

# LVSS-B Report

## 1. Project Information

Date	2019-2-13
Project name	Milwaukee ChurchR2
Project address	
Country	U.S.
State	Wisconsin
City	Green Bay
Client name	
Client address	
Reference	New Project
Revision	
Altitude(ft)	702
Indoor DB temperature in cooling(°F)	72
Indoor WB temperature in cooling(°F)	65
Outdoor DB temperature in cooling(°F)	95
Outdoor WB temperature in cooling(°F)	76
Indoor DB temperature in heating(°F)	70
Indoor WB temperature in heating(°F)	56
Outdoor DB temperature in heating(°F)	30
Outdoor WB temperature in heating(°F)	24

## 2. Overall Material List

### 2.1 Equipment List

Model	Quantity	Description
VPB168H4M-3Y	1	Heat Pump (208/230V)
VPB120H4M-3Y	2	Heat Pump (208/230V)
VCFB048H4-3P	8	VCFB-Ceiling/Floor
VWMB018H4-3P	2	VWMB-Wall Mounted
V8IDBP05	2	Branch
V8IDBP04	3	Branch
V8IDBP03	2	Branch
V8IDBP02	2	Branch
V8ODBP03HP-3	1	Branch
99Z61	1	Factory Commission/Startup-Primary
11718	1	JIT At-Your-Office Course
VOSTAT54P-3	4	Non-Programmable Controller
VOCTRL15P-1	1	LVM Touchscreen component - 15" option (1 of 3 items required for LVM)
VOCTRL91P-3	1	VRF Lennox BAS - Software
VOCTRL95P-3	1	VRF LVM/BACnet Gateway - Hardware

### 2.2 Field Providing List

#### 2.2.1 Refrigerant Piping Materials

Model	Quantity	Unit	Description
F7/8	65	ft	Copper pipe
F1-5/8	70	ft	Copper pipe
F3/4	80	ft	Copper pipe
F3/8	145	ft	Copper pipe
F1-3/8	60	ft	Copper pipe
F5/8	150	ft	Copper pipe
F1-1/8	25	ft	Copper pipe
F1/2	5	ft	Copper pipe
Insulation casing for piping			All refrigerant piping and branch joints should be completely insulated.

Recommended insulation casing thickness:

Piping size	Thickness	
	Humidity<80%RH	Humidity≥80%RH
1/4~1-1/2 inch	≥3/5inch	≥4/5inch
1-1/2~1-5/8 inch	≥4/5inch	≥1inch

#### 2.2.2 Refrigerant charge

System name	Model	Quantity	Unit	Description
System1	R410A	64.48	lbs	Extra Refrigerant Charged

### 2.2.3 Electrical cables

Type	Size	Length
Power supply cable	Select based on MCA of each unit	According to the actual system design
Communication cable	18 G.a shielded cable	According to the actual system design

## 3. Overall Electrical Characteristics

Model	Quantity	Power supply	MCA(A)	MFA(A)	Power input in cooling(kW)	Power input in heating(kW)
VPB168H4M-3Y	1	208/230V-3Ph-60Hz	84.8	90	9.402	9.769
VPB120H4M-3Y	2	208/230V-3Ph-60Hz	54.2	60	14.185	13.811
VCFB048H4-3P	8	208/230V-1Ph-60Hz	1.6	15	0.212	0.212
VWMB018H4-3P	2	208/230V-1Ph-60Hz	0.42	15	0.035	0.035

Notes:

1. MCA: Minimum Circuit Amps. MCA is used to select wire size.
2. MFA: Maximum Fuse Amps. MFA is used to select overcurrent circuit breakers and residual-current circuit breakers.
3. Power in put in cooling and heating are based on below conditions:

Cooling: indoor air temperature 80°F DB/67°F WB; outdoor temperature 95°F DB;

Heating: indoor air temperature 68°F DB; outdoor temperature 47°F DB/43°F WB;

Equivalent refrigerant piping length 24.6ft with zero level difference.

