



ADDENDUM #2 February 24, 2016

UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

**McEniry Building Chiller Replacement
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, North Carolina 28223**

The following Addendum clarifies, revises, and takes precedence over Drawings and Specifications dated December 11, 2015. This addendum shall become a part of the Contract Documents for the above-mentioned. The following items are intended to revise and clarify the Drawings and Specifications and shall be included by the bidder in his proposal.

Each contractor shall be responsible for notifying his subcontractors of the contents of this addendum.

SPECIFICATIONS

1. Section 012100 - Allowances

- A. Paragraph 2.1.A was revised to clarify that each bid price is to include the contingency allowance. This includes the base bid and each alternate price.

DRAWINGS (Revision Date 2/24/16)

1. M002

- A. Points list for controls system added.

2. M003

- A. Sequence of operation for chiller plant revised.
- B. Controls alternates clarified.

2. M101

- A. Keynote #8 clarified to include replacement of pneumatic actuators with DDC actuators and not replacement of entire valve.
- B. Controls alternates clarified.
- C. Extent of temporary chilled water piping to be replaced clarified.
- D. Electrical keynote #3 added.

End of Addendum Number 2

Acknowledge the receipt of this addenda on the bid form

2.1 ALLOWANCE NO. 1 - CONTINGENCY ALLOWANCE:

- A. Make a cash allowance for a contingency that is to cover minor, unforeseen items of work arising during construction. It does not include error or omissions by Contractor. Work shall be charged against this allowance only under the direction of the Engineer with approval by Owner. Each bid price (i.e. base bid, alternate #1, etc.) is to include the contingency allowance.
- B. Determined Cash Allowance: 3% of the construction cost.

2.2 ALLOWANCE NO. 2 - CONTROLS:

- A. Make a cash allowance for a contingency that is to cover unforeseen changes to the controls scope of work arising during construction. It does not include error or omissions by Contractor. Work shall be charged against this allowance only under the direction of the Engineer with approval by Owner.
- B. Determined Cash Allowance: \$20,000
- C. This allowance shall include the net cost of all materials, delivered FOB job site, plus all applicable taxes, installation, handling and storage. The Contractor's overhead and profit shall be considered as part of the Contract Sum and not part of this allowance.

PART 3 - EXECUTION

(NOT APPLICABLE)

END OF SECTION 01 21 00

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MECHANICAL SPECIFICATIONS

PART 1 - GENERAL

1.01 INSTRUCTIONS

- A. SCOPE OF WORK SHALL INCLUDE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY FOR A COMPLETE AND PROPERLY FUNCTIONING INSTALLATION IN ACCORDANCE WITH LOCAL AND STATE CODES, AND CONTRACT DRAWINGS AND SPECIFICATIONS.

1.02 LOCAL CONDITIONS

- A. CONTRACTOR SHALL VISIT THE SITE AND OBSERVE ALL EXISTING LOCAL CONDITIONS WHICH WOULD AFFECT WORK UNDER THIS CONTRACT. CONTRACTOR SHALL EXAMINE ALL PLANS AND SPECIFICATIONS FOR THIS PROJECT AND CONSULT THEM FOR INSTRUCTIONS PERTAINING TO WORK OF THIS SECTION.

1.03 PERMITS AND FEES

- A. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND INSPECTIONS REQUIRED FOR PERTAINING TO WORK UNDER THIS CONTRACT AT HIS OWN EXPENSE. ALL CHARGES INCIDENTAL THERETO, DELIVER TO ARCHITECT ALL CERTIFICATES OF INSPECTION ISSUED BY AUTHORITIES HAVING JURISDICTION.

1.04 CODES AND STANDARDS

- A. FURNISH AND INSTALL MECHANICAL SYSTEMS TO MEET ALL CURRENT REQUIREMENTS OF NATIONAL, STATE AND MUNICIPAL CODES, RULES REGULATIONS, LAWS, AND STANDARDS AS THEY ARE ADOPTED BY THE GOVERNING AGENCY AND AS THEY MAY APPLY.
- NORTH CAROLINA BUILDING CODE 2012
 - NORTH CAROLINA MECHANICAL CODE 2012
 - NORTH CAROLINA PLUMBING CODE 2012
 - NORTH CAROLINA FIRE CODE 2012
 - STANDARD FOR THE INSTALLATION OF A/C AND VENT SYSTEMS, NFPA 90A (2012 ED.), UNDERWRITERS LABORATORIES

1.05 SUBMITTALS

- A. MATERIAL LIST: WITHIN TWENTY (20) DAYS OF AWARD OF CONTRACT, CONTRACTOR SHALL SUBMIT TO ENGINEER A COMPLETE LIST OF MATERIALS TO BE PROVIDED. THE LIST SHALL INCLUDE SUPPLIERS' NAMES AND MANUFACTURERS' NAMES AND NUMBER OR SERIES FOR EACH ITEM ON LIST.
- B. SHOP DRAWINGS: SUBMIT TO THE ENGINEER FOR APPROVAL, BEFORE COMMENCING WORK, SHOP DRAWINGS FOR ALL MATERIALS AND EQUIPMENT TO BE PROVIDED UNDER THIS CONTRACT. THE FOLLOWING MUST BE SUBMITTED TO THE SHOP DRAWINGS:
- CONTRACTOR SHALL SUBMIT WITHIN 30-DAYS AFTER AWARD OF CONTRACT, DRAWINGS AND/OR CUT SHEETS OF ALL MATERIALS, AND EQUIPMENT, AND 1/4" SCALE EQUIPMENT ROOM DRAWINGS FOR APPROVAL BY ARCHITECT-ENGINEER. SUCH SUBMITTALS MUST CONTAIN OUTLINE DIMENSIONS, OPERATING CLEARANCES, INSTALLATION, OPERATING AND MAINTENANCE INFORMATION AND SUFFICIENT ENGINEERING DATA TO INDICATE SUBSTANTIAL COMPLIANCE WITH SPECIFICATIONS. ALL SHOP DRAWINGS FOR ONE SECTION OF WORK OR ONE MECHANICAL SYSTEM SHALL BE SUBMITTED AT ONE TIME IN PDF FORMAT; NO APPROVAL WILL BE GIVEN IF SUBMITTED PIECEMEAL.
 - WHERE CONTRACTOR CONSIDERS ADDITIONAL DETAIL OR SHOP DRAWINGS ESSENTIAL TO PROPER FABRICATION OR INSTALLATION OF EQUIPMENT, DUCTWORK, AND PIPING HE SHALL CONSIDER AND INTEND TO APPLY TO HIS WORK AND MATERIALS, SUCH AS STANDARDS. ENGINEER RESERVES THE RIGHT TO DIRECT REMOVAL AND REPLACEMENT OF ANY ITEMS WHICH, IN HIS OPINION, DO NOT PRESENT AN ORDERLY AND REASONABLY NEAT AND WORKMANLIKE APPEARANCE, PROVIDED SUCH AN ORDERLY INSTALLATION CAN BE MADE USING CURRENT INDUSTRY METHODS AND STANDARDS. REPLACEMENT SHALL BE DONE WHEN DIRECTED IN WRITING BY ENGINEER AT THE CONTRACTOR'S EXPENSE AND WITHOUT ADDITIONAL EXPENSE TO OWNER.
 - APPROVAL GRANTED ON SHOP DRAWINGS IS RENDERED AS A SERVICE ONLY AND SHALL NOT BE CONSIDERED AS A GUARANTEE OF BUILDING COMPLIANCE. CONTRACTOR SHALL NOT SHALL IT BE CONSTRUED AS RELIEVING THE MECHANICAL CONTRACTOR OF BASIC RESPONSIBILITIES UNDER THIS CONTRACT.
 - CHANGES IN FOUNDATIONS, BASES, CONNECTIONS, PIPING, CONTROLS, STARTERS, ELECTRICAL EQUIPMENT, WIRING AND CONDUIT, SPACE OPENINGS, WALLS AND CEILINGS, AND VIBRATION ISOLATION IN ORDER TO ACCOMMODATE SUBSTITUTE EQUIPMENT SHALL BE MADE AT NO ADDITIONAL COST TO THE OWNER.
 - CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND RECEIVE ENGINEER'S APPROVAL BEFORE INSTALLING MATERIALS OR EQUIPMENT. ANY EQUIPMENT OR MATERIALS INSTALLED PRIOR TO RECEIPT OF APPROVED SHOP DRAWINGS FROM ENGINEER SHALL BE SUBJECT TO REMOVAL AND/OR ALTERATION AT THE DISCRETION OF THE MECHANICAL ENGINEER AT NO ADDITIONAL COST.
 - APPROVAL OF ANY SHOP DRAWINGS FOR MATERIALS, EQUIPMENT, APPARATUS DEVICES, ARRANGEMENTS AND/OR LAYOUTS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY OF FURNISHING SAME OF PROPER DIMENSIONS, CAPACITIES, SIZES, QUANTITIES AND INSTALLATION DETAILS TO EFFICIENTLY PERFORM REQUIREMENTS AND INTENT OF CONTRACT. SUCH APPROVAL SHALL NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS OF ANY SORT.
 - ANY ELECTRICAL DEVIATIONS BETWEEN THE CONTRACT DOCUMENTS AND THE FURNISHED EQUIPMENT MUST BE SEPARATELY ACKNOWLEDGED BY A SUBSTITUTION OF MATERIALS AND INTENT OF CONTRACT. SUCH APPROVAL SHALL NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS OF ANY SORT.
- D. PROVIDE MECHANICAL SHOP DRAWINGS FOR: CHILLERS, PIPING, PIPE INSULATION, CONTROLS, VALVES, AND PIPING ACCESSORIES.

