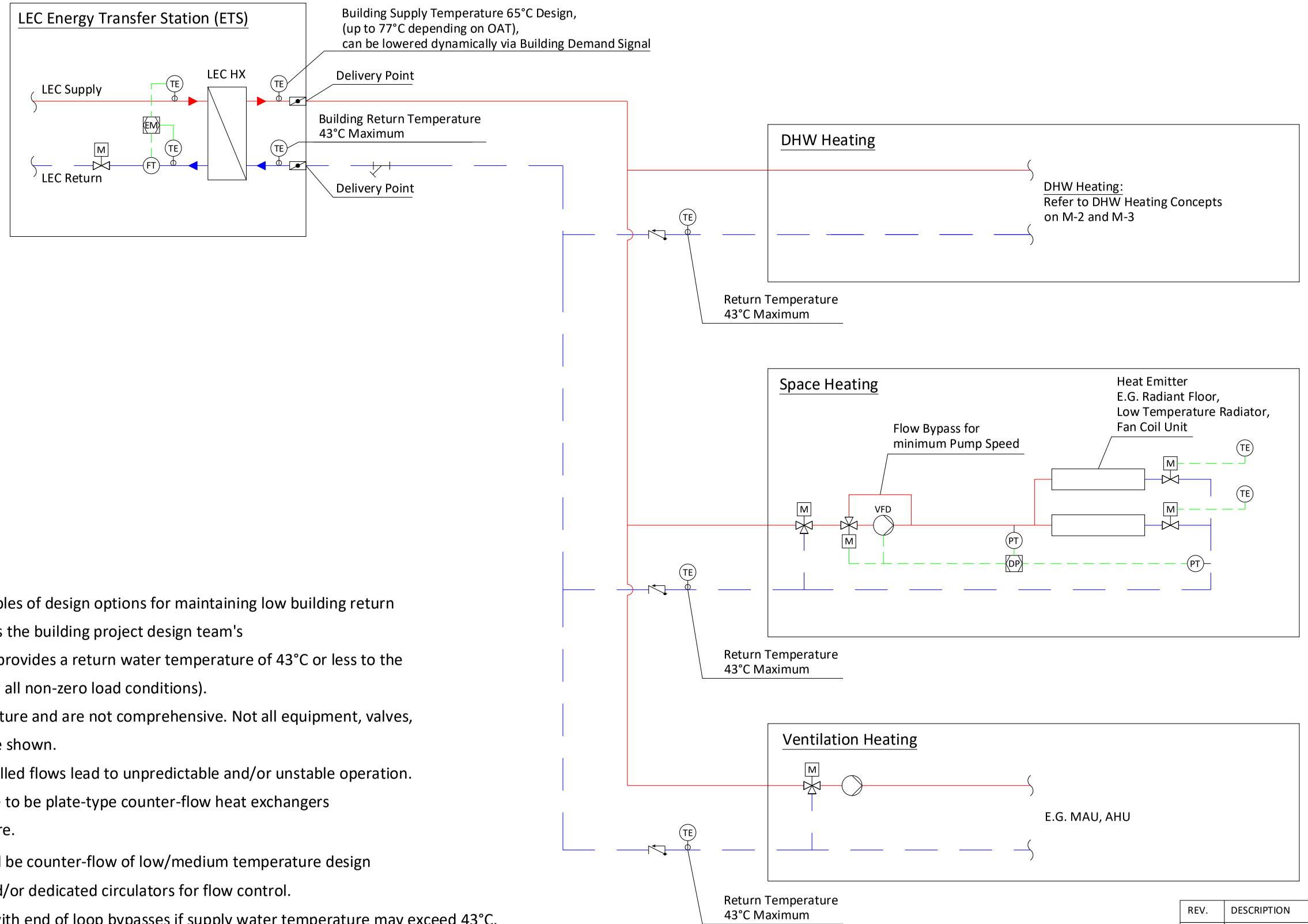
M1 General Design Heating Concept

Legend

- Plate Heat Exchanger
- Centrifugal Pump
- Electric Actuator
- 2-way Valve
- 3-way Valve
- Butterfly Valve
- Check Valve
- Y-Strainer
- Temperature Element with well
- Flow Element with Transmitter
- Pressure Transmitter
- Programmable Controller
- Energy Meter
- Pipe Heating
- Pipe DW
- Field Signal Wire



General Design Notes

1. These schematics and notes are examples of design options for maintaining low building return water temperature to the LEC ETS. It is the building project design team's responsibility to design a system that provides a return water temperature of 43°C or less to the LEC ETS at all times of the year (during all non-zero load conditions).
2. These schematics are conceptual in nature and are not comprehensive. Not all equipment, valves, controls, etc. that may be required are shown.
3. All flows must be controlled. Uncontrolled flows lead to unpredictable and/or unstable operation.
4. All water to water heat exchangers are to be plate-type counter-flow heat exchangers to ensure low return water temperature.
5. All heat emitters/terminal units should be counter-flow of low/medium temperature design and must have control/zone valves and/or dedicated circulators for flow control.
6. Supply/return loops cannot be fitted with end of loop bypasses if supply water temperature may exceed 43°C.

Control Notes

1. Provide modulating heating supply temperature set point demand signal (4-20 mA) to LEC ETS control panel. The signal shall vary between no demand and maximum demand as required to satisfy the set point of the active heating loop requiring highest supply temperature (e.g. radiant floor heat set point when DHW is satisfied).
2. PID controllers must be appropriately tuned and deadbands implicated to avoid rapid cycling and unstable operation.

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Heating Customer Connections

General Design Heating Concept

Drawn: Jacob Allen	DATE 2019-12-18	DWG NO M-1	
Reviewed: Ivan Tang	SCALE n/a	SHEET 1 of 1	REV 2

Legend

- Plate Heat Exchanger
- Centrifugal Pump
- Electric Actuator
- 2-way Valve
- 3-way Valve
- Butterfly Valve
- Check Valve
- Y-Strainer
- Temperature Element with well
- Flow Switch
- Pressure Transmitter
- Programmable Controller
- Pipe
- Field Signal Wire

General Design Notes

1. Heat Interface Units are intended to be installed in each unit to serve that unit. This system employs decentralized instantaneous heating of DHW and does not require any DHW or DHWR distribution. Hydronic buffer tanks should be implemented to reduce peak heating capacity. This type of system is well-suited for hydronic submetering.
2. Refer to notes on M-1.

Example Sequence of Control

Buffer tanks

- P-1 to start when T_H drops below set point
- P-1 to stop when T_L reaches set point

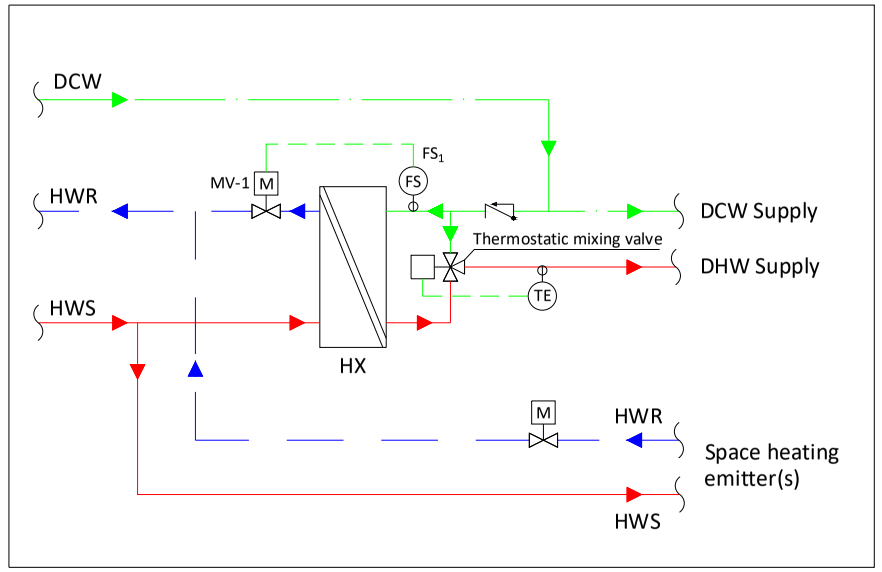
Heating Distribution

When dP drops below set point

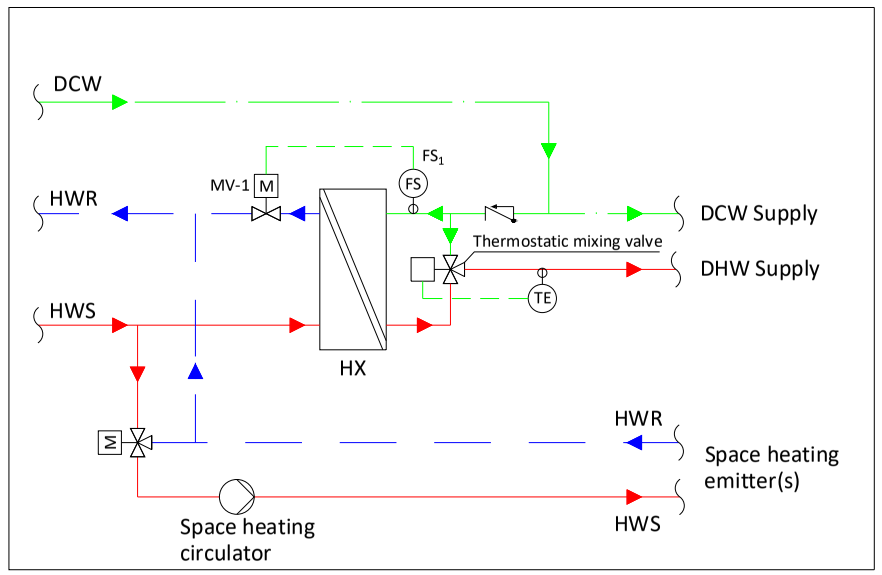
- P-2 starts at minimum speed with MV-1 at minimum setting

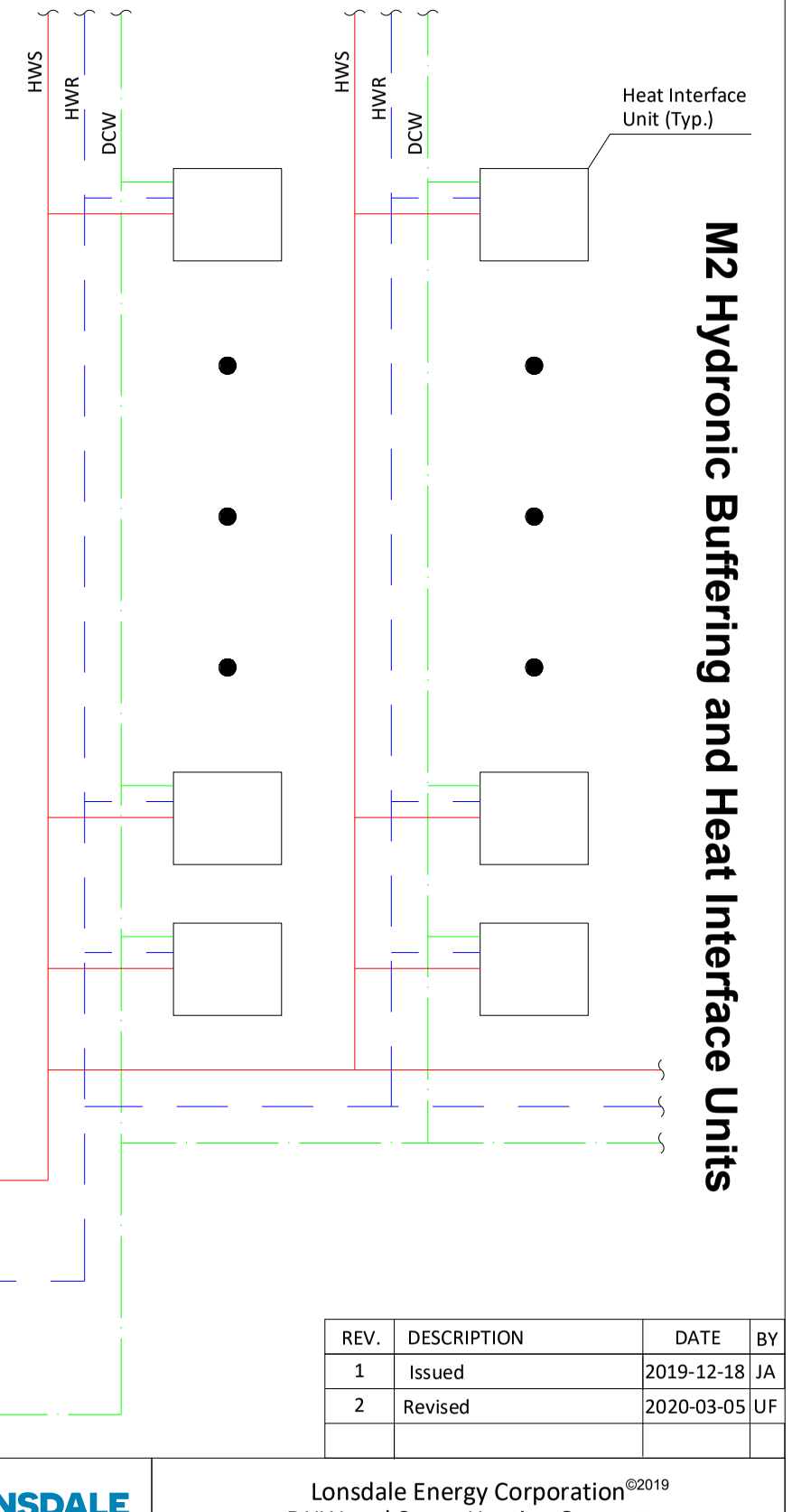
  (maximum flow through pump bypass)
- MV-1 opens to achieve dP set point
- Once MV-1 is at maximum setting, P-2 increases speed to achieve dP set point
- Reverse sequence as necessary to maintain dP set point

Example Heat Interface Units Configuration 1



Example Heat Interface Units Configuration 2





M2 Hydronic Buffering and Heat Interface Units

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1	Issued	2019-12-18	JA
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DHW and Space Heating Concept

Hydronic Buffering and Heat Interface Units

Drawn: Jacob Allen	DATE 2019-12-18	DWG NO M-2	
Reviewed: Ivan Tang	SCALE n/a	SHEET 1 of 1	REV 2

Legend

- Plate Heat Exchanger
- Centrifugal Pump
- Electric Actuator
- 2-way Valve
- 3-way Valve
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- Check Valve
- Y-Strainer
- Temperature Element with well
- Flow Switch
- Pressure Transmitter
- Programmable Controller
- Pipe Heating
- Pipe DW
- Field Signal Wire

General Design Notes

1. This system employs the use of scavenging tanks to charge/discharge thermal energy as required to maintain low overall return temperature.

   The scavenging tanks shall be kept as cool as possible as often as possible. Cooler water from the scavenging tank(s) is used for mixing when hydronic return from DHW heating is too warm.

   These tanks are re-cooled from DCW makeup when DHW is demanded. The scavenging tank volume that is required shall be engineered and calculated specifically for the subject building.

2. Refer to notes on M-1.

Example Sequence of Control

DHW Storage Tanks

- P-3 to start when T_H drops below set point
- P-3 to stop when T_L reaches set point

DHW Heating

While P-3 is ON:

- P-1 starts at minimum speed
- PV-1 modulates speed to achieve T_1 set point

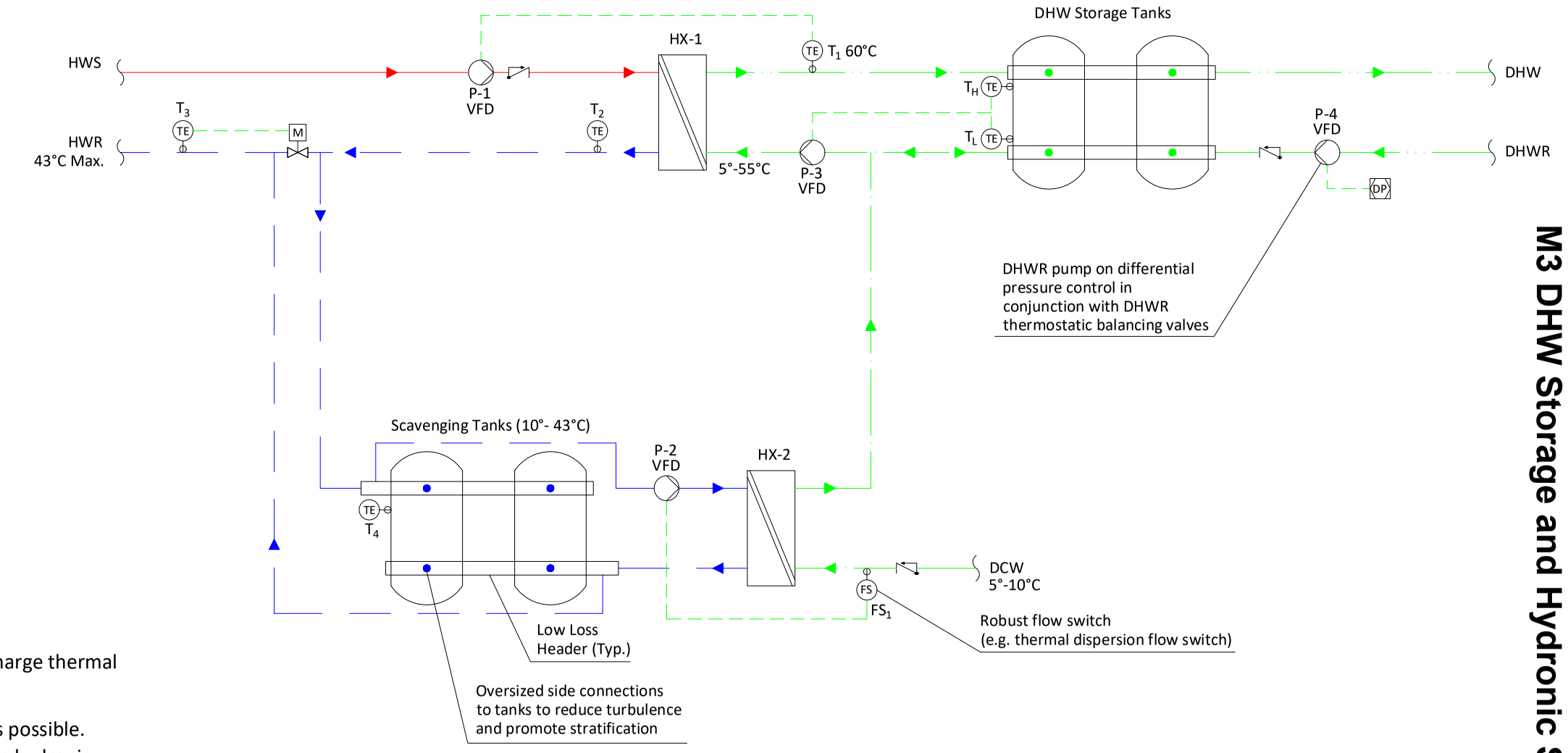
Scavenging

If $T_2 \leq 43°C$, MV-3 is fully open.

If $T_2 > 43°C$, MV-3 modulates to control T3 to 43°C

If Flow is sensed at FS_1, P-2 starts

If no flow is sensed at FS_1, P-2 stops



M3 DHW Storage and Hydronic Side Scavenging

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1	Issued	2019-12-18	JA
2	Updated	2021-12-14	JA
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DHW Heating Concept

DHW Storage and Hydronic Side Scavenging

Drawn: Jacob Allen	DATE 2021-09-14	DWG NO M-3	
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