## 4. Disclaimer

### IMPORTANT ELECTRICAL & REFRIGERANT PIPING INSTALLATION INFORMATION

The piping diagram or diagrams included within this document have been prepared based on the information provided to the Lennox VRF applications department. If no information was available at the time of preparing this document, all identified lengths and quantity of fittings have been assumed by Lennox VRF applications to enable the completion of this document. When the indicated lengths (whether these were provided as an accurate assessment of the proposed installation or assumed by Lennox VRF applications department) change from the figures stated within this document, it is imperative that prior to the commencement of the refrigerant pipe work installation, Lennox VRF applications department are informed of these proposed changes. Upon receipt of this new information the Lennox VRF applications department will confirm any changes that may be applicable to this installation. If changes are required, a new piping diagram will be produced and will supersede all other previously provided documents. Failure to provide this information regarding changes to the original design may lead to insufficient capacity, equipment failure, warranty being made void and the refusal to commission the system. It is the responsibility of the VRF equipment purchaser to ensure that incoming power supplies to both outdoor and indoor equipment meets Lennox specifications – please refer to submittals. Failure to ensure stable or constant power may result in premature failure not covered under warranty. All costs associated with stabilizing the incoming power are the responsibility of the purchaser. Any components which fail due to higher than normal voltages or unstable power will not be replaced under the standard warranty program. Please refer to submittals for all incoming power requirements.

For any questions please contact us at:

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PLEASE READ THIS DOCUMENT FULLY BEFORE COMMENCING WITH YOUR PIPE WORK INSTALLATION

## 5. System1

### 5.1 BOM List (System1)

Model	Quantity	Unit	Description
VPB168H4M-3Y	1		Heat Pump (208/230V)
VPB120H4M-3Y	2		Heat Pump (208/230V)
VCFB048H4-3P	8		VCFB-Ceiling/Floor
VWMB018H4-3P	2		VWMB-Wall Mounted
V8IDBP05	2		Branch
V8IDBP04	3		Branch
V8IDBP03	2		Branch
V8IDBP02	2		Branch
V8ODBP03HP-3	1		Branch
99Z61	1		Factory Commission/Startup-Primary
R410A	64.48	lbs	Extra Refrigerant Charged
F7/8	65	ft	Copper pipe
F1-5/8	70	ft	Copper pipe
F3/4	80	ft	Copper pipe
F3/8	145	ft	Copper pipe

F1-3/8	60	ft	Copper pipe
F5/8	150	ft	Copper pipe
F1-1/8	25	ft	Copper pipe
F1/2	5	ft	Copper pipe

## 5.2 Indoor Unit Details (System1)

### 5.2.1 Indoor Unit Details Table

IDU Name	Model	Weight(lbs)	Dimension(W*H*D)	Power supply	MCA(A)	MFA(A)
IDU2	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU3	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU4	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU5	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU6	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU7	VWMB018H4-3P	30.2	38-31/32*12-13/32*8-25/32	208/230V-1Ph-60Hz	0.42	15
IDU8	VWMB018H4-3P	30.2	38-31/32*12-13/32*8-25/32	208/230V-1Ph-60Hz	0.42	15
IDU10	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU11	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15
IDU1	VCFB048H4-3P	106	66*27*10	208/230V-1Ph-60Hz	1.6	15