1.06 CONNECTING TO WORK OF OTHERS

- A. BEFORE STARTING HIS WORK, AND FROM TIME TO TIME AS WORK PROGRESSES, MECHANICAL CONTRACTOR SHALL EXAMINE WORK AND MATERIALS INSTALLED BY OTHERS INsofar AS THEY APPLY TO HIS WORK AND MATERIALS. IF ANY NOTICES ARE IMMEDIATELY IN WRITING IF CONDITIONS EXIST WHICH WILL PREVENT SATISFACTORY RESULTS IN INSTALLATION OF SYSTEM.
- B. SHOULD CONTRACTOR START HIS WORK WITHOUT SUCH NOTIFICATION, IT SHALL BE CONSIDERED AS AN ACCEPTANCE BY HIM OF ALL CLAIMS OR QUESTIONS AS TO THE SUITABILITY OR WORK OF OTHERS TO RECEIVE HIS WORK. HE SHALL REMOVE AND REPLACE, AT HIS OWN EXPENSE, ALL WORK UNDER THIS CONTRACT WHICH MAY HAVE TO BE REMOVED ON ACCOUNT OF SUCH DEFECTS.

1.07 CONTRACT DRAWINGS

- A. IT IS THE INTENT OF DRAWINGS AND SPECIFICATIONS TO OBTAIN A COMPLETE AND FULLY OPERATIONAL, AND SATISFACTORY INSTALLATION. AN ATTEMPT HAS BEEN MADE TO SEPARATE AND GROUP WORK UNDER THIS CONTRACT. HOWEVER, SUCH SEPARATE DIVISIONAL DRAWINGS AND SPECIFICATIONS SHALL NOT RELIEVE CONTRACTOR FROM FULL RESPONSIBILITY OF COMPLIANCE WITH WORK OF HIS TRADE WHICH MAY BE INDICATED ON ANY DRAWING OR IN ANY SECTION OF THE SPECIFICATIONS. CONTRACTOR SHALL CAREFULLY EXAMINE ALL DRAWINGS PRIOR TO SUBMITTING BID. CONTRACTOR WILL BE REQUIRED TO FURNISH, INSTALL AND CONNECT WITH APPROPRIATE SERVICES ALL ITEMS SHOWN ON ANY DRAWINGS WITHOUT ADDITIONAL EXPENSE TO OWNER. ARCHITECT SHALL BE NOTIFIED AND TIME TO BID DATE OF ANY DISCREPANCIES, OMISSIONS, CONFLICTS OR INTERFERENCES WHICH OCCUR BETWEEN DRAWINGS OR BETWEEN DRAWINGS AND SPECIFICATIONS. IF SUCH NOTIFICATION IS RECEIVED IN ADEQUATE TIME, ADDITIONAL DATA OR CHANGES WILL BE ISSUED BY ADDENDUM TO ALL BIDDERS. SUBMITTAL OF BID BY CONTRACTOR SHALL INDICATE THE CONTRACTOR'S ACKNOWLEDGEMENT AND ACCEPTANCE TO PROVIDE ALL NECESSARY EQUIPMENT, MATERIALS AND LABOR TO MEET THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IN ACCORDANCE WITH ALL CODE REQUIREMENTS.
- B. MECHANICAL DRAWINGS ARE DIAGRAMMATIC BUT SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION AND WORK OF OTHER TRADES WILL PERMIT. CHANGES FROM DRAWINGS NECESSARY TO MAKE WORK OF CONTRACTOR CONFORM WITH BUILDING AS CONSTRUCTED AND TO FIT WORK OF OTHER TRADES OR RULES OF BODIES HAVING JURISDICTION SHALL BE MADE BY CONTRACTOR AT HIS OWN EXPENSE. SOME DRAWINGS MAY HAVE BEEN PREPARED FROM EXISTING DRAWINGS WITH INTENT OF PROVIDING THE CONTRACTOR WITH INFORMATION CONCERNING THE EXISTING CONDITIONS. DATA SHOWN HAS NOT BEEN COMPLETELY VERIFIED BY ENGINEER AND NO GUARANTEE OF ACCURACY OF THIS INFORMATION IS GIVEN OR INTENDED. IT SHALL BE THE RESPONSIBILITY OF CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS. DATA WHICH IS SHOWN BUT PROVES TO BE INCORRECT SHALL IN NO WAY RELIEVE THE CONTRACTOR FROM INSTALLING HIS WORK WITHIN THE INTENT OF PLANS AND SPECIFICATIONS, NOR SHALL IT CONSTITUTE BASIS FOR A CHANGE ORDER UNLESS, IN THE OPINION OF THE ENGINEER IT IS DETERMINED TO BE AN EXTRA COST OVER AND ABOVE THE BASIC INTENT OF THESE PLANS AND SPECIFICATIONS.

1.08 DAMAGE TO OTHER WORK

- A. ALL EQUIPMENT AND MATERIALS SHALL BE PROTECTED FROM THE WEATHER, DAMAGE, MOISTURE, DIRT, DEBRIS, ETC. USE OF CARDBOARD, VISQUEEN, OR OTHER SIMILAR MATERIALS WHILE STORED OUTSIDE IS NOT ACCEPTABLE. DO NOT INSTALL DAMAGED EQUIPMENT.

1.09 STORAGE AND WORK AREAS

- A. ALL EQUIPMENT AND MATERIALS SHALL BE PROTECTED FROM THE WEATHER, DAMAGE, MOISTURE, DIRT, DEBRIS, ETC. USE OF CARDBOARD, VISQUEEN, OR OTHER SIMILAR MATERIALS WHILE STORED OUTSIDE IS NOT ACCEPTABLE. DO NOT INSTALL DAMAGED EQUIPMENT.

1.10 APPROVAL OF MATERIAL

- A. EQUIPMENT OTHER THAN SPECIFIED IN THE CONTRACT DOCUMENTS REQUIRES APPROVAL FROM ENGINEER 7 DAYS PRIOR TO BID DATE.
- B. WRITTEN REQUEST FOR PRIOR APPROVAL MUST BE RECEIVED IN ENGINEER'S OFFICE BY CLOSE OF BUSINESS NO LATER THAN 10 DAYS PRIOR TO SCHEDULED BID DATE. REQUEST SHALL CONTAIN DETAILED INFORMATION ON THE PROPOSED ITEM. THIS SHALL INCLUDE:
- CATALOG CUTS SHEETS
 - DETAILED SPECIFICATIONS
 - DESCRIPTION OF DEVIATION FROM SPECIFIED ITEM
- C. AN ADDENDA SHALL BE ISSUED LISTING ALL PROSPECTIVE CONTRACTORS LISTING ALL PRIOR APPROVED MANUFACTURERS AND PRODUCTS.

