



MEMO – BOILERS REVIEW RECAP

WHEATON ENGINEERING AND ENVIRONMENTAL SCIENCE, LLC

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TBPE FIRM REG # F-7915

Submitted To: ABM

Revision 2, November 10, 2022

Project: Nueces County Performance Contract

Revision 1, October 27, 2022

Location: Corpus Christi, Texas

FR #10202022A

Attachments: M7.7.2, M7.7.5, Boiler DDC Diagram, RHM Chem. Boiler Water Analysis

Page 1 of 6

Documentation:

Review published 2/14-3/7 & 3/25 of 2022

1. New boiler systems re-rating to 30 psi will require a review of the existing steam system to verify that all pressure vessel systems connected to the new boilers are capable of and rated for 30 psi or higher. Contractor needs to hire third party contractor to review the systems and record and document pressure vessel ratings for all hot water tanks, heat exchangers, and other vessels incorporated into the steam system. Verify the tube rating where possible on the heat exchangers as well. Also provide ultrasonic wall thickness testing on main steam lines between the domestic water heating systems in the courthouse basement and room 120 of the jail. Readings should be taken at three positions, 60° from the top center of the pipe on each side, and at 180° or the bottom of the pipe. Measurements should be taken on 12-foot intervals based on accessibility and condition of pipe. These measurements should be provided and reported for engineering review. The report should provide measurement location, pipe thickness data, and original pipe mill thickness. Contractor shall report pipe system adequacy to handle 30 psi with a safety factor recommended at minimum of 4 to 1, or as stipulated in applicable codes including potential applications of ANSI-B 31.1 Additionally, the condensate line from room 120 into the boiler D aerator system should be replaced due to the excessive patching and damage apparent in the line.

Review published Aug. 10, 2022

2. Boiler Number One
 - a. Provide evidence of oxygen trim balancing, burner system.
 - b. Terminate open ground wire and control box.
 - c. Remove all nonessential materials from the burner control cabinet.
 - d. Verify control connection between boiler and Deaerator unit, including level controllers and static pressure boiler feed water delivery sensor. Provide evidence of testing showing low-water and high-water alarm settings. Demonstrate boiler feed water pump system operation in auto mode.

3. Boiler Number Two
 - a. Provide evidence of oxygen trim balancing, burner system.

- b. Terminate open ground wire and control box.
 - c. Remove all nonessential materials from the burner control cabinet.
 - d. Verify control connection between boiler and Deaerator unit, including level controllers and static pressure boiler feed water delivery sensor. Provide evidence of testing showing low-water and high-water alarm settings. Demonstrate boiler feed water pump system operation in auto mode.
4. Boiler Number Three
- a. Provide evidence of oxygen trim balancing, burner system.
 - b. Terminate open ground wire and control box.
 - c. Remove all nonessential materials from the burner control cabinet.
 - d. Verify control connection between boiler and Deaerator unit, including level controllers and static pressure boiler feed water delivery sensor. Provide evidence of testing showing low-water and high-water alarm settings. Demonstrate boiler feed water pump system operation in auto mode.
5. Deaerator Unit
- a. Deaerator pump system is in "hand "unit should be operating in auto mode. Verify connection of input information from high water sensor, low-water sensor, and boiler feed water static pressure sensor. Verify operation on auto mode, see notes above for boilers one through three.
6. Hot Water Heating Pumps Room 120
- a. Require testing balance of water flow and head pressure across the pump.
 - b. Condition observed was that isolation valves on the suction side of the pump were partially closed. This is not a legitimate method of balancing; these valves should be wide open.
 - c. Chemical pot is installed but the valving system to the chemical pot is completely shut off and no circulation is going to the site stream filters.
7. Steam to Hot Water Heat Exchanger
- a. Steam control valves are required to be upgraded refer to drawing M7.7.5, pneumatic control valves are still in place, piping upgrade around the heat exchangers as part of project.
 - b. Steam traps at the same heat exchangers are existing units drawing requires upgrade refer to keynotes sheet M7.7.5

Memo from walk-through, information provided September 23 and September 26 of 2022. The following items were reviewed:

8. Boiler operation was observed. All boilers were maintaining water levels and all three boilers were active and operating. There is still no DDC control connected to the boiler systems, which has been the subject of multiple review memos at this point. Given that, there is no way to automatically lead-lag the boilers to decrease the amount or frequency rotation time. This also substantially affects condensate accumulation due to the fact that some boilers may be in a lag mode for multiple days. Notes on drawings required BAS-

DDC control which must be installed. **A detailed DDC Diagram is attached to illustrate work noted on Sheet M7.7.2, #8.**

9. The deaerator tank continues to bypass substantial quantities of water. Makeup water line needs to be checked along with the control valve for makeup water. Also, DDC control and monitoring needs to be installed on this system as well.
10. Drawing details also require that the fans be upgraded and provided with a DDC differential pressure controller inside the boiler room for combustion air safety and makeup. It is critical that the differential pressure controller system be installed to maintain gas flame control and proper flue flow. Without this kind of control there is a potential fire hazard issue during boiler operation.
11. Boiler capacities and output are also being affected by shutting off reheat control features within the buildings during summertime.
12. Boilers are not being blown down. It would appear from observations that the attempts at blowdown are using the boiler tank drain rather than the blowdown valve. Wheaton has also learned from Beyer personnel comments on site that the tank drain valve is now plugged with mud. This indicates that the boilers are suffering from deterioration from not being correctly blown down and regular operation. The boiler blowdown system itself and the discharge pipe do not indicate that they've actually ever been utilized. This issue also significantly increases the time period required to dump water off the boiler when they overflow due to non-cycling operations.
13. Room 120 controls: drawing sheet M7.7.5, this drawing specifically outlines DDC control for both the hot and chilled water pumps that were upgraded inside of the jail system. None of these DDC systems appear to be connected or operating based on input received during phone conference calls on September 26th. All pump controls and bypass system controls need to be reviewed and modified as necessary. Additionally, as documented in previous punch list reviews the pneumatic valves on the building heating hot water supply heat exchangers have not been upgraded to electronic DDC control systems. Items noted here are required to support the dehumidification system and all 2-way valves on both hot and chilled water at the jail air handlers.
14. (Added) Boiler water treatment needs to be fully operable including the water softener, see attached water test provided by mechanical contractor.

Mechanical contractor needs to complete full reports and feed back on all of these items including the required steam system data report. Action needs to be taken immediately to correct/complete:

- A. Integrate Boiler – Aerator control.
- B. Blow down program minimum 20% with cold water blend.
- C. DDC lead-lag control.
- D. Two boiler operation limit and isolation.

- E. Boiler level adjustment training and enforcement on startup and operation.
- F. Feed water treatment and water softener full function (Nueces County).
- G. Full steam system written data report on existing piping and vessels. Report shall include Third Party ultrasonic inspection interpretation and recommendation on piping pressure capabilities.

All of these items have been noted and required by multiple previous reviews. DDC control was requested before boiler was started for the first time, October 12, 2021.

Review of additional steam system items outside of the boiler mechanical room as of 10/28/2022:

- I. Additional piping work is required on the steam line system at the domestic water tanks shown on sheet M7.7.2. Drawing clearly indicates that control and isolation valves along with vertical piping connections to the steam main should be replaced as part of the project. This work is not done. Refer to Keynote number four on the above sheet.
- II. It is important to coordinate the DDC control of the new electronic steam valves installed on the heat exchangers at the courthouse basement, and also in room 120 in the jail. As was discovered very recently, Nueces County physical plant operators are shutting off the reheat systems within the buildings during the summer. This means that there is no load on the heat exchangers to create hot water. These valves need to be coordinated such that the steam feeds to the heat exchangers are turned off along with the hot water to the building reheat system. Currently the steam is feeding the heat exchangers with no place for the heat to be absorbed because reheat systems have been shut off. Additionally, as noted prior, cutting off the reheat systems limits dehumidification capability of the HVAC system and also substantially reduces the boiler steam load. Steam load reduction will affect the operation of a boiler system and it will have to be modified to accommodate the lower demand, and less reheat is reinitiated.
- III. Test and balance data across the new domestic hot water circulator pumps is required.
- IV. Room 120 jail area, bucket steam traps on building heating water exchangers have not been replaced, as noted on previous documentation. Trap piping steam and condensate systems feeding the new duplex condensate pump require complete replacement per note 3, sheet M 7.7.4.
- V. Room 120 jail area, pneumatic steam control valves have been updated with new electronic valves. However, the piping replacement indicated on drawing sheet M7.7.4 is incomplete. Keynote four requires new steam piping between the steam header and the heat exchanger bundles.
- VI. Test and balance data indicating flow and pressure across new hot water pumps Room 120 is required.
- VII. Test and balance data indicating flow and pressure across new chilled water pumps Room 120 is required.
- VIII. Verify the flow and programming is complete on variable frequency drives for both hot and chilled water pumps. Provide data on differential pressure settings for control.
- IX. Complete DDC programming controlling graphics upgrades indicated for the pumps in Room 120.
- X. Provide DDC graphical programming and controls monitoring for the domestic hot water system allowing monitoring of the water heating system to the BAS. See sheet P7A .1 and subsequent updates on monitoring.


Additional steam and boiler related items reviewed on November 10, 2022, observations and notes are as follows:

- 1. Hot water circulator pumps feeding the main courthouse building and old jail facility were found to be operational. These units have been delivering hot water effectively for over six months to the facility without issues. Within the last week the unit specifically feeding the old jail has failed to provide adequate flow. The pump was checked and

operated without piping connections and found to flow at over hundred gallons a minute. Additional investigation led to the discovery that a check valve in the mixing and diverter system, recently modified above the main hot water storage tanks, was mounted backwards. This valve essentially dead headed the pump. When the three-way mixing valve in the existing hot water system went into bypass, the reverse check valve did not allow flow. Additionally, the discharge check valve on the pump itself was found to have a defective flapper valve mechanism which was removed. At the time of review today both pumps were operating at or above 50 gallons per minute. Jail reported through Officer Murillo that there was hot water circulation and shower pressure available in the older portion of the jail once again. There are apparently some plumbing fixture issues preventing proper hot water flow which are not part of the ABM project.

2. The deaerator was reviewed, and modifications noted providing blending of makeup water with discharge water from the deaerator which now releases blow down at adequate temperature into the sanitary sewer system. This item has been completely corrected.
3. Observations in Room 120 indicated that live steam is entering the HVAC heating exchanger generator system. No steam flow should be entering the system and the control valves need to be shut. The same issue was noted in the main central plant on earlier walk-through lists. The observation of the live steam discharge was created due to a faulty pressure relief valve on one of the two heat exchangers. This pressure relief valve should be able to hold 15 psi pressure inside of the heat exchanger shell. Relief valves are not part of the ABM project scope, and this pressure relief valve needs to be replaced and upgraded by Nueces County. The valve on the second exchanger is recommended to be replaced as well since they are of equal age, and probably close to failure at both locations. This valve will need to be replaced to provide heat to the new jail facility.
4. Closed system chemical pot chemical treatment systems on both the hot water and chilled water distribution within the new jail were found to be shut off. Valves at the pump discharges on, both hot water and chilled water, were closed eliminating circulation to the chemical pot and therefore all chemical treatment and side stream filtration. These need to be provided with chemical treatment material and filter media and put online. Valve positions and flow directions were reviewed in the field with ABM.
5. Flow meter systems installed by Raptor Engineering need to be cleared up and reviewed for adequate seal and installation based on proper manufacturer's recommended methods. Additionally, the old flow sensor systems and wiring need to be demolished and removed from site. Managing contractor will and shall ensure that seals at these meter points are adequate to maintain piping system integrity.

An important general note in regard to all the documentation included in this and all walk-through/punch list memorandums. These items are critical to the safe and continued efficient operation of the installed equipment and existing systems. Items noted herein are intended to be carried out via repair, correction, or other action within a maximum 30-day period which has not been the case. Continued delay of completion on items listed within Wheaton Engineering's walk-through lists creates a risk of equipment damage, loss of efficiency and potential safety issues. We would implore those responsible for completing tasks involved move definitively to take action on corrections and completion.

References:	Attachments: <u>0</u> Pages
The original of this report was sealed by Ronald B Wheaton P.E.	WHEATON ENGINEERING AND ENVIRONMENTAL SCIENCE, LLC (WHEATON) Authorized Signature _____  _____ Ronald B. Wheaton, P.E., Vice President TBPE # 73355` Date: _____ 11/10/2022
Responses:	Signature: _____ (Client) Title/Firm: _____

NUECES COUNTY COURTHOUSE
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KEY NOTES:

1. PROVIDE AND INSTALL NEW DOMESTIC HOT WATER CIRCULATION PUMPS, UNIT SHALL BE VFD CONTROLLED BASED ON TEMPERATURE DEMAND CONTROL. PROVIDE NEW PIPING INCLUDING FLEX COUPLING AT SUCTION, REDUCERS, DISCONNECT AND RECONNECT POWER. PROVIDE ALL NEW PIPING FROM STEAM TRAPS TO CONDENSATE TRAP AND REPLACE DISCHARGE PIPING FROM PUMPS TO MAIN DISCHARGE LINE RETURN. PROVIDE ISOLATION AND CHECK VALVE SYSTEMS ON PUMP DISCHARGE.
2. REPLACE ALL PIPING BETWEEN STEAM TRAPS AND CONDENSATE DUPLEX PUMP. PROVIDE NEW BUCKET TYPE STEAM TRAPS TO EACH DEVICE TOTAL OF FOUR. THESE UNITS SHALL BE CONNECTED TO DOMESTIC WATER HEAT EXCHANGER BUNDLE TANK SYSTEMS, AND BUILDING HEATING WATER HEAT EXCHANGER SYSTEMS.
3. PROVIDE NEW PIPING SYSTEMS BETWEEN MAIN STEAM LINE AND HEAT EXCHANGER BUNDLES ON ALL FOUR HEAT EXCHANGER SYSTEMS. PROVIDE NEW ELECTRONIC STEAM CONTROL VALVES, ALONG WITH ISOLATION VALVES FLANGES AND HARDWARE SYSTEMS. ALL CONNECTING BOLT AND GASKET SETS SHALL BE REPLACED WHERE NEW PIPE CONNECTS TO OLD. INSPECT ALL PIPING FOR STEAM LEAKS DAMAGE AND CORROSION, REPLACE SECTIONS, INDICATING POTENTIAL FAILURE, RE-GASKET ALL AREAS WHERE LEAKS MAY BE OCCURRING.
4. PROVIDE NEW BOILERS IN THE SEQUENCE INDICATED AND DESCRIBED IN A DEMOLITION DRAWING. EXISTING BOILER NUMBER ONE SHALL REMAIN IN OPERATION WHILE BOILERS NUMBER TWO AND NUMBER THREE ARE BEING REPLACED. BOILER FEED SYSTEM COMPONENTS INCLUDING THE DEAERATOR, WATER SOFTENER AND CLARIFIER SYSTEM SHALL REMAIN IN OPERATION AS WELL. ONCE BOILER NUMBER TWO AND BOILER NUMBER THREE ARE IN PLACE AND OPERABLE, BOILER NUMBER ONE CAN BE DEMOLISHED ALONG WITH THE BOILER FEED WATER SYSTEM.
5. PROVIDE NEW BOILER COMPLETE, RECAST EXISTING HOUSEKEEPING PAD WITH 3000 POUND CONCRETE REINFORCED WITH NUMBER FOUR CONCRETE REINFORCING BAR 12 INCH CENTERS BOTH WAYS. SECURE NEW BOILER SYSTEMS IN PLACE PER MANUFACTURER'S RECOMMENDATIONS. PROVIDE NEW BOILER FLUE, DOUBLE WALL 304 STAINLESS STEEL. RECONNECT TO EXISTING FLUE THROUGH ROOF PENETRATION SYSTEM. PROVIDED NEW NATURAL GAS CONNECTION, COMPLETE WITH DIRT LEG, GAS COCK AND PRESSURE REGULATOR, SIZED FOR 8 MILLION BTUS. PROVIDE THERMAL EXPANSION VALVE, DISCHARGE PIPING SYSTEMS AND RELIEF VENTS TWO PER BOILER OR AS REQUIRED BY BOILER MANUFACTURER. ROUTE NEW MAIN STEAM LINES 8 INCH DIAMETER FROM BOILERS TO EXISTING STEAM MAIN AND PROVIDE A NEW STEAM RATED 150 POUND GATE VALVE. MAINTAIN ACCESS TO DRAINS, UTILITIES, LIGHTING AND EXISTING PIPING WHILE COMPLETING INSTALLATIONS.
6. PROVIDE NEW DEAERATOR TANK SYSTEM WITH THREE BOILER FEED WATER PUMPS INDEPENDENTLY CIRCUITED PER DESIGN DIAGRAM. PROVIDE PRESSURE RATED STEEL PIPING 2 INCH DIAMETER TO EACH BOILER FOR BOILER FEED WATER SYSTEMS. RECONNECT EXISTING SOFT WATER TREATMENT SYSTEM AND UPGRADE WATER TREATMENT PER DIAGRAMS SHOWN HEREIN.
7. PROVIDE NEW DDC CONTROL POINTS TO OPERATE RENOVATED BOILER SYSTEM, DIRECT BOILER CONTROL SHALL BE THROUGH SYSTEM CONTROL PROVIDED WITH THE BOILER UNITS FROM THE BOILER MANUFACTURER, BOILER SEQUENCE AND CONTROL. FINAL EFFICIENCY AND ENERGY SAVING SHALL BE THE SOLE RESPONSIBILITY OF ABM. BUILDING DDC SYSTEM SHALL HAVE THE ABILITY TO DO TEMPERATURE RESET, MONITOR STATUS, WATER LEVEL, STEAM PRESSURE, CRITICAL TEMPERATURES, AND BE ABLE TO TURN BOILERS ON AND OFF AND PROVIDE LEAD LAG CONTROL.
8. REBUILD EXISTING EXHAUST FANS WITHIN THE BOILER ROOM, AND BALANCE SYSTEM SUCH THAT THE STATIC PRESSURE WITHIN THE ROOM MAINTAINS COMBUSTION FLAME PRESSURES, AND THAT IT DOES NOT PROVIDE NEGATIVE PRESSURE AND REVERSE FLOW ON THE BOILER FLUE SYSTEMS.
9. CLEAN AND REPLACE DAMAGED LOUVER SYSTEM PARTS ON THE OUTSIDE WALL OF THE BOILER ROOM TO MAINTAIN STATIC COMBUSTION AIR FLOW.
10. PROVIDE A DIFFERENTIAL PRESSURE METER FOR CONTROL OF THE STATIC PRESSURE WITHIN THE BOILER ROOM, AND INCLUDE WITH THE DDC CONTROL SYSTEM AND ALARM INDICATING NEGATIVE PRESSURES WITHIN THE BOILER ROOM WITH THE POTENTIAL TO CAUSE REVERSE FLUE FLOW.
11. CONNECT NEW BOILER SYSTEMS INTO THE REFRIGERATION MONITOR SYSTEMS, SUCH THAT BOILERS CAN BE SHUT OFF AS REQUIRED IN THE CASE OF A FAILURE IN THE CHILLER CAUSING A REFRIGERANT DISCHARGE.
12. CLEAN AND PAINT THE BOILER ROOM, PROVIDE AN ALTERNATIVE TRAVEL IN COLOR AROUND THE DOORS AND OPENING SYSTEMS WITHIN THE ROOM. NEWLY COMPLETED BOILER HOUSEKEEPING PAD SHALL BE PAINTED WITH YELLOW EPOXY AROUND THE BORDER CURB. IN THE FLOOR. THE BOILER ROOM SHALL BE PAINTED IN A GRAY POLYURETHANE CONCRETE PAINT MATERIAL.
13. PROVIDE COMPLETE RECONNECTION OF ELECTRICAL POWER TO THE NEW BOILERS, COORDINATE ASPECTS OF POWER INSTALLATION FOR ALL EQUIPMENT WITH THE ELECTRICAL CONTRACTOR.
14. NOT USED
15. NO WORK ON CHILLER UNITS.

LEGEND

- HOT WATER SOLAR SYSTEM
- HOT WATER BOILER SYSTEM COMPONENTS
- NEW LINES, PIPING AND VALVES
- NATURAL GAS LINES
- BOILER FEED WATER

NUECES COUNTY JAIL FIRST FLOOR CENTRAL PLANT
SCALE: 1/4"=1'-0"



ISSUED FOR CONSTRUCTION

REVISION 1 - NO VFD ADDED TO HW PUMPS

AUTHORIZATION

APPROVED AND ACCEPTED AS FINAL ALL CONTENT, SCOPE, NOTES AND DESIGN LAYOUTS. APPROVED FOR CONSTRUCTION. MODIFICATIONS BEYOND DATE BELOW WILL CONSTITUTE A NEGOTIABLE CHARGE. AGREED TO IN FORM AND FUNCTION:

DATE: _____
 ABM: _____ / TITLE _____
 NUECES COUNTY: _____ / TITLE _____
 (WHEATON)
 EGR: _____ / TITLE _____

PROJECT #:

2004

DATE:

7/7/2021

Drawn:

C. CHRISTENSEN

Checked:

R. WHEATON

Issued:

R. WHEATON

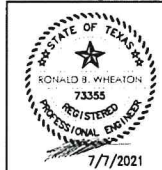
REVISIONS:

2 - FOR CONSTRUCTION

Sheet Number:

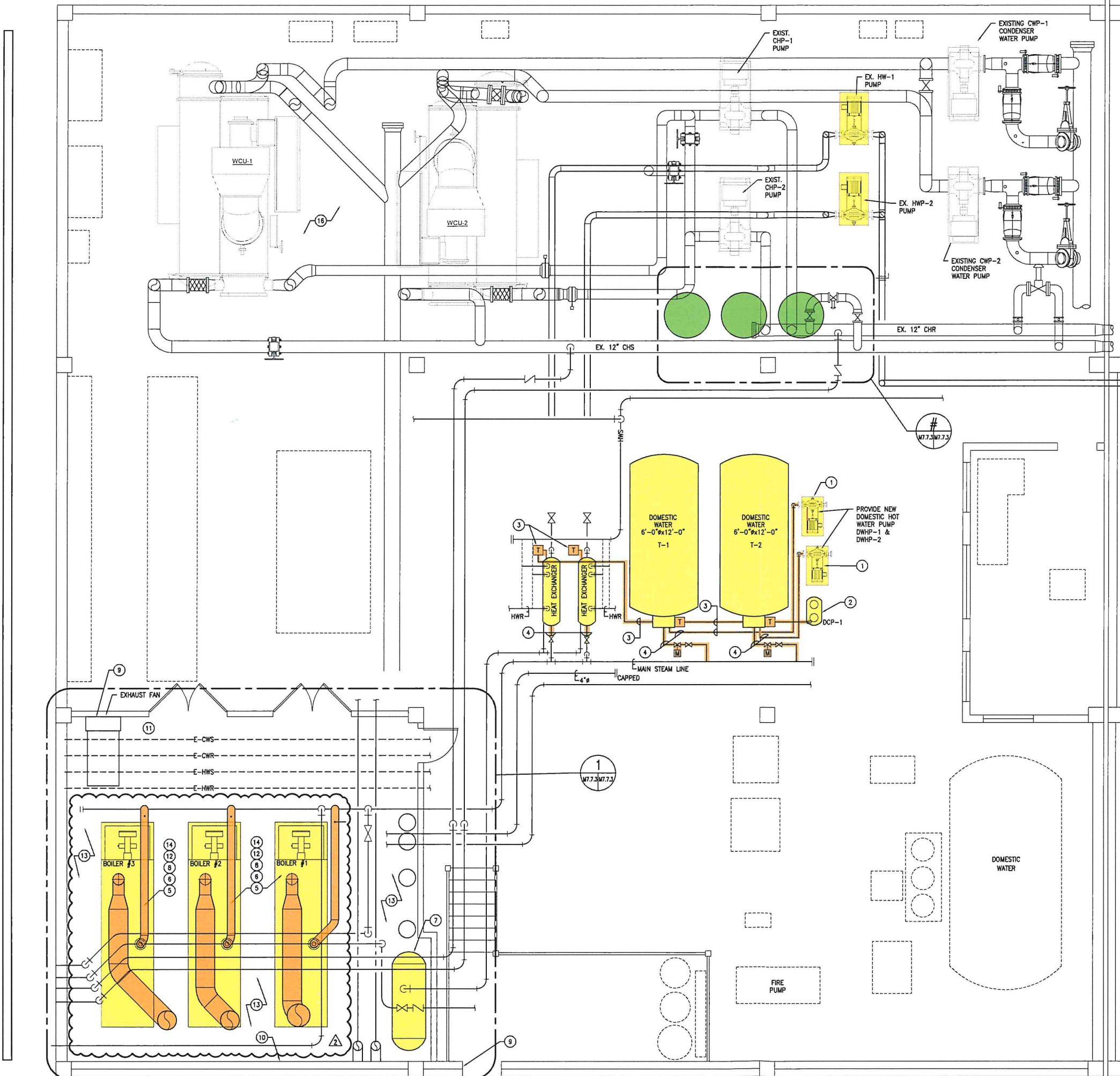
M7.7.2

NUECES COUNTY PERFORMANCE CONTRACT
 VARIOUS FACILITIES
 CORPUS CHRISTI, TEXAS



NOTE:

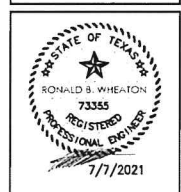
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NUECES COUNTY PERFORMANCE CONTRACT
VARIOUS FACILITIES
CORPUS CHRISTI, TEXAS



NOTE:
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PROJECT #: 2004
DATE: 7/7/2021
Drawn: C. CHRISTENSEN
Checked: R. WHEATON
Issued: R. WHEATON
REVISIONS:
1 - FOR CONSTRUCTION
Sheet Number:
M7.7.5

LEGEND - COLOR CODED SCOPE

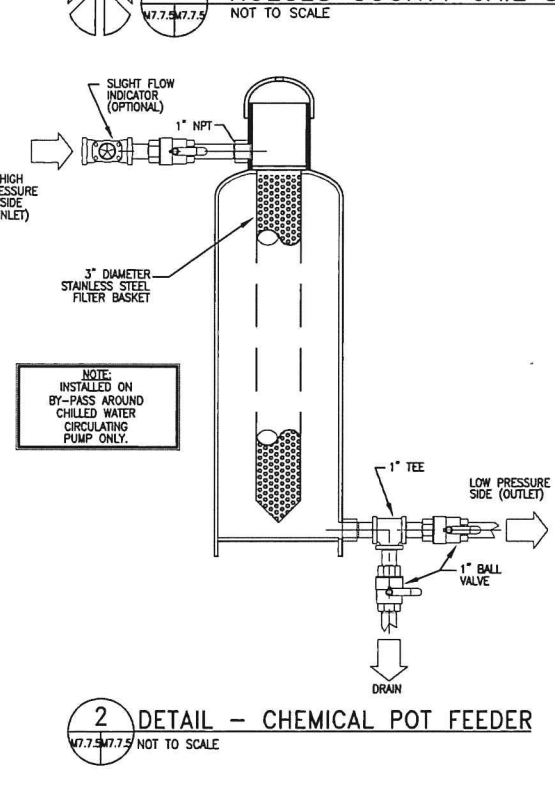
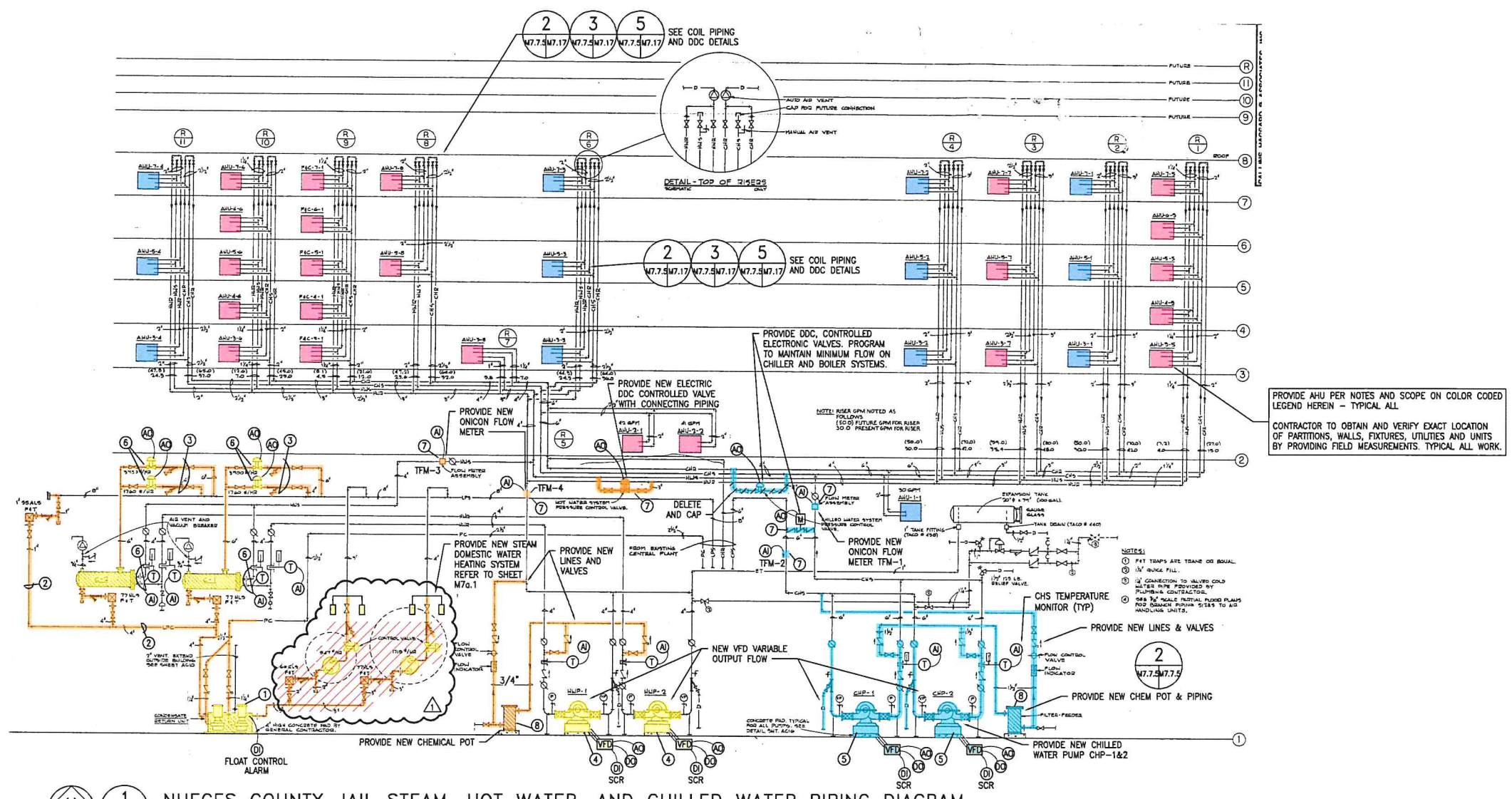
- AIR HANDLER UNITS TO BE REPLACED: UNITS IDENTIFIED BY COLOR CODE SHALL BE COMPLETELY DEMOLISHED, DUCTWORK PIPING DISCONNECTED, CONDENSATE DRAIN DISCONNECTED, ALL HYDRONIC PIPING DISCONNECTED. COORDINATE POWER SHUT DOWN WITH ELECTRICAL AND DISCONNECT POWER. PROVIDE COMPLETE NEW AIR HANDLER UNIT MATCHING THE SCHEDULED SYSTEM CAPACITIES. CONTRACTOR SHALL VERIFY THE FIT OF THE UNIT TO WORK WITH THE SPACE AVAILABLE AND MATCH AS CLOSE AS POSSIBLE TO THE EXISTING SYSTEM DIMENSIONS. PROVIDE NEW HYDRONIC PIPING AS SHOWN IN DIAGRAM DETAILS. RECONNECT DUCTWORK SYSTEMS AND CONDENSATE SYSTEMS PER DETAILS AS WELL REPLACE DAMAGED AND PLUGGED-CORRODED SECTIONS OF DUCT. PROVIDE NEW VARIABLE FREQUENCY DRIVE. REPROGRAM TO CONTROL THE UNIT AS A SINGLE ZONE VAV UNIT. FINAL OPERATING SEQUENCE, DDC PROGRAMMING, ENERGY SAVINGS ARE DEPENDENT UPON AND THE SOLE RESPONSIBILITY OF ABM, AS AGREED BELOW, NOT WHEATON ENGINEERING. VERIFY ALL SEQUENCE REQUIREMENTS DIRECTLY WITH ABM AUTHORITY AND ABM COMMISSIONING AGENT. CHILLED WATER VALVES SHALL BE PROGRAMMED TO MAINTAIN CONSTANT LEAVING DISCHARGE TEMPERATURE OF 55°F OR LESS. COORDINATE WITH ELECTRICAL RECONNECT POWER AND PERFORM FACTORY START UP ON THE SYSTEM. PROGRAM DRIVE TO MATCH THE REQUIREMENTS FOR BOTH AIR-CONDITIONING AND SMOKE PURGE OPTIONS. SMOKE PURGE CONTROL SHALL BE COORDINATED THROUGH AND PROVIDED BY LICENSED FIRE ALARM CONTRACTOR. SPACE CONTROL SHALL BE THROUGH THE VARIABLE FREQUENCY DRIVE, PROGRAM ACCORDING TO CONTROL DDC DIAGRAMS AS APPROVED AND NOTED HEREIN.
- AIR HANDLER UNITS TO BE RENOVATED: UNITS IDENTIFIED BY COLOR CODE TO BE RENOVATED, SHALL BE COMPLETELY INSPECTED AND CLEANED. REMOVE AND CLEAN CONDENSATE DRAINS AND REPLACE DUCTWORK SECTIONS SHOWING BLOCKAGE. REBUILD EXISTING DUCTWORK CONNECTION FLEX JOINTS, ELIMINATE DUCTWORK LEAKS NEAR THE UNIT. CLEAN AND INSPECT BOTH HOT AND CHILLED WATER COIL SYSTEMS, AND VERIFY AIR FLOW THROUGH UNITS. IT'S EXTREMELY IMPORTANT THAT THE FLOW BE VERIFIED AT THE SMOKE PURGE VELOCITY RATES, AND AIR CONDITIONING RATES AND THAT THE UNIT PERFORM AT BOTH POINTS. UNITS UNABLE TO PERFORM, OR UNITS PERFORMING VERY CLOSE TO THE PEAK OF THE FAN CURVE SHALL HAVE COILS REPLACED, OR BE REVIEWED FOR COMPLETE REPLACEMENT. PROVIDE AIRLOCK MASTIC SEAL TO ANY CASING JOINTS OR LEAKING SPOTS AROUND THE AIR HANDLER UNIT. REVIEW MOTOR SYSTEM MANUFACTURER'S ACCEPTABILITY FOR APPLICATION OF VARIABLE FREQUENCY DRIVES AND REPLACE BELT DRIVE SYSTEM. REPLACE CONTROL VALVES ON BOTH HOT AND CHILLED WATER COILS, AND REPROGRAM SYSTEM OPERATION TO PROVIDE SINGLE ZONE VAV. CHILLED WATER VALVES SHALL BE PROGRAMMED TO MAINTAIN CONSTANT LEAVING DISCHARGE TEMPERATURE OF 55°F OR LESS. FINAL OPERATING SEQUENCE, DDC PROGRAMMING, ENERGY SAVINGS ARE DEPENDENT UPON AND THE SOLE RESPONSIBILITY OF ABM, AS AGREED BELOW, NOT WHEATON ENGINEERING. VERIFY ALL SEQUENCE REQUIREMENTS DIRECTLY WITH ABM AUTHORITY AND ABM COMMISSIONING AGENT. REMOVE POWER FROM THE UNIT AND INSTALL A NEW VARIABLE FREQUENCY DRIVE, IF ALLOWED BY MOTOR MANUFACTURER. IF NOT, REPLACE MOTOR, THEN PROVIDE PROGRAM DRIVE TO MATCH THE REQUIREMENTS FOR BOTH AIR-CONDITIONING AND SMOKE PURGE OPTIONS. SMOKE PURGE CONTROL SHALL BE COORDINATED THROUGH AND PROVIDED BY LICENSED FIRE ALARM CONTRACTOR. SPACE CONTROL SHALL BE THROUGH THE VARIABLE FREQUENCY DRIVE, PROGRAM ACCORDING TO CONTROL DDC DIAGRAMS AS APPROVED AND NOTED HEREIN.

- LEGEND**
- HOT WATER SOLAR SYSTEM
 - HOT WATER BOILER SYSTEM COMPONENTS
 - NEW LINES, PIPING AND VALVES
 - NATURAL GAS LINES
 - BOILER FEED WATER
 - CHILLED WATER PUMP SYSTEM AND COMPONENTS

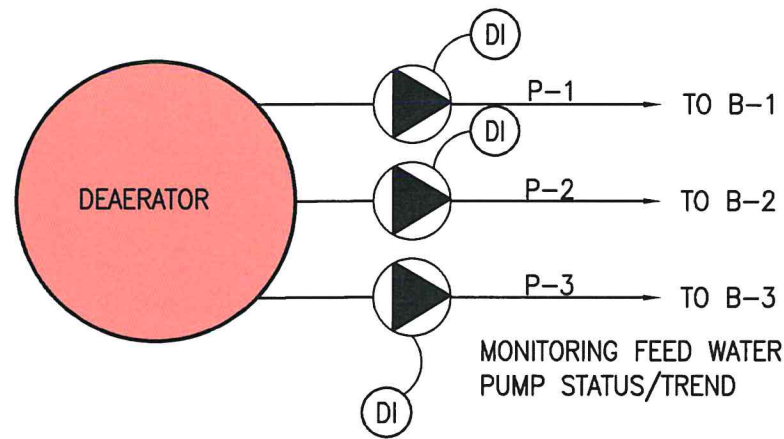
GENERAL NOTES AND DRAWING DETAILS APPLY TO ALL WORK HEREIN AS SHOWN ON SHEETS M7.1 TO M7.26

ISSUED FOR CONSTRUCTION

AUTHORIZATION
APPROVED AND ACCEPTED AS FINAL ALL CONTENT, SCOPE, NOTES AND DESIGN LAYOUTS. APPROVED FOR CONSTRUCTION. MODIFICATIONS BEYOND DATE BELOW WILL CONSTITUTE A NEGOTIABLE CHARGE. AGREED TO IN FORM AND FUNCTION:
DATE: _____
ABM: _____/TITLE
NUECES COUNTY: _____/TITLE
(WHEATON) EGR: _____/TITLE

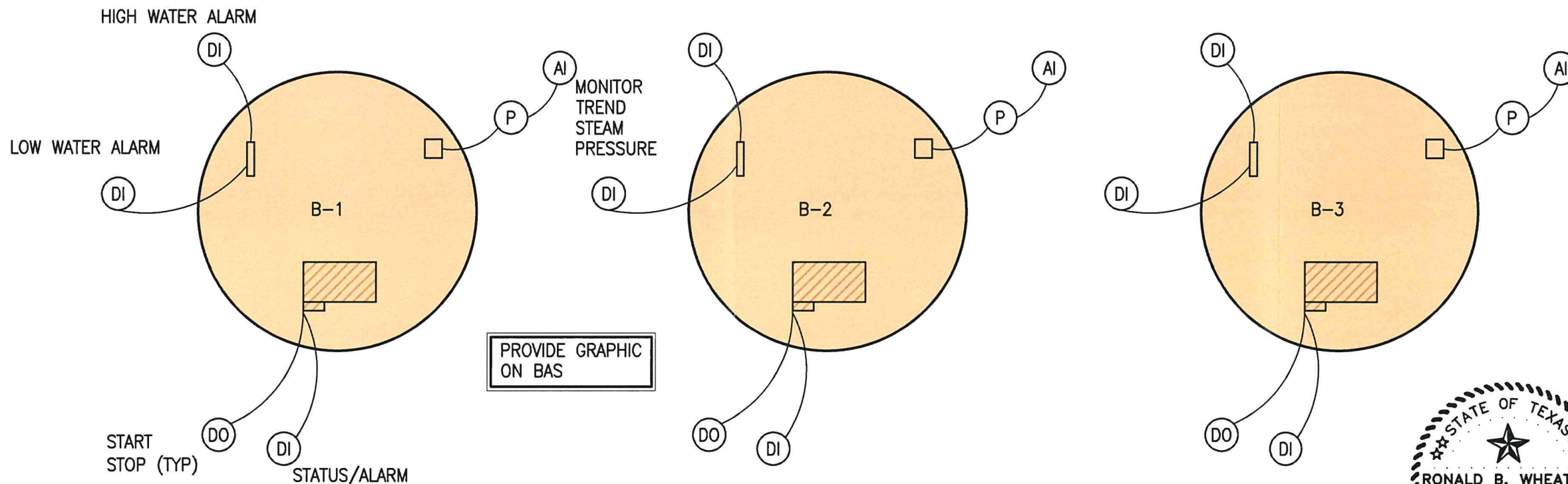


- KEY NOTES:** ○
1. PROVIDE DUAL PUMP CONDENSATE TANK PUMP SYSTEM, MATCH PRESSURES AND FLOWS OF EXISTING, MODIFY MOUNTING PAD TO HOLD NEW UNIT. DISCONNECT AND RECONNECT POWER. PROVIDE ALL NEW PIPING FROM STEAM TRAPS TO CONDENSATE TRAP AND REPLACE DISCHARGE PIPING FROM PUMPS TO MAIN DISCHARGE LINE RETURN. PROVIDE ISOLATION AND CHECK VALVE SYSTEMS ON PUMP DISCHARGE.
 2. REPLACE ALL PIPING BETWEEN STEAM TRAPS TO EACH DEVICE TOTAL OF TWO THESE UNIT SHALL BE CONNECTED TO DOMESTIC WATER HEAT EXCHANGER BUNDLE TANK SYSTEMS, AND BUILDING HEATING WATER HEAT EXCHANGER SYSTEMS.
 3. PROVIDE NEW PIPING SYSTEMS BETWEEN MAIN STEAM LINE AND HEAT EXCHANGER BUNDLES ON ALL HEAT EXCHANGER SYSTEMS. PROVIDE NEW ELECTRONIC STEAM CONTROL VALVES, ALONG WITH ISOLATION VALVES FLANGES AND HARDWARE SYSTEMS. ALL CONNECTING BOLT AND GASKET SET SHALL BE REPLACED WHERE NEW PIPE CONNECTS TO OLD. INSPECT ALL PIPING FOR STEAM LEAKS DAMAGE AND CORROSION, REPLACE SECTIONS, INDICATING POTENTIAL FAILURE, RE-GASKET ALL AREAS WHERE LEAKS MAY BE OCCURRING.
 4. PROVIDE NEW VARIABLE FREQUENCY DRIVE CONTROLLERS FOR EXISTING HEATING HOT WATER PUMP SYSTEMS. DISCONNECT POWER AND INSTALL VFD UNITS PROGRAM DDC CONTROL TO MONITOR HYDRONIC STATIC PRESSURE IN THE SYSTEM AND MAINTAIN FLOW AS REQUIRED BY AIR HANDLERS. SYSTEM FLOW SHALL BE CONVERTED TO VARIABLE PRIMARY STYLE FROM EXISTING CONSTANT VOLUME. PROVIDE COMPLETE MODIFICATION OF AIR HANDLER VALVE SYSTEMS TO TWO-WAY POSITION. FINAL CONTROL SEQUENCE AND ENERGY SAVINGS SHALL BE THE SOLE RESPONSIBILITY OF ABM. ELECTRONIC VALVES FOR HOT WATER CONTROL TO COILS AS PART OF THIS CONVERSION. COORDINATE BYPASS CONTROL TO MAINTAIN MINIMUM CHILLER FLOW.
 5. PROVIDE NEW VARIABLE FREQUENCY DRIVE CONTROLLERS FOR FOR NEW CHILLED WATER PUMP SYSTEMS. DISCONNECT POWER AND INSTALL VFD UNIT PROGRAM DDC CONTROL TO MONITOR HYDRONIC STATIC PRESSURE IN THE SYSTEM AND MAINTAIN FLOW AS REQUIRED BY AIR HANDLERS. SYSTEM FLOW SHALL BE CONVERTED TO VARIABLE PRIMARY STYLE FROM EXISTING CONSTANT VOLUME. PROVIDE COMPLETE MODIFICATION OF AIR HANDLER VALVE SYSTEMS TO TWO-WAY POSITION. FINAL CONTROL SEQUENCE AND ENERGY SAVINGS SHALL BE THE SOLE RESPONSIBILITY OF ABM. ELECTRONIC VALVES FOR HOT WATER CONTROL TO COILS AS PART OF THIS CONVERSION. COORDINATE BYPASS CONTROL TO MAINTAIN MINIMUM CHILLER FLOW.
 6. PROVIDE NEW HOT WATER PIPING WITH DDC TEMPERATURE CONTROL. PROVIDE NEW VALVES AND SENSORS CONTROL WATER SUPPLY TEMPERATURE THROUGH NEW ELECTRONIC STEAM VALVE, 20° DELTA T, VARIABLE DELIVERY @ 140°F TO 160°F.
 7. PROVIDE NEW BYPASS VALVES FOR CHILLED AND HOT WATER SYSTEMS PROGRAMMED TO MAINTAIN MINIMUM OPERATING FLOW, PROVIDE DUAL POSITION ONICON FLOW METERS AND DDC PROGRAMMED TO CONTROL VALVES.
 8. PROVIDE NEW FILTER FEEDER SYSTEM AND PIPING.



DDC BOILER MONITORING
TWO BOILER "ON" - LEAD LAG

PER DESIGN ONLY (2) BOILER SHALL RUN AT ONE TIME. THE LAG (2) BOILER MUST BE MANUALLY STARTED AFTER THE ISOLATION VALVE IS OPENED AND THE BOILER ENABLED. BOILER SHALL BE BLOWN DOWN AND WATER LEVELS ADJUSTED MANUALLY BEFORE STARTUP.



410 S ENTERPRISE PKWY
 CORPUS CHRISTI, TX 78405
 PHONE 361-299-1801
 RWHEATON@WHEATON-EES.COM
 REGISTRATION # F-7915

NUECES COUNTY PERFORMANCE CONTRACT
 VARIOUS FACILITIES
 CORPUS CHRISTI, TEXAS



1. START LEAD AND LAG-1 BOILERS, BAS SHALL IDENTIFY OPERATING ENABLED BOILERS THROUGH STATUS.
2. BAS SHALL LEAD-LAG CONTROL OF THE ENABLED LEAD AND LAG-1 BOILER EVERY 24 HR PERIOD. BOTH BOILERS WILL REMAIN "ON".
3. LAG-2 BOILER SHALL REMAIN "OFF" AND ISOLATED (CLOSED VALVE) FROM SYSTEM, STATUS SHALL INDICATE BAS "UNAVAILABLE."
4. BOILER PRESSURE SHALL BE MONITORED WITH TREND. IF BOILER PRESSURE FALLS BELOW 5 PSI (ADJ) BAS SHALL ALARM OPERATORS TO MANUALLY START THE LAG-2 BOILER AND SHUT DOWN THE LEAD OR PROBLEM UNIT TO CONTROL WITH (2) BOILER OPERATION. OPERATIONS SHALL ALSO START OR SHUT OFF THE CORRESPONDING DEAERATOR PUMPS, ONLY PUMP CONNECTED TO OPERATING BOILERS SHALL BE ENABLED.

5. MONITOR AND ALARM HIGH AND LOW LEVELS. STOP THE BOILER AND ALARM IF LEVEL EXCEEDS OPERATIONAL PARAMETERS.
6. DETERMINATION OF LAG-2 BOILER ROTATION SHALL BE DETERMINED BY OWNER - MAINTENANCE PROGRAM. FINAL SEQUENCE SHALL BE THE RESPONSIBILITY OF ABM FOR COMPLYING WITH ENERGY SAVINGS REQUIREMENTS PER ORIGINAL DESIGN NOTES.

PROVIDE LEAD LAG CONTROL 24 HR SWITCHING

LEAD	LAG 1	LAG 2	COMMENT
B-1	B-2	B-3	REPEAT DAILY, MAINTAIN BLOWDOWN DAILY
B-2	B-3	B-1	REPEAT DAILY, MAINTAIN BLOWDOWN DAILY
B-3	B-1	B-2	REPEAT DAILY, MAINTAIN BLOWDOWN DAILY
B-2	B-1	B-3	REPEAT DAILY, MAINTAIN BLOWDOWN DAILY
B-3	B-2	B-1	REPEAT DAILY, MAINTAIN BLOWDOWN DAILY
B-2	B-3	B-2	REPEAT DAILY, MAINTAIN BLOWDOWN DAILY

* LAG-2 BOILER SHALL BE VALVE ISOLATED AND MANUALLY STARTED WITH DDC NOTIFICATIONS

PROJECT #
2004
 DATE:
10/12/2022
 Drawn:
J.HERNANDEZ
 Checked:
R.WHEATON
 Issued:
R.WHEATON
 REVISIONS:
1 - SEQUENCE ADD.

RHM CHEMICAL

2732 SPID #239

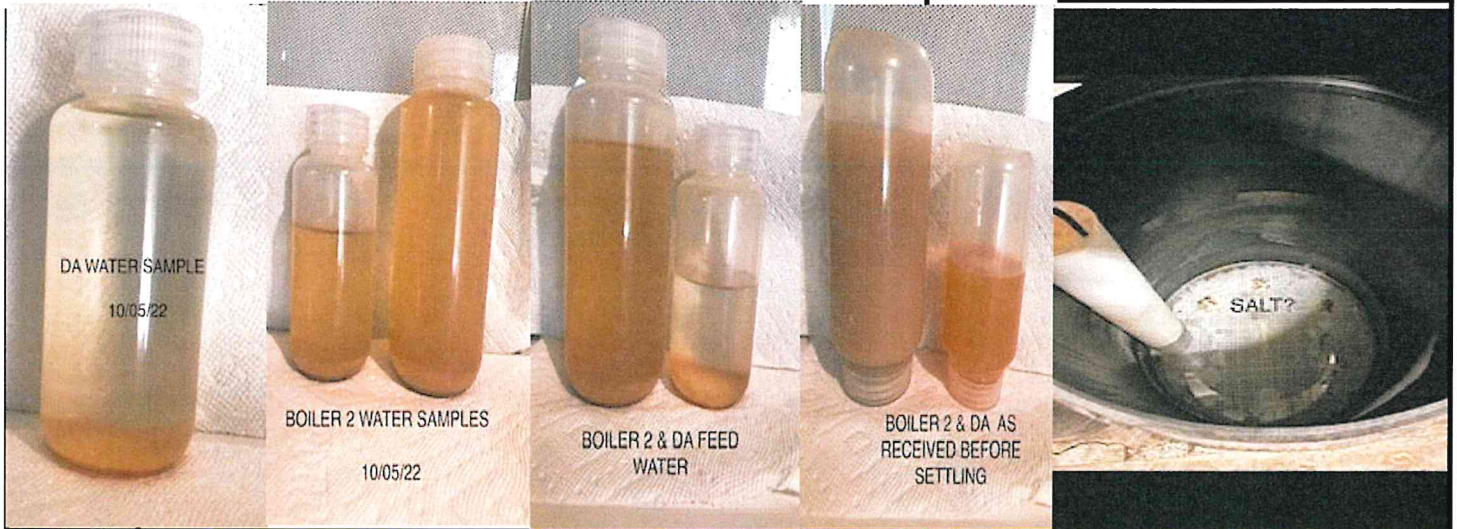
CORPUS CHRISTI, TX. 78415

361-815-5809

ATTN: **JORDAN BEYER**

DATE: **OCTOBER 13,2022**

sample date: 10/05/22



	pH	conductivity	TDS	hardness	alkalinity	iron	phosphate	sulfite	
DA-FW	7.1	280	150ppm	50ppm	60	0.89ppm	<10ppm	5ppm	SETTLED
#2 BOILER	11.2	18060	>10000ppm	1000ppm	400	HIGH		~10ppm	SETTLED
#2 BOILER		18300	11440ppm	>2000ppm	1400	>6ppm			BEFORE SETTLING

NOTE: FEED WATER pH SHOULD BE KEPT BETWEEN 8.5 AND 10.5	MY OBSERVATION
NOTE: FEED WATER TOTAL IRON NO GREATER THAN 0.10ppm	THESE WATER SAMPLES HAVE A GREAT DEAL OF
NOTE: FEED WATER TOTAL COPPER NO GREATER THAN 0.05	INTERFERENCE: DUE TO THE LACK OF BOILER B.D.
NOTE: FEED WATER TOTAL HARDNESS NO GREATER THAN 0.30	THE HARDNESS IS OUT-OF-CONTROL; THE TDS IS
NOTE: BOILER WATER pH SHOULD BE KEPT BETWEEN 10.5 AND 12.0	ON THE EXTREME SIDE OF FAILURE. THE IRON LEVELS
NOTE: BOILER WATER TDS SHOULD BE KEPT BETWEEN 700ppm AND 3500ppm	ARE HIGH -- THE CHEMICAL LEVELS ARE LOW.
NOTE: BOILER WATER ALKALINITY MAX 350ppm	THE WATER SOFTENER, THE BEST TOOL FOR A
NOTE: BOILER CONDUCTIVITY MAX 1100-5400umho	STEAM BOILER IS NOT BEING USED. THERE ARE NO
NOTE: BOILER SILICA MAX 150ppm	SAMPLE VALVES AVAILABLE. THERE SEEMS TO BE NO
	BASIC CARE TAKEN FOR THESE BOILERS.
**** THE ABOVE RECOMMENDATIONS ARE THE ASME BOILER WATER LIMITS FOR A DRUM OPERATING PRESSURE (psig) 0-300	
ASME: AMERICAN SOCIETY OF MECHANICAL ENGINEERS	
*****THESE LIMITS ARE THE MAX -- AS THE psig GOES UP, THE LIMITS REDUCE, BECOMING MORE STRICT	
J.R. Matthews 361-815-5809	