IDU Name	Model	Tmp-C(°F)	RTC(Btu/h)	ATC(Btu/h)	RSC(Btu/h)	ASC(Btu/h)	PI-C(W)	Tmp-H(°F)	RHC(Btu/h)	AHC(Btu/h)	PI-H(W)
IDU2	VCFB048H4-3P	72		41,667		30,151	212	70		42,726	212
IDU3	VCFB048H4-3P	72		41,667		29,987	212	70		42,493	212
IDU4	VCFB048H4-3P	72		41,667		30,069	212	70		42,609	212
IDU5	VCFB048H4-3P	72		41,667		30,642	212	70		43,423	212
IDU6	VCFB048H4-3P	72		41,667		30,969	212	70		43,889	212
IDU7	VWMB018H4-3P	72		16,494		12,221	35	70		17,659	35
IDU8	VWMB018H4-3P	72		16,494		12,330	35	70		17,872	35
IDU10	VCFB048H4-3P	72		41,667		31,578	212	70		44,888	212
IDU11	VCFB048H4-3P	72		41,667		31,578	212	70		44,888	212
IDU1	VCFB048H4-3P	72		41,667		30,151	212	70		42,726	212

IDU Name	Model	Airflow(CFM)	Sound-Pr(dB(A))	ESP(in.w.g.)
IDU2	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU3	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU4	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU5	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU6	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU7	VWMB018H4-3P	450/380/340	42/37/36	/
IDU8	VWMB018H4-3P	450/380/340	42/37/36	/
IDU10	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU11	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04
IDU1	VCFB048H4-3P	1351/1001/932	58/51/49	0~0.04

### 5.2.2 Table of Abbreviations

Abbreviation code	Description
Tmp-C	Indoor temperature in cooling (Dry bulb temp. / Wet bulb temp. / RH)
RTC	Required total cooling capacity
ATC	Available total cooling capacity
RSC	Required sensible cooling capacity
ASC	Available sensible cooling capacity
Tmp-H	Indoor temperature in heating (Dry bulb temp.)
RHC	Required heating capacity
AHC	Available heating capacity
Airflow	Indoor unit airflow (High/Medium/Low)
ESP	External static pressure
Sound-Pr	Sound pressure level (High/Medium/Low)
MCA	Minimum Circuit Amps
MFA	Maximum Fuse Amps
Power supply	Power supply
Dimension(WxHxD)	NetDimension+WxHxD+inch
Weight	Weight
PI-C	Power input in cooling
PI-H	Power input in heating

## 5.3 Outdoor Unit Details (System1)

### 5.3.1 Outdoor Unit Details Table

Model		VPB408H4M-3Y		
Module		VPB168H4M-3Y	VPB120H4M-3Y	VPB120H4M-3Y
Tmp-C	°F	72		
RTC	Btu/h	366,325		
ATC	Btu/h	366,325		
EER	kW/kW	2.98		
Tmp-H	°F	70		
RHC	Btu/h	383,174		
AHC	Btu/h	394,851		
COP	kW/kW	2.66		
CR	%	103.4		
Airflow	CFM	12500	9200	9200
Sound-Pr	dB(A)	67	69	69
Dimension(W*H*D)	inch	68-1/2*72*32-5/8	52-3/4*64-3/8*31-1/2	52-3/4*64-3/8*31-1/2
Weight	lbs	1067	761	761
Bas-Refr	lbs	71.40		
Ex-Refr	lbs	64.48		
Power supply	V/Ph/Hz	208/230V-3Ph-60Hz	208/230V-3Ph-60Hz	208/230V-3Ph-60Hz
MCA	A	84.8	54.2	54.2
MFA	A	90	60	60

### 5.3.2 Table of Abbreviations

Abbreviation code	Description
Tmp-C	Outdoor conditions in cooling (Dry bulb temp.)
RTC	Required cooling capacity
ATC	Available cooling capacity
Tmp-H	Indoor conditions in heating (Dry bulb temp. / Wet bulb temp. / RH)
RHC	Required heating capacity
AHC	Available heating capacity
COP	COP
CR	Combination ratio
Airflow	Outdoor unit airflow
Sound-Pr	Sound pressure level
Dimension(WxHxD)	NetDimension+WxHxD+inch
Weight	Weight
Bas-Refr	Standard factory refrigerant charge
Ex-Refr	Extra refrigerant charge
Power supply	Power supply
MCA	Minimum Circuit Amps
MFA	Maximum Fuse Amps

### 5.4 Piping Limitations (System1)

#### 5.4.1 Piping Limitations

Piping length	Capability	Actual Value
Total piping length	3280.00(ft)	310.00(ft)
Longest actual length	574.00(ft)	180.00(ft)
Longest equivalent length	656.00(ft)	180.00(ft)
Longest equivalent length after first branch	295.00(ft)	130.00(ft)
Indoor unit to nearest branch length	132.00(ft)	25.00(ft)
Length difference between longest and shortest distance to indoor units	132.00(ft)	110.00(ft)
Height difference between indoor and outdoor unit(ODU up)	360.00(ft)	0.00(ft)
Height difference between indoor and outdoor unit(ODU down)	230.00(ft)	0.00(ft)
Height difference between indoor units	98.00(ft)	0.00(ft)
Combination ratio	50-130%	103.43%

#### 5.4.2 Correction Factors

Item	Correction factor
Altitude (indoor unit)	0.99
Altitude (outdoor unit)	0.99
Piping (cooling)	0.96
Piping (heating)	0.98
Defrost (heating)	1.00

#### 5.4.3 Piping Details Table

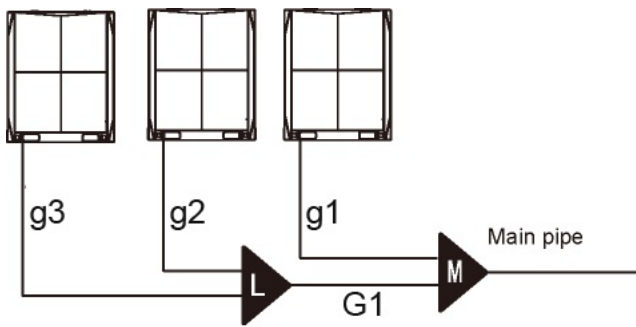
No.	Length(ft)	Piping diameter
(1)	50.00	1-5/8,7/8
(2)	20.00	1-5/8,3/4
(3)	10.00	7/8,3/8
(4)	20.00	1-3/8,3/4

(5)	10.00	5/8,3/8
(6)	20.00	1-3/8,3/4
(7)	10.00	5/8,3/8
(8)	20.00	1-3/8,3/4
(9)	10.00	5/8,3/8
(10)	20.00	1-1/8,5/8
(11)	10.00	5/8,3/8
(12)	5.00	1-1/8,1/2
(13)	25.00	5/8,3/8
(14)	10.00	5/8,3/8
(15)	10.00	5/8,3/8
(16)	5.00	7/8,3/8
(17)	25.00	5/8,3/8
(18)	10.00	5/8,3/8
(19)	10.00	5/8,3/8

#### 5.4.4 Branch Joints Details Table

No.	Load(Btu/h)	Model
(1)	422,000	V8IDBP05
(2)	326,000	V8IDBP05
(3)	307,000	V8IDBP04
(4)	288,000	V8IDBP04
(5)	240,000	V8IDBP04
(6)	192,000	V8IDBP03
(7)	96,000	V8IDBP02
(8)	144,000	V8IDBP03
(9)	96,000	V8IDBP02

#### 5.4.6 Combined Outdoor Units Details Information



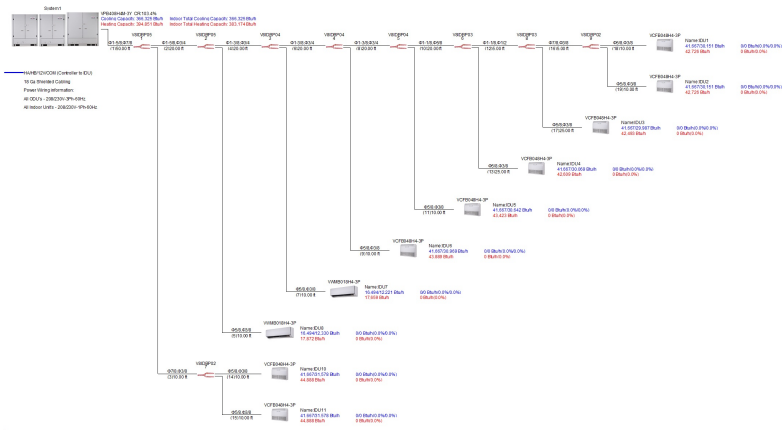
Outdoor branch joint model

Outdoor branch	Model name
L+M	V8ODBP03HP-3

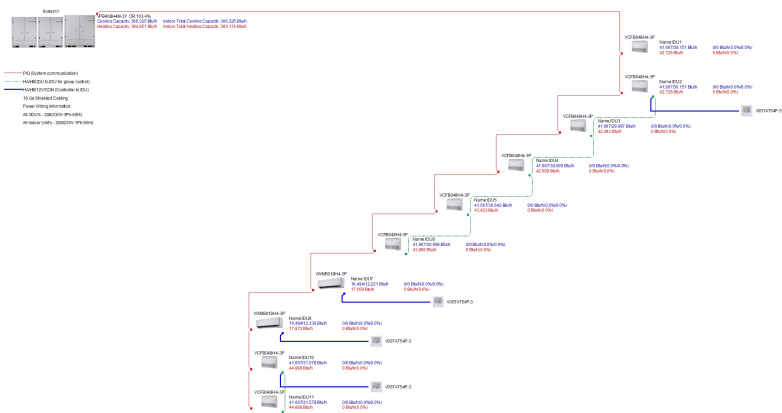
Outdoor unit-Branch/Branch-Branch

Piping	Piping diameter(inch)	Piping length(ft)
G1	1-5/8,7/8	0
g1	1-3/8,3/4	0
g2	1-1/8,5/8	0
g3	1-1/8,5/8	0
Balance Pipe	3/4,7/8,1/4	0

### 5.5 Piping Diagrams (System1)



## 5.6 Wiring Diagrams (System1)



## 6. Centralized Control Solution

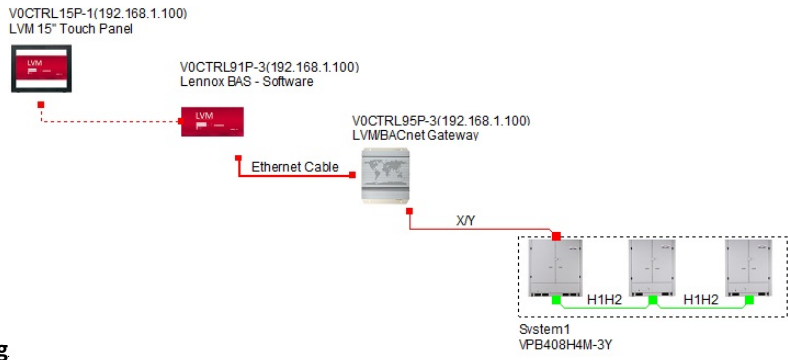
### 6.1 Centralized Controller List

Model	Quantity	Description
VOCTRL15P-1	1	LVM Touchscreen component - 15" option (1 of 3 items required for LVM)
VOCTRL91P-3	1	VRF Lennox BAS - Software
VOCTRL95P-3	1	VRF LVM/BACnet Gateway - Hardware

### 6.2 Control Solution1 (Group1)

#### 6.2.1 Details

Controller model	Port no.	Controller model	Port no.	Controller model	Port no.	System
VOCTRL15P-1 192.168.1.100 LVM Touchscreen component - 15" option (1 of 3 items required for LVM)	1	VOCTRL91P-3 192.168.1.100 VRF Lennox BAS - Software	1	VOCTRL95P-3 192.168.1.100 VRF LVM/BACnet Gateway - Hardware	1	System1 Address:



**6.2.2 Wiring**