PART 2 - PRODUCTS

2.01 CHILLED WATER AND CONDENSER WATER PIPE AND INSULATION

A. GENERAL:

- STEEL PIPE: BLACK STEEL, SEAMLESS OR THERMAL WELD FOR PIPE SIZES TWO (2) INCHES AND ABOVE, CONTINUOUS WELD BELOW TWO (2) INCHES, CONFORMING TO ASTM STANDARD SPEC. A53.
- CHILLED WATER PIPE INSULATION: UNFACED, PREFORMED RIGID CELLULAR POLYISOCYANURATE MATERIAL INTENDED FOR USE AS THERMAL INSULATION. COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. ACCEPTABLE: DOW CHEMICAL; TYMER 2000XP, DUNA USA INC; CORFOAM, DYPLAST PRODUCTS; ISO-25, ELLIOTT COMPANY OF INDIANAPOLIS; ELFOAM.
- CHILLED WATER JACKETING:
 - INDOOR CHILLED WATER PIPE: THE JACKET MATERIAL SHALL BE HIGH IMPACT PVC CLASS 16354-C COMPOUND CONFORMING TO ASTM D 1784. ADHESIVE AS RECOMMENDED BY JACKET MATERIAL MANUFACTURER. COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. FACTORY FABRICATED FITTING COVERS TO MATCH JACKET. JACKETING SHALL BE COLORED PER UNCC DESIGN AND CONSTRUCTION MANUAL: SAFETY BLUE (DEV0E DC9800), ACCEPTABLE: JOHNS MANVILLE; ZESTON, P.I.C. PLASTICS, INC.; FG SERIES, PROTO CORPORATION; LOSMOKE, SPEEDLINE CORPORATION; SMOKESAFE.
 - INSULATION THICKNESS: INSULATION THICKNESS SHALL MATCH THE THICKNESS OF THE EXISTING PIPING INSULATION.
 - CONDENSER WATER PAINT COLOR: CAR BLUE (DC4035). APPLY 2 COATS OF PAINT TO PIPING.
 - PIPING IDENTIFICATION: IDENTIFY PIPING SERVICE AND FLOW DIRECTION.

2.02 JOINTS AND CONNECTIONS

- A. GENERAL JOINTS AND CONNECTIONS SHALL BE MADE PERMANENTLY AIR, GAS, AND WATER TIGHT.
- B. WELDED JOINTS: ALL PIPE TWO AND ONE-HALF INCHES (2-1/2") AND LARGER SHALL BE WELDED. CUT PIPE SQUARE USING PIPE CUTTING TOOL AND CAREFULLY REAM PIPE TO REMOVE ALL BURRS. BEVEL ENDS OF PIPE, AND AFTER CAREFULLY ALIGNING AND SETTING OF PROPER WELD GAP, TACK WELD TO SECURE PIPE AND FITTINGS IN TRUE ALIGNMENT. ALL WELDS SHALL BE OF SOUND METAL WITH TACK WELDS REMOVED IN ADVANCE OF FINISH WELDS. ALL WELDING SHALL BE PERFORMED BY WELDERS CERTIFIED IN ACCORDANCE WITH ANSI B.31.1 WITH TEST CONDUCTED BY AN APPROVED TESTING LABORATORY. PROVIDE THERMAL WELD COUPLERS.

2.03 ACCESSORIES

A. PRESSURE GAUGES

- GAUGES: 4-1/2" INCH DIAMETER WITH CAST ALUMINUM BLACK FINISHED FLANGELESS CASE. BOURDON TUBE. PHOSPHOR BRONZE, SILVER SOLDERED TO SOCKET AND THE SOCKET: FORGED BRASS BOTTOM ODIN TYPE. MOVEMENT: BRONZE ROTARY TYPE WITH DELRIN SECTOR AND BUSHINGS AND MICROMETER TYPE POINTER. ACCURACY: ONE-HALF OF 1% OVER MIDDLE RANGE. SCALE RANGE: 0-100 PSI. ACCEPTABLE: H. O. THERICE COMPANY 600Q, EQUIVALENT PRODUCT OF MARSHALLTOWN, OR PRIOR APPROVED EQUAL.
 - GAUGE COCKS: BRASS, NEEDLE VALVE, ROUND KNURLED HANDLE, 1/4 INCH FEMALE NPT. ELEMENT: BIMETAL COIL. POINTER: DARK-COLORED METAL. ACCEPTABLE: H. O. THERICE COMPANY 735-2, EQUIVALENT PRODUCT OF MARSHALLTOWN, OR PRIOR APPROVED EQUAL.
 - PRESSURE SNUBBERS: BRASS, 1/4 INCH MALE X 1/4 INCH FEMALE NPT. INCLUDE EXTENSION FOR USE ON INSULATED PIPING. ACCEPTABLE: H. O. THERICE COMPANY 872-2, EQUIVALENT PRODUCT OF MARSHALLTOWN, OR PRIOR APPROVED EQUAL.
- B. THERMOMETERS
- BIMETALIC-ACTUATED THERMOMETERS: SEALED TYPE; STAINLESS STEEL WITH 5-INCH DIAL; DIAL: NONREFLECTIVE ALUMINUM WITH PERMANENTLY ETCHED SCALE MARKINGS IN DEG F. SCALE RANGE: 0-100 DEG F. STANDARD: ASME B40.200. CONNECTOR TYPE: UNION JOINT, ADJUSTABLE ANGLE, WITH UNIFIED-INCH SCREW THREADS. CONNECTOR SIZE: 1/2 INCH, WITH ASME B1.1 SCREW THREADS. STEM: 0.25 OR 0.375 INCH IN DIAMETER, STAINLESS STEEL WINDOW. PLAIN GLASS. RING: STAINLESS STEEL ELEMENT. BIMETAL COIL. POINTER: DARK-COLORED METAL. ACCURACY: PLUS OR MINUS 1 PERCENT OF SCALE RANGE.
 - THERMOWELLS: PRESSURE-TIGHT, SOCKET-TYPE FITTING MADE FOR INSERTION INTO PIPING TEE FITTING. MATERIAL FOR USE WITH STEEL PIPING: CRES. TYPE; STEPPED SHANK UNLESS STRAIGHT OR TAPERED SHANK IS INDICATED. INTERNAL THREADS: NPS 1/2, ASME B1.1 SCREW THREADS. BORE: DIAMETER REQUIRED TO MATCH THERMOMETER BULB OR STEM. INSERTION LENGTH: LENGTH REQUIRED TO MATCH THERMOMETER BULB OR STEM. STANDARD: ASME B40.200. LAGGING EXTENSION: INCLUDE ON THERMOWELLS FOR INSULATED PIPING AND TUBING. BUSHINGS: FOR CONVERTING SIZE OF THERMOWELL'S INTERNAL SCREW THREAD TO SIZE OF THERMOMETER CONNECTION.
 - MANUFACTURERS: H. O. THERICE COMPANY, WEISS INSTRUMENTS, OR APPROVED EQUAL.

2.04 VALVES, AIR CONTROL DEVICES, AND PIPING SPECIALTIES

- A. BUTTERFLY VALVES: 200 CWP, IRON, SINGLE-FLANGE BUTTERFLY VALVES WITH EPDM SEAT AND ALUMINUM-BRONZE DISC. STANDARD: MSS SP-67, TYPE 1. BODY DESIGN: LUG TYPE; SUITABLE FOR BIDIRECTIONAL DEAD-END SERVICE AT RATED PRESSURE WITHOUT USE OF DOWNSTREAM FLANGE. BODY MATERIAL: ASTM A 126, CAST IRON OR ASTM A 536, DUCTILE IRON. STEM: ONE- OR TWO-PIECE STAINLESS STEEL.
- B. NOTORIZED BUTTERFLY VALVES: RESILIENT SEAT, ASME CLASS 125/150 FLANGED. BODY SHALL BE CAST IRON MEETING ASTM A126 CLASS B REQUIREMENTS AND SHALL BE FULLY LUGGED. SEAT SHALL BE EPDM. DISK SHALL BE DUCTILE IRON WITH NYLON 11 COATING. BUTTERFLY VALVE STEMS SHALL BE STAINLESS STEEL. FLOW CHARACTERISTICS SHALL BE EQUAL PERCENTAGE UP TO 70° OF DISK ROTATION. ALL VALVES SHALL BE RATED FOR SERVICE WITH HOT WATER, CHILLED WATER AND SO2 GLYCOL SOLUTIONS. VALVES SHALL BE MAINTENANCE FREE AND SHALL BE PROVIDED WITH A 3 YEAR WARRANTY. VALVE ELECTRIC ACTUATORS SHALL BE UL-RECOGNIZED OR CSA-CERTIFIED. TRIPLE-DUTY VALVES: EACH VALVE SHALL INCORPORATE THE FOLLOWING THREE FUNCTIONS IN ONE BODY: TIGHT SHUT-OFF, SPRING-CLOSURE TYPE SILENT NON-SLAM CHECK, AND EFFECTIVE THROTTLING DESIGN CAPABILITY. THE VALVE BODY SHALL BE DUCTILE IRON (ASTM A536) AND THE DISC SHALL BE BRONZE (ASTM B584). THE SEAT SHALL BE EPDM. THE VALVE STEM SHALL BE STAINLESS STEEL. EACH VALVE SHALL BE FURNISHED WITH A PRE-FORMED, REMOVABLE PVC INSULATION JACKET WITH A FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE SPREAD RATING OF 50 OR LESS. THERE WILL BE PROVIDED SUFFICIENT MINERAL FIBERGLASS INSULATION TO MEET ASHRAE 90.1. MANUAL AIR VENTS: BRONZE BODY, NONFERROUS INTERNAL PARTS, SCREWDRIVER OR THUMBSCREW OPERATION, NPS 1/2 INLET CONNECTION, NPS 1/8 DISCHARGE CONNECTION. CWP RATING: 150 PSIG. MAX. OPERATING TEMPERATURE: 225 DEG F. STAINLESS-STEEL BELLOW, FLEXIBLE CONNECTORS: STAINLESS-STEEL BELLOWS WITH WOVEN, FLEXIBLE, BRONZE, WIRE-REINFORCING PROTECTIVE JACKET. FLANGED ENDS. CAPABLE OF 3/4 INCH MISALIGNMENT. CWP RATING: 150 PSIG. MAX. OPERATING TEMPERATURE: 250 DEG F.
- F. ALL VALVES SHALL BE PROVIDED WITH 0.032" THICK POLISHED BRASS VALVE TAGS WITH STAMP-ENGRAVED PIPING SYSTEM ABBREVIATION AND SEQUENCED VALVE NUMBERS. ATTACH WITH BRASS CHAINS OR S-HOOKS.

PART 3 - EXECUTION

3.01 PIPING AND EQUIPMENT LABELING

- A. MECHANICAL EQUIPMENT SHALL BE LABELED WITH NAME, NUMBER AS DESIGNATED ON CONTRACT DOCUMENTS, SERVICE AND OPERATIONAL REQUIREMENTS, DESIGN CAPACITY, AND OTHER DESIGN PARAMETERS SUCH AS PRESSURE DROP, ENTERING AND LEAVING CONDITIONS, RPM, ETC. EQUIPMENT SHALL BE IDENTIFIED WITH STENCIL PAINTING. PIPING LABELS SHALL BE PREPARED AND COLOR-CODED WITH LETTERING INDICATING SERVICE AND SHOWING FLOW DIRECTION. BACKGROUND COLOR SHALL BE SAFETY BLUE (DEV0E DC9800) AND LETTERING SHALL BE WHITE.

3.02 TESTS

- A. TEST PIPING SYSTEMS PRIOR TO THE APPLICATION OF ANY INSULATION AND PRIOR TO THEIR BEING RENDERED INACCESSIBLE BY THE PROGRESS OF THE WORK. PRESSURE TEST THE PIPING AT ONE HUNDRED FIFTY PERCENT (150%) OF WORKING PRESSURE OR ONE HUNDRED PSIG (100), WHICHEVER IS GREATER. THE SYSTEM SHALL HOLD THE PRESSURE FOR SUCH TIME AS REQUIRED TO INDICATE ITS INTEGRITY TO THE SATISFACTION OF THE ENGINEER BUT IN NO CASE LESS THAN EIGHT (8) HOURS.
- B. GENERAL: AFTER THE PIPING SYSTEMS HAVE BEEN TESTED AND PROVED TIGHT, THE CONTRACTOR SHALL CLEAR THE VARIOUS SYSTEMS OF DIRT, SCALE, OIL, GREASE, WASTE AND OTHER FOREIGN SUBSTANCES WHICH MAY HAVE ACCUMULATED DURING THE PROCESS OF INSTALLATION.

3.03 REFRIGERANT MANAGEMENT

- A. HANDLING OF REFRIGERANT MUST BE IN COMPLIANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS. CONTRACTOR MUST CARRY THE NECESSARY LICENSES AND RELATED EVIDENCE AT ALL TIMES.
- B. A REFRIGERANT COMPLIANCE STATE REPORT SHALL BE EXECUTED EVERY TIME REFRIGERANT IS ADDED TO OR REMOVED FROM EXISTING/NEW CHILLER. ONE COPY OF EACH FORM SHALL BE GIVEN TO THE UNC-CHARLOTTE/ZONE-6 SUPERVISOR, ONE COPY LEFT ON THE JOBSITE IN CLOSE PROXIMITY OF THE CHILLER AND COPIES RETAINED AT THE CONTRACTOR'S OFFICE.
- C. REFRIGERANT COMPLIANCE FORMS: UNC-CHARLOTTE/PM MANAGER WILL PROVIDE ALL NECESSARY FORMS AND TEMPLATES AS UNC-CHARLOTTE STANDARD POLICY.

3.04 WITNESS TEST

- A. THE OWNER AND A REPRESENTATIVE OF THE OWNER'S CHOOSING WILL, AT NO ADDITIONAL COST TO THE OWNER OR OWNER'S REPRESENTATIVE, WITNESS THE SPECIFIED CHILLER FACTORY PERFORMANCE TEST. OWNER AND OWNER'S REPRESENTATIVE EXPENSES TO INCLUDE TRAVEL, LODGING AND MEALS WILL BE A COST TO THE CHILLER VENDOR. FACTORY PERFORMANCE TEST CHILLERS, BEFORE SHIPPING, ACCORDING TO ARI 506/110 TO BE WITNESSED BY OWNERS.
- TEST THE FOLLOWING CONDITIONS:
 - DESIGN CONDITIONS INDICATED.
 - REDUCTION IN CAPACITY FROM DESIGN TO MINIMUM LOAD IN STEPS OF 25 WITH VARYING ENTERING CONDENSER-FLUID TEMPERATURE FROM DESIGN TO MINIMUM CONDITIONS IN 5 DEG F INCREMENTS.
 - DESIGN FLOW, 85 DEG F ENTERING CONDENSER WATER, 56 F ENTERING EVAPORATOR WATER, 42 F LEAVING EVAPORATOR WATER SETPOINT.
 - PROVIDE OWNER ACCESS TO PLACE WHERE CHILLERS ARE BEING TESTED.
 - PREPARE TEST REPORT INDICATING TEST PROCEDURES, INSTRUMENTATION, TEST CONDITIONS, AND RESULTS. SUBMIT COPY OF RESULTS WITHIN ONE WEEK OF TEST DATE.

3.05 TESTING, ADJUSTING, AND BALANCING FOR HYDRONIC PIPING SYSTEMS

A. QUALITY ASSURANCE

- TAB CONTRACTOR QUALIFICATIONS: ENGAGE A TAB ENTITY CERTIFIED BY AABC OR NEBB.
 - TAB FIELD SUPERVISOR: EMPLOYEE OF THE TAB CONTRACTOR AND CERTIFIED BY AABC OR NEBB.
 - TAB TECHNICIAN: EMPLOYEE OF THE TAB CONTRACTOR AND WHO IS CERTIFIED BY AABC OR NEBB AS A TAB TECHNICIAN.
- B. GENERAL PROCEDURES FOR TESTING & BALANCING
- PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN AABC'S "NATIONAL" STANDARDS FOR TOTAL SYSTEM BALANCE OR NEBB'S "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS".
 - SCOPE OF WORK:
 - PRIOR TO DEMOLITION, PERFORM PRELIMINARY MEASUREMENTS TO DETERMINE EXISTING SYSTEM FLOWS AND PRESSURES.
 - AFTER INSTALLATION IS COMPLETE, THE CONTRACTOR SHALL TEST AND BALANCE THE ENTIRE HYDRONIC PIPING SYSTEM WITHIN THE MECHANICAL ROOM. AT A MINIMUM, THIS INCLUDES THE EVAPORATOR AND CONDENSER SIDES OF ALL CHILLERS, ALL CONDENSER WATER PUMPS, ALL PRIMARY CHILLED WATER PUMPS, AND ALL SECONDARY CHILLED WATER PUMPS.

3.06 REMOVAL OF RUBBISH

- CONTRACTOR SHALL AT ALL TIMES KEEP PREMISES FREE FROM ACCUMULATIONS OF WASTE MATERIAL OR RUBBISH GENERATED BY WORK UNDER THIS CONTRACT.

3.07 CLEANING AND ADJUSTMENTS

- UPON COMPLETION OF WORK, CONTRACTOR SHALL PREPARE ALL RUNNING EQUIPMENT AND APPARATUS WHICH HE INSTALLS AND MAKE CERTAIN ALL SUCH APPARATUS AND MECHANISMS ARE IN PROPER WORKING ORDER AND READY FOR TEST.

3.08 AS-BUILT DRAWINGS

- UPON COMPLETION OF INSTALLATION, THE CONTRACTOR SHALL FURNISH TO THE ARCHITECT A SET OF DRAWINGS, MARKED TO SCALE, INDICATING THE CHANGES IN SIZE AND LOCATION OF PIPING AND FITS, AND NOTING ALL MAJOR CHANGES MADE DURING CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN THE DRAWINGS FROM THE ARCHITECT AND SHALL BEAR ALL COSTS IN OBTAINING THE DRAWINGS AND PROVIDING THE AS-BUILT DRAWINGS. THE CONTRACTOR SHALL DELIVER THE DRAWINGS PLUS TWO SETS OF AS-BUILT DRAWINGS TO THE ARCHITECT. EACH SHEET IN EACH SET SHALL BE SIGNED BY A PRINCIPAL REPRESENTATIVE OF THE CONTRACTOR, DATED AND HAVE "AS-BUILT" STAMPED NEAR THE SIGNATURE. DRAWINGS SHALL INCLUDE ACCURATE MEASUREMENTS MEASURED FROM COLUMNS, WALLS, BEAMS AND OTHER FIXED PARTS OF THE BUILDING TO THE CONCEALED MATERIALS. THE CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS AT THE SITE AND EACH DAY SHALL RECORD INSTALLATION OF PIPE, DUCTS, ETC. TO INSURE ACCURATE "AS-BUILT" DRAWINGS. THE CONTRACTOR SHALL ALSO FURNISH A SET OF DRAWINGS AND TWO SETS OF CONTRACTOR SIGNED AND DATED AS-BUILT DRAWINGS OF THE CONTROLS.

3.09 GUARANTEE AND SERVICE

- A. IN ADDITION TO THE GUARANTEE OF EQUIPMENT BY THE MANUFACTURER OF EACH PIECE OF EQUIPMENT SPECIFIED HEREIN, THE MECHANICAL CONTRACTOR SHALL ALSO GUARANTEE SUCH EQUIPMENT AND SHALL BE HELD RESPONSIBLE FOR A PERIOD OF ONE YEAR FROM FINAL ACCEPTANCE FOR NECESSARY ADJUSTMENTS AND/OR REPLACEMENTS OF ALL DEFECTIVE EQUIPMENT, MATERIALS AND WORKMANSHIP WITHOUT EXPENSE TO THE OWNER. PROVIDE A LETTER TO THE OWNER STATING THE CONTRACTOR'S GUARANTEE AND DATES OF GUARANTEE COVERAGE.
- B. CLEANING OF PERMANENT TYPE FILTERS; LUBRICATION, AND CLEANING OF STRAINERS SHALL BE TO 30-DAYS AFTER THE FINAL ACCEPTANCE.
- C. THE CONTRACTOR SHALL PROVIDE FOR A REPRESENTATIVE OF HIS FIRM, THE CONTROL SYSTEM CONTRACTOR, AND THE OWNER'S REPRESENTATIVE TO RETURN TO THE JOB AT THE CHANGE OF SEASONS (SUMMER TO WINTER OR WINTER TO SUMMER) FOR THE FIRST YEAR ONLY, TO ADJUST THE SYSTEMS AND RECHECK OR RECALIBRATE CONTROLS AS MAY BE REQUIRED OF THE SEASON CHANGE.

3.10 ACCEPTANCE

- A. AS A PREREQUISITE TO REQUESTING FINAL INSPECTION, CONTRACTOR SHALL:
- TEST AND BALANCE EACH SYSTEM TO ASSURE DESIGN PERFORMANCE AND PROVIDE ARCHITECT AND ENGINEER WITH PRELIMINARY TEST RESULTS.
 - FURNISH LETTER FROM AUTHORIZED REPRESENTATIVE OF CONTROL MANUFACTURER THAT ALL CONTROLS HAVE BEEN CHECKED FOR OPERATION AND CALIBRATION AND THAT ALL SYSTEMS ARE OPERATING AS INTENDED.
- B. ACCEPTANCE WILL BE MADE BY THE ARCHITECT-ENGINEER OR HIS REPRESENTATIVE ON THE BASIS OF TESTS AND INSPECTION OF THE JOB. CONTRACTOR SHALL FURNISH THE NECESSARY MECHANICS TO OPERATE SYSTEMS, MAKE ANY NECESSARY ADJUSTMENTS AND ASSIST WITH THE FINAL INSPECTION.

| REVIEWS | |
|---------|----------|
| NO. | DATE |
| | 12/11/15 |
| | 02/11/16 |
| 1 | 02/24/16 |
| 2 | |

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Charlotte, North Carolina 28204-3906
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Eng. of Record: Larry P. McWilliams, No. C-33307

MCENERY BUILDING CHILLER REPLACEMENT
UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE
9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223

MECHANICAL SPECIFICATIONS

| DRAWN | DESIGNED |
|---------|------------|
| LPM | LPM |
| CHECKED | |
| SRC | |
| DATE | 10/16/2015 |
| SCALE | AS NOTED |
| JOB NO | 15593 |
| SHEET | M002 |



1
MO02

SCALE: NTS

THE FOLLOWING POINTS NEED TO BE ADDED TO THE CONTROLS SYSTEM:
BASE BID: CONTROL VALVE FOR AHU IN MECHANICAL ROOM.
ALTERNATE #3: FAULT, SPEED, DIFF PRESS, SUP & RET TEMP, AND FLOW FOR CHWP1 & 2

CONTROLS SYSTEM POINTS LIST

| Point Type | Point Name |
|------------|-----------------------------|
| DO-3 | Chiller 1 Start/Stop |
| DO-4 | Chiller 2 Start/Stop |
| DO-5 | Sec CHW Pmp 1 Start/Stop |
| DO-6 | Sec CHW Pmp 2 Start/Stop |
| DO-7 | CT 1 Fan Low Start/Stop |
| DO-8 | CT 1 Fan High Start/Stop |
| DI-1 | Chiller 1 Status |
| DI-2 | Chiller 1 Alarm |
| DI-3 | Chiller 2 Status |
| DI-4 | Chiller 2 Alarm |
| DI-5 | Pri CHW Pmp 3 Status |
| DI-6 | Pri CHW Pmp 4 Status |
| DI-7 | Sec CHW Pmp 1 Status |
| DI-8 | |
| AI-1 | Outside Air Temp |
| AI-2 | common CHW Return Temp |
| AI-3 | CT Lvg CDW Temp |
| AI-4 | CT Ent CDW Temp |
| AI-5 | Sec CHW Supply Temp |
| AI-6 | Sec CHW Return Temp |
| AI-7 | Outside Air Humidity |
| AI-8 | Space Temperature |
| AO-1 | Cig Trw Bypass Valve |
| AO-2 | Sec CHW Pressure Relief |
| AO-9 | EF-1 VFD Speed |
| AO-10 | |
| AO-11 | Chiller 1 Isolation Valve |
| AO-12 | Chiller 2 Isolation Valve |
| AO-13 | |
| AO-14 | |
| XTID11 | Sec CHW Pmp 2 Status |
| XTID12 | |
| XTID13 | CDW Pmp 5 Status |
| XTID14 | CDW Pmp 6 Status |
| XTID15 | CT1 Fan Vibration Alarm |
| XTID16 | CT2 Fan Vibration Alarm |
| XTID17 | Refrigeration Alarm |
| XTID18 | Emergency Stop Switch |
| XT2D01 | CT 2 Fan Low Start/Stop |
| XT2D02 | CT 2 Fan High Start/Stop |
| XT2D03 | |
| XT2D04 | |
| XT2D05 | Refrigeration Alarm PL |
| XT2D06 | Refrigeration Alarm Rly |
| XT2D07 | EF-1 Status Light |
| XT2D08 | EF-1 Start/Stop |
| XT3A11 | Sec CHW Diff Press |
| XT3A12 | Sec CHW Flow |
| XT3A13 | Smith Sec CHW Diff Press |
| XT3A14 | Smith Sec CHW Sup Temp |
| XT3A15 | Smith Sec CHW Ret Temp |
| XT3A16 | Smith Sec CHW Flow |
| XT3A07 | Smith Sec CHWP7 Speed |
| XT3A08 | Smith Sec CHWP8 Speed |
| XT4D11 | CT 1 Fan Low Status |
| XT4D12 | CT 1 Fan High Status |
| XT4D13 | CT 2 Fan Low Status |
| XT4D14 | CT 2 Fan High Status |
| XT4D15 | CT1 Sump Heater Status |
| XT4D16 | CT2 Sump Heater Status |
| XT4D17 | EF-1 Fan Fault |
| XT4D18 | EF-1 Fan VFD Fault |
| XT5D11 | EF-1 OFF-AUTO Status |
| XT5D12 | Smith Sec CHWP-7 Status |
| XT5D13 | Smith Sec CHWP-8 Status |
| XT5D14 | Smith Sec CHWP-7 Fault |
| XT5D15 | Smith Sec CHWP-8 Fault |
| XT5D16 | |
| XT5D17 | |
| XT5D18 | Rem Pnl Push-to-Test |
| XT6D01 | Smith Sec CHWP-7 Start/Stop |
| XT6D02 | Smith Sec CHWP-8 Start/Stop |
| XT6D03 | |
| XT6D04 | |
| XT6D05 | |
| XT6D06 | |
| XT6D07 | |
| XT6D08 | |

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CHILLER PLANT SEQUENCE OF OPERATION:

- CHILLER PLANT
- FAN
- REFRIGERANT LEAK DETECTION SYSTEM

1. CHILLER PLANT

CHILLER 1 SHALL BE INTERLOCKED THROUGH CHILLER PANEL WITH CONDENSER WATER PUMP P-5 AND CHILLED WATER PUMP P-3. CHILLER-2 SHALL BE INTERLOCKED WITH CONDENSER WATER PUMP P-6 AND CHILLED WATER PUMP P-4. ON ACTIVATION OF CHILLER THE RESPECTIVE PUMPS SHALL BE ACTIVATED AND NORMALLY CLOSED CONTROL VALVE IN THE CONDENSER WATER SUPPLY LINE TO THE CHILLER SHALL OPEN. ONLY ON PROVEN FLOW BY FLOW SWITCHES, THE REFRIGERATION MACHINE SHALL BE ACTIVATED. THE CHILLER CONTROLS SHALL MAINTAIN DESIRED CHILLED WATER SUPPLY TEMPERATURE. PROVIDE ALARMS FOR EACH PUMP FAILURE.

COOLING TOWER FANS SHALL BE CONTROLLED BY TEMPERATURE SENSOR IN THE CONDENSER WATER SUPPLY LINE. FANS SHALL BE ACTIVATED ON LOW SPEED IN SEQUENCE AND HIGH SPEED IN SEQUENCE TO MAINTAIN SUPPLY WATER TEMPERATURE AT 85 DEGREES F. COOLING TOWER BYPASS VALVES SHALL MODULATE TO MAINTAIN CONDENSER SUPPLY WATER TEMPERATURE ABOVE 65 DEGREES F (ADJUSTABLE). COOLING TOWER BASIN HEATERS SHALL BE ACTIVATED BY AQSTAT TO MAINTAIN BASIN WATER TEMPERATURE ABOVE 40 DEGREES F.

PUMPS P-1, 2 AND FUTURE PUMPS P-7, 8 ARE SECONDARY CHILLED WATER PUMPS, WITH ONE ACTING AS STAND-BY IN EACH SET, SHALL BE ACTIVATED THROUGH DDC. PROVIDE MANUAL OVERRIDE. STANDBY SECONDARY CHILLED WATER PUMP WILL BE ACTIVATED ON FAILURE OF LEAD SECONDARY CHILLED WATER PUMP. PROVIDE LEAD LAG CONTROL FOR THE PUMP.

CHILLERS 1 AND 2 SHALL BE ACTIVATED BY OUTDOOR TEMPERATURE SENSOR. PROVIDE A LEAD LAG CONTROL ON THE CHILLERS. AT START-UP LEAD CHILLER SHALL BE ACTIVATED. SECONDARY CHILLED WATER PUMPS WILL RIDE PUMP CURVE AT REDUCED FLOW. DIFFERENTIAL PRESSURE VALVE V-1 SHALL BE SET TO OPEN AT 4 DIFFERENTIAL PRESSURE SETTING REPRESENTING MINIMUM FLOW REQUIRED FOR THE OPERATION OF THE PUMP. LAG CHILLER AND RESPECTIVE PRIMARY PUMP SHALL BE ACTIVATED AUTOMATICALLY ON FAILURE OF THE LEAD CHILLER AND PUMP. ANY PUMP AND CHILLER CAN BE SELECTED AS LEAD EQUIPMENT AND SHALL BE ALTERNATED.

COMMON CHILLED WATER RETURN TEMPERATURE SHALL ACTIVATE LAG CHILLER AND LAG SECONDARY PUMP WHEN COMMON RETURN WATER TEMPERATURE RISES ABOVE SETPOINT, 56F (ADJ) AND DEACTIVATE LAG CHILLER WHEN COMMON RETURN WATER TEMPERATURE DROPS BELOW SETPOINT, 46F (ADJ).

PROVIDE ALARMS FOR HIGH CHILLED WATER SUPPLY TEMPERATURE AND SECONDARY PUMP FAILURE. PROVIDE ALARM FOR HIGH AND LOW CONDENSER WATER SUPPLY TEMPERATURE AND CHILLER FAILURE.

PROVIDE A TRANSLATOR TO ALLOW REMOTE MONITORING, AT THE PHYSICAL PLANT, OF THE POINTS MONITORED BY THE MICRO-COMPUTER CONTROL CENTER ON THE CHILLER PROVIDED BY THE CHILLER MANUFACTURER FOR THE LIST OF THE POINTS AS A MINIMUM TO BE MONITORED.

EXHAUST FAN F-1 SHALL BE ACTIVATED WHEN REFRIGERANT LEAK DETECTION SYSTEM IS IN ALARM. FAN WILL OVERRIDE THERMOSTAT CONTROL AND NM AT FULL SPEED.

PROVIDE MANUAL START-UP OF FAN FROM OUTSIDE OF THE MECHANICAL ROOM.

3. REFRIGERANT LEAK DETECTION SYSTEM

ON ACTIVATION OF REFRIGERANT LEAK DETECTION SYSTEM ALARM, AN AUDIBLE ALARM SHALL BE SOUNDED OUTSIDE OF THE MECHANICAL ROOM. EXHAUST FAN F-1 SHALL BE ACTIVATED. CHILLERS SHALL BE DEACTIVATED.

INTERLOCK ALARM WITH EXISTING AIR HANDLERS IN THE CHILLER ROOM TO DEACTIVATE THE FANS OF THE AIR HANDLERS ON ACTIVATION OF LEAK DETECTION SYSTEM. AIR HANDLER FANS WILL HAVE TO BE MANUALLY RESTARTED. PROVIDE A WEATHERPROOF CONTROL PANEL WITH A LOCK. PANEL SHALL BE LOCATED OUTSIDE THE MECHANICAL ROOM THAT WILL ALLOW TO ACTIVATE FAN F-1 AND TURN THE CHILLERS OFF MANUALLY.

PROVIDE A MANUAL SWITCH TO DEACTIVATE THE ALARM ON THE CONTROL PANEL OF THE LEAK DETECTION SYSTEM.

PROVIDE A MANUAL SWITCH TO ACTIVATE FANS F-1 ON THE CONTROL PANEL.

PROVIDE A MANUAL SWITCH TO DEACTIVATE THE CHILLERS ON THE CONTROL PANEL.

PROVIDE A DRY CONTACT FOR REMOTE MONITORING OF THE ALARM.

NOTE: TUNING PARAMETERS ON NEW DDC CONTROLS VALVES SHALL BE ADJUSTABLE FROM BAS CONTROL SCREEN.

BASE BID: REPLACE ALL EXISTING PNEUMATIC ACTUATORS ON CONTROL VALVES WITH MOTORIZED DDC ACTUATORS. REPROGRAM EXISTING JOHNSON CONTROLS FOR COOLING TOWERS AND CHILLERS TO PERFORM SEQUENCE AS LISTED ABOVE.

ALTERNATE #3: REMOVE EXISTING JOHNSON CONTROLS FROM COOLING TOWERS AND CHILLERS. INSTALL NEW OPEN PROTOCOL BAGNET MS/TP OR LON CONTROLS AND TIE INTO EXISTING BUILDING CONTROLS. ANY EXISTING SENSORS TO BE REUSED MUST BE IN GOOD WORKING ORDER AND CALIBRATED. ANY SENSORS IN NEED OF REPLACEMENT WILL BE FUNDED BY CONTROLS ALLOWANCE. REPLACE EXISTING STANDALONE CONTROLS ON PUMP PACKAGE FOR P-7 & P-8 AND EXISTING STANDALONE DIFFERENTIAL PRESSURE SENSOR CONTROLS FOR P-1 & P-2 WITH NEW OPEN PROTOCOL BAGNET MS/TP OR LON CONTROLS AND TIE INTO EXISTING BUILDING CONTROLS.

NOTE: ALL CONTROLS MUST BE COMPATIBLE WITH EXISTING TRIDUO JACE AND HONEYWELL CONTROLS IN BUILDING. CONTROLS GRAPHICS SHOULD BE UPDATED AS REQUIRED. CONTRACTOR MUST BE AX CERTIFIED AND HAVE EXPERIENCE WITH EXPORT TAGGING.

APPROVED DEVICE MANUFACTURERS: ALERTON, HONEYWELL, SCHNEIDER, AND JOHNSON CONTROLS.

APPROVED CONTROLS INTEGRATORS: HOFFMAN BUILDING SYSTEMS, JOHNSON CONTROLS, MSS, PLATINUM BUILDING AUTOMATION, SCHNEIDER, AND UNITED AUTOMATION.

**ALTERNATE #1
WATER-COOLED CHILLER SCHEDULE**

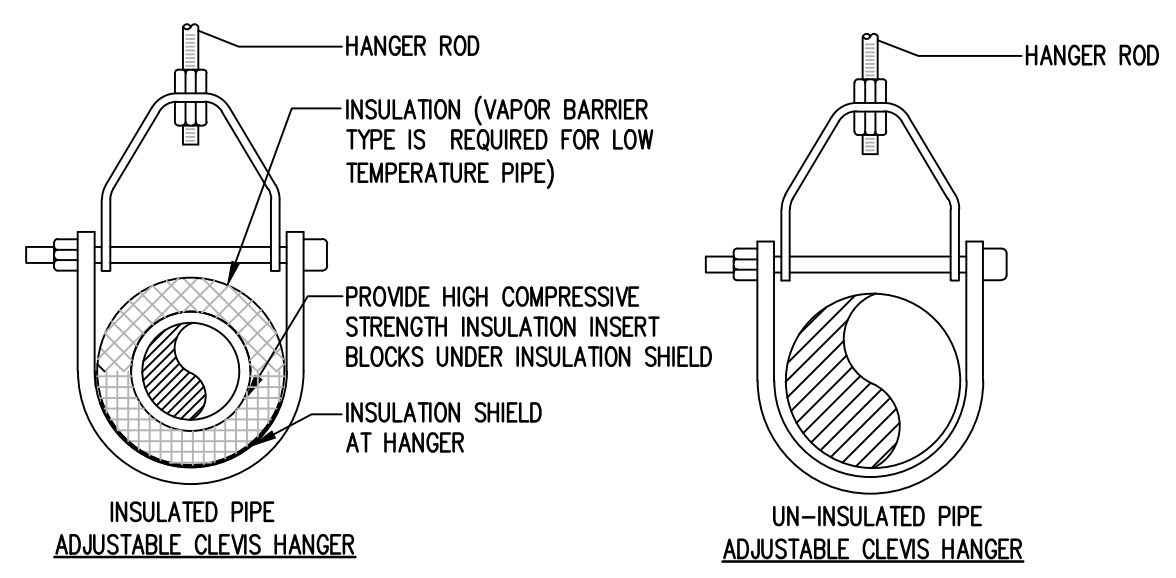
| | |
|---------------------------|----------|
| UNIT DESIGNATION | CH-1 |
| NOMINAL TONS | 550 |
| MANUFACTURER | CARRIER |
| MODEL NUMBER | 19XR6767 |
| REFRIGERANT TYPE | R-134a |
| REFRIGERANT CHARGE (LBS.) | 1632 |
| OPERATING WEIGHT (LBS.) | 30,153 |
| EVAPORATOR: | |
| ENTERING WATER TEMP. (F) | 52 |
| LEAVING WATER TEMP. (F) | 42 |
| FLOW RATE (GPM) | 1318 |
| PASSES | 2 |
| PRESSURE DROP (FT.) | 11.3 |
| FOULING FACTOR | 0.0001 |
| WORKING FLUID | WATER |
| CONDENSER: | |
| ENT. WATER TEMP. (F) | 85 |
| LVG. WATER TEMP. (F) | 95 |
| FLOW RATE (GPM) | 1650 |
| PASSES | 2 |
| PRESSURE DROP (FT.) | 11.3 |
| FOULING FACTOR | 0.00025 |
| WORKING FLUID | WATER |
| ELECTRICAL DATA | |
| UNIT VOLTAGE/PHASE | 460/3 |
| MCA/MOCP | 549/700 |
| PRIMARY L.R.A. | 439 |
| MAX. KW/TON | 0.588 |
| MAX N.P.L.V. KW/TON | 0.381 |

- NOTES**
- Provide 3/4" Armaflex Factory insulation on all cold parts
 - Chiller shall turn down to 20% at constant 85F condenser water temp w/o hot gas bypass
 - Provide VFD starter and factory installed IEEE 519 filter. Performance ratings shall include filter.
 - Chiller shall be provided with chiller controller and tied into existing building automation system
 - See specifications for owner witness test requirements
 - 5 year extended warranty on unit, including parts, labor and refrigerant
 - Soft interlock chiller w/ primary pump through flow or pressure switch
 - Approved manufacturers: Carrier, Trane, York.

**ALTERNATE #2
WATER-COOLED CHILLER SCHEDULE**

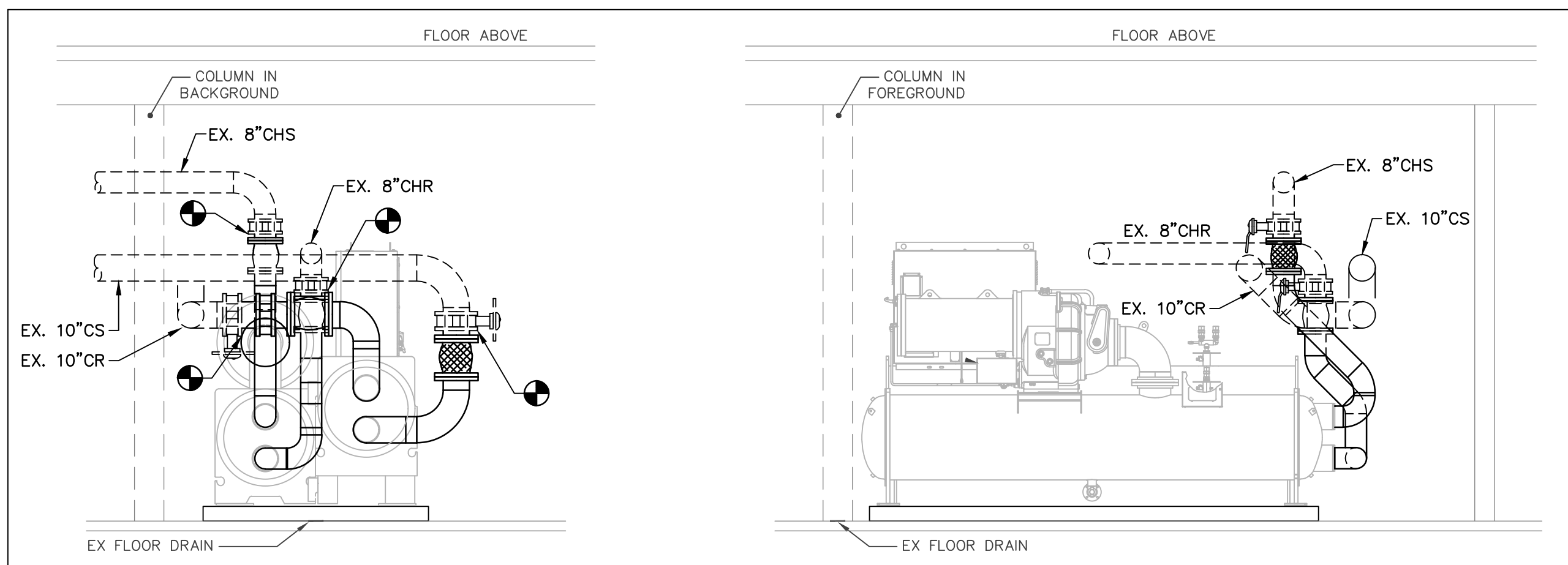
| | |
|---------------------------|--------------|
| UNIT DESIGNATION | CH-1 |
| NOMINAL TONS | 550 |
| MANUFACTURER | YORK |
| MODEL NUMBER | YMC2-S1934AB |
| REFRIGERANT TYPE | R-134a |
| REFRIGERANT CHARGE (LBS.) | 1396 |
| OPERATING WEIGHT (LBS.) | 25,102 |
| EVAPORATOR: | |
| ENTERING WATER TEMP. (F) | 52 |
| LEAVING WATER TEMP. (F) | 42 |
| FLOW RATE (GPM) | 1320 |
| PASSES | 2 |
| PRESSURE DROP (FT.) | 17.5 |
| FOULING FACTOR | 0.0001 |
| WORKING FLUID | WATER |
| CONDENSER: | |
| ENT. WATER TEMP. (F) | 85 |
| LVG. WATER TEMP. (F) | 95 |
| FLOW RATE (GPM) | 1650 |
| PASSES | 2 |
| PRESSURE DROP (FT.) | 10.3 |
| FOULING FACTOR | 0.00025 |
| WORKING FLUID | WATER |
| ELECTRICAL DATA | |
| UNIT VOLTAGE/PHASE | 460/3 |
| MCA/MOCP | 522/800 |
| PRIMARY L.R.A. | 417 |
| MAX. KW/TON | 0.573 |
| MAX N.P.L.V. KW/TON | 0.329 |

- NOTES**
- Provide 3/4" Armaflex Factory insulation on all cold parts.
 - Chiller shall turn down to 20% at constant 85F condenser water temp w/o hot gas bypass.
 - Provide VFD starter and factory installed IEEE 519 filter. Performance ratings shall include filter.
 - Chiller shall be provided with chiller controller and tied into existing building automation system.
 - See specifications for owner witness test requirements.
 - 5 year extended warranty on unit, including parts, labor and refrigerant.
 - Soft interlock chiller w/ primary pump through flow or pressure switch.
 - Approved Manufacturers: York, Daikin, Smardt.

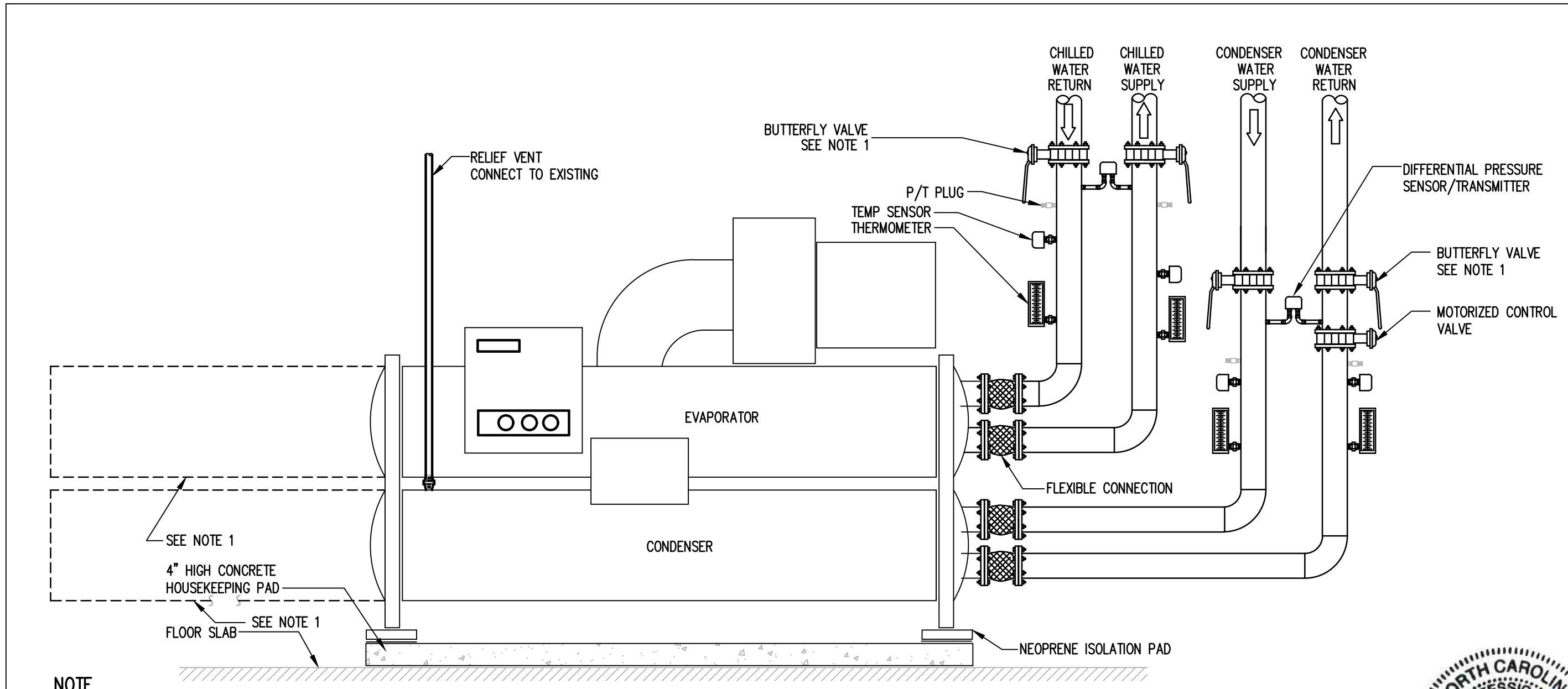


NOTE: ALL PIPE HANGERS SHALL BE MANUFACTURED AND INSTALLED IN ACCORDANCE WITH THE NORTH CAROLINA BUILDING CODE 2012 - MECHANICAL.

2 TYPICAL PIPE HANGERS
MO02 NTS



3 SECTIONS AT CHILLER PIPING
MO02 SCALE: 1/4" = 1'-0"



NOTE
1. LOCATE ISOLATION VALVