PAE CONSULTING ENGINEERS, INC.

LANE COMMUNITY COLLEGE DOWNTOWN CAMPUS

Mechanical Basis of Design

PRESENTED TO: Lane Community College

PRESENTED BY: Marc Brune, PE, LEED AP

GOALS

Way back in 2010…

Mixed use building

- Academic and Residential Space

“A Building that Teaches”

- Energy Management Program

Energy & Comfort

- 80°F Cooling
- 70°F Heating
- Living Building Ready

GOALS

Way back in 2010…

Mixed use building

- Academic and Residential Space

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- Energy Management Program

Energy & Comfort

- 80°F Cooling
- 70°F Heating
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GOALS

Way back in 2010…

Mixed use building

- Academic and Residential Space

"A Building that Teaches"

- Energy Management Program

Energy & Comfort

- 80°F Cooling
- 70°F Heating
- LEED Platinum/Gold

TEACHING, ENERGY & COMFORT

Results

	ACADEMIC	RESIDENTIAL
	GOALS	
EUI (kBTU/SF/YR)	10-13	10-13
% BETTER THAN CODE	35-40	50
LEED RATING	GOLD	PLATINUM
DIFFERENT SYSTEM TYPES	8	1
	PROJECTIONS	
EUI (kBTU/SF/YR)	25	39
% BETTER THAN CODE	31%	52%
LEED RATING	TARGETING	TARGETING
DIFFERENT SYSTEM TYPES	8	1
	ACHIEVAL	
EUI (kBTU/SF/YR)	NO	NO
% BETTER THAN CODE	NEARLY	EXCEEDING
LEED RATING	YES, TBD	YES, TBD
DIFFERENT SYSTEM TYPES	YES	YES

PRESENTATION OVERVIEW

Natural Ventilation

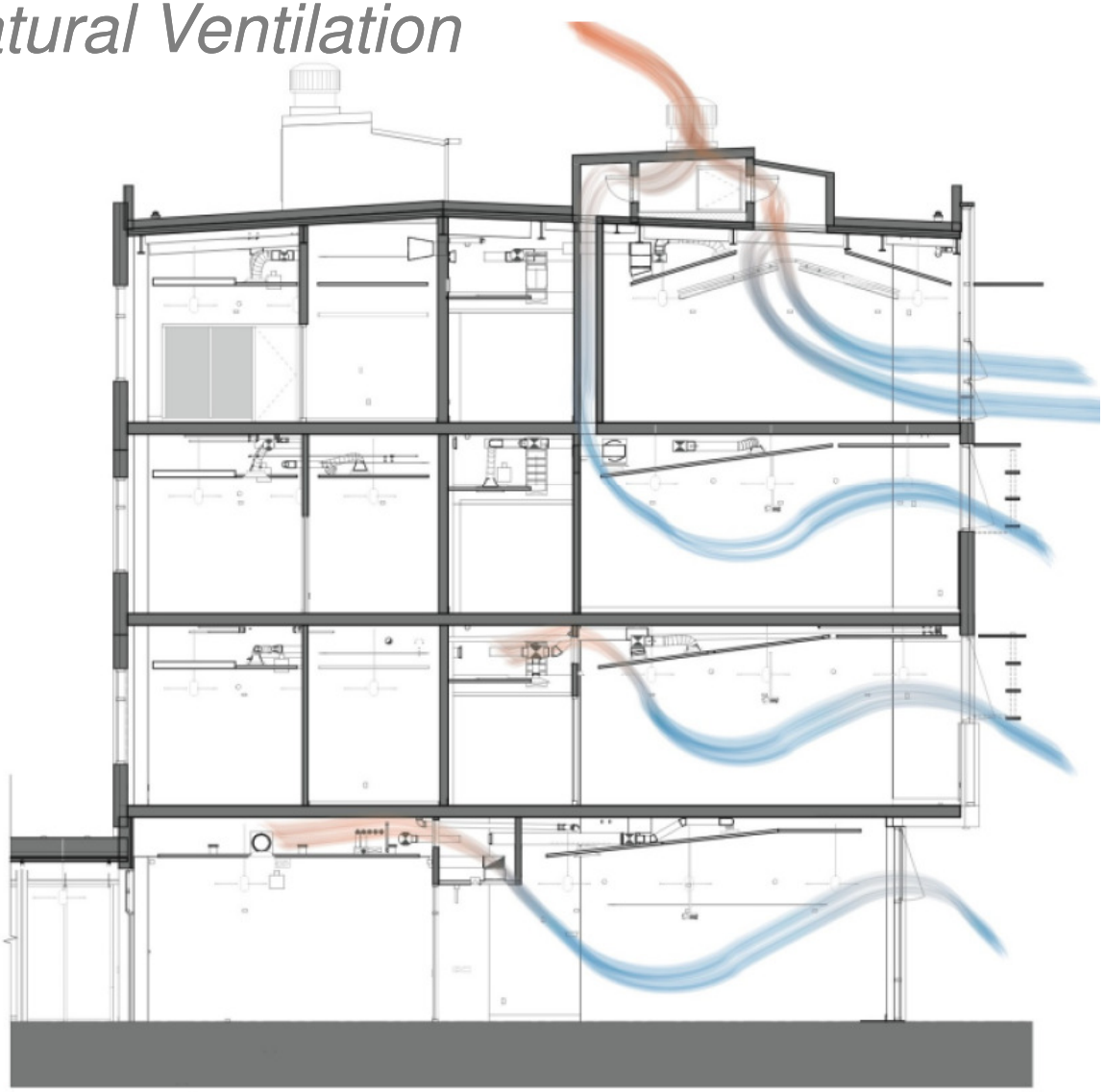
Academic Mechanics

Academic Overlay

Residential Mechanics

MECHANICAL BASIS OF DESIGNN

Natural Ventilation

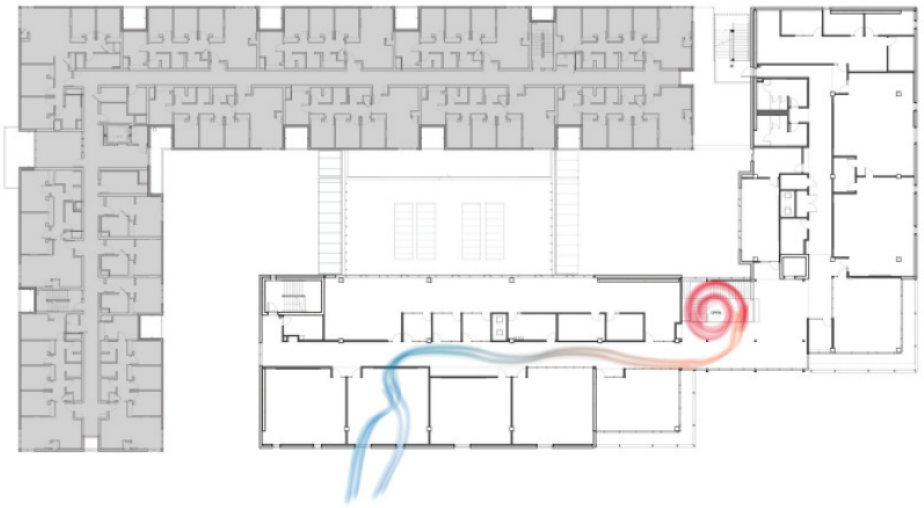


Section - South Classroom Looking East

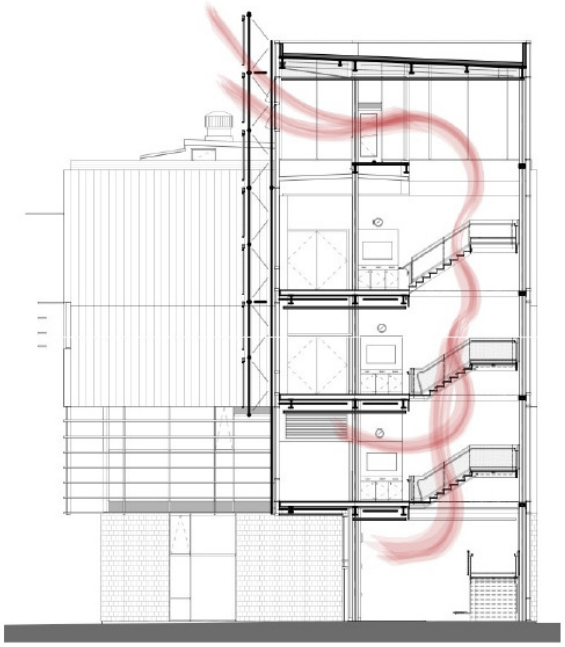
Image courtesy of SRG Partnership

MECHANICAL BASIS OF DESIGN

Systems Overview: 1st Floor Natural Ventilation



Plan – Level 2



Section – Central Stair Looking West

Image courtesy of SRG Partnership

MECHANICAL BASIS OF DESIGN

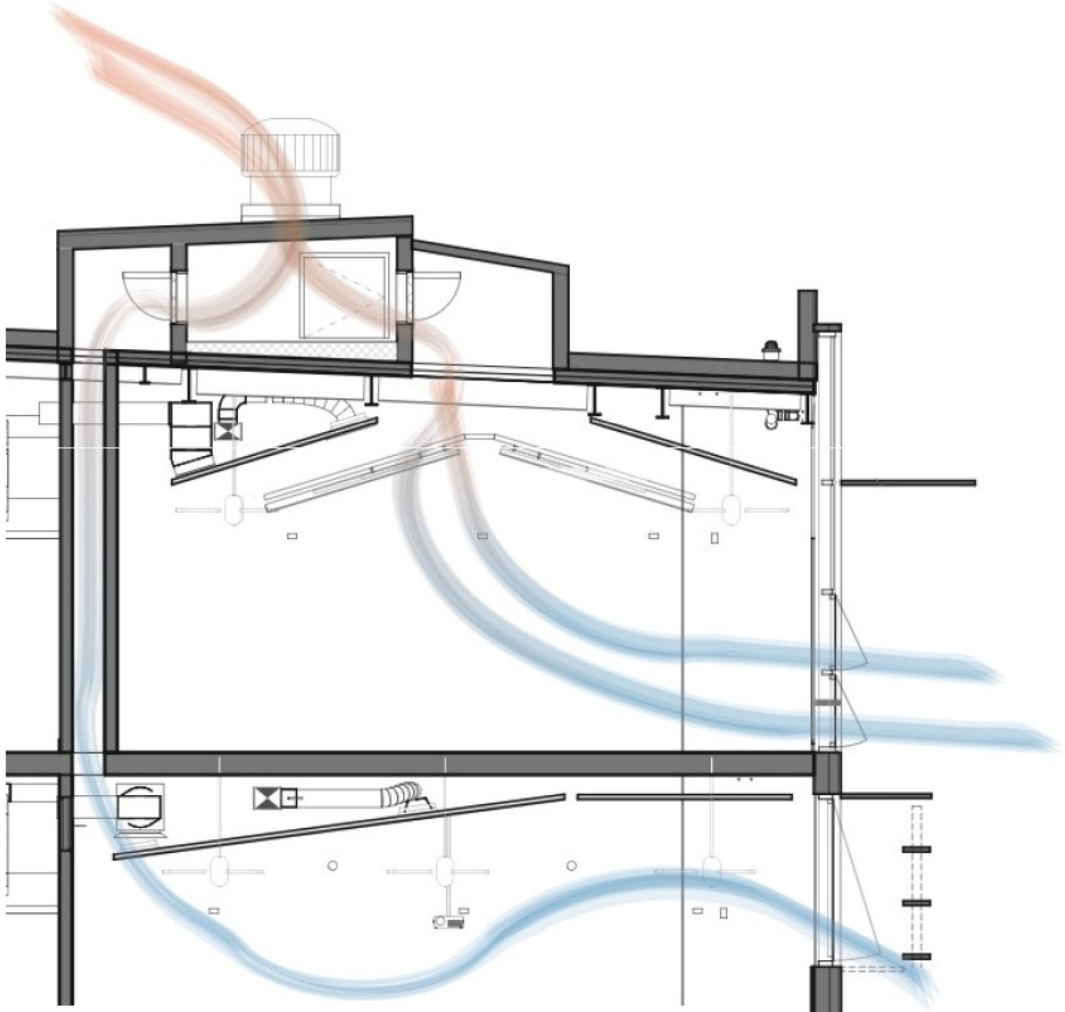
Systems Overview: 2nd and 3rd Floor Natural Ventilation

Section - South Classroom Looking East

Image courtesy of SRG Partnership

MECHANICAL BASIS OF DESIGN

Systems Overview: 4th Floor Natural Ventilation



Section - South Classroom Looking East

Image courtesy of SRG Partnership

MECHANICAL BASIS OF DESIGN

Systems Overview: 4th Floor Natural Ventilation

Passive penthouses

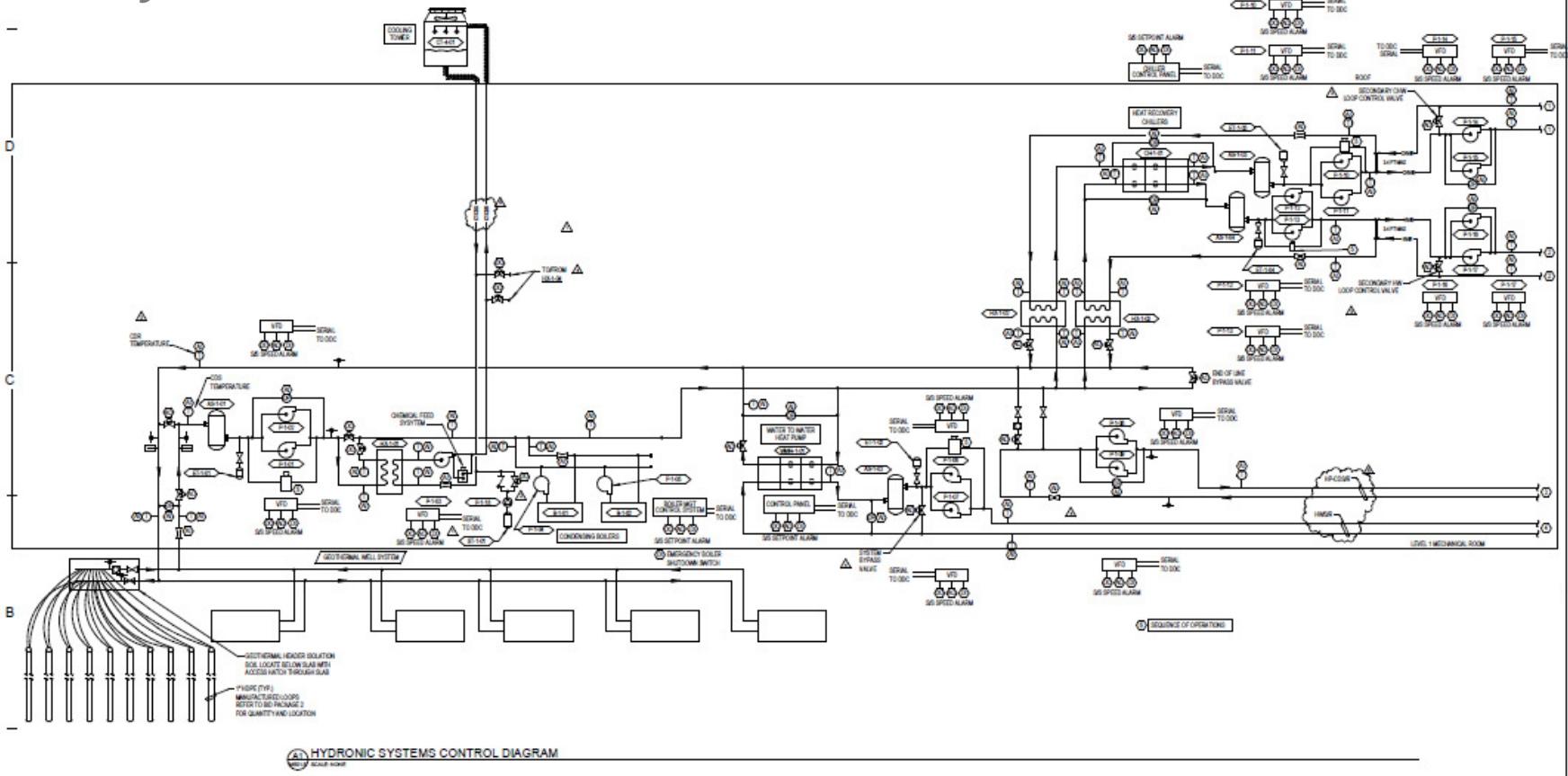
Image courtesy of SRG Partnership

MECHANICAL BASIS OF DESIGN

Mechanical Systems

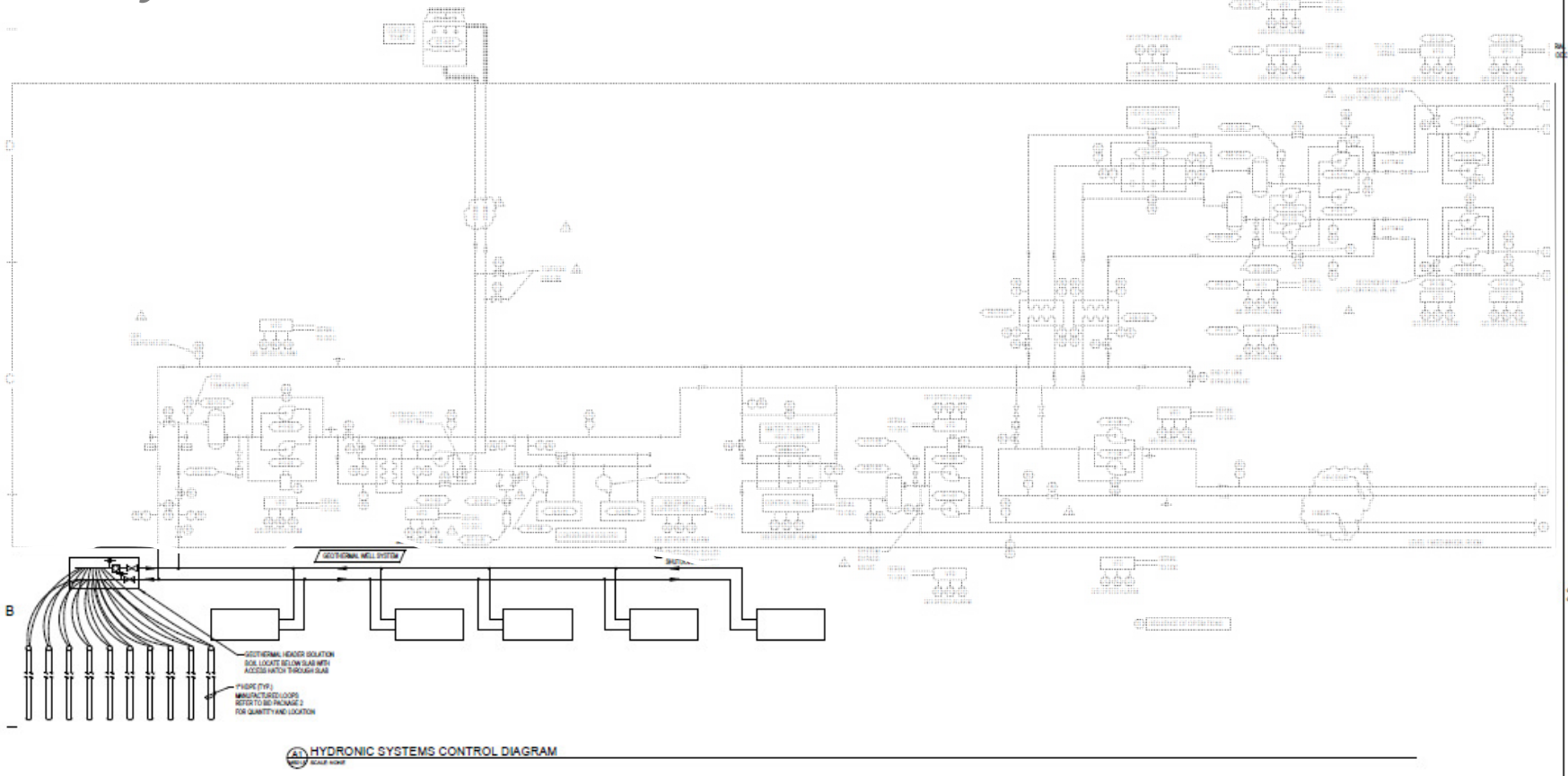
MECHANICAL BASIS OF DESIGN

Systems Overview



MECHANICAL BASIS OF DESIGN

Systems Overview: Geothermal

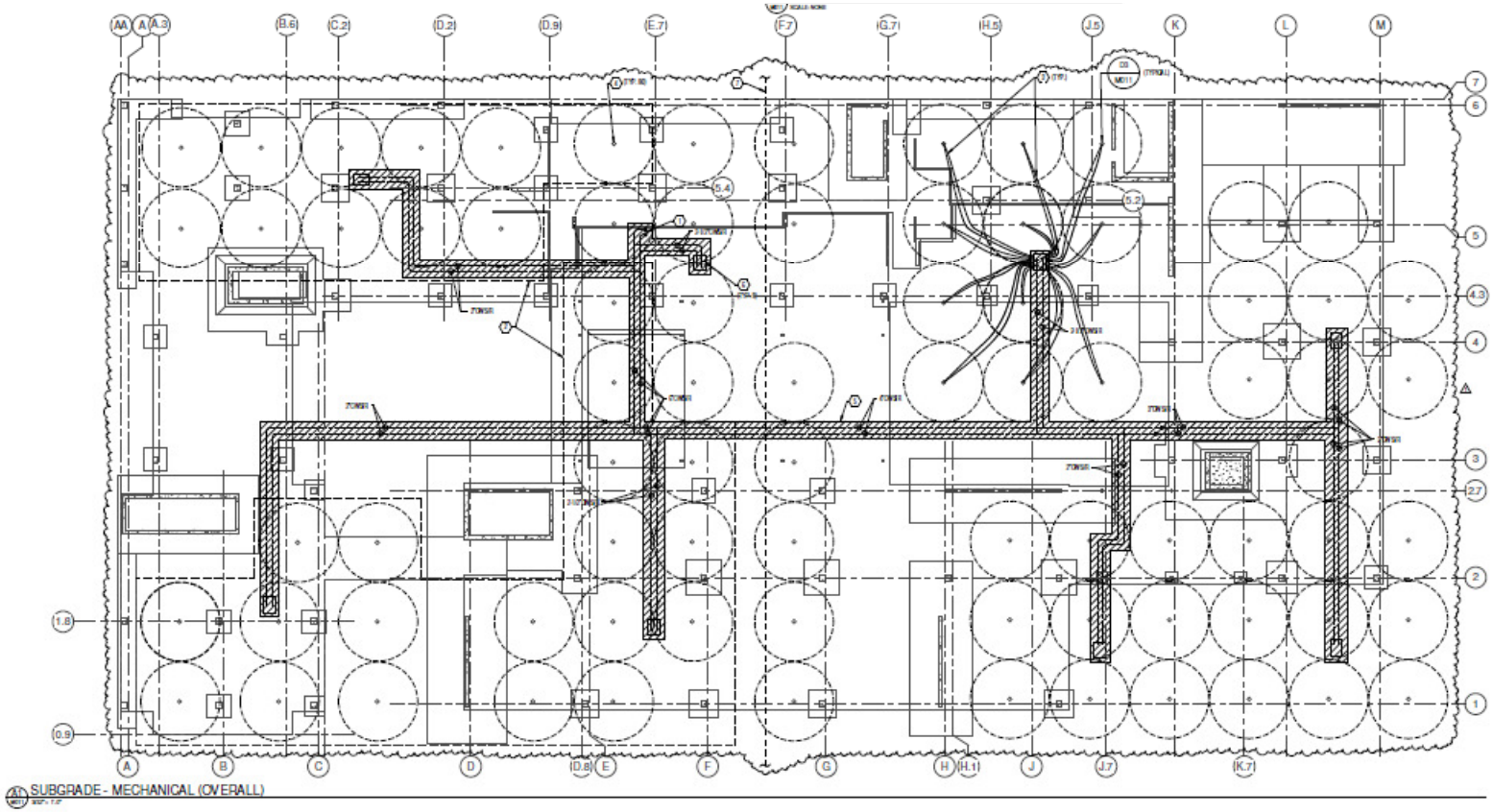


LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS
BP-05 SITE, SHELL AND INTERIORS

M501.5

MECHANICAL BASIS OF DESIGN

Systems Overview

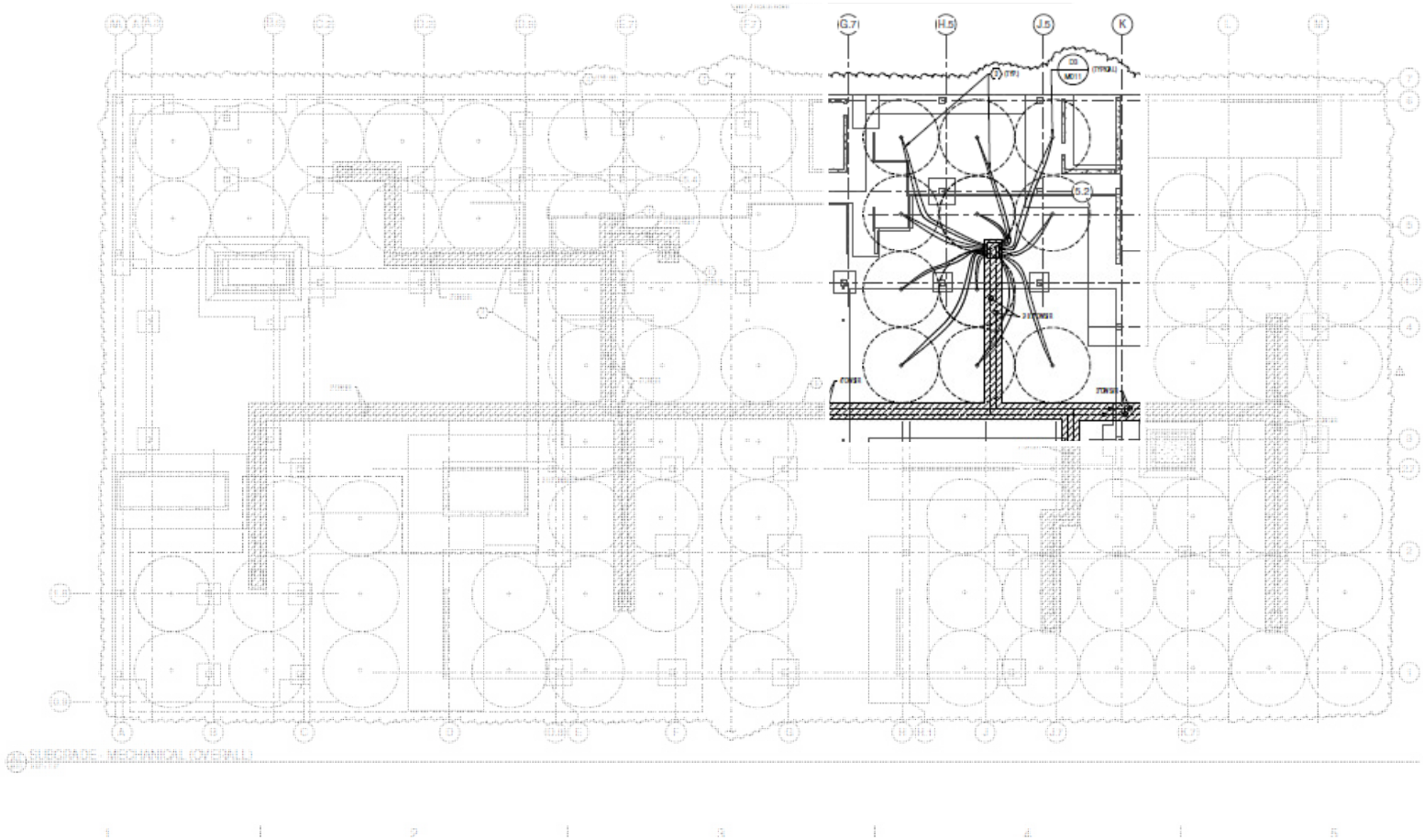


LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS

M011

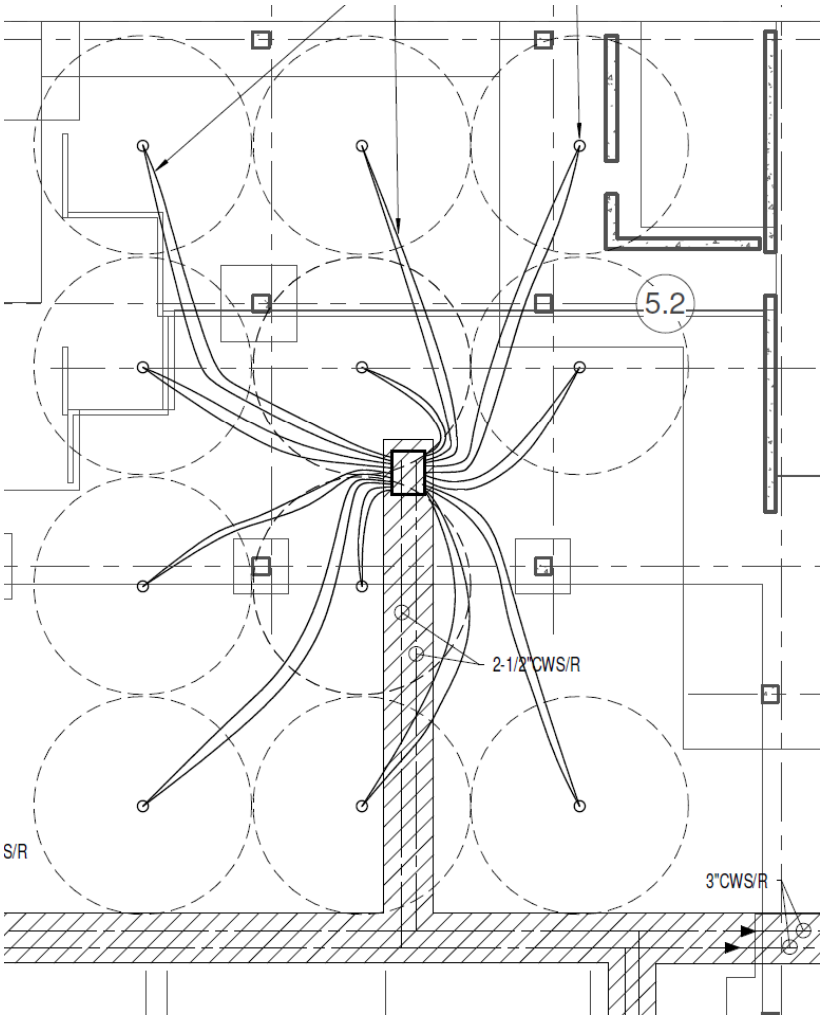
MECHANICAL BASIS OF DESIGN

Systems Overview



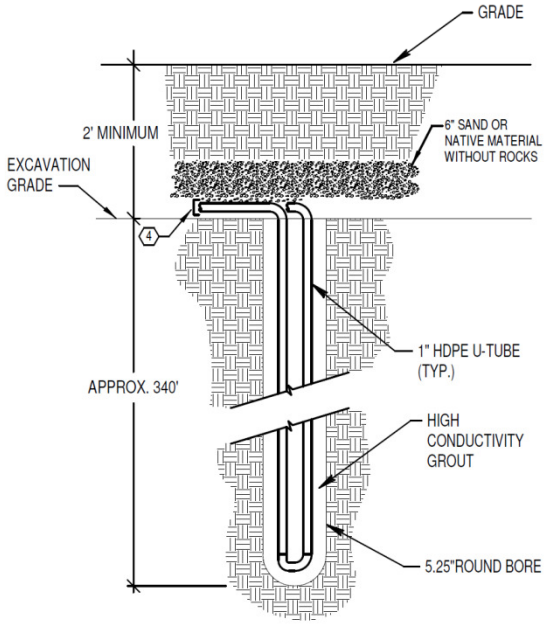
MECHANICAL BASIS OF DESIGN

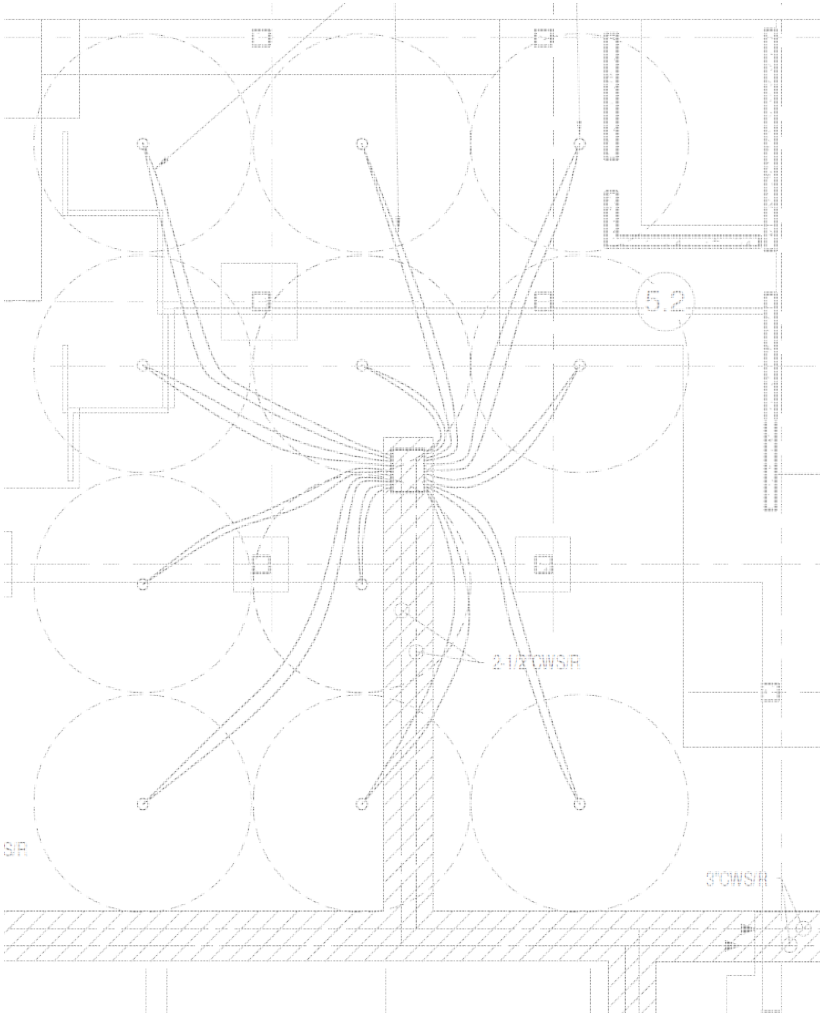
Systems Overview



MECHANICAL BASIS OF DESIGN

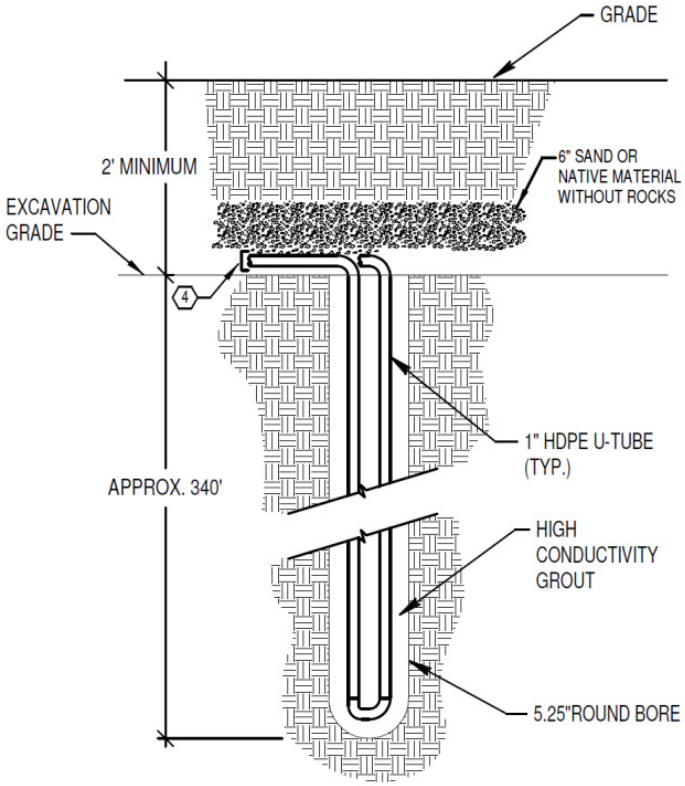
Systems Overview





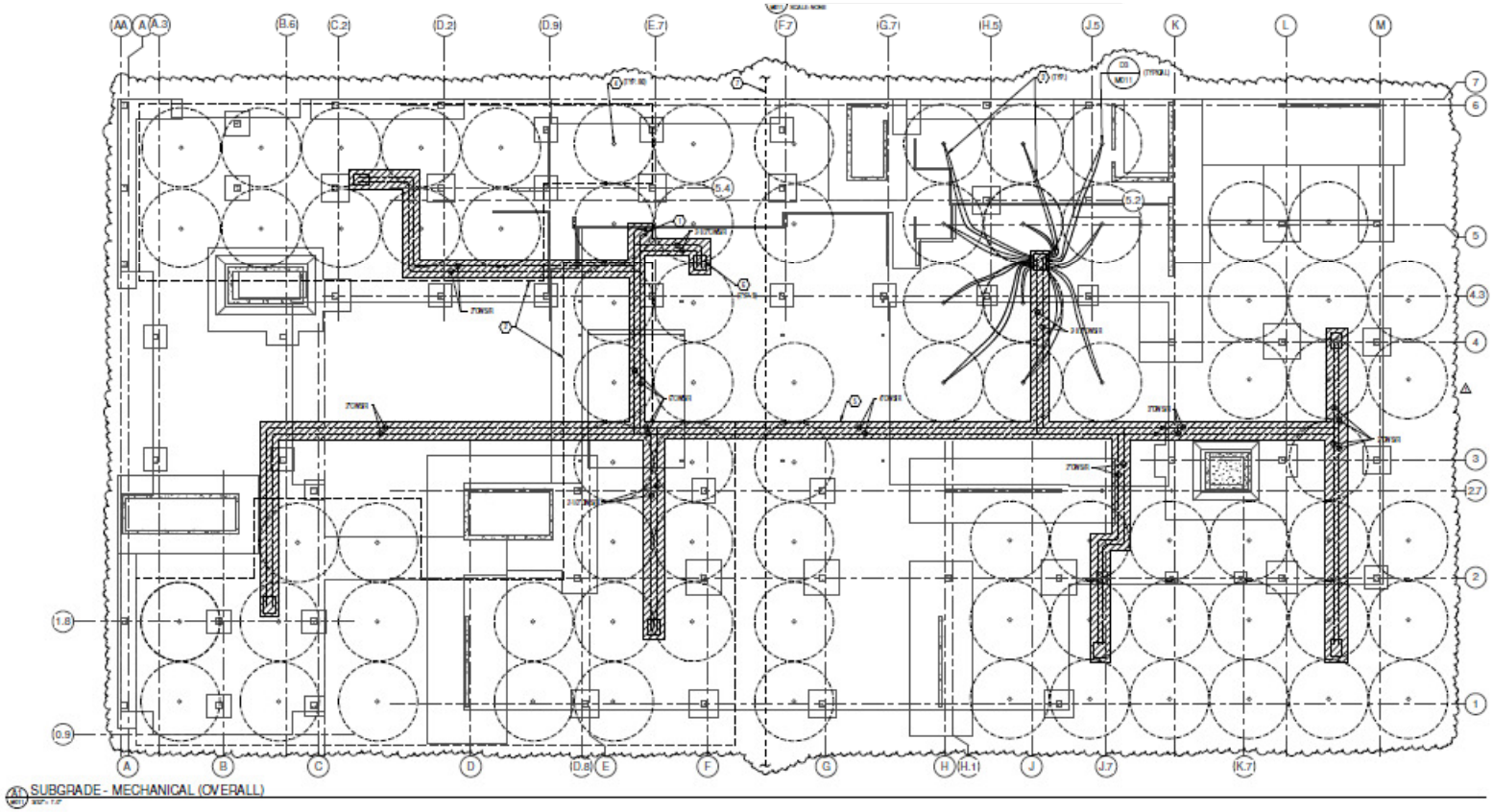
MECHANICAL BASIS OF DESIGN

Systems Overview



MECHANICAL BASIS OF DESIGN

Systems Overview

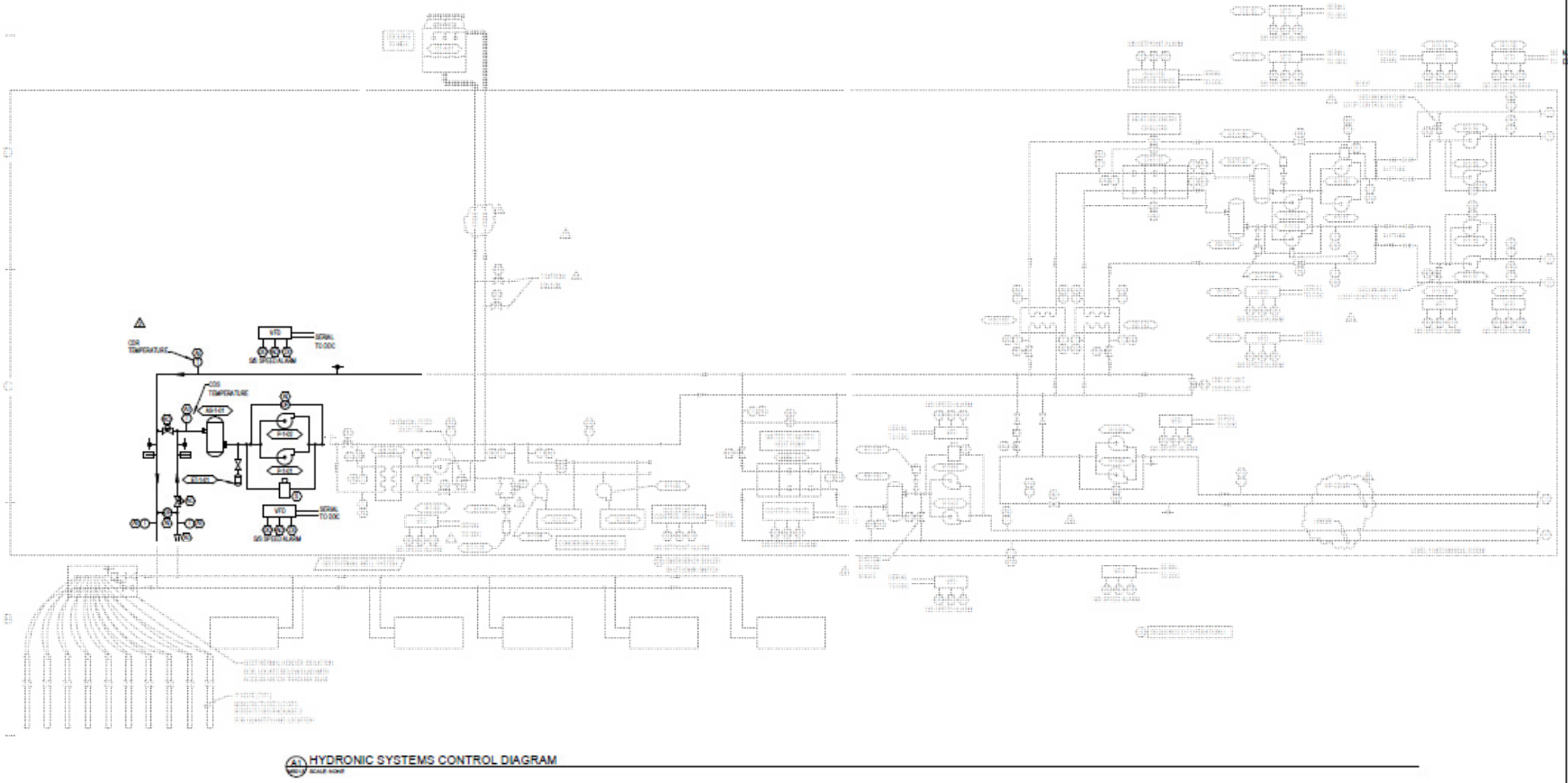


LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS

M011

MECHANICAL BASIS OF DESIGN

Systems Overview: Condenser Water



HYDRONIC SYSTEMS CONTROL DIAGRAM

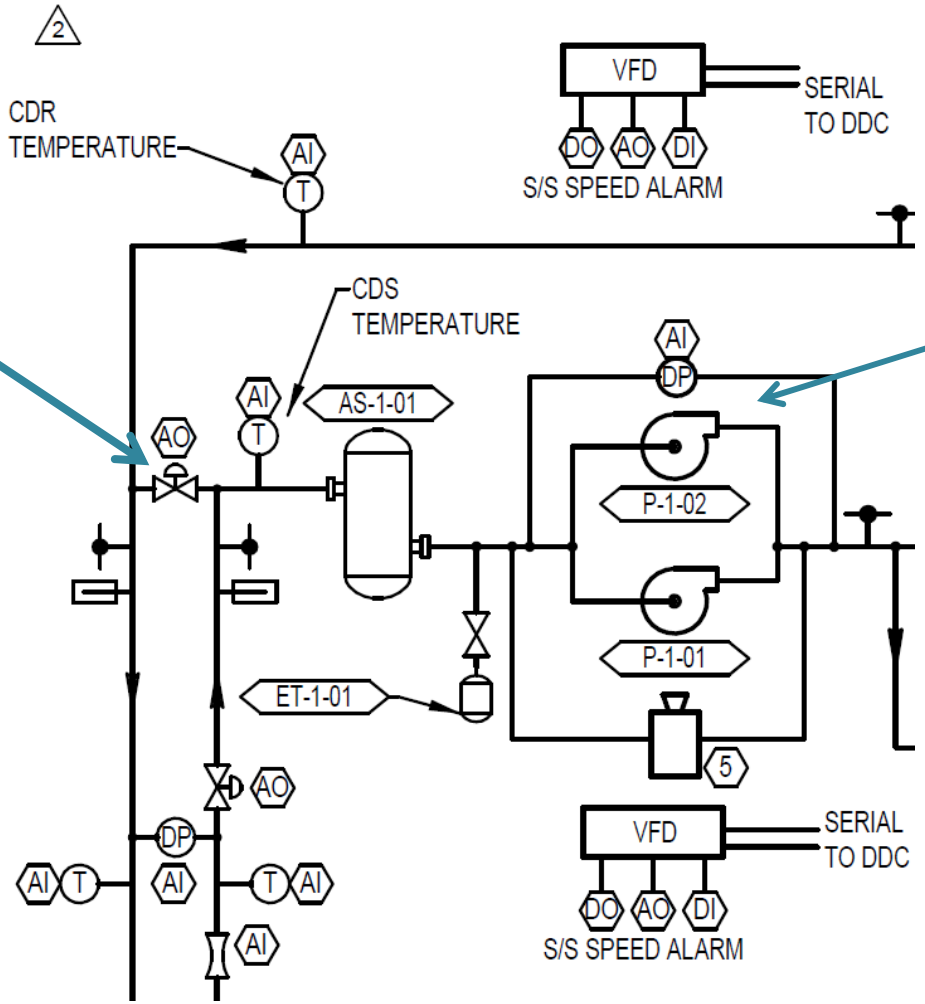
LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS
BP-05 SITE, SHELL AND INTERIORS

M501.5

MECHANICAL BASIS OF DESIGN

Systems Overview: Condenser Water

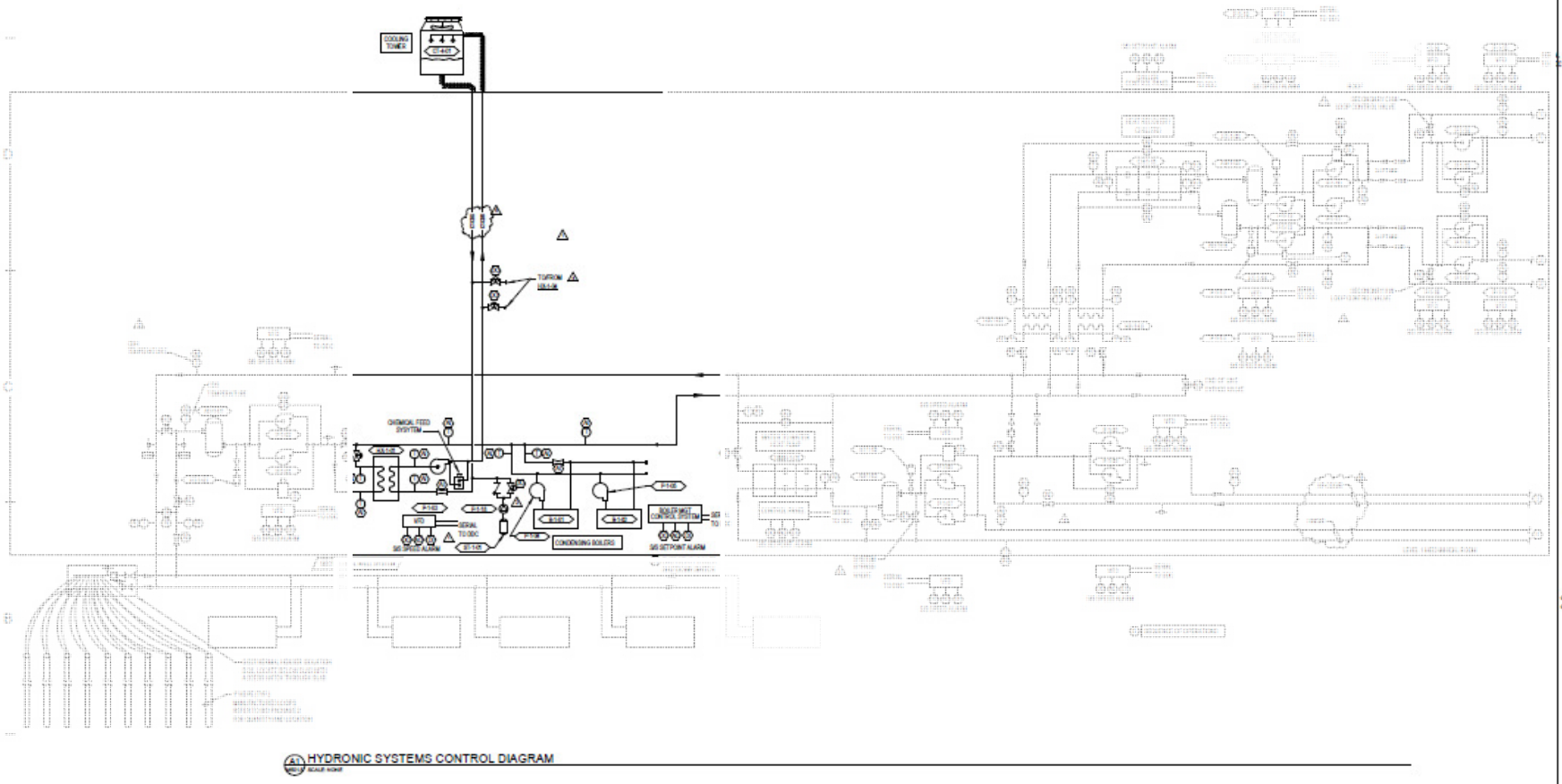
First stage of heating and cooling is geothermal wells.



Condenser water pumps vary speed based on DP signal.

MECHANICAL BASIS OF DESIGN

Systems Overview: Condenser Water



HYDRONIC SYSTEMS CONTROL DIAGRAM

LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS
BP-05 SITE, SHELL AND INTERIORS

M501.5

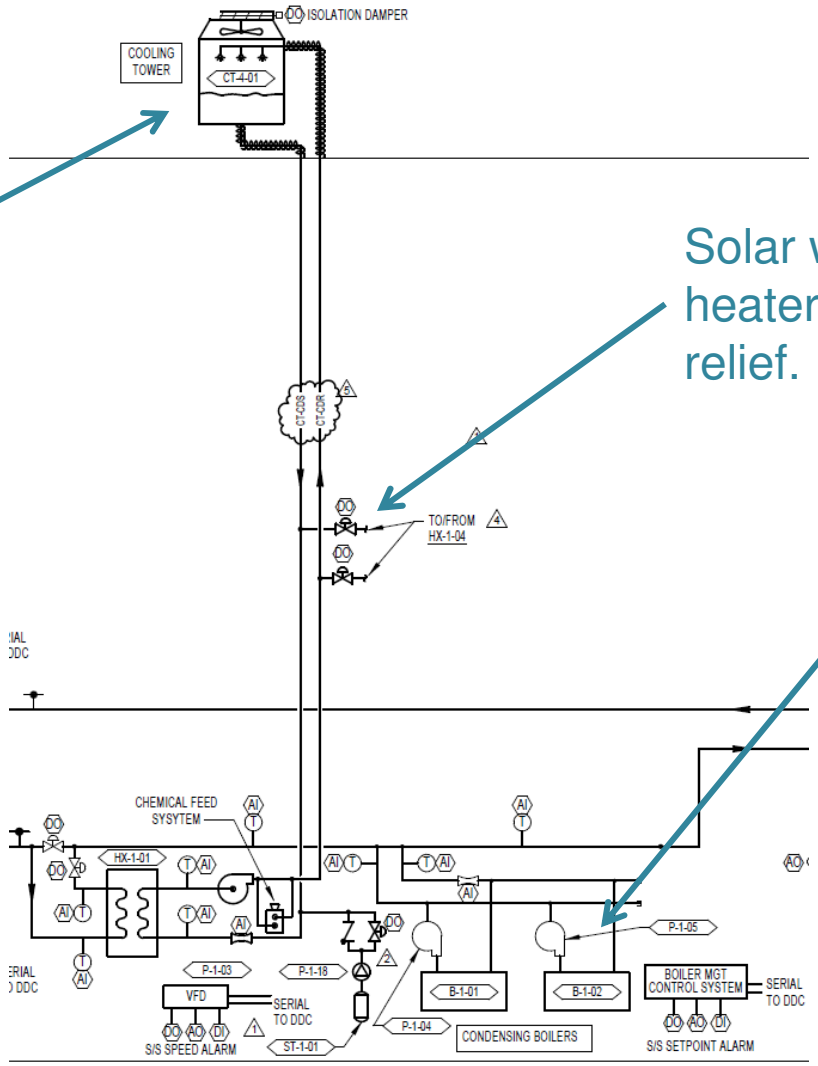
MECHANICAL BASIS OF DESIGN

Systems Overview: Condenser Water

50-ton cooling tower to trim load.

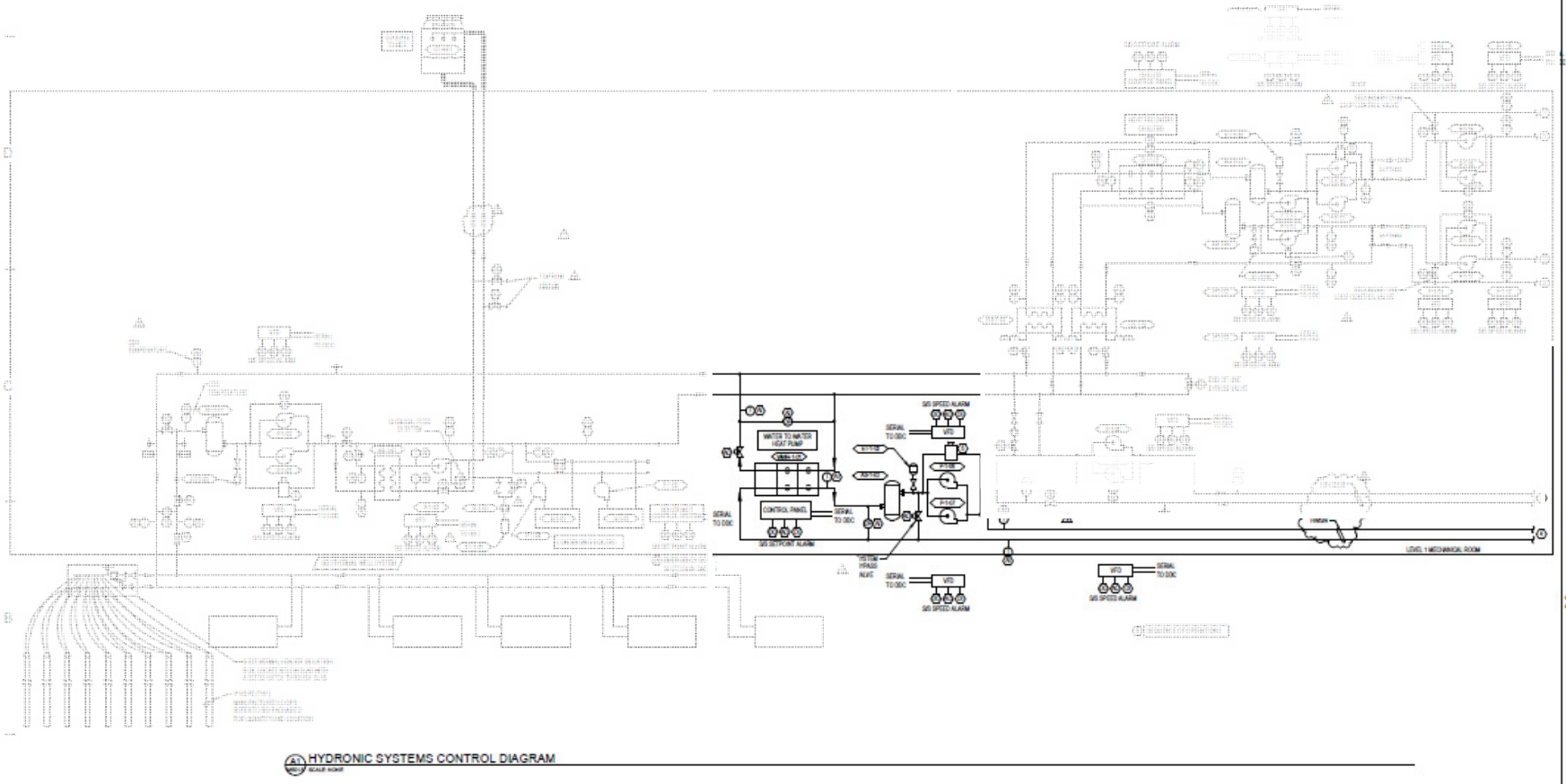
Solar water heater thermal relief.

2x 500 MBH Boilers to trim load.



MECHANICAL BASIS OF DESIGN

Systems Overview: AHU Coils Plant Equipment



HYDRONIC SYSTEMS CONTROL DIAGRAM

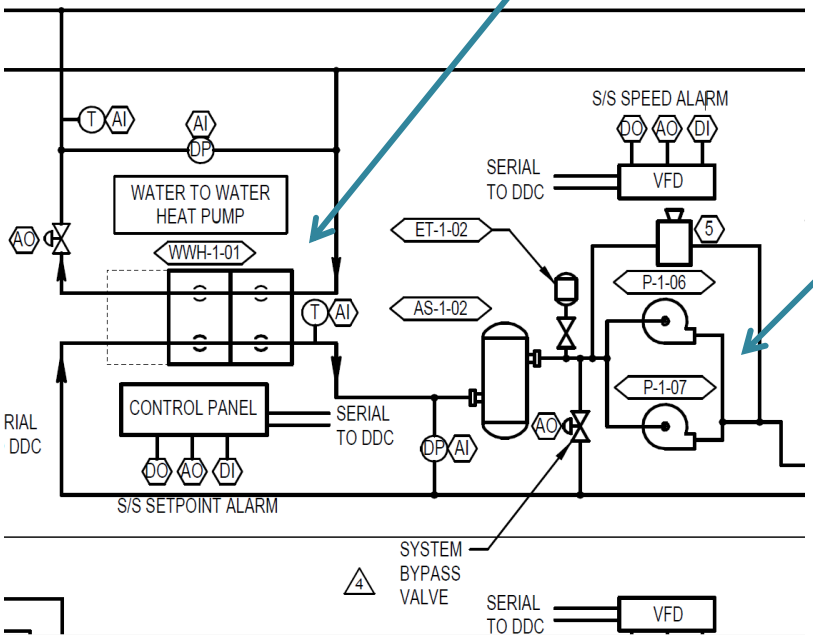
LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS
BP-05 SITE, SHELL AND INTERIORS

M501.5

MECHANICAL BASIS OF DESIGN

Systems Overview: AHU Coils Plant Equipment

Water-to-water heat pumps provide hot or cold water for AHUs.

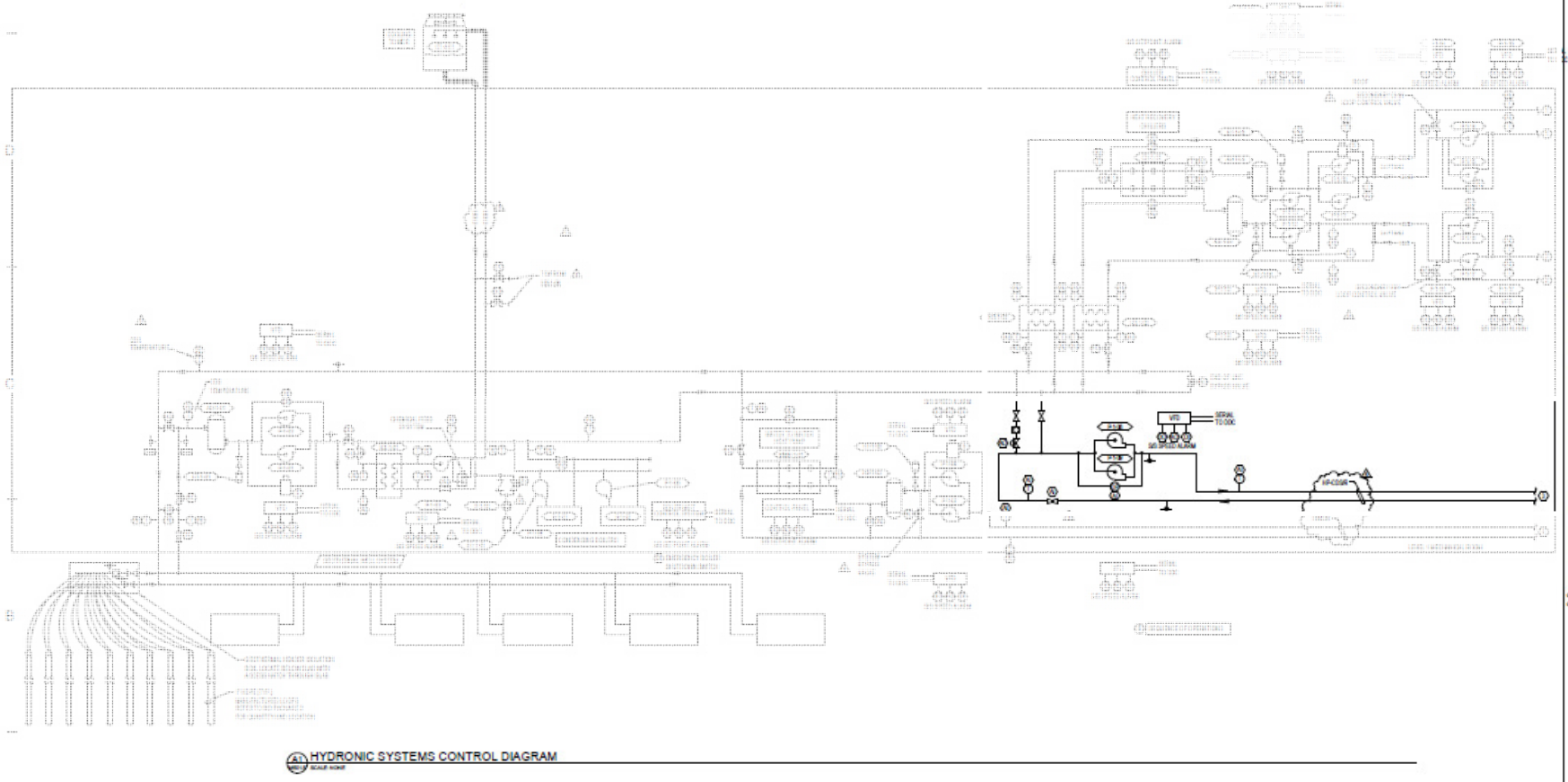


Pumps vary speed based on differential pressure.

Supply and return for AHU-501,502, 503

MECHANICAL BASIS OF DESIGN

Systems Overview: AHU Coils Plant Equipment



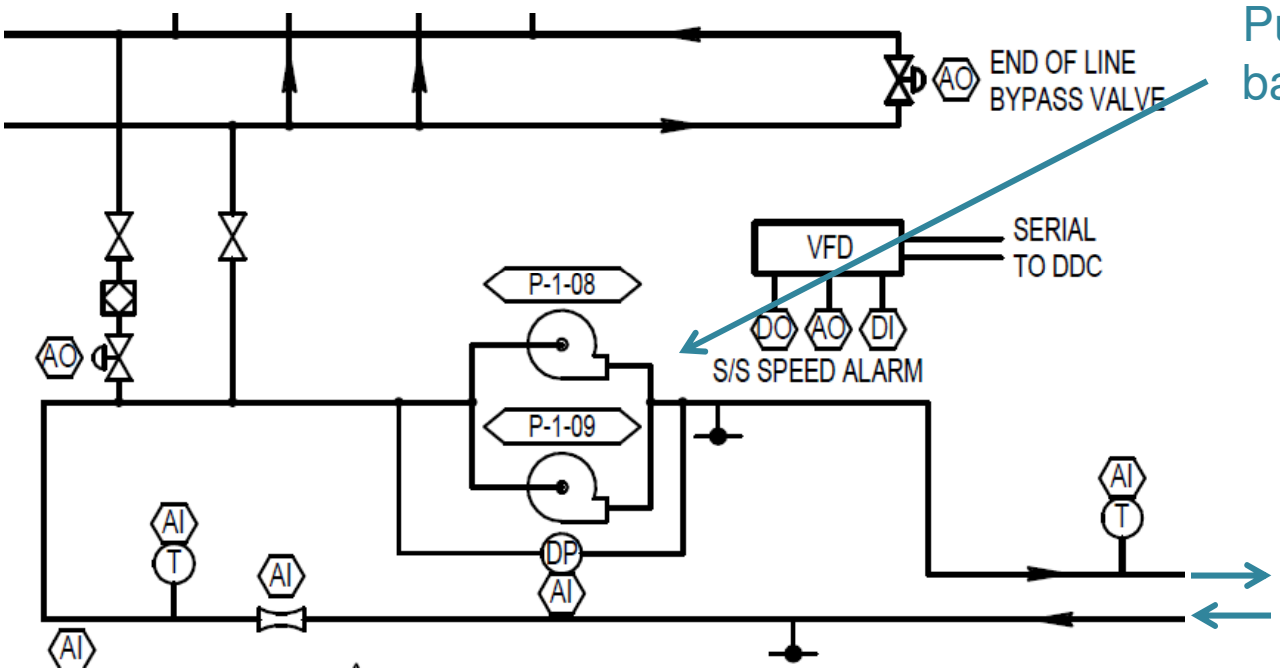
HYDRONIC SYSTEMS CONTROL DIAGRAM

LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS
BP-05 SITE, SHELL AND INTERIORS

M501.5

MECHANICAL BASIS OF DESIGN

Systems Overview: Water-Source Heat Pump Loop

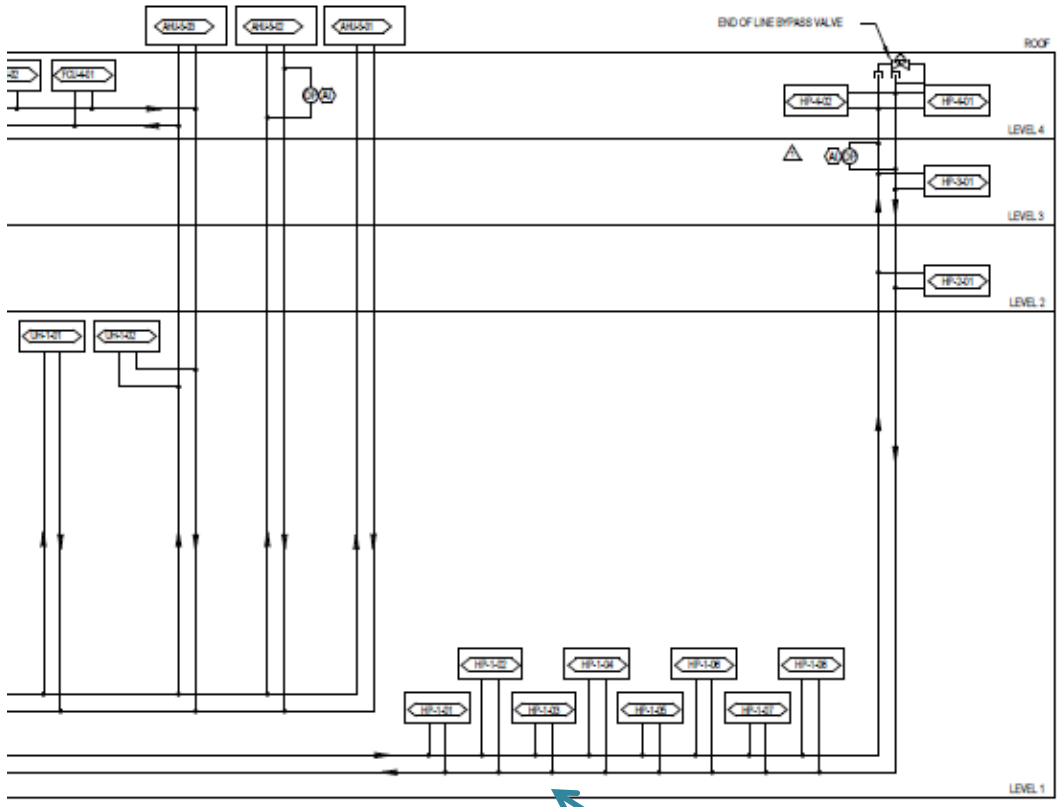


Pump speed controlled based on DP.

Supply and return for water source heat pumps

MECHANICAL BASIS OF DESIGN

Systems Overview: Water-Source Heat Pump Loop

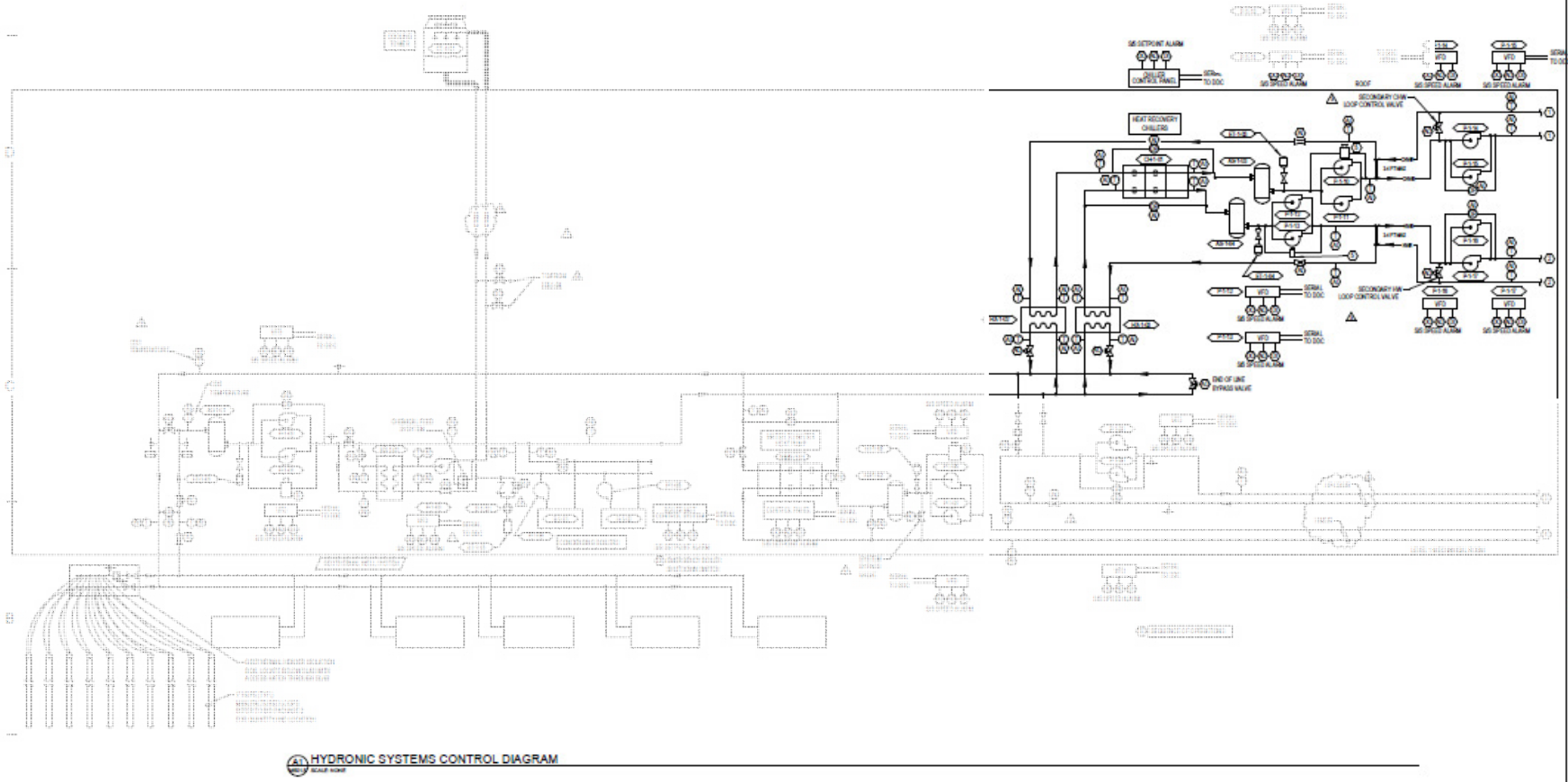


Supply and return for water source heat pumps

Water source heat pumps (typical)

MECHANICAL BASIS OF DESIGN

Systems Overview: Radiant Panel System



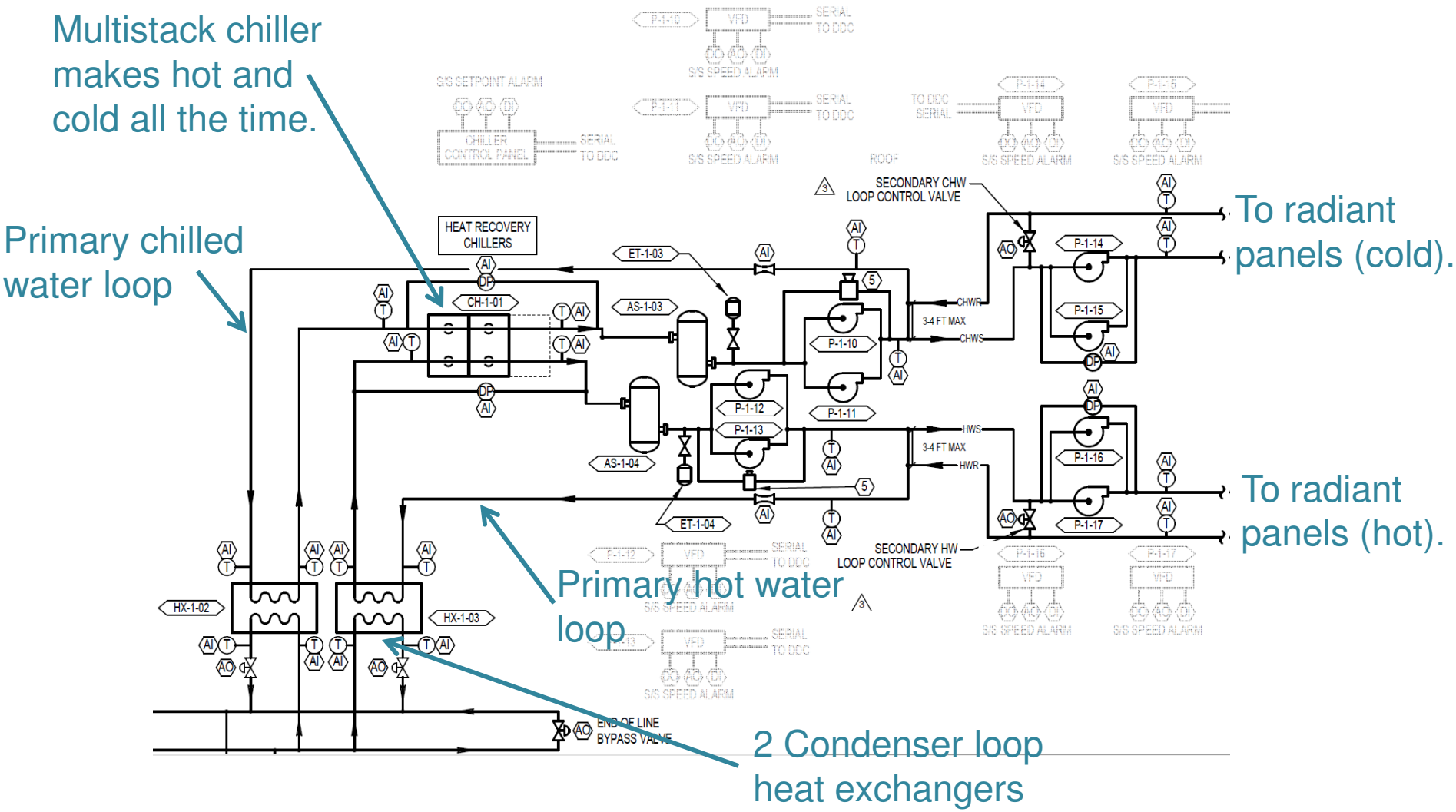
HYDRONIC SYSTEMS CONTROL DIAGRAM

LANE COMMUNITY COLLEGE
DOWNTOWN CAMPUS
BP-05 SITE, SHELL AND INTERIORS

M501.5

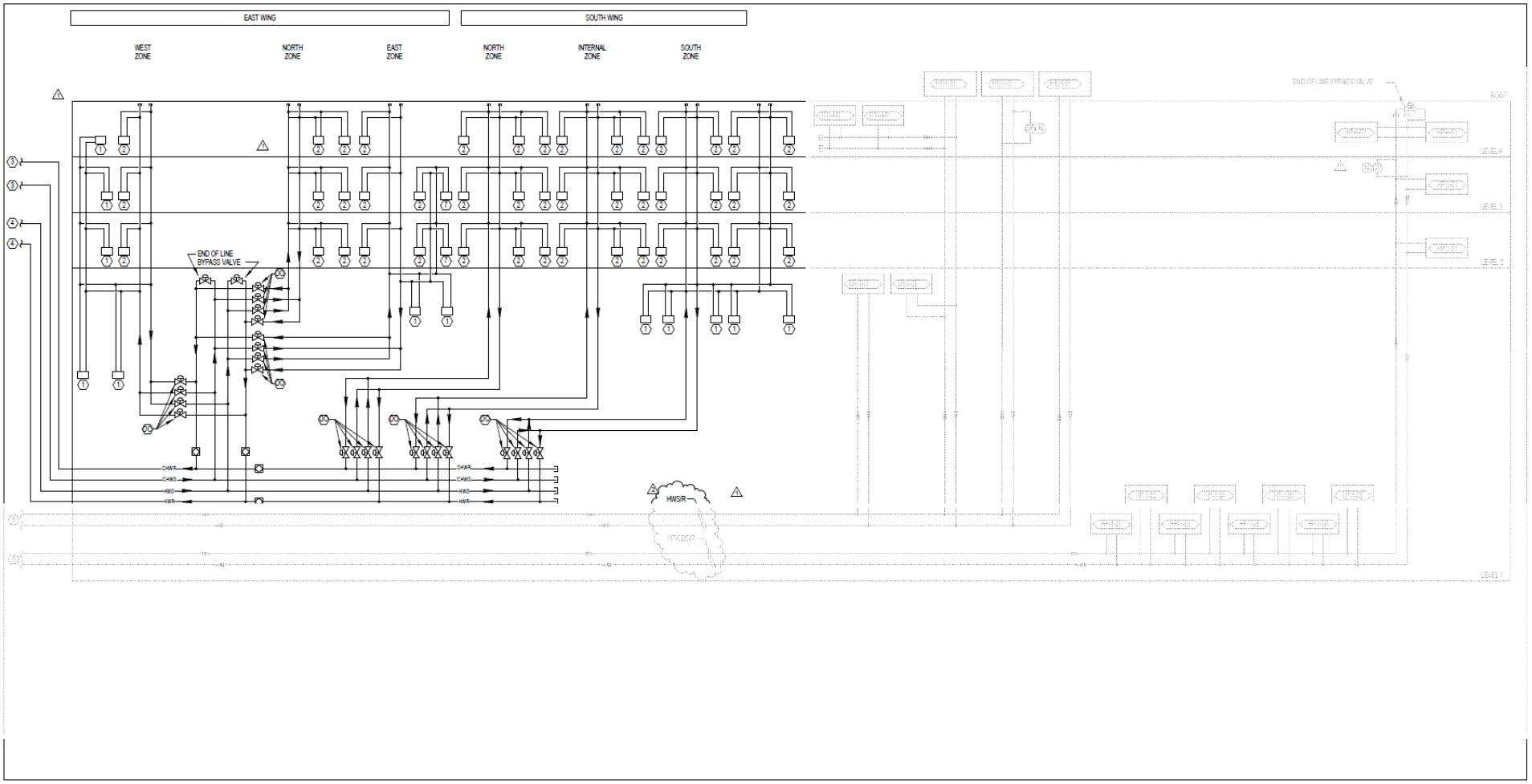
MECHANICAL BASIS OF DESIGN

Systems Overview: Water-Source Heat Pump Loop



MECHANICAL BASIS OF DESIGN

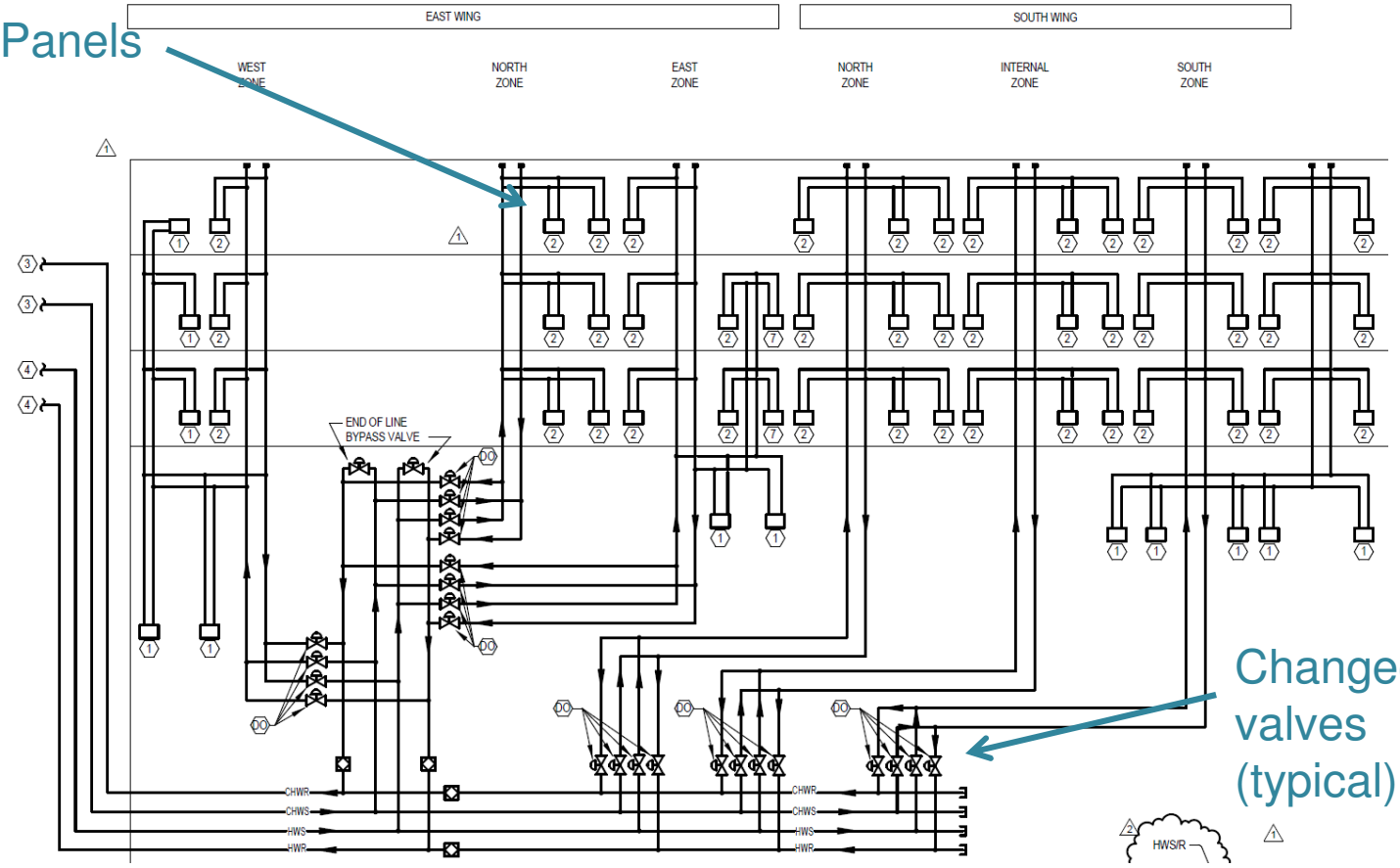
Systems Overview: Radiant Panel System



MECHANICAL BASIS OF DESIGN

Systems Overview: Water-Source Heat Pump Loop

Radiant Panels (typical)



Changeover valves (typical)

MECHANICAL BASIS OF DESIGN

Systems Overview: Academic Overlay

Packaged terminal AC

Reheat terminal bench

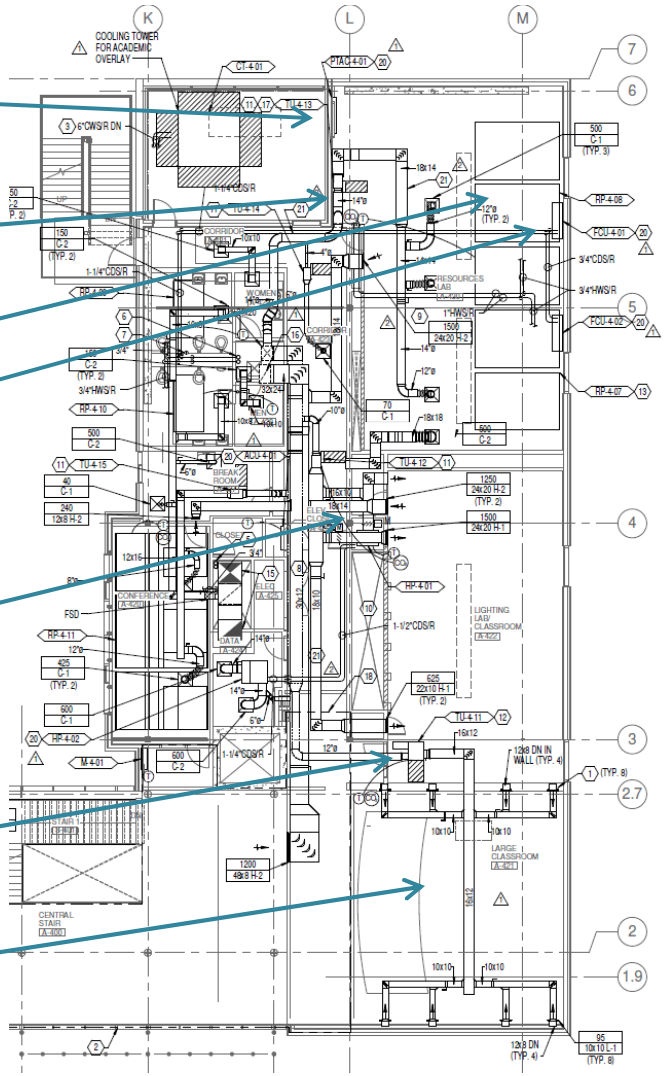
Radiant Panels

Fan coil

Water-to-air heat pump

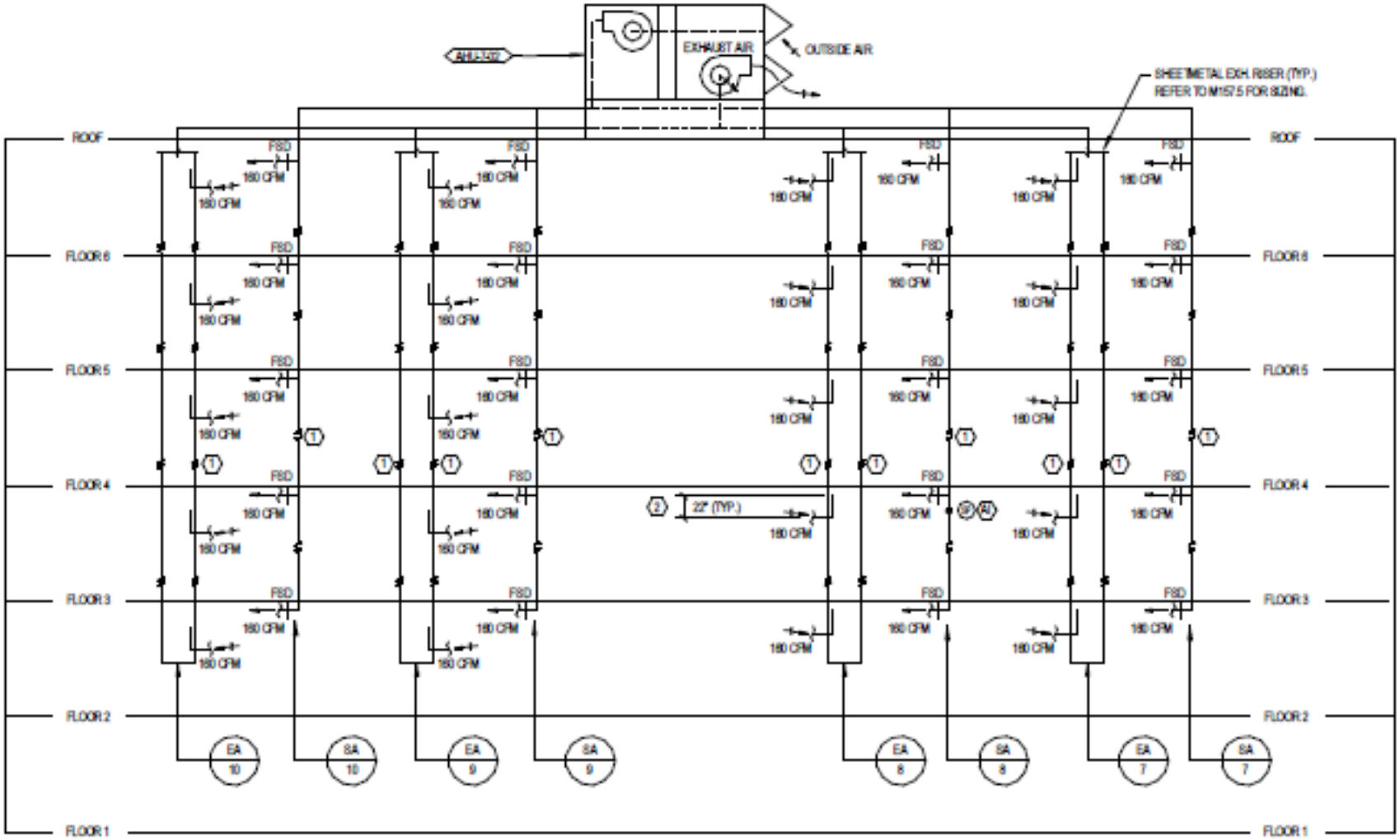
Fan-powered box

Displacement ventilation



MECHANICAL BASIS OF DESIGN

Systems Overview: Residential Systems



MECHANICAL BASIS OF DESIGN

Any questions?

PAE CONSULTING ENGINEERS, INC.

LANE COMMUNITY COLLEGE DOWNTOWN CAMPUS

Plumbing Basis of Design

PRESENTED TO: Lane Community College

PRESENTED BY: Marc Brune, PE, LEED AP

GOALS

Way back in 2010…

"A Building that Teaches"

- Energy Management Program

Energy & Water

- LEED Platinum/Gold
- Minimal water use
- Solar water heating
- Rainwater reclamation.

PRESENTATION OVERVIEW

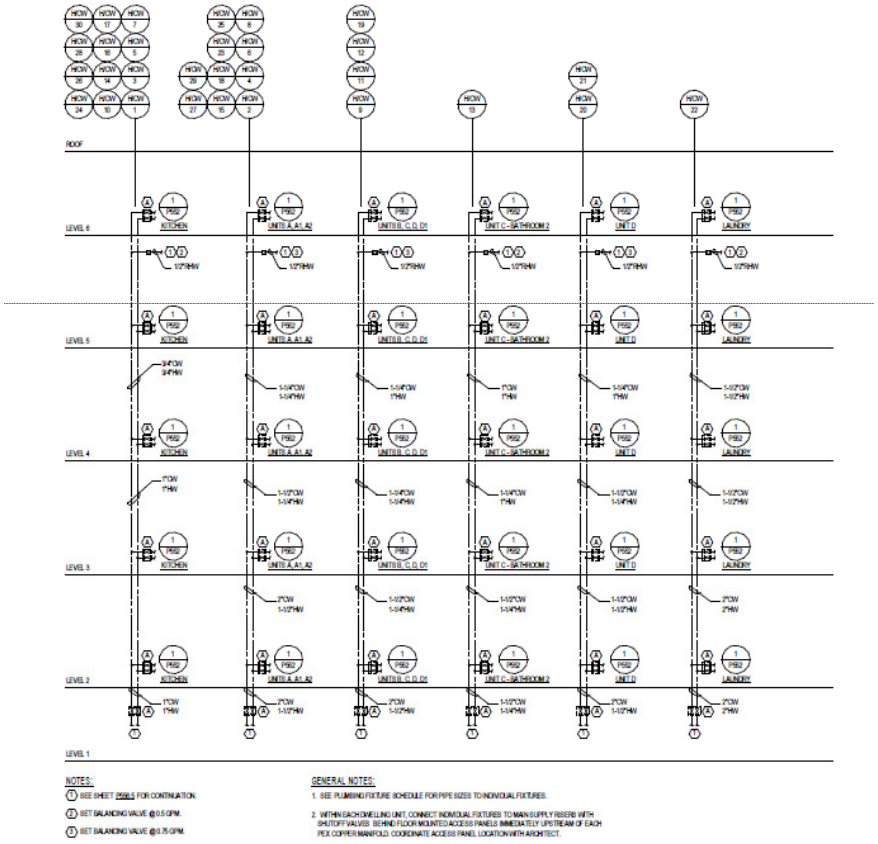
General Plumbing Systems

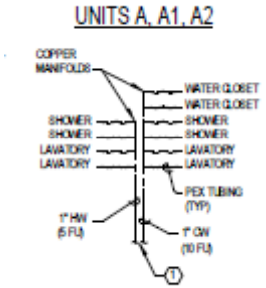
Solar Hot Water

Rainwater reclamation

PLUMBING BASIS OF DESIGN

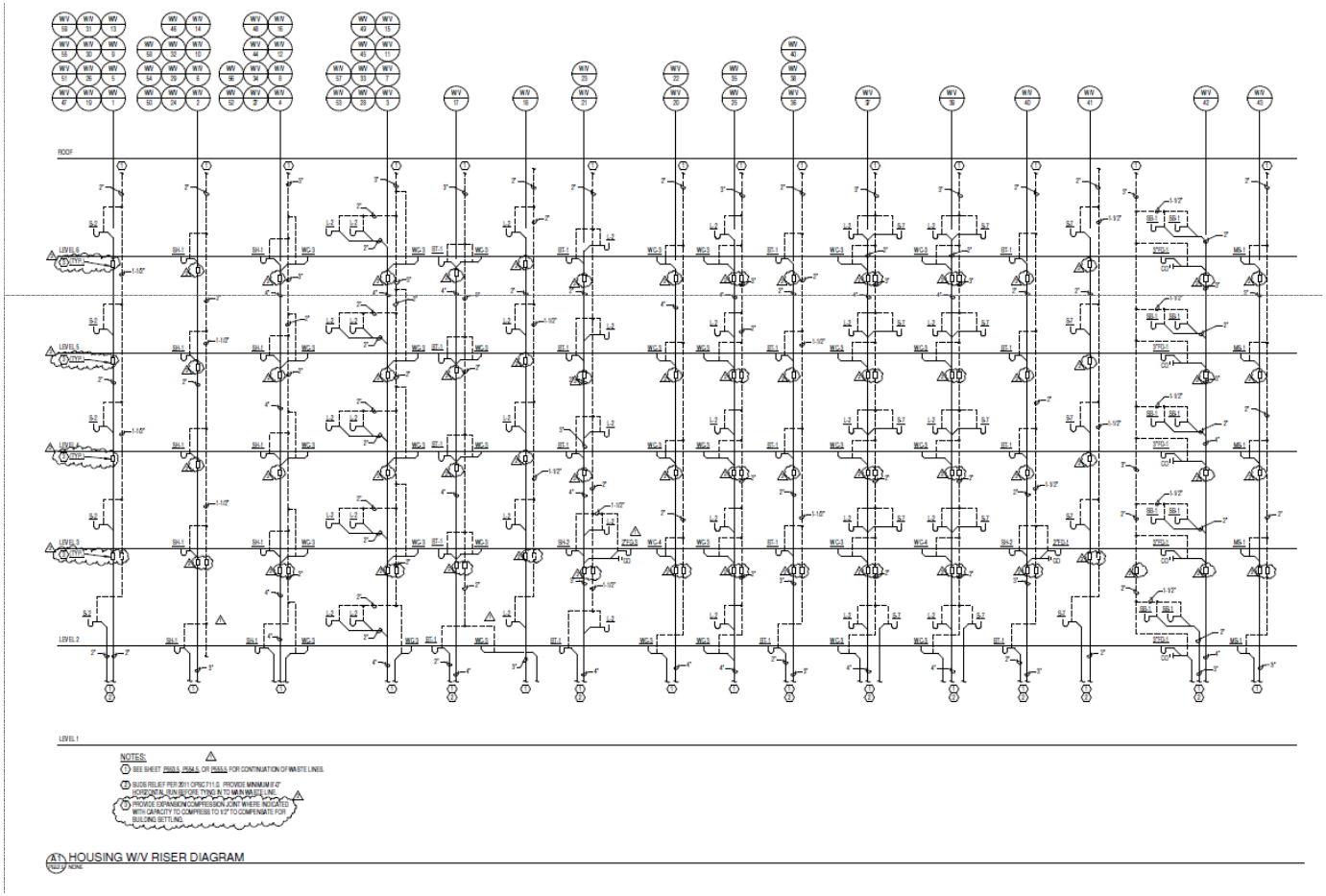
Housing Hot and Cold Water





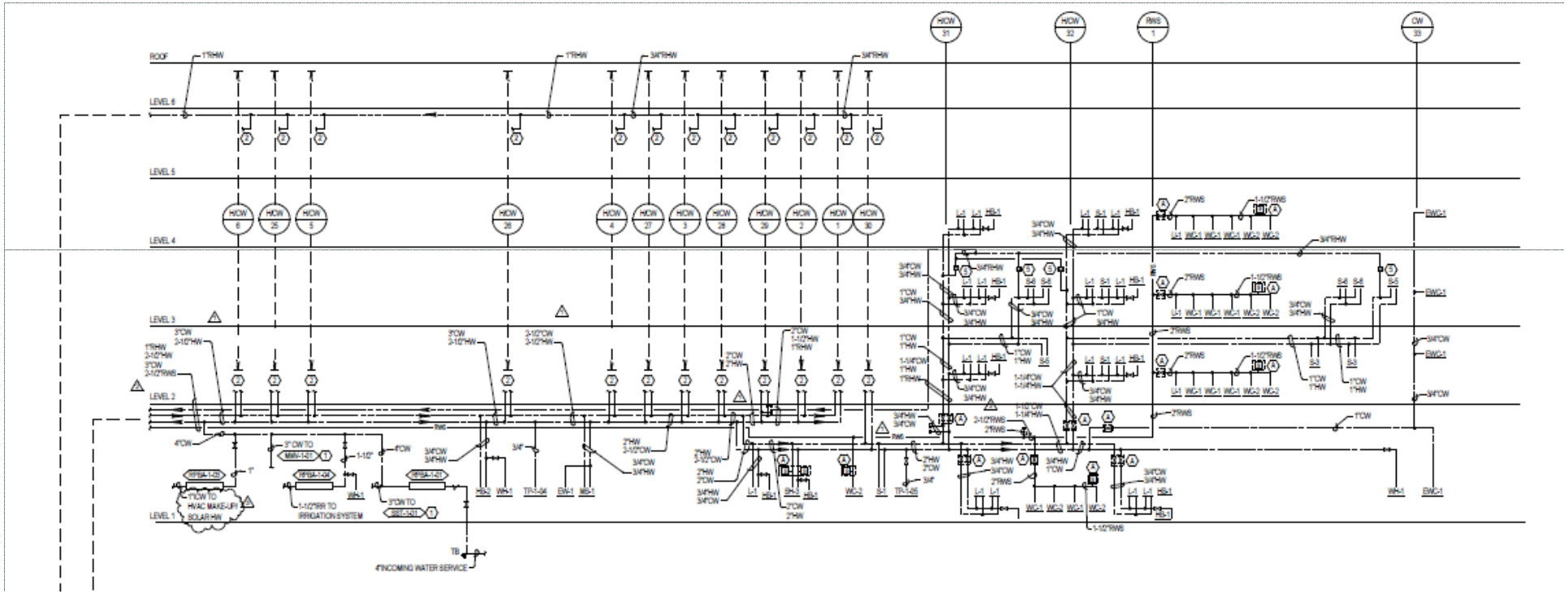
PLUMBING BASIS OF DESIGN

Housing waste and vent



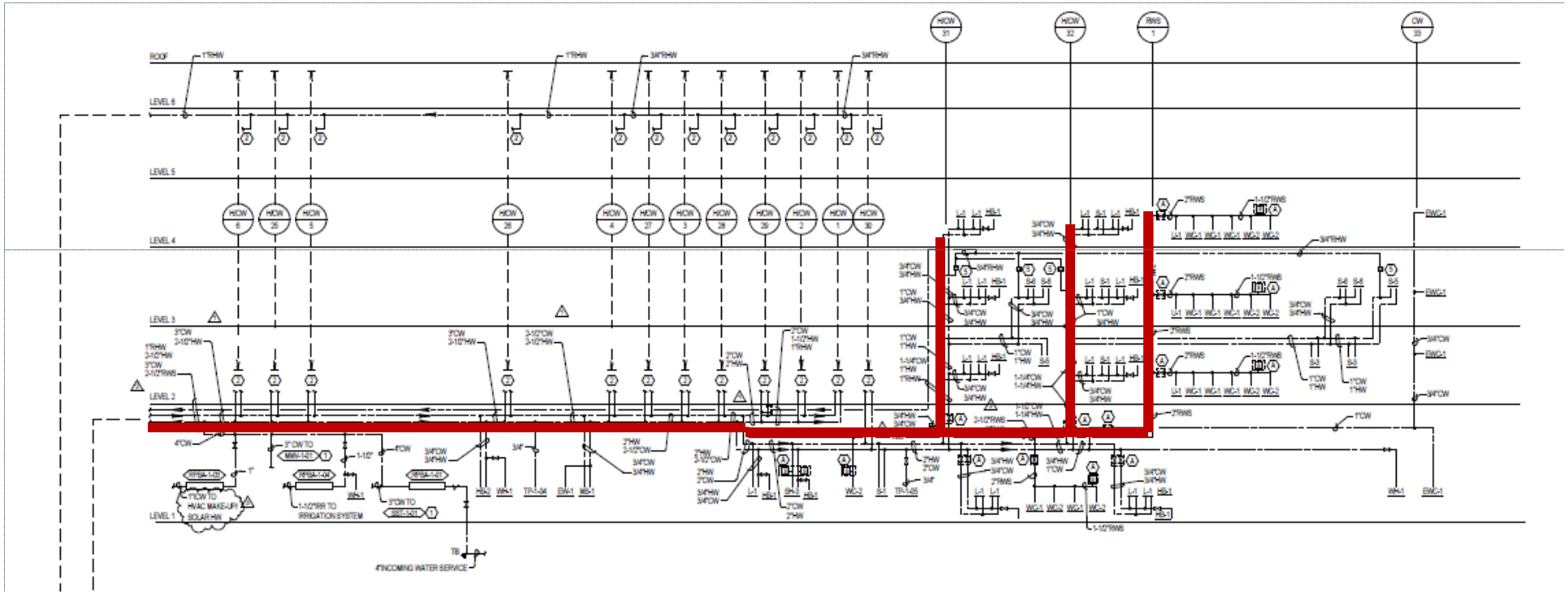
PLUMBING BASIS OF DESIGN

Academic Hot and Cold Water



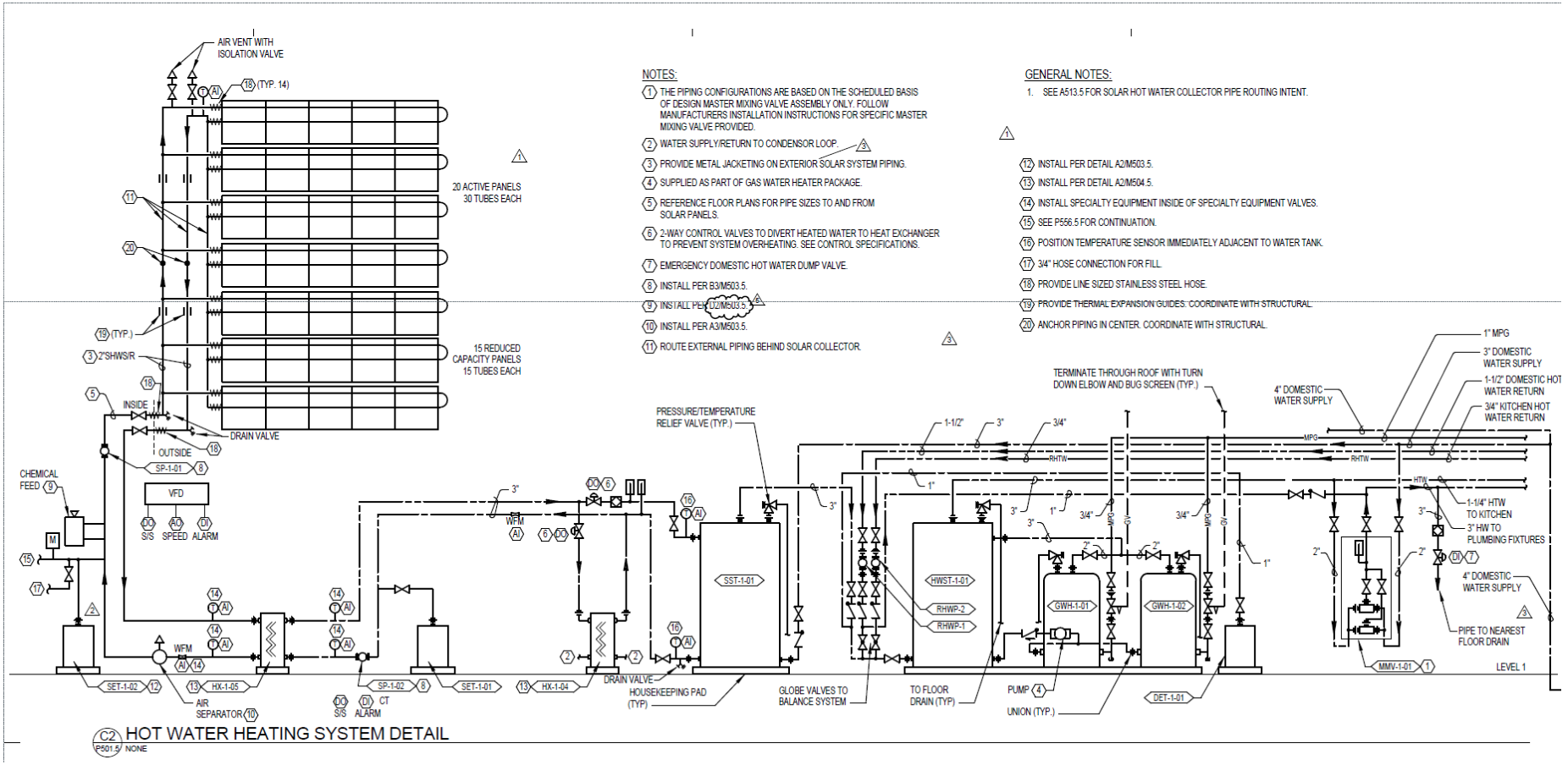
PLUMBING BASIS OF DESIGN

Rainwater



PLUMBING BASIS OF DESIGN

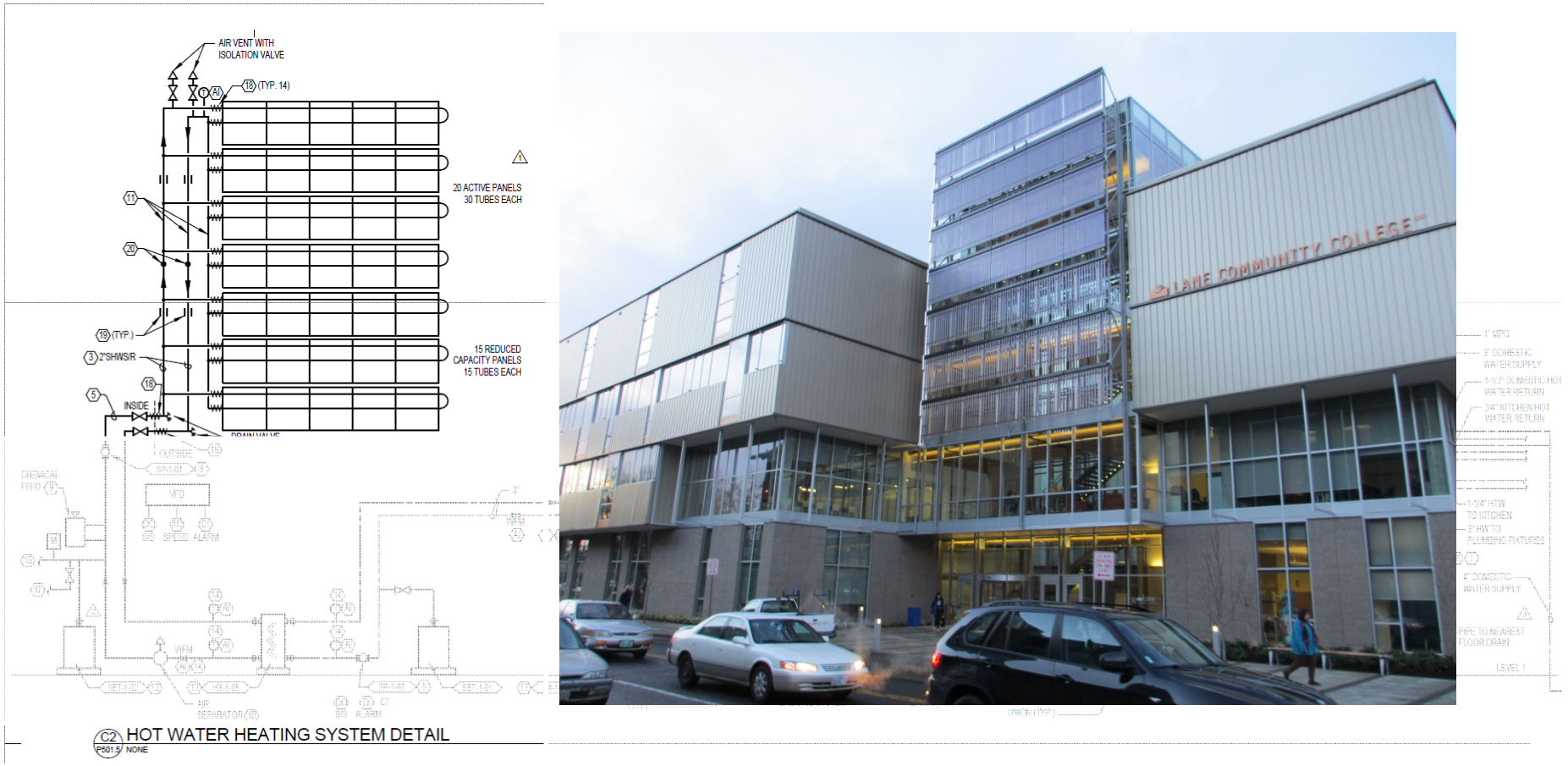
Solar Hot Water System



C2 HOT WATER HEATING SYSTEM DETAIL
P501.5 NONE

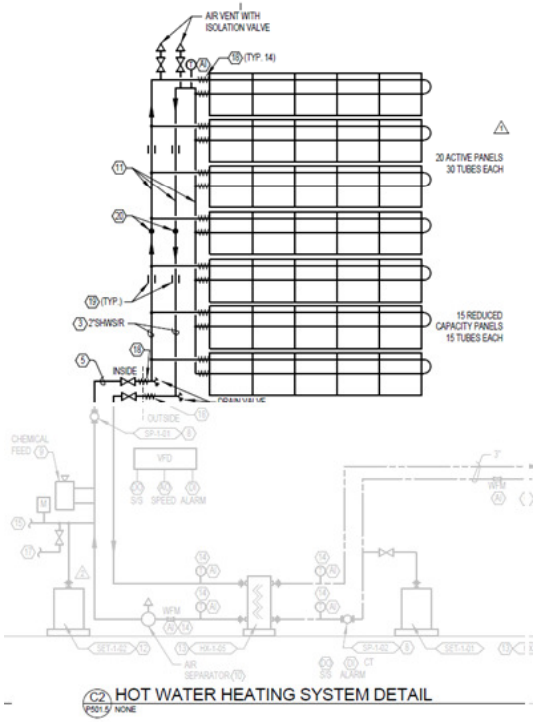
PLUMBING BASIS OF DESIGN

Solar Hot Water System



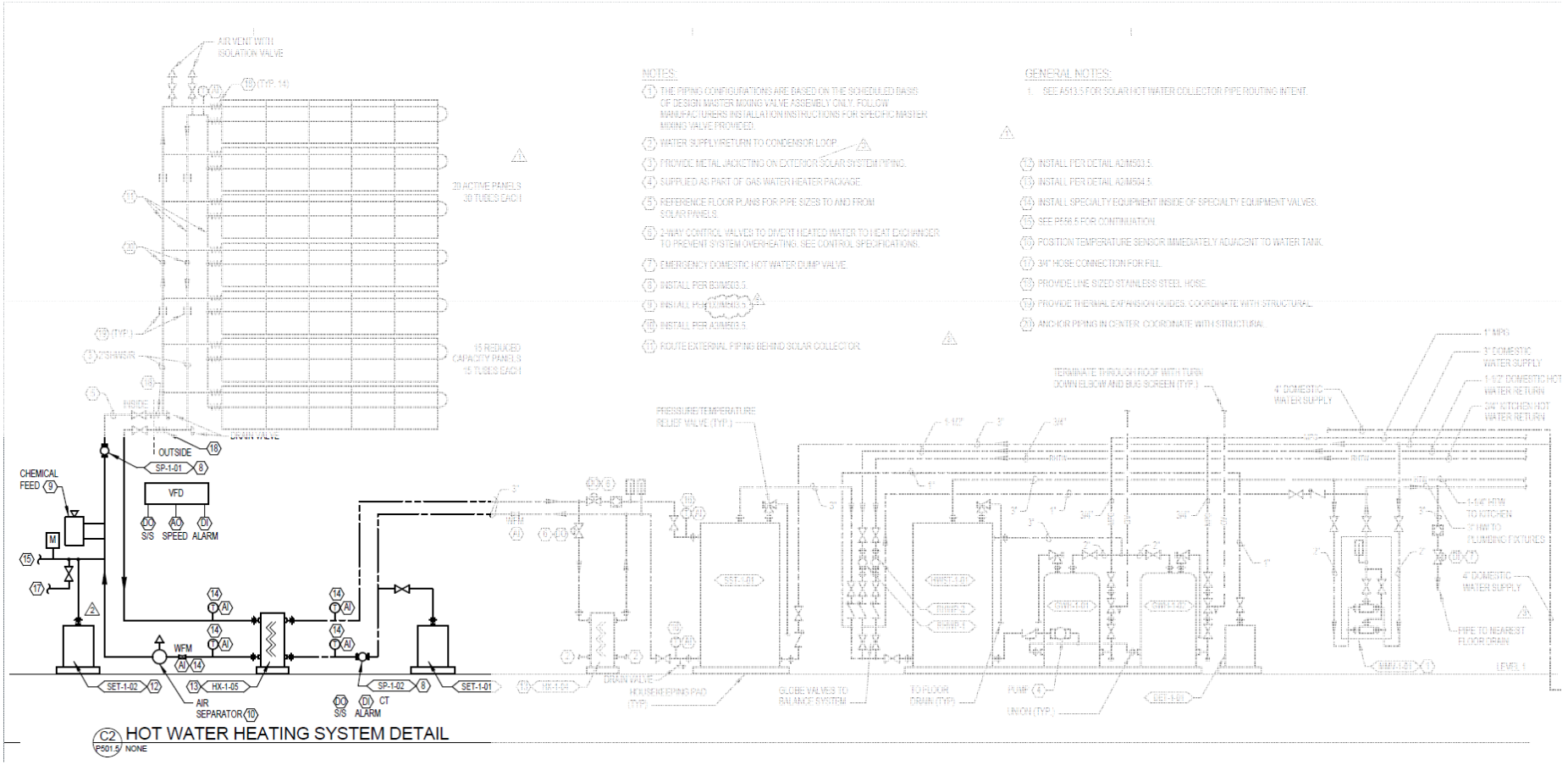
PLUMBING BASIS OF DESIGN

Solar Hot Water System



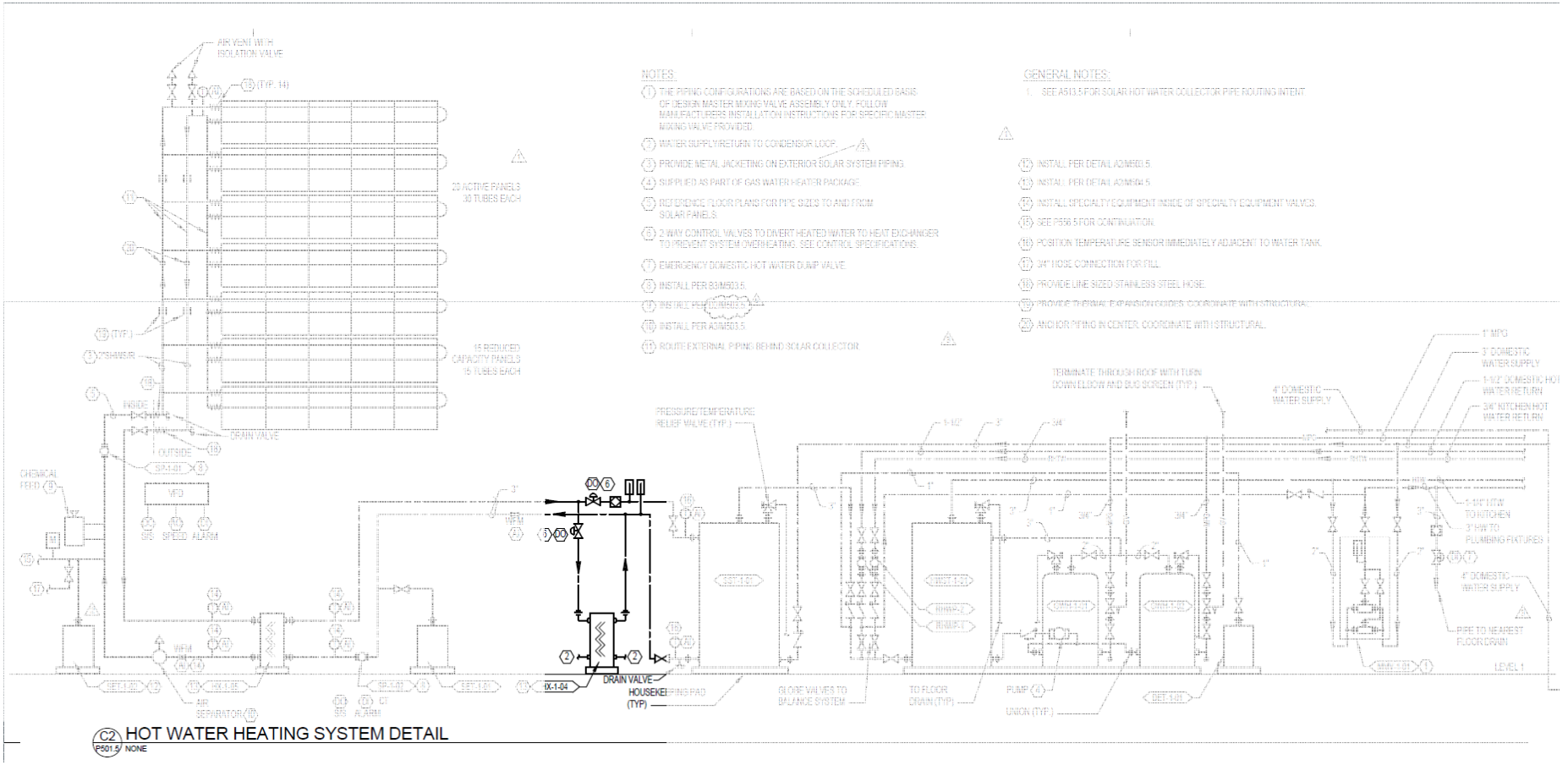
PLUMBING BASIS OF DESIGN

Solar Hot Water System



PLUMBING BASIS OF DESIGN

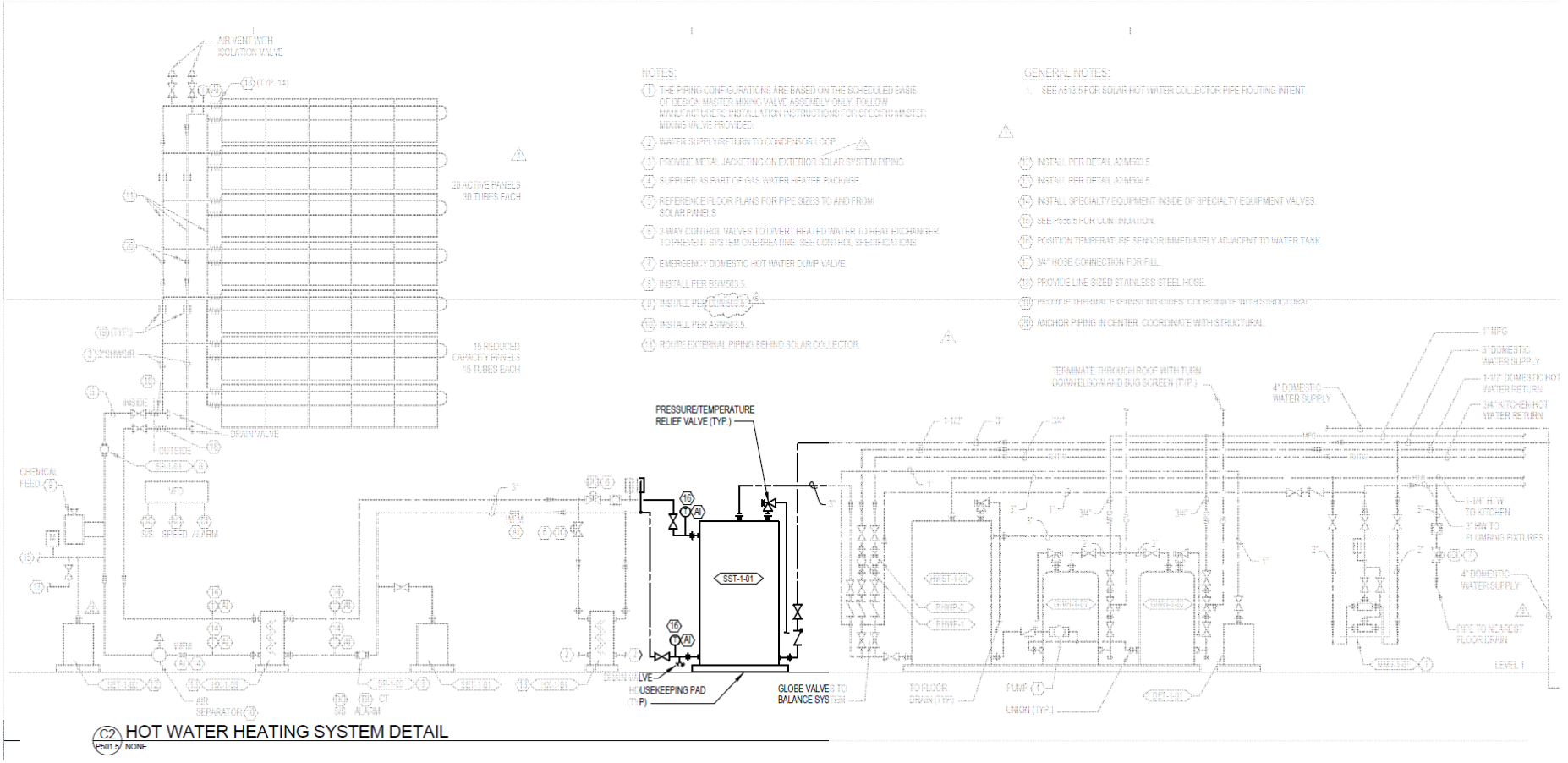
Solar Hot Water System



C2 P501.5 HOT WATER HEATING SYSTEM DETAIL
NONE

PLUMBING BASIS OF DESIGN

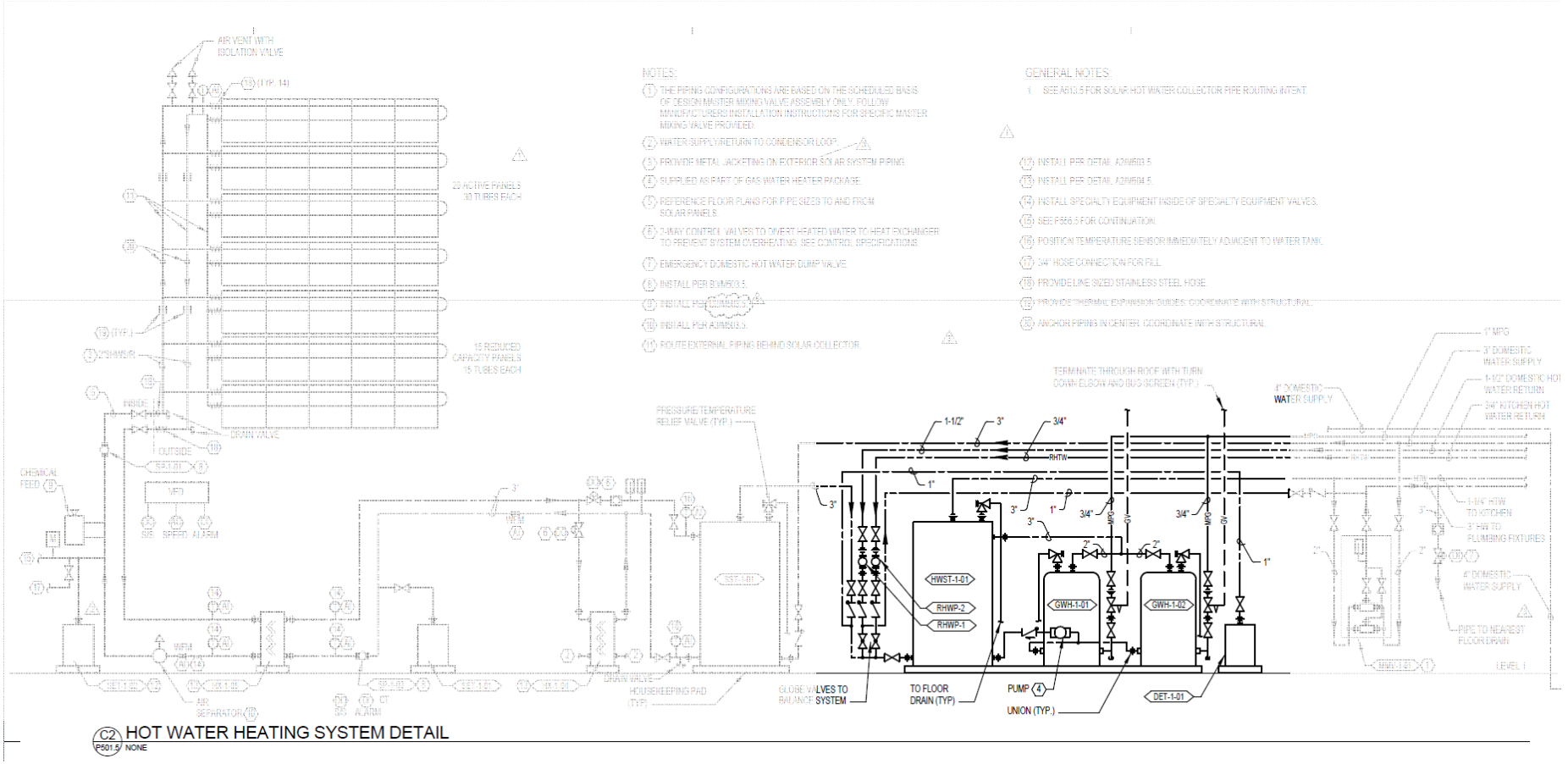
Solar Hot Water System



C2 P501.5 HOT WATER HEATING SYSTEM DETAIL
NONE

PLUMBING BASIS OF DESIGN

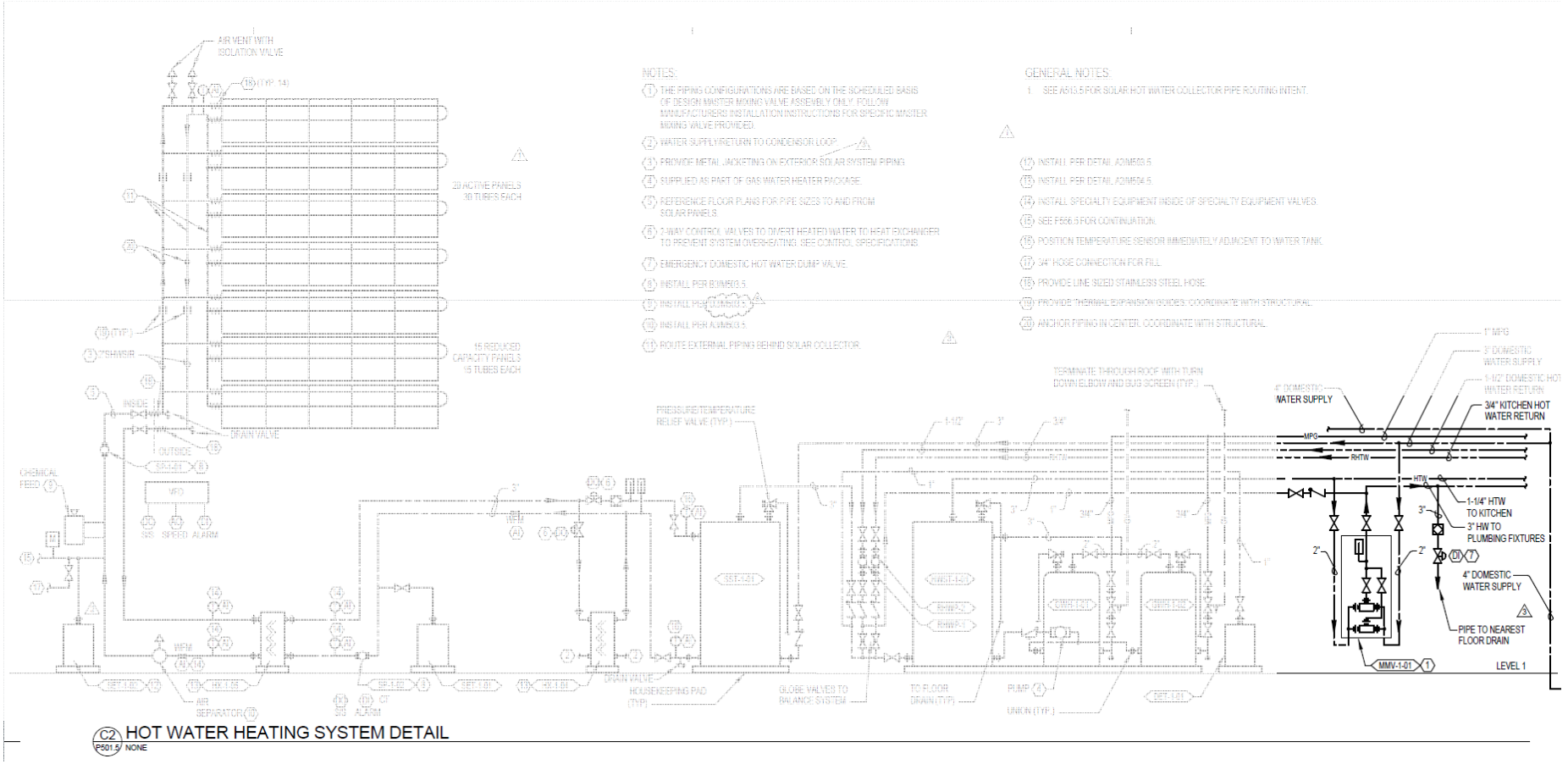
Solar Hot Water System



C2 / P501.5 HOT WATER HEATING SYSTEM DETAIL
NONE

PLUMBING BASIS OF DESIGN

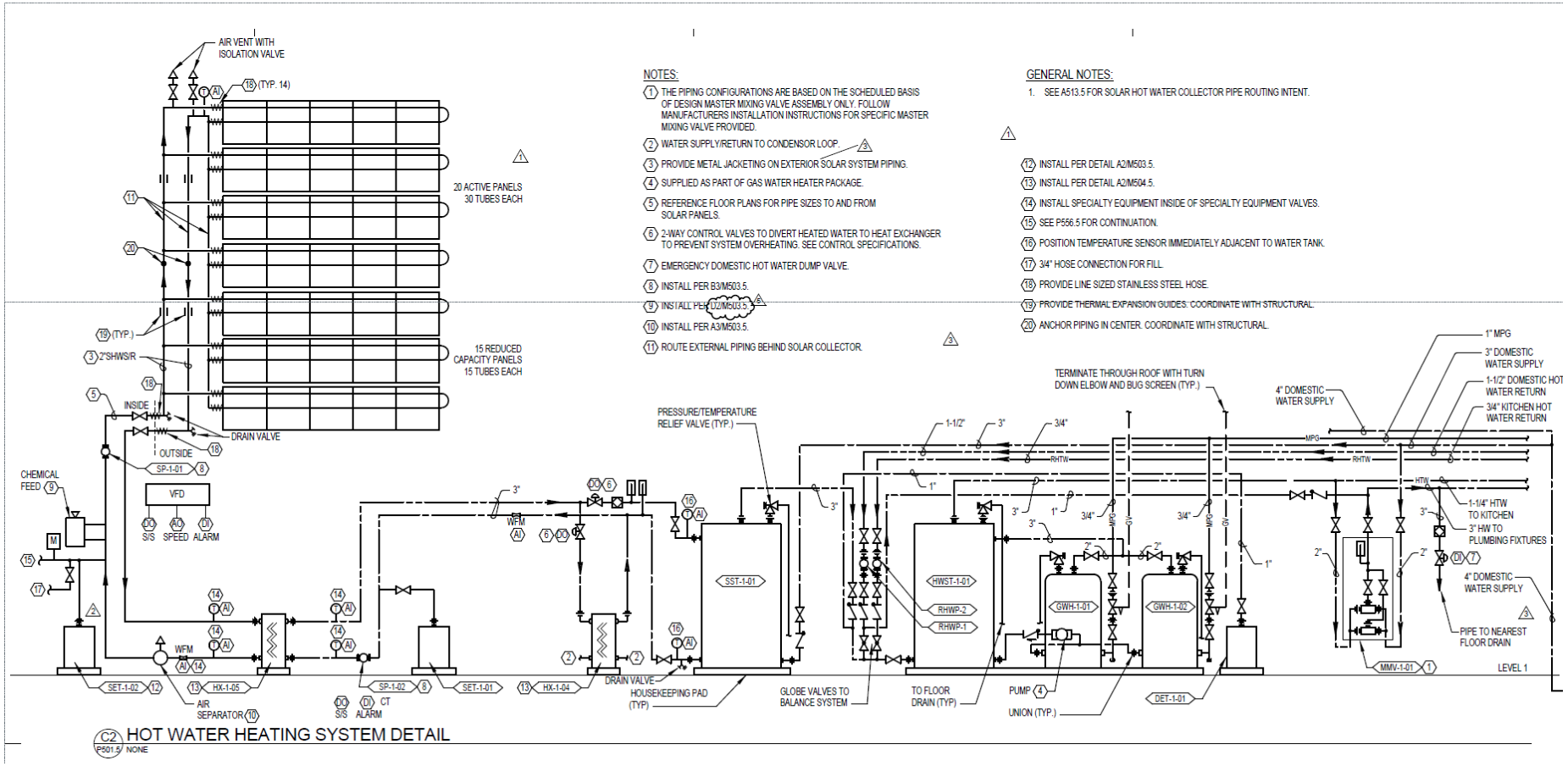
Solar Hot Water System



C2 HOT WATER HEATING SYSTEM DETAIL
P501.5 NONE

PLUMBING BASIS OF DESIGN

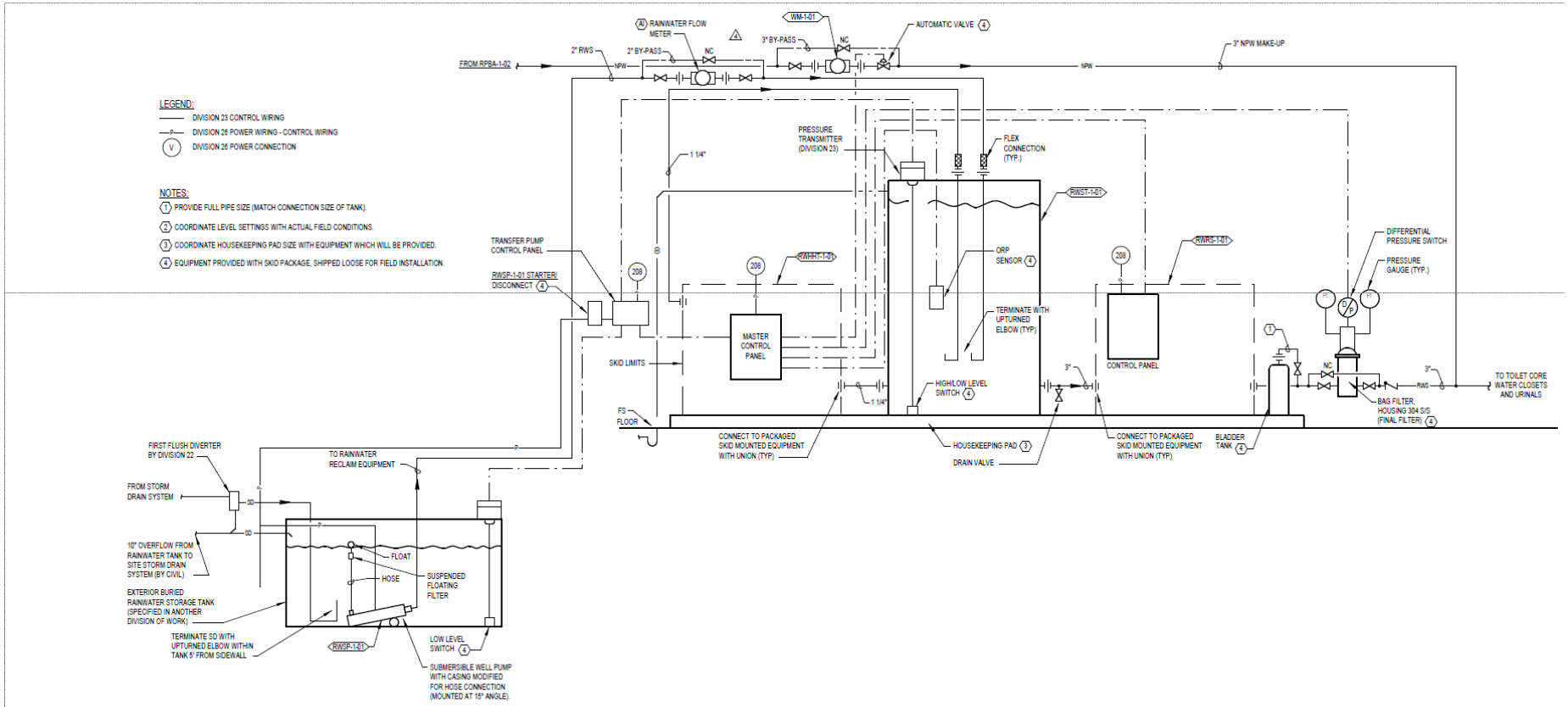
Solar Hot Water System



C2 HOT WATER HEATING SYSTEM DETAIL
P501.5 NONE

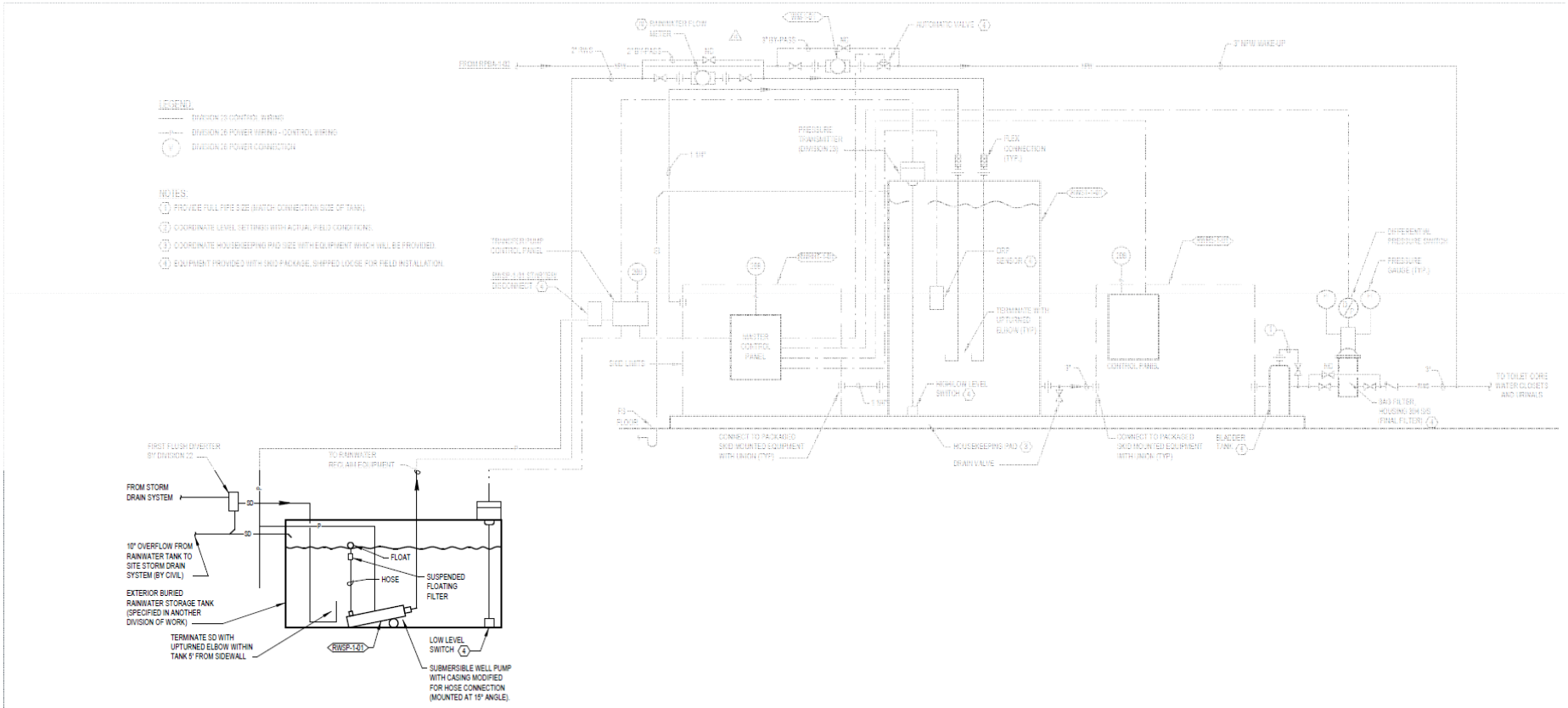
PLUMBING BASIS OF DESIGN

Rainwater System



PLUMBING BASIS OF DESIGN

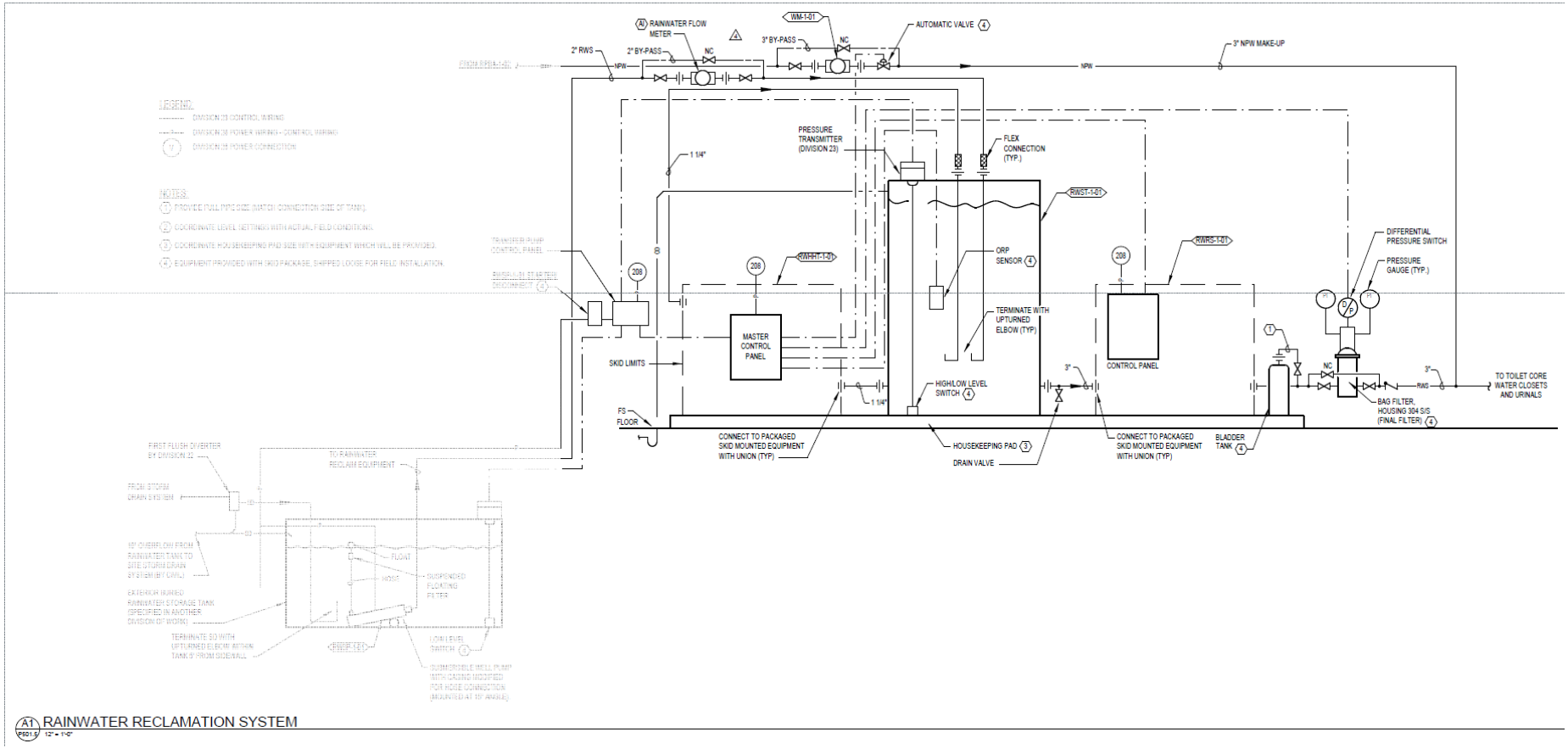
Rainwater System



A1 RAINWATER RECLAMATION SYSTEM
P501.5 1/2" = 1'-0"

PLUMBING BASIS OF DESIGN

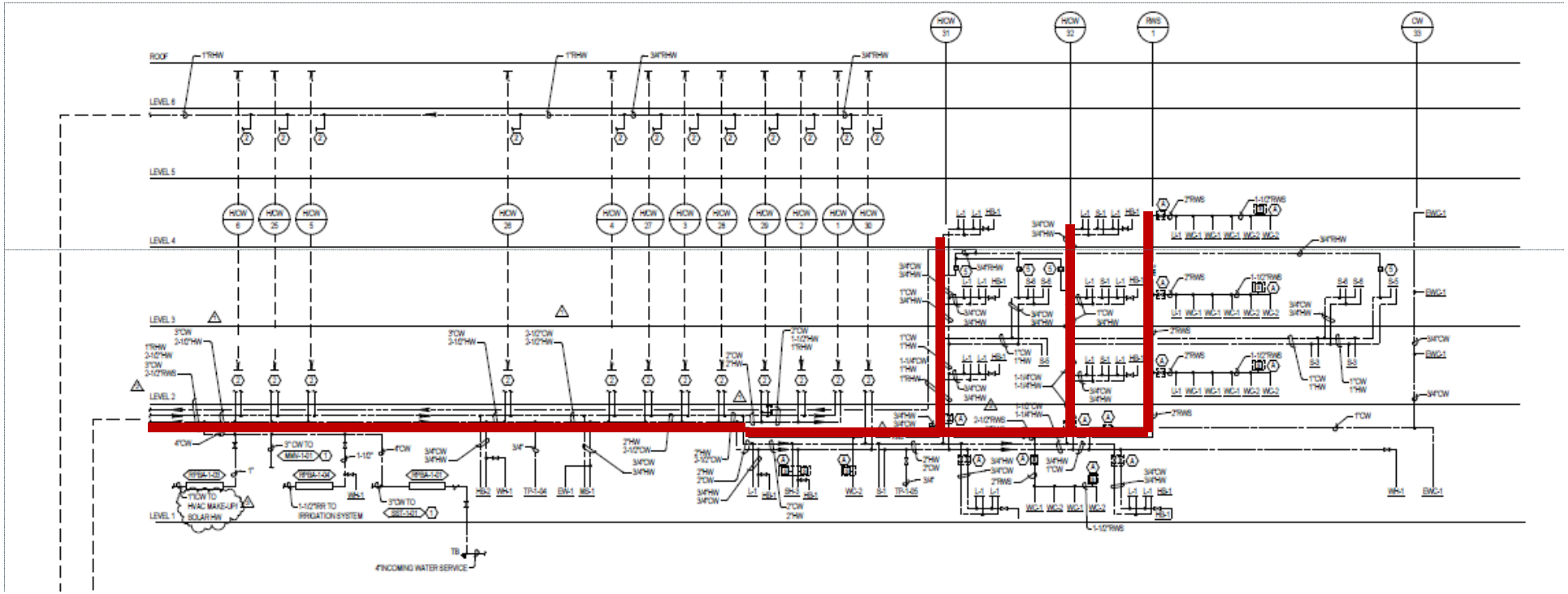
Rainwater System



A1 RAINWATER RECLAMATION SYSTEM
P501.5 1/2" = 1'-0"

PLUMBING BASIS OF DESIGN

Rainwater System



PLUMBING BASIS OF DESIGN

Any questions?