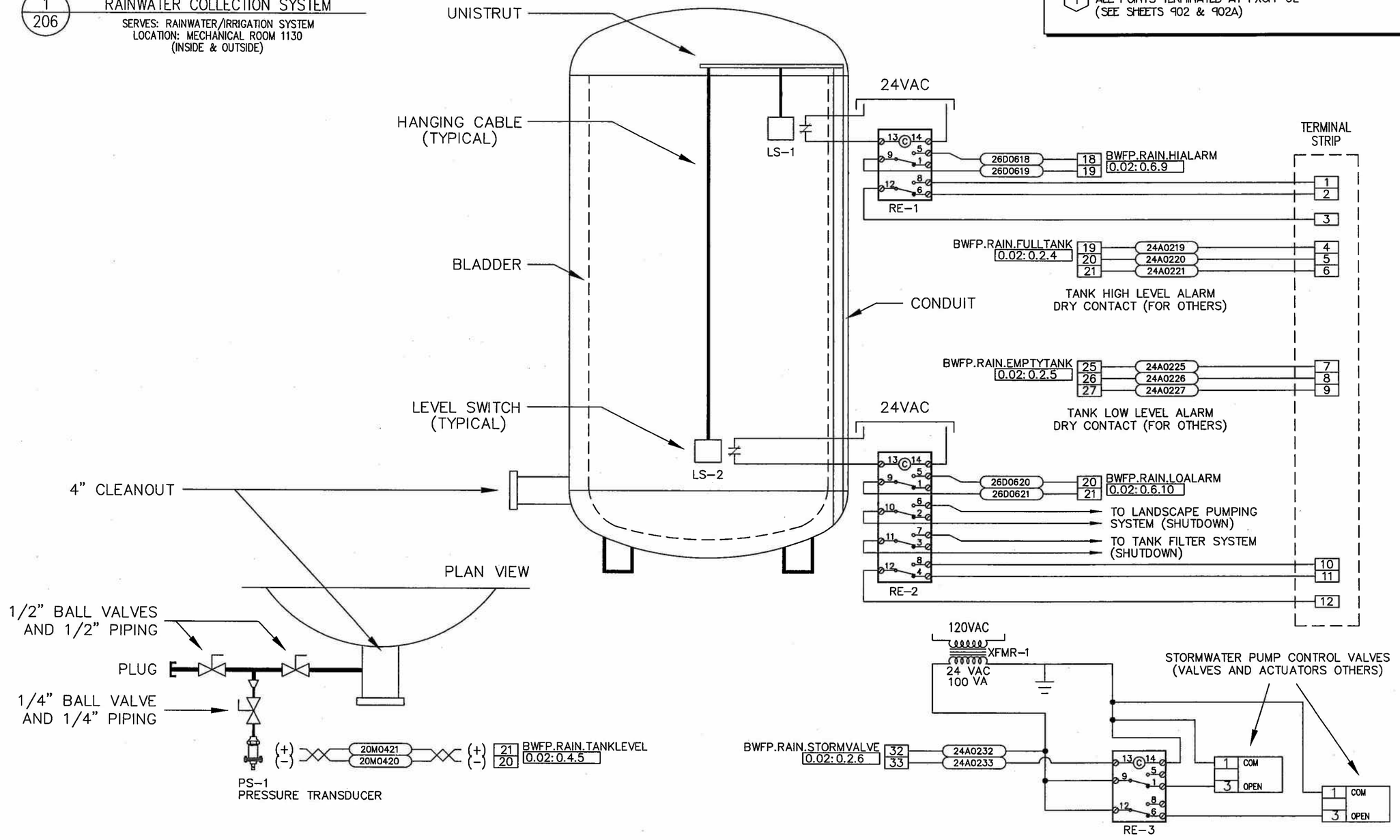
1/206 RAINWATER COLLECTION SYSTEM

SERVES: RAINWATER/IRRIGATION SYSTEM
LOCATION: MECHANICAL ROOM 1130
(INSIDE & OUTSIDE)

INSTALLATION NOTES:

1. ALL POINTS TERMINATED AT PXCM1-02 (SEE SHEETS 902 & 902A)



REVISION HISTORY

1	10/30/2009	MM	ISSUED FOR SUBMITTAL APPROVAL & REVIEW

SIEMENS

Siemens Building Technologies, Inc.
Building Automation Division

3650 Industrial Boulevard
Suite 100
West Sacramento
CA 95691
Phone: (916) 553-4444
Fax: (916) 447-4724

BREWERY, WINERY & FOOD PILOT FACILITIES
DAVIS, CA

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
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RAINWATER COLLECTION SYSTEM

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AIR HANDLER UNIT, AHU-1

The air handler will operate continuously and normal modes will only be interrupted in the case of alarm situations as described below. An alarm will be provided at the BAS for each of these alarm conditions. During non-occupied periods, the air handler will ramp down in airflow to only provide conditioned air to the labs, electrical rooms and mechanical rooms as required.

Fire Alarm Shutdown: When the life safety system input to the AHU-1 control panel is in alarm (open), the supply and return fans will be disabled. When the alarm condition is cleared and the life safety input returns to normal, AHU-1 will return to normal operation.

High Duct Static Pressure Safety: Should the supply plenum pressure exceed the high limit setpoint (initially set at 4.0?1WC), the differential pressure switch will open and disable the supply and return fans. This is a manual reset condition that is returned to normal through the BAS workstation, or via a local pushbutton in the control panel. When the condition is reset, AHU-1 will return to normal operation.

Pre-Low Temperature Limit: Should the mixed air sensor located in the mixed air section of the airhandler sense lower than 38?F air, the minimum outdoor, outdoor and exhaust air dampers will be commanded closed and the return air dampers will be commanded open. This is an automatic reset condition that is intended to circumvent the low temperature limit alarm condition described below. When the mixed air rises above 40?F, the economizer will return to normal operation.

Low Temperature Limit: A low limit thermostat located downstream of the hot water coil will disable the supply and return fan if any 12?1 section of the sensing element is below 35?F. This is a manual reset condition that is returned to normal through the BAS workstation, or via a local pushbutton in the control panel. When the condition is reset, AHU-1 will return to normal operation.

Supply Fan Speed Control: The supply fan speed will be controlled to maintain the supply duct static pressure setpoint. This setpoint will be reset as required to allow the worst case VAV terminal to operate at +/- 95% open position.

Return Fan Speed Control: The return fan speed will be controlled by the greater of two loop inputs. The first is to maintain the exhaust plenum at a minimum positive pressure (initially set at 0.02?1wc). The second is to maintain the building pressure at a maximum positive pressure (initially set at 0.03?1wc).

Supply Air Setpoint: The economizer, chilled water valve, and hot water valve will be controlled in sequence to maintain the reset supply air temperature setpoint. Supply air temperature setpoint will be reset based on the greatest cooling demand of all VAV zones.

Economizer Control: The airside economizer will provide necessary cooling or supplement chilled water cooling depending on zone demand and outdoor air conditions. The economizer will be allowed to operate until the outdoor air temperature exceeds the return air temperature by 3F?, adjustable. This will allow for full utilization of ?0free cooling?1 from the outdoor air. When allowed to operate, the economizer will be positioned to maintain the desired reset supply air temperature setpoint as sensed by the supply air temperature sensor. When the outdoor air temperature exceeds the return air temperature by the set deviation, the outdoor air and exhaust air dampers will be positioned to their minimum positions and the return air damper will be positioned to the 100% open (or pre-determined position by air balance) position.

Minimum Ventilation Control: The minimum outside air damper will be positioned to maintain the minimum outdoor air CFM setpoint as sensed by the airflow station. This minimum setpoint will be adjusted for occupied and partial occupied periods. (Also see Demand Ventilation Control below)

VARIABLE AIR VOLUME (VAV) TERMINALS

During occupied hours, the direct digital controller will control the VAV airflow between minimum and maximum design cooling CFM to satisfy cooling demand and maintain cooling setpoint. On terminals with hydronic reheat, the controller will control the hot water valve and the VAV airflow (between minimum and reheat design CFM) in sequence to satisfy heating demand and maintain heating setpoint. All VAV terminals with hydronic reheat will be provided with a supply air sensor for ease of determining status. Zones that operate on a time-of-day schedule will be commanded closed during non-occupied hours.

Zone VAVs serving the Food Science Lab and Winery Lab shall operate continuously and modulate between minimum and maximum settings based on room temperature to provide makeup for the lab hoods. Refer to Winery Lab and Food Science Lab Hoods sequence below.

VAV-1 is provided with a motorized damper in the return duct serving the space. This damper is to be closed when the VAV zone (Gen Food Processing) is unoccupied.

DEMAND VENTILATION CONTROL

As a VAV zone (excluding VAV zones 3, 4 & 13) exceeds the high limit CO2 setpoint (initially set at 1200 PPM), the CFM will be increased up to the maximum design cooling CFM. If the CO2 level cannot be maintained with this action, the minimum outdoor air CFM setpoint at AHU-1 will be reset above its preset setpoint as required to maintain zone CO2 setpoints.

Room 124 served by VAV-6 and room 115 served by VAV-7 have individual CO sensing used in conjunction with the CO sensing at their respective VAV room transmitter and will be utilized in above strategy.

VAV-2 and VAV-12 will not be involved with strategy to increase AHU-1 minimum outdoor airflow. Refer to Winery Fermentation Hall sequence (EF-2) and Brewery sequence (EF-1) below.

HOT WATER SYSTEM (COMFORT HEATING AND FERMENTATION HEATING)

This system will operate based on AHU-1 demand, zone reheat demand, or Fermentation demand.

AHU-1 demand is present whenever the HWV is greater than 50% open in excess of the time delay period. Conversely, AHU-1 demand is terminated when the HWV is 0% open in excess of the time delay period (all above parameters are adjustable).

Zone reheat demand is present whenever the greatest demand reheat valve is 100% open in excess of the time delay period. Conversely, zone reheat demand is terminated when the greatest demand reheat valve is 0% open in excess of the time delay period (all above parameters are adjustable).

Fermentation demand is determined by the manual switch described below in the Tempered Heating Water System sequence.

When the system is commanded to operate, the lead HWP will be commanded on. Pump speed will be controlled to maintain differential pressure setpoint (initially set at 5PSID). Differential pressure will be sensed at two locations (AHU-1 and VAV-1). The loop will control to the lowest of these two locations. Lag pump will be enabled when the pump speed command exceeds 95% for the specified time delay period, or if the lead pump fails. Pump failure is determined based on feedback from the respective pump VFD or from flow switch at entering water side of HX-1. Lead pump will rotate every 500 hours of operation. Lag pump normal operation will be terminated when the pump speed command controlling two pumps is less than 45% for the specified time delay period (all above parameters are adjustable).

When proof of flow is received from the flow switch at HX-1, the steam valve will be allowed to operate. The steam valve will be controlled to maintain the hot water supply temperature setpoint. This setpoint is determined by the greater of two demands. If the fermentation system is demanding hot water, the setpoint will be 160?F. If the fermentation system is not demanding hot water and the HX-1 system is commanded on based on AHU-1 or zone reheat demand, the hot water supply temperature will be based on a comfort heating zone demand reset schedule (initially 100?F – 160?F). Upon termination of operation, the steam valve will be closed and pump operation will be maintained for a 10 minute cool down cycle.

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TEMPERED HEATING WATER SYSTEM (FERMENTATION HEATING)

Fermentation process hot water demand is initiated with a manual switch located in the Fermentation room. The ON/OFF switch will be provided with a red indicator light and label (?0Fermentation Hot Water System?1). When fermentation demand is present, the HX–1 system will be commanded on as described above.

When Fermentation process hot water demand is present and HX–1 system is proven to be in operation (flow switch at HX–1 and proof of HWP–1 or HWP–2 VFD operation), the lead THWP will be commanded on. Pump speed will be controlled to maintain differential pressure setpoint (initially set at 5PSID) as sensed by the differential pressure transmitter in the fermentation room. Lag pump will be enabled when the pump speed command exceeds 95% for the specified time delay period, or if the lead pump fails. Pump failure is determined based on feedback from the respective pump VFD. Lead pump will rotate every 500 hours of operation. Lag pump normal operation will be terminated when the pump speed command controlling two pumps is less than 45% for the specified time delay period (all above parameters are adjustable). As demand continues to drop, the THWP speed reaches minimum speed (15Hz) and the differential pressure is above setpoint, the minimum flow control valve located in the Fermentation room will be positioned to maintain differential pressure setpoint.

The 3–way hot water valve will be controlled to maintain 100?F tempered hot water supply temperature to the fermentation room.

CHILLED WATER SYSTEM (COMFORT COOLING AND FERMENTATION COOLING)

This system will operate based on AHU–1 demand or Fermentation demand.

AHU–1 demand is present whenever the CHWV is 100% open in excess of the time delay period. Conversely, AHU–1 demand is terminated when the CHWV is 0% open in excess of the time delay period (all above parameters are adjustable).

Fermentation process chilled water demand is initiated with a manual switch located in the Fermentation room. The ON/OFF switch will be provided with a blue indicator light and label (?0Fermentation Chilled Water System?1).

When commanded to operate, the lead CHWP will be commanded on. Pump speed will be controlled to maintain differential pressure setpoint (initially set at 5PSID). Differential pressure will be sensed at two locations (AHU–1 and in the Fermentation room). The loop will control to the lowest of these two locations. Lag pump will be enabled when the pump speed command exceeds 95% for the specified time delay period, or if the lead pump fails. Pump failure is determined based on feedback from the respective pump VFD. Lead pump will rotate every 500 hours of operation. Lag pump normal operation will be terminated when the pump speed command controlling two pumps is less than 45% for the specified time delay period (all above parameters are adjustable).

As demand continues to drop, the CHWP speed reaches minimum speed (15Hz) and the differential pressure is above setpoint, the minimum flow control valve located in the Fermentation room will be positioned to maintain differential pressure setpoint.

CONDENSER WATER SYSTEM (WATER SOURCE AC, HP, AND REFRIGERATION SYSTEMS)

The system will operate continuously to provide condenser water to the process equipment. The lead CWP will be rotated each 500 hours of operation. Upon rotation, new lead pump will be enabled and proof of operation received prior to disabling of current pump operation to assure no disruption to flow. Lag pump will also be enabled if the lead pump fails. Pump proof of operation/failure is determined based on feedback from the respective pump current sensor. Condenser water supply temperature setpoint will be maintained by controlling the fluid cooler spray pump and fluid cooler fan speed in sequence. During low outdoor ambient conditions, with fluid cooler fan and spray pump off, if the condenser water temperature falls below setpoint the 3–way valve will be controlled to bypass the fluid cooler and maintain condenser water setpoint. In the event of a fluid cooler fan VFD failure, the bypass mode will be automatically enabled to allow for 60Hz operation of the fan.

WINERY LAB AND FOOD SCIENCE LAB HOODS

HEF–1 shall operate continuously. The BAS will control the speed of HEF–1 to maintain a constant negative pressure (adjustable) in the common exhaust duct. Fan current sensing is provided to allow for fan failure alarm at BAS when proof of operation is not confirmed.

The fume hood controllers located in both labs will control their respective exhaust duct terminal damper to maintain the correct sash velocity setpoint.

Zone supply air VAVs serving the Labs shall operate continuously and modulate between minimum and maximum settings based on room temperature to provide makeup for the lab hoods.

The general room exhaust VAV?7s shall modulate to maintain the room at a negative pressure of –100 CFM (based on the room supply airflow minus the total exhaust).

JANITOR ROOM

CEF–1 shall operate continuously.

GENERAL EXHAUST

REF–1 shall operate based on a time–of–day schedule. BAS will provide start/stop capability. Fan current sensing is provided to allow for fan failure alarm at BAS when proof of operation is not confirmed.

BREWERY

EF–1 shall be utilized to perform off–hours purge within the Brewery. During unoccupied hours for this area, if the outdoor air dry bulb temperature is 5F? lower than the space temperature (as sensed by the VAV room transmitter) and the space temperature is 2F? greater than the occupied setpoint, the motorized dampers at FB–3 and FB–4 will be commanded open and EF–1 will be commanded on by the BAS when proof of open position is confirmed via the respective damper end switches. This cycle will be terminated when the outdoor air dry bulb temperature exceeds the indoor temperature for 5 minutes, the space temperature drops 5F? below occupied cooling setpoint, or an occupied period is present.

When the CO2 level exceeds the setpoint (initially set at 1200 PPM), the VAV–2 position will be increased to the maximum design cooling CFM if the area is in occupancy mode. If the CO2 level cannot be maintained with this action, the motorized dampers at FB–3 and FB–4 will be commanded open and EF–1 will be commanded on by the BAS when proof of open position is confirmed via the respective damper end switches. A local red indicator alarm light will be illuminated simultaneous to the damper open command to provide local indication of the high CO2 alarm condition. A label will be provided (?0High CO2 Alarm?1). The above strategy will be reversed as CO2 level is reduced to the acceptable level (initially set at 1000 PPM).

Fan current sensing is provided to allow for fan failure alarm at BAS when proof of operation is not confirmed.

WINERY FERMENTATION HALL

EF–2 shall be utilized to perform off–hours purge within the Winery. During unoccupied hours for this area, if the outdoor air dry bulb temperature is 5F? lower than the space temperature (as sensed by the VAV room transmitter) and the space temperature is 2F? greater than the occupied setpoint, the motorized dampers at FB–3 and FB–4 will be commanded open and EF–2 will be commanded on by the BAS when proof of open position is confirmed via the respective damper end switches. This cycle will be terminated when the outdoor air dry bulb temperature exceeds the indoor temperature for 5 minutes, the space temperature drops 5F? below occupied cooling setpoint, or an occupied period is present.

When the CO2 level exceeds the setpoint (initially set at 1200 PPM), the VAV–12 position will be increased to the maximum design cooling CFM if the area is in occupancy mode. If the CO2 level cannot be maintained with this action,

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CA 95691
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Fax: (916) 447-4724

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the motorized dampers at FB–1 and FB–2 will be commanded open and EF–2 will be commanded on by the BAS when proof of open position is confirmed via the respective damper end switches. A local red indicator alarm light will be illuminated simultaneous to the damper open command to provide local indication of the high CO2 alarm condition. A label will be provided (?0High CO2 Alarm?1). The above strategy will be reversed as CO2 level is reduced to the acceptable level (initially set at 1000 PPM).

Fan current sensing is provided to allow for fan failure alarm at BAS when proof of operation is not confirmed.

WINERY EQUIPMENT

An occupancy sensor located in the Winery Equipment Room shall automatically start EF–3 for a preset time period when occupancy is detected within the room.

WINERY FRUIT CELLAR

Water cooled refrigeration units and steam humidification will be provided by others to condition the manufactured cold box units.

The BAS shall command open the motorized damper in the duct serving the Winery Fruit Cellar and start EF–3 when the CO2 level exceeds the setpoint (initially set at 1200 PPM) in the Winery Fruit Cellar. A local red indicator alarm light will be illuminated simultaneous to the damper open command to provide local indication of the high CO2 alarm condition. A label will be provided (?0High CO2 Alarm?1). This function will be terminated when the CO2 level is reduced to the acceptable level (initially set at 1000 PPM).

WINERY CIP

An occupancy sensor shall automatically start EF–4 for a preset time period when occupancy is detected within the room.

WINERY CELLARS 1, 2, & 3

Water cooled refrigeration systems and steam humidification will be provided by others to condition the manufactured cold box units.

The BAS shall command open the associated damper when the CO2 level exceeds the setpoint (initially set at 1200 PPM) in the respective Winery Cellar. A local red indicator alarm light will be illuminated simultaneous to this action to provide local indication of the high CO2 alarm condition at the respective Cellar. A label will be provided (?0High CO2 Alarm?1) for each. The BAS will start EF–5 when any damper end switch confirms that a damper is open. The above function will be terminated when the CO2 level is reduced to the acceptable level (initially set at 1000 PPM).

FOOD DRY STORAGE AND BREWERY MILL

EF–6 shall operate based on a time–of–day schedule. BAS will provide start/stop capability and current sensing. A fan failure alarm will be provided at the BAS.

BREWERY CIP

An occupancy sensor shall automatically start EF–7 for a preset time period when occupancy is detected within the room.

HOT ROOM

VAV–14 will be allowed to operate based on a manual command via the zone transmitter, or space temperature above 105 DegF. EF–8 shall be commanded on when the space temperature exceeds 90 DegF. Fan shall be commanded off when outside air is above 100 DegF. BAS will provide start/stop capability and current sensing. A fan failure alarm will be provided at the BAS.

WSAC-1: SPECIAL COLLECTIONS

A factory supplied thermostat shall control humidity and temperature setpoint.

WSAC-2: WINERY RESEARCH BOTTLE STORAGE

A factory supplied thermostat shall control humidity and temperature setpoint.

WSAC-3: CONTROL ROOM

A factory supplied thermostat shall control humidity and temperature setpoint. A temperature sensor will be provided to the BAS from this room for monitoring and alarm purposes

WSAC-4: WINERY LONG TERM BARREL STORAGE

A factory supplied thermostat shall control humidity and temperature setpoint.

WSAC-5: TELE/DATA

A factory supplied thermostat shall control temperature setpoint. A temperature sensor will be provided to the BAS from this room for monitoring and alarm purposes

WSHP-1: MILK PROCESSING

A factory supplied thermostat shall control temperature setpoint. A temperature sensor will be provided to the BAS from this room for monitoring and alarm purposes

DOMESTIC HOT WATER

Domestic hot water will be generated with the steam–to–hot water converter located in the Mechanical Room using stand–alone control. The domestic hot water circulation pump will be operated by a stand–alone programmable timer for occupied period operation.

RAINWATER COLLECTION/IRRIGATION SYSTEM

The Storm Drain Pump System will operate automatically (via its packaged system floats in the drain sump) to maintain sump level. Rainwater will be can be pumped to either the Rain Water Collection Tank for storage or the site storm drain. Siemens will monitor the RWC Tank levels via an analog level sensor and high alarm and low alarm level float switches. When the tank level (monitored by the analog tank level sensor) reaches a Storm Drain setpoint (adjustable and initially set to 17 feet), the Storm Drain Pump System diverter valves will be positioned to the storm drain position and all water will be pumped to the storm drain. When the tank level (monitored by the analog tank level sensor) drops to a Tank setpoint (adjustable and initially set to 16 feet), the Storm Drain Pump System diverter valves will be repositioned to the RWC Tank position and all water will be pumped to Rain Water Collection Tanks.

The Irrigation Pump System will operate automatically to maintain pressure setpoint (via the packaged pressure controller). If the level of the Rain Water Collection Tank drops below the low level float switch larm, the Irrigation Pump System will be disabled (via hardwire interlock). Normally, the tanks will never be allowed to drop to this low level. Please note that high and low level float switches and analog level are located in the eastern tank (1 of 4) and that all tanks are normally interconnected and at the same level. When the eastern tank is drained for cleaning, the Irrigation Pump will be disabled.

The Tank Filter System will operate automatically to filter the water in the RWC Tanks. If the level of the Rain Water Collection Tank drops below the low level float switch larm, the Irrigation Pump System will be disabled (via hardwire interlock). Normally, the tanks will never be allowed to drop to this low level. Please note that high and low level float switches and analog level are located in the eastern tank (1 of 4) and that all tanks are normally interconnected and at the same level. When the eastern tank is drained for cleaning, the Tank Filter System will be disabled.

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The Siemens system will provide four tank level contacts for monitoring by others: Two contacts function as indications of a malfunction in the operation of the Rain Water Collection Tank System. The Tank Full contact functions as normal status in the operation of the Rain Water Collection Tank System. The Tank Empty contact functions as abnormal status in the operation of the Rain Water Collection Tank System (that should initiate action).

1. There is a contact from the high alarm level float switch (that indicates of a malfunction in the operation of the Rain Water Collection Tank System and that the tanks may overflow soon).

2. There is analog–level driven contact that functions to notify staff that the tank is full. When the tank level (monitored by the analog tank level sensor) reaches a Full Tank setpoint (adjustable and initially set to 17 feet), the Full Tank contract will switch and be maintained until the tank level drops 0.5 feet (adjustable).

3. There is analog–level driven contact that functions to notify staff that the tank is empty (but still operational) and that immediate action should be taken to add water to the tanks. When the tank level (monitored by the analog tank level sensor) reaches a Empty Tank setpoint (adjustable and initially set to 1.5 feet), the Empty Tank contract will switch and be maintained until the tank level raises 1.0 feet (adjustable).

4. There is a contact from the low alarm level float switch (that indicates of a malfunction in the operation of the Rain Water Collection Tank System, that the tanks are completely empty, and that no water is available for flushing and irrigation).

WATER TREATMENT SYSTEM

The Reverse Osmosis (RO) skid is provided with a standalone controller. The BAS shall monitor an alarm, in the event of equipment fault.

The BAS shall monitor current for the RO distribution pump and provide an alarm on pump failure.

The Tank Filter System shall operate continuously. The BAS shall monitor an alarm, in the event of equipment fault.

CO2 CAPTURE

Regenerative Blower (RB–1) shall be controlled via wall switch with light. When commanded on a current sensor shall monitor the blower and alarm on failure.

VACUUM PUMP

VP–1 contact for remote alarm monitoring.

AIR COMPRESSOR

AC–1 contact for remote alarm monitoring.

STEAM MONITORING

No sequence, monitor points only.

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