15 "Metered" Energy Use Comparison

FY15 Metered Energy Use									
Building Metrics		Energy Metrics							
Building	GSF	ELE [kWh]	NGS [therm]	Total [kBtu]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Town	204,605	2,104,883	78,277	15,009,561	73	\$ 263,110	\$ 99,177	\$ 362,287	\$ 1.77
School	881,983	5,726,389	506,114	70,149,839	80	\$ 715,799	\$ 641,246	\$ 1,357,045	\$ 1.54
Total	1,086,588	7,831,272	584,391	85,159,400	78	\$ 978,909	\$ 740,423	\$ 1,719,332	\$ 1.58

FY12 Metered Energy Use									
Building Metrics		Energy Metrics							
Building	GSF	ELE [kWh]	NGS [therm]	Total [kBtu]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Town	204,605	2,187,898	67,478	14,212,908	69	\$ 273,487	\$ 85,495	\$ 358,982	\$ 1.75
School	881,983	5,950,167	418,767	62,178,670	70	\$ 743,771	\$ 530,578	\$ 1,274,349	\$ 1.44
Total	1,086,588	8,138,065	486,245	76,391,578	70	\$ 1,017,258	\$ 616,072	\$ 1,633,331	\$ 1.50

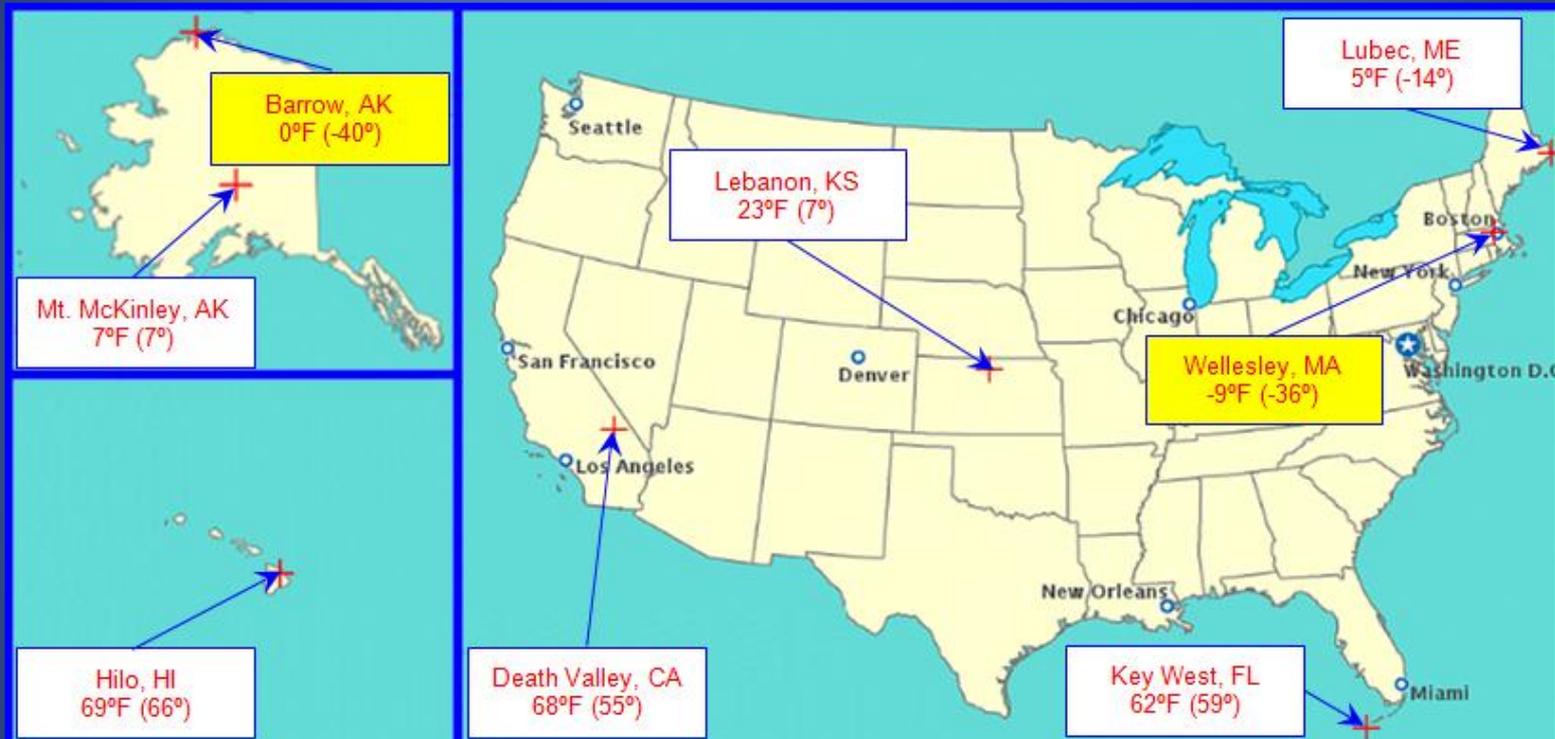
FY15 Metered versus FY12 Metered Energy Use Percent Change									
Building Metrics		Energy Metrics							
Building	GSF	ELE [kWh]	NGS [therm]	Total [kBtu]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Town	0%	-4%	16%	6%	6%	-4%	16%	1%	1%
School	0%	-4%	21%	13%	13%	-4%	21%	6%	6%
Total	0%	-4%	20%	11%	11%	-4%	20%	5%	5%

# FY15 Weather Comparison



# Weather Trivia!

Temperatures at Extreme Points in U.S. on Sunday, 2/14/16, 6:00AM



# FY15 “Metered” v. FY15 “Normalized”

FY15 Metered Energy Use									
Building Metrics		Energy Metrics							
Building	GSF	ELE [kWh]	NGS [therm]	Total [kBtu]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Town	204,605	2,104,883	78,277	15,009,561	73	\$ 263,110	\$ 99,177	\$ 362,287	\$ 1.77
School	881,983	5,726,389	506,114	70,149,839	80	\$ 715,799	\$ 641,246	\$ 1,357,045	\$ 1.54
Total	1,086,588	7,831,272	584,391	85,159,400	78	\$ 978,909	\$ 740,423	\$ 1,719,332	\$ 1.58

FY15 Normalized Energy Use									
Building Metrics		Energy Metrics							
Building	GSF	ELE [kWh]	NGS [therm]	Total [kBtu]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Town	204,605	2,130,807	89,784	16,248,763	79	\$ 266,351	\$ 113,757	\$ 380,108	\$ 1.86
School	881,983	5,979,138	570,910	77,491,818	88	\$ 747,392	\$ 723,343	\$ 1,470,735	\$ 1.67
Total	1,086,588	8,109,945	660,694	93,740,582	86	\$ 1,013,743	\$ 837,100	\$ 1,850,843	\$ 1.70

FY15 Metered versus FY15 Normalized Energy Use Percent Change									
Building Metrics		Energy Metrics							
Building	GSF	ELE [kWh]	NGS [therm]	Total [kBtu]	kBtu/GSF	ELE [\$]	NGS [\$]	Total [\$]	\$/GSF
Town	0%	-1%	-13%	-8%	-8%	-1%	-13%	-5%	-5%
School	0%	-4%	-11%	-9%	-9%	-4%	-11%	-8%	-8%
Total	0%	-3%	-12%	-9%	-9%	-3%	-12%	-7%	-7%

# FY15 “Normalized” Energy Use Summary

FY15 Normalized Energy Use (FY12 = Base Year)														
Building	FY12 - FY15 ECMs Completed							FY15 Actual Energy Use [kBtu]			FY15 Variance from FY12 [%]			Notes
	ELE		NGS					ELE	NGS	Total	ELE	NGS	Total	
	T8s	LEDs	Traps	STPTs	Controls	ReCx	HVAC							
Police	X	X			X		X	1,369,713	745,900	2,115,613	-9%	-63%	-40%	New Controls, HVAC, & Condensing Boilers (PBC)
Sprague	X	X			X	X		2,088,144	3,725,600	5,813,744	-15%	-36%	-30%	Recommissioned (30+ Defective Valves)
Fiske	X	X			X	X		866,512	3,896,700	4,763,212	-10%	-19%	-17%	New Controls and HVAC (PBC)
Fieldhouse								71,973	479,800	551,773	8%	-18%	-15%	NA
Hardy	X	X					X	635,956	3,301,300	3,937,256	-3%	-17%	-15%	Recommissioned
Schofield	X	X			X	X		1,271,994	3,051,300	4,323,294	-8%	-17%	-15%	New Controls and HVAC (PBC)
FS Main		X			X	X	X	603,924	1,854,400	2,458,324	-16%	-5%	-8%	New Controls, HVAC, & Condensing Boilers (PBC)
Middle School	X	X	X	X	X	X		4,278,239	16,624,600	20,902,839	-9%	-7%	-7%	Recommissioned and Behavioral Changes
FS Central	X	X					X	129,595	501,000	630,595	0%	-8%	-6%	New Controls and HVAC
High School	X							7,915,840	7,169,300	15,085,140	1%	-9%	-4%	Better Diagnostics!
Bates	X	X			X	X		1,055,946	4,738,900	5,794,846	10%	-5%	-2%	Recommissioned (Maybe Rentals Increased?)
PAWS	X	X					X	191,345	432,700	624,045	-6%	1%	-1%	NA
Hunnewell	X	X					X	523,629	4,709,500	5,233,129	-4%	0%	-1%	Recommissioned (Boiler Problems)
Town Hall	X				X		X	933,933	1,312,300	2,246,233	-3%	8%	3%	New Controls and Chiller (New Boilers Just Installed)
Main Library	X				X			3,090,453	1,895,100	4,985,553	2%	6%	4%	Boiler Problems/Programming Issues
Upham		X					X	638,863	2,481,700	3,120,563	-3%	7%	5%	Recommissioned
Warren	X							945,806	1,216,700	2,162,506	11%	1%	5%	NA
Hills	X							43,281	302,300	345,581	-4%	16%	13%	NA
Bathroom		X						33,311	-	33,311	21%	0%	21%	NA
Fells								31,844	-	31,844	22%	0%	22%	New Furnace Just Installed
<b>Total</b>	<b>15</b>	<b>13</b>	<b>1</b>	<b>1</b>	<b>9</b>	<b>10</b>	<b>4</b>	<b>26,720,300</b>	<b>58,439,100</b>	<b>85,159,400</b>	<b>-3%</b>	<b>-12%</b>	<b>-9%</b>	

# FY15 “Normalized” Energy Use Summary

- 37% MORE Heating Degree Days
- Yet Only 20% MORE “Metered” NGS Use
- 12% LESS “Normalized” NGS Use
- 9% LESS Total Energy Use Overall
- \$132k Annual Cost Avoidance
- Savings Mostly Attributable to ECMs

# Agenda

- Quick Facts Review for FMD Buildings
- Electricity and Natural Gas Prices for FY17
- Metered & Normalized Energy Use for FY15
- **ECMs Completed, Pending, and Planned**
- Preventive Maintenance Program

# ECMs Completed, Pending, and Planned

ECMs					
Category	Description	Completed (FY12-FY15)	Pending (FY16)	Planned (FY17-FY20)	Total
ReCx	Recommissioning	\$ 370,000	\$ 250,000	\$ -	\$ 620,000
Metasys	Upgraded and New	\$ 30,000	\$ 383,000	\$ -	\$ 413,000
LEDs	T8s, LEDs, Controls	\$ 165,000	\$ -	\$ 5,173,000	\$ 5,338,000
Total Project Cost		\$ 565,000	\$ 633,000	\$ 5,173,000	\$ 6,371,000

ECMs																						
Category	Town									School										Total		
	Bath	Fells	FS Central	FS Main	Hills	Main Library	Police	Town Hall	Warren	Bates	Fieldhouse	Fiske	Hardy	High School	Hunnewell	Middle	PAWS	Schofield	Sprague		Upham	
Recommissioning																						16
Metasys																						15
T8s																						19
LEDs - Exterior																						20
LEDs - Interior - Common																						20
LEDs - Interior - Class/Office																						20
Total	4	5	6	6	5	6	6	6	6	6	4	6	5	6	5	6	6	6	6	4	110	
Completed		Pending								Planned								Not Included				

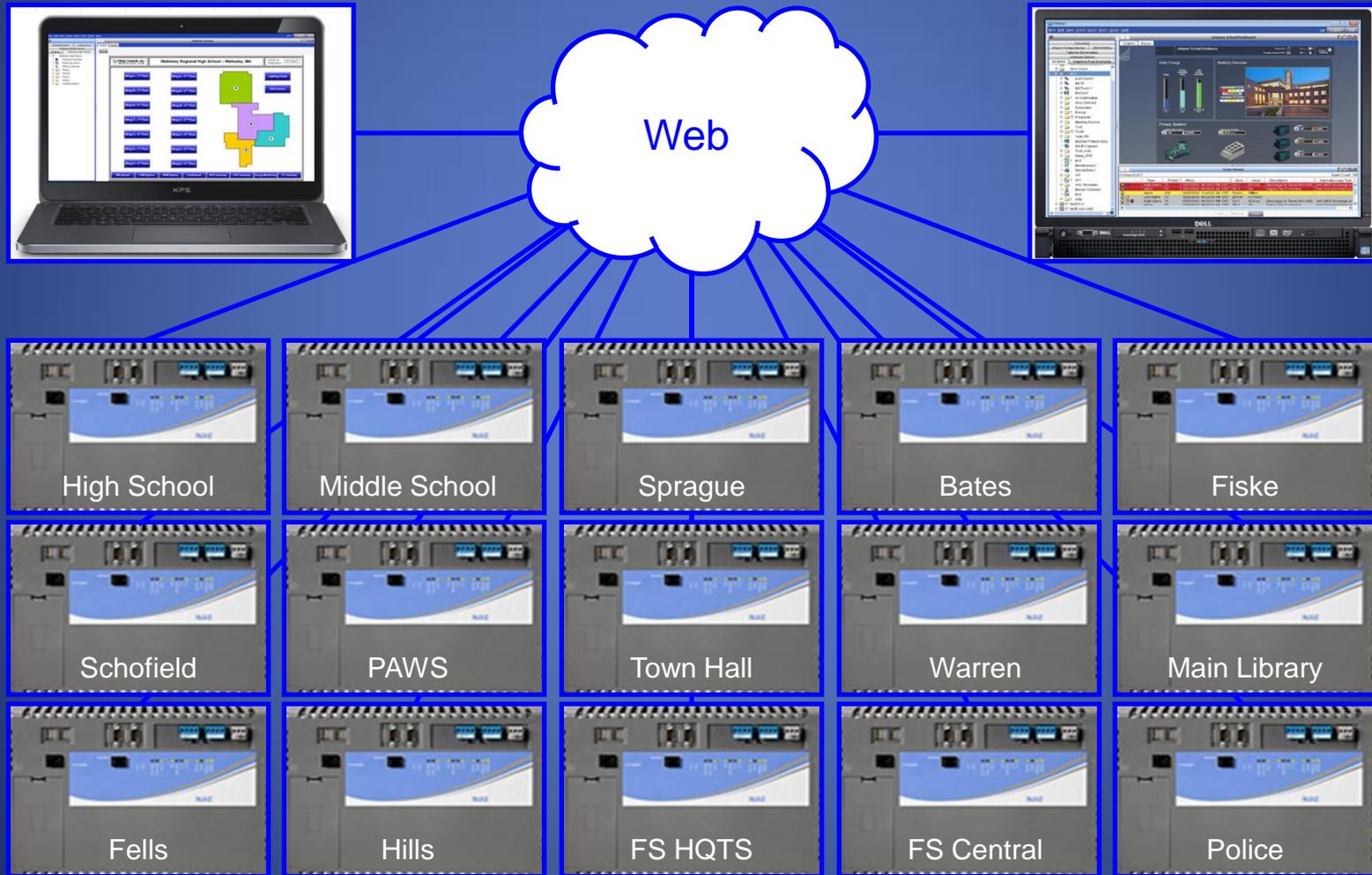
# Recommissioning

- Total Project Budget \$620k over Two Phases
- Includes 18 Town and School Buildings
- Improves Safety, Comfort, and Performance
- Reduces Natural Gas by 15% - 20%
- Must have Preventive Maintenance Program

# Metasys (HVAC Controls)

- Total Project Budget \$413k over Two Phases
- Includes 15 Town and School Buildings
- Optimizes Performance/Minimizes Energy Use
- Reduces Natural Gas Use by 10% - 15%
- Must have Preventive Maintenance Program

# Metasys – Network Level



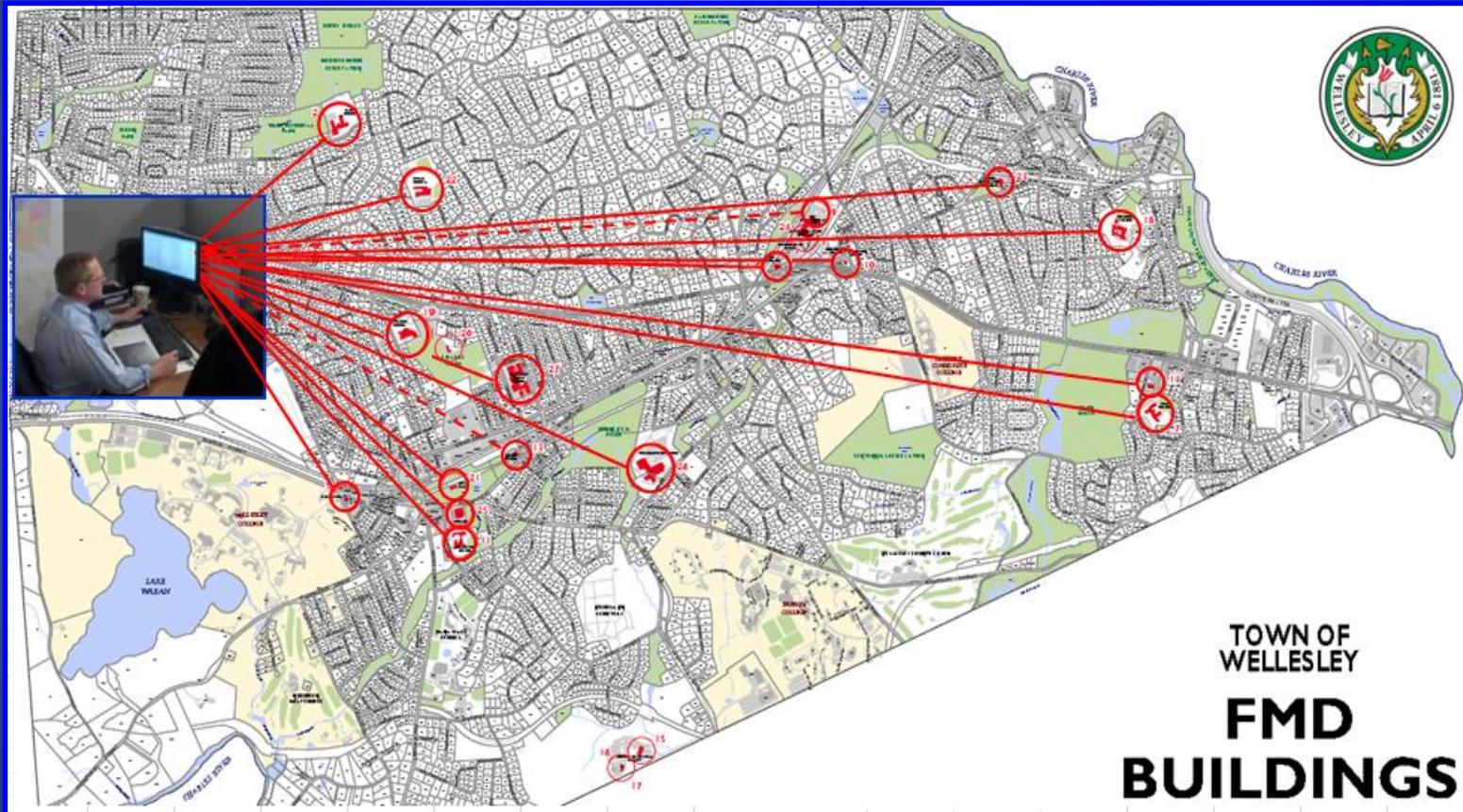
# Metasys – Building Level



# Metasys – User Level



# Metasys – Town Network



# Metasys – Town Network

50,000 Data Points!

A120.2 GROUNDS EQUIPMENT.Zon...	68.5 deg F
A120.3 Electric Demarcation(ACU22)...	59.0 deg F
A120.4 Custodian.Zone Temp	64.8 deg F
A120.5 Toilet.Zone Temp	69.0 deg F
A120.6 VESTIBULE.Zone Temp	67.3 deg F
A120.7 RAIN WH(UH1).Zone Temp	60.1 deg F
A126.1 ATHLETIC DIR.Zone Temp	69.0 deg F
A200 GYMNASIUM LOBBY(FPB-A202...	67.7 deg F
A200.1 CORRIDOR(FCU5).Zone Temp	67.8 deg F
A200.1 CORRIDOR(FPB-A201)(AHU-...	70.2 deg F
A202 DANCE.Zone Temp	67.6 deg F
A202 MULTI-PURPOSE DANC.Zone ...	62.0 deg F
A207 WRESTLING.Zone Temp	67.2 deg F
A209 FITNESS.Zone Temp	58.4 deg F
A210.1 ATHLETIC STOR.(UH4).Zone ...	63.1 deg F
A210.2 F/H STORE(UH4).Zone Temp	65.5 deg F
AHU6(B180 AUDITORIUM).Zone Temp	69.0 deg F
B Stair-2 Flr-1(FPB-B101)(AHU-3).Zo...	76.0 deg F
B Stair-2 Flr-2(CUH-3).Zone Temp	73.6 deg F
B Stair-2 Flr-2(EF-30).Zone Temp	68.3 deg F
B Stair-2 Flr-3(CUH-3).Zone Temp	67.2 deg F
B Stair-2 North(CUH-5).Zone Temp	46.9 deg F
B Stair-2 South(CUH-5).Zone Temp	48.4 deg F
B1-1 STAIR(FPB-B104)(AHU-3).Zone ...	71.2 deg F
B101 LOBBY(FPB-B102)(AHU-3).Zon...	70.3 deg F

A200 GYMNASIUM LOBBY(FPB-A...	77.3 cfm
A200.1 CORRIDOR(FPB-A201)(A...	96.2 cfm
AHU1(CLASSROOMS D WING W...	1,925.6 cfm
AHU1(CLASSROOMS D WING W...	12,099.8 cfm
AHU10(1ST, 2ND, 3RD FLR BUI...	10,130.4 cfm
AHU10(1ST, 2ND, 3RD FLR BUI...	9,808.6 cfm
AHU11 A210 GYM SOUTH.Retur...	9,214.3 cfm
AHU11 A210 GYM SOUTH.Suppl...	10,583.9 cfm
AHU12 A210 GYM NORTH.Retur...	8,166.0 cfm
AHU12 A210 GYM NORTH.Suppl...	14,839.1 cfm
AHU2(CLASSROOMS D WING E...	12,616.1 cfm
AHU2(CLASSROOMS D WING E...	8,881.0 cfm
AHU3(1ST FLR FPB).Supply Fan ...	7,077.2 cfm
AHU4(2ND, 3RD, 4TH FLR FPB)....	7,649.0 cfm
AHU4(2ND, 3RD, 4TH FLR FPB)....	6,322.7 cfm
AHU6(B180 AUDITORIUM).Suppl...	11,027.0 cfm
AHU7(1ST, 2ND FLR BUILDING ...	13,635.2 cfm
AHU7(1ST, 2ND FLR BUILDING ...	14,639.8 cfm
AHU8(3RD FLR BUILDING C FP...	7,348.3 cfm
AHU8(3RD FLR BUILDING C FP...	7,120.2 cfm
AHU9(C171 STAGE).Return Fan ...	8,491.9 cfm
AHU9(C171 STAGE).Supply Fan ...	7,112.7 cfm
B Stair-2 Flr-1(FPB-B101)(AHU-3...	432.5 cfm
B1-1 STAIR(FPB-B104)(AHU-3)....	200.2 cfm
B101 LOBBY(FPB-B102)(AHU-3)....	430.4 cfm

A200 GYMNASIUM LOBBY(FPB-A...	100.0 % open
A200.1 CORRIDOR(FCU5).Heati...	100.0 % open
A200.1 CORRIDOR(FPB-A201)(A...	100.0 % open
A202 MULTI-PURPOSE DANC.H...	100.0 % open
A210.1 ATHLETIC STOR.(UH4)....	0.0 % open
A210.2 F/H STORE(UH4).Heatin...	100.0 % open
AHU1(CLASSROOMS D WING W...	0.0 % open
AHU10(1ST, 2ND, 3RD FLR BUI...	0 % open
AHU11 A210 GYM SOUTH.Rehe...	0 % open
AHU12 A210 GYM NORTH.Rehe...	100 % open
AHU2(CLASSROOMS D WING E...	0.0 % open
AHU3(1ST FLR FPB).Reheat Out...	0.0 % open
AHU4(2ND, 3RD, 4TH FLR FPB)....	0.0 % open
AHU5(CROCKETT LIBRARY).Re...	100.0 % open
AHU6(B180 AUDITORIUM).Rehe...	100.0 % open
AHU7(1ST, 2ND FLR BUILDING ...	0.0 % open
AHU8(3RD FLR BUILDING C FP...	0.0 % open
AHU9(C171 STAGE).Reheat Out...	57 % open
B Stair-2 Flr-1(FPB-B101)(AHU-3...	0.0 % open
B Stair-2 Flr-2(CUH-3).Heating O...	0.0 % open
B Stair-2 Flr-3(CUH-3).Heating O...	0.0 % open
B Stair-2 North(CUH-5).Heating ...	100.0 % open
B Stair-2 South(CUH-5).Heating ...	100.0 % open
B1-1 STAIR(FPB-B104)(AHU-3)....	0.0 % open
B101 LOBBY(FPB-B102)(AHU-3)....	100.0 % open

# Metasys – Service Call Example

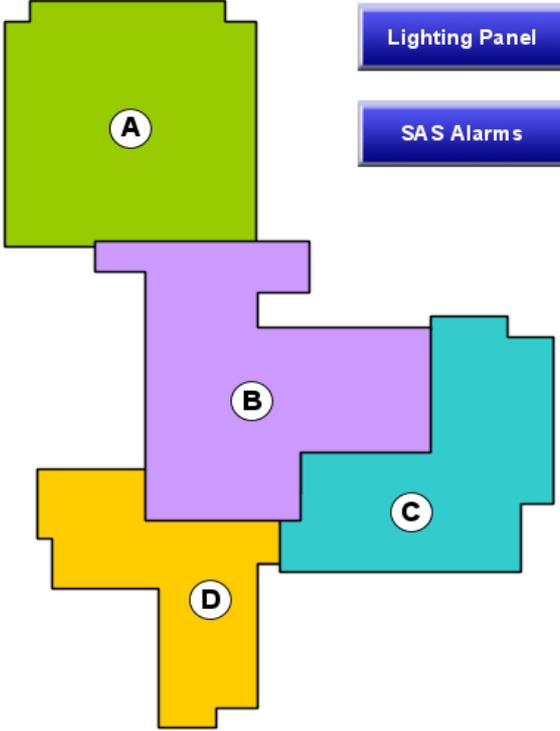
9:30AM – Received call from Facility Supervisor at High School that Room D147 is too hot.

# Metasys – Service Call Example (High School Main Graphic)

**Viking Controls, Inc.**  
TEMPERATURE CONTROL SYSTEMS

**Wellesley Regional High School – Wellesley, MA**

Outside Air Temperature: 10.4 deg F

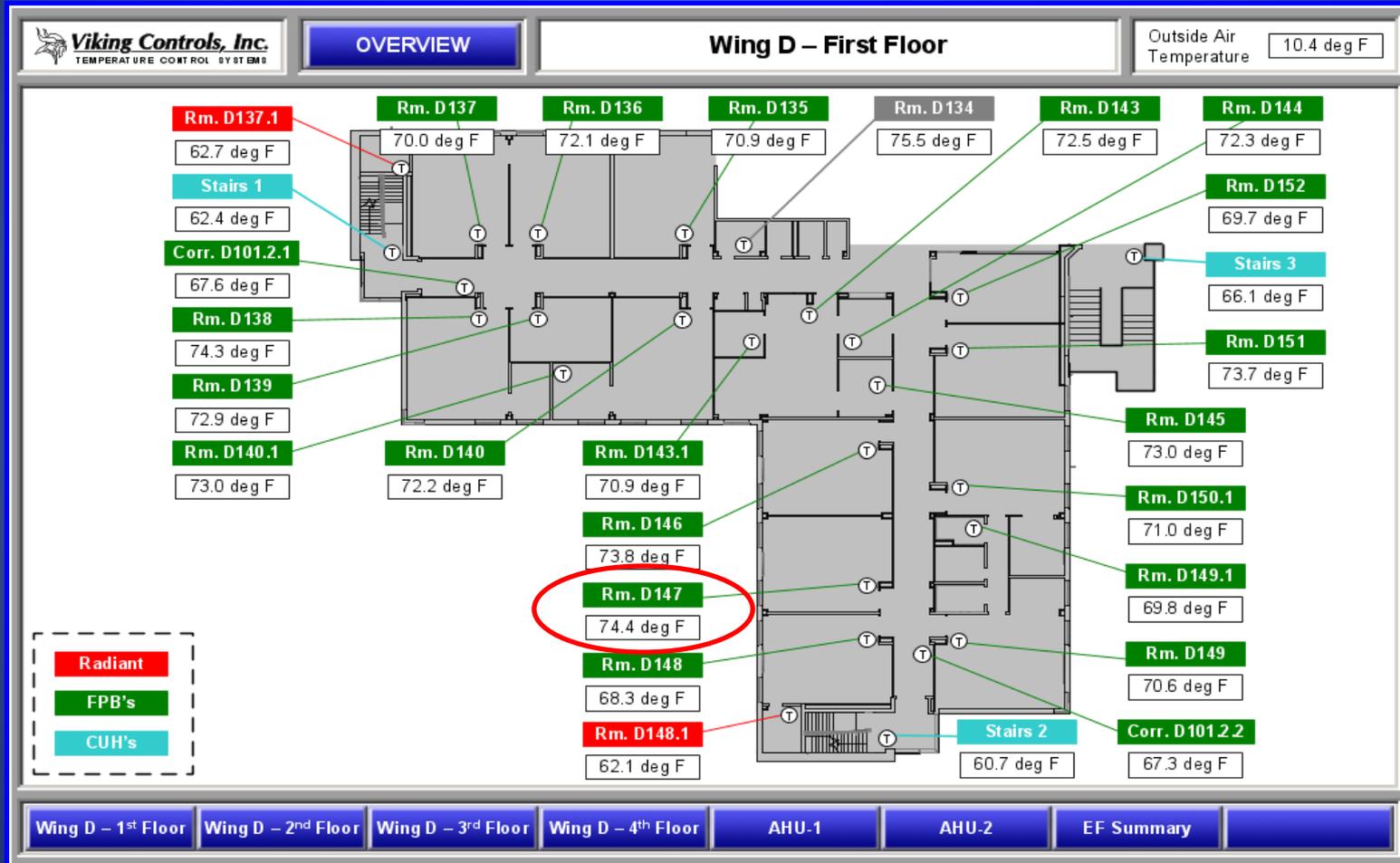
Wing A – 1 <sup>st</sup> Floor	Wing A – 2 <sup>nd</sup> Floor	
Wing B – 1 <sup>st</sup> Floor	Wing B – 2 <sup>nd</sup> Floor	
Wing B – 3 <sup>rd</sup> Floor	Wing B – 4 <sup>th</sup> Floor	
Wing C – 1 <sup>st</sup> Floor	Wing C – 2 <sup>nd</sup> Floor	
Wing C – 3 <sup>rd</sup> Floor	Wing C – 4 <sup>th</sup> Floor	
<b>Wing D – 1<sup>st</sup> Floor</b>	Wing D – 2 <sup>nd</sup> Floor	
Wing D – 3 <sup>rd</sup> Floor	Wing D – 4 <sup>th</sup> Floor	

Lighting Panel

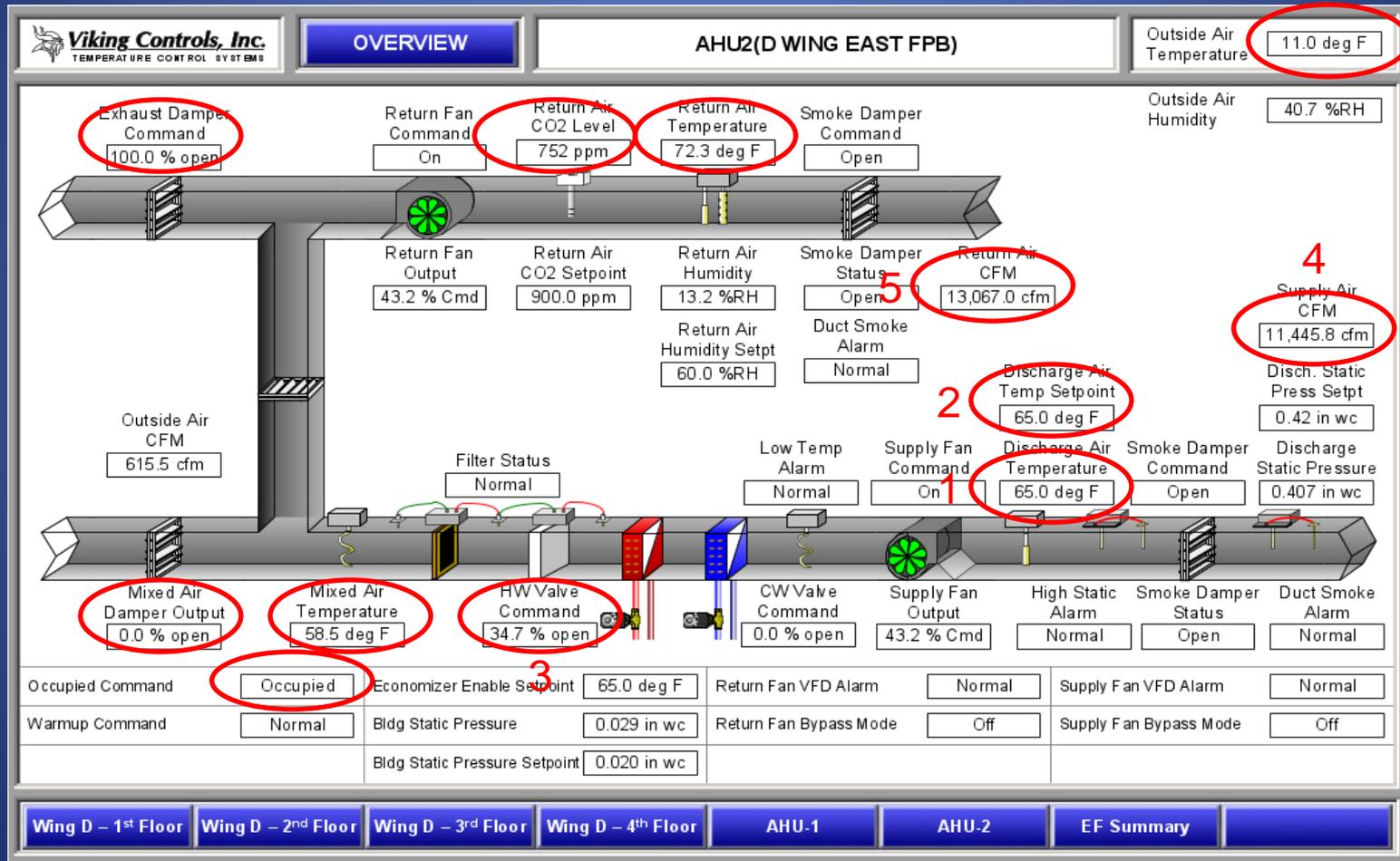
SAS Alarms

HW System | CHW System | DHW System | Geothermal | AHU Summary | ERU Summary | Energy Monitoring | EF Summary

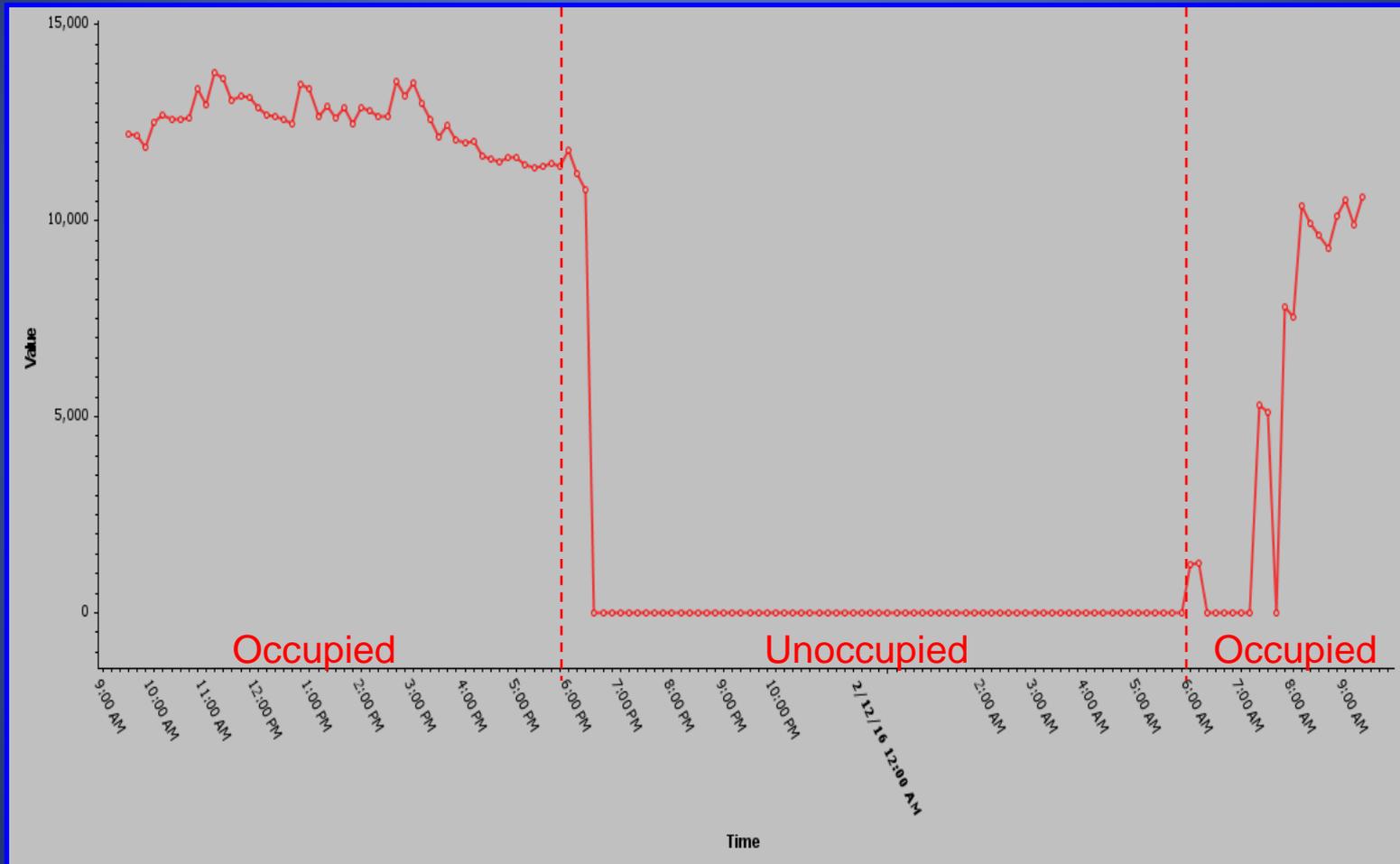
# Metasys – Service Call Example (Wing D - First Floor Graphic)



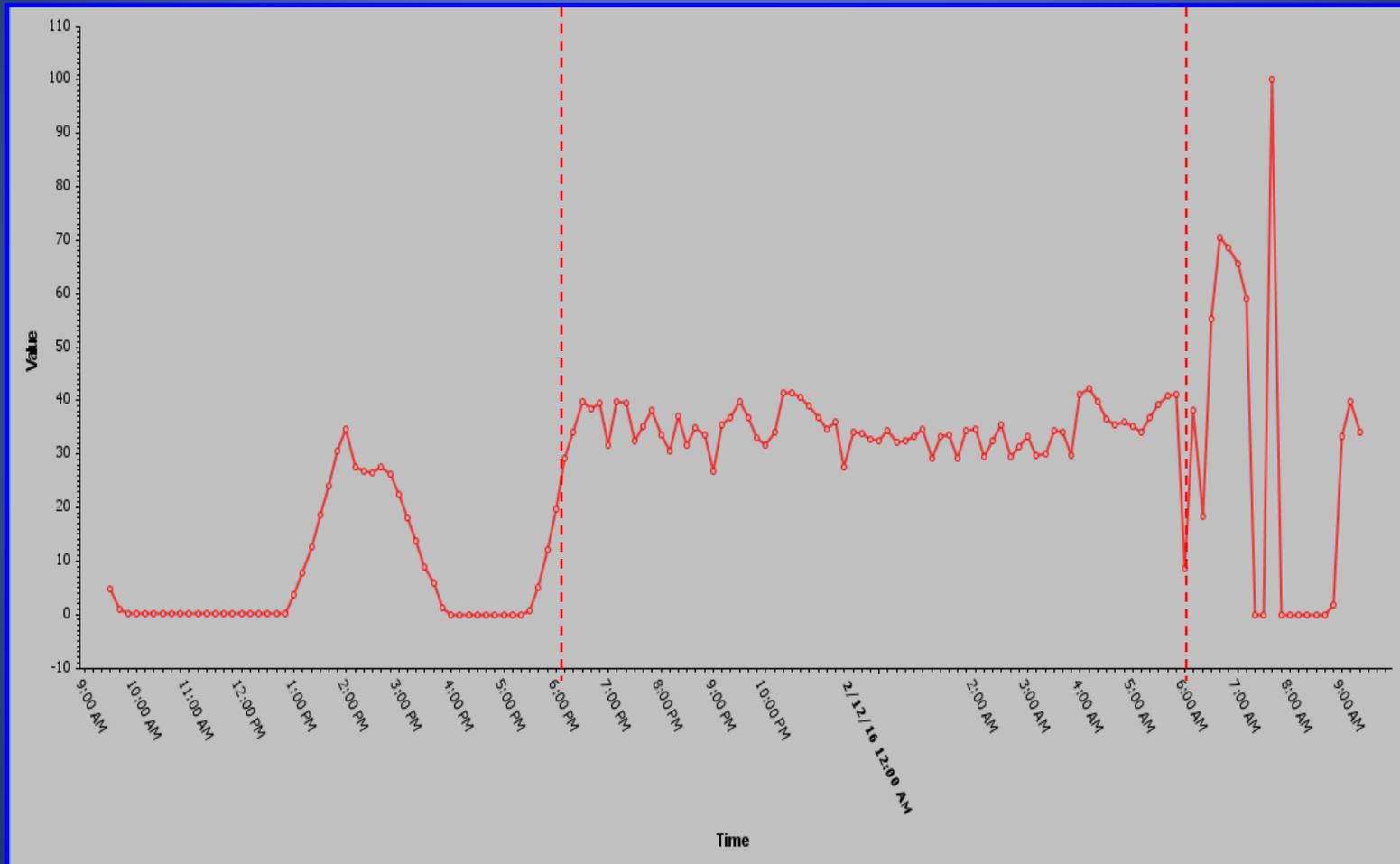
# Metasys – Service Call Example (AHU#2 Graphic)



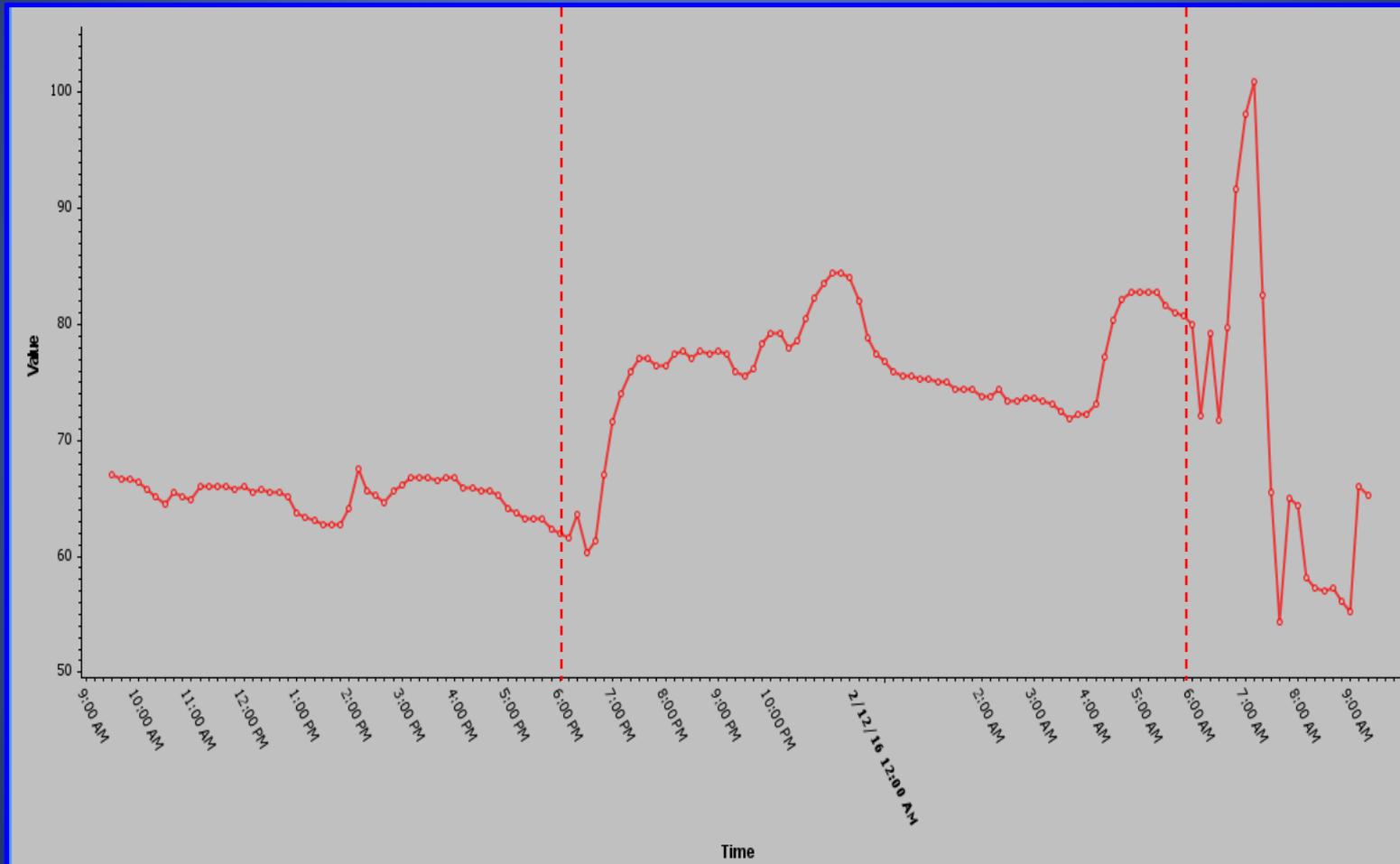
# Metasys – Service Call Example (AHU#2 SA CFM)



# Metasys – Service Call Example (AHU#2 HW Valve)



# Metasys – Service Call Example (AHU#2 DAT)



# Metasys – Service Call Example

9:35AM – Except for HW valve operation, AHU#2 looks good. HW valve operation unlikely cause of room overheating because it closed at 8:00AM and DAT stabilized at 65°F setpoint. However, still need to check valve. Now, need to look at FPB for D147.

# Metasys – Service Call Example (FPB #D117)

Viking Controls, Inc. TEMPERATURE CONTROL SYSTEMS

OVERVIEW

D147 LANGUAGE CM(FPB-D117)(AHU-2)

Outside Air Temperature 11.0 deg F

CFM Flow Setpoint 0.0 cfm

CFM Flow 0.0 cfm

Supply Air From AHU 65.0 deg F

Damper Command 0.0 %

Supply Fan Command On

Discharge Air Temperature 100.0 deg F

Heating Command 100.0 % open

Occupied Command Standby

Cooling Standby Setpoint 77.0 deg F

Unocc. Cooling Setpoint 82.0 deg F

Effective Cooling Setpoint 70.0 deg F

Warmest/Cooler Adjust -3.0 deg F

Heating Standby Setpoint 72.0 deg F

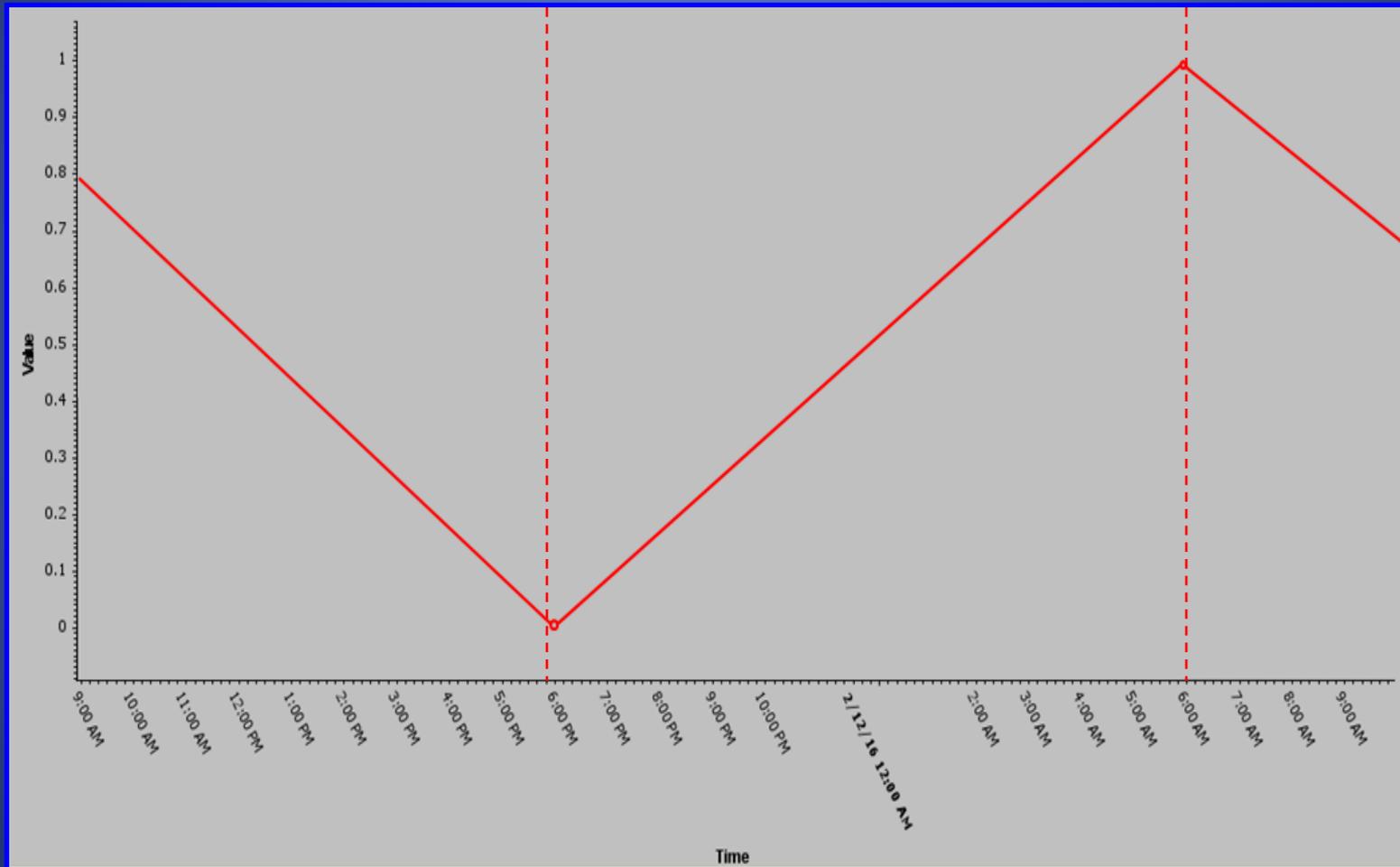
Unocc. Heating Setpoint 60.0 deg F

Effective Heating Setpoint 68.0 deg F

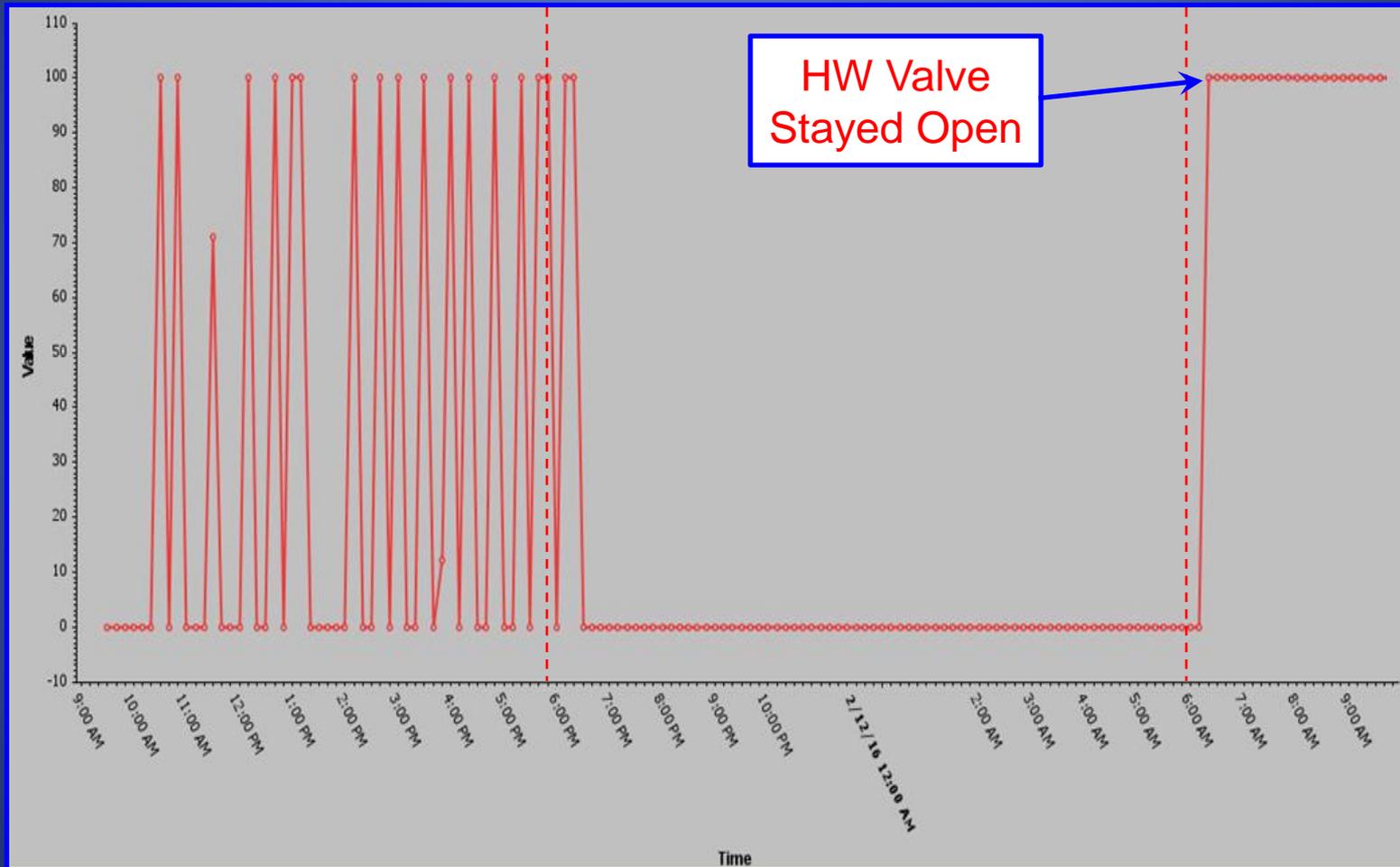
Lighting Interlock Active

Wing D – 1<sup>st</sup> Floor Wing D – 2<sup>nd</sup> Floor Wing D – 3<sup>rd</sup> Floor Wing D – 4<sup>th</sup> Floor AHU-1 AHU-2 EF Summary

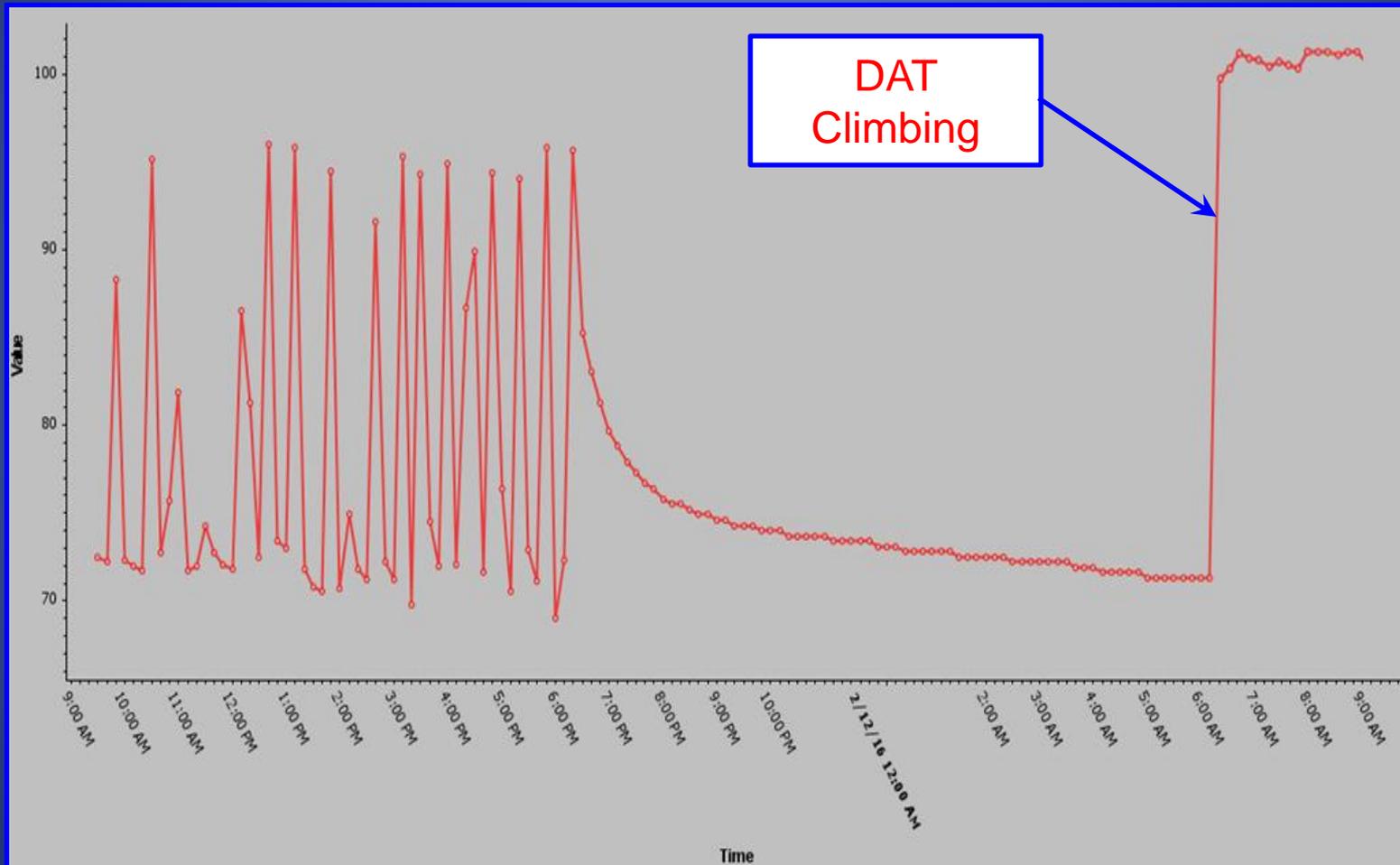
# Metasys – Service Call Example (FPB #D117 SF CMD)



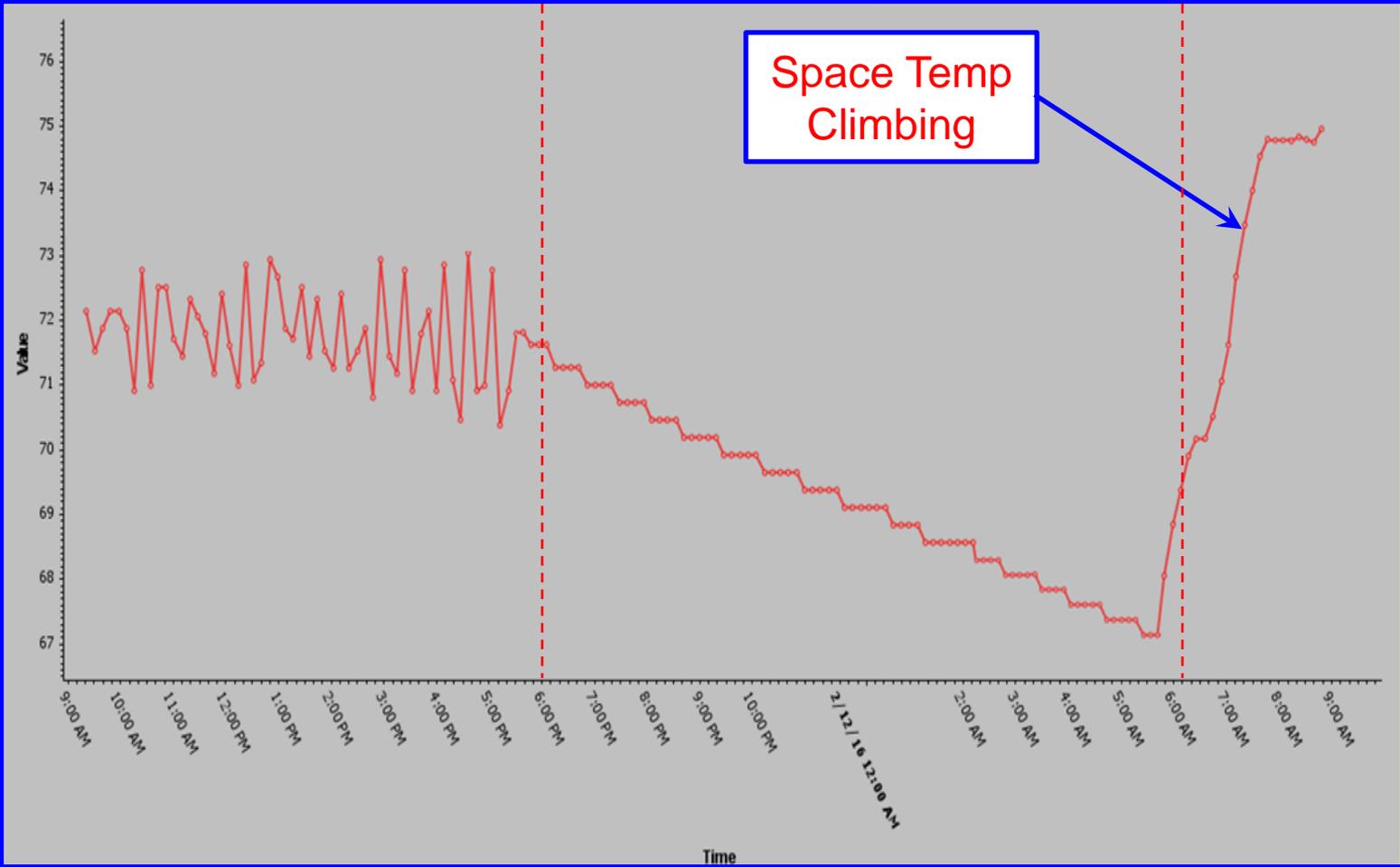
# Metasys – Service Call Example (FPB #D117 HW Valve Position)



# Metasys – Service Call Example (FPB #D117 DAT)



# Metasys – Service Call Example (FPB #D117 Space Temperature)



# Metasys – Service Call Example

9:40AM – Appears that FPB HW valve is stuck open. Called Facility Supervisor to explain problem, issued WO, and called FMD Tech to repair. Total diagnostic time about 10 minutes. *Metasys not only powerful energy management tool but also greatly enhances problem solving maintenance issues.*

# LEDs

- Total Project Budget \$5.3M over Five Years
- Includes 15 Town and School Buildings
- Phasing Based on LCCA
  - Exterior
  - Interior - Common
  - Interior - Classes/Offices
- Priority Based on Remaining Service Life of T8s Lamps (7.5 yrs.) and Ballasts (15 yrs.)

# LEDs

- Must have Methodology for Planning, Designing, and Installing LEDs
- Exterior Emphasis on Minimizing “BUG” (Backlight, Uplight, and Glare)
- Interior Emphasis on Foot-Candles, Uniform Distribution, and Lighting Control

# LEDs

## Exterior - Middle School

The image displays a lighting design workflow. On the left, six different LED fixture models are shown in a grid. A blue arrow points from the top-right fixture to a software control panel. The panel includes sections for LUMINAIRE, ARRANGEMENT / LAYOUT, ISOLINES, DISPLAY, ANALYSIS, UNITS, and OUTPUT / HELP. The ANALYSIS section is active, showing a 'Show Statistical Area' with dimensions: Left (X): 0 ft, Bottom (Y): -25 ft, Length (X): 40 ft, and Width (Y): 50 ft. Below this, there are checkboxes for 'Show Summary' and various metrics: Avg, Max, Min, Units, Max/Min, Avg/Min, Max/Avg, LPD, LPD Area, LPD Watts, and Total Watts. A blue arrow points from the bottom of the control panel to a light distribution diagram on the right. The diagram shows a grid with concentric contour lines representing light levels. A 'Statistical Area' box is overlaid on the diagram with the following data: Avg: 2.84 fc, Max: 15.53 fc, Min: 0.1 fc, Avg/Min: 27.21, and Max/Min: 148.89. A blue arrow points from the bottom of the diagram to two photographs of a school entrance at night. The left photograph shows the entrance with warm, yellowish light from the fixtures, while the right photograph shows the same entrance with a cooler, greenish light from the fixtures.

# LEDs

## Interior - Warren



Luminaire: LG LGE-2X2LT-53-40-T UL\_LG LED Lense

Dimensions (L x B x H): 1.968 x 1.968 x 0.318 ft

Calculation Parameters

Planned Em: 40 fc Suggestion

Em from: 33 fc

---

Horizontal arrangement

7.43 ft      3.71 ft

Vertical arrangement

Number: 1      8.00 ft      4.00 ft

Arrangement parameters

Luminaire: 90° Centre up

Isolux Lines

Automatic

Free Choice

New: 0.00 fc

Paste

Delete

Values as Standard

	0.08	0.23	0.38	0.53	0.69	0.84	0.99	1.14	1.30	1.45	1.60
3.84	20	21	23	25	26	27	27	27	27	28	28
3.59	20	21	24	26	27	28	28	28	28	28	29
3.34	22	23	26	28	29	30	30	30	31	31	31
3.10	23	25	28	30	31	32	33	33	33	33	34
2.85	24	26	29	31	33	34	34	34	34	35	35
2.60	25	27	30	33	35	36	36	36	36	36	37
2.35	26	28	31	34	36	37	37	37	37	37	38

	Eav [fc]	Emin [fc]	Emax [fc]	Emin / Eav	Emin / Emax
	34	41	57	0.47	

Calculate





# LEDs Interior - Bates

Before



After



# LEDs

## Interior Corridors - Bates



# Agenda

- Quick Facts Review for FMD Buildings
- Electricity and Natural Gas Prices for FY17
- Metered & Normalized Energy Use for FY15
- ECMs Completed, Pending, & Planned
- Preventive Maintenance Program

# Preventive Maintenance

- FMD has made Significant Progress with respect to Capital Projects since 2012
- Energy Management and Maintenance Work are Directly Related – Synergy \*
- ECMs must be Maintained once Installed to Retain System Performance and Savings

\* “The interaction ... of two or more organizations ... [that] produce a combined effect greater than the sum of their separate effects.” (Oxford Dictionary)

# Preventive Maintenance

- Now Focusing on Proactive (Preventive) Maintenance versus Reactive Maintenance
- Preventive Maintenance – “Actions performed on a ... schedule that ... mitigate[s] degradation of a component or system with the aim of extending its useful life ...”
- PM Extends Equipment Life, Optimizes Performance, and Reduces Operating Costs

# Preventive Maintenance

## Advantages

- Cost effective in many capital-intensive processes.
- Flexibility allows for the adjustment of maintenance periodicity.
- Increased component life cycle.
- Energy savings.
- Reduced equipment or process failure.
- Estimated 12% to 18% cost savings over reactive maintenance program.

\* DOE Office of Energy Efficiency & Renewable Energy FEMP  
“Operations and Maintenance (O&M) Best Practices Guide: Release 3.0” (2010)

# Preventive Maintenance

- Already have Tools and Technical Expertise to Create and Implement Dynamic PM Program
- Starting to Survey Equipment, Compile Database, and Populate PMDirect
- Will Kick-Off PM Program July 1, 2016!



# Questions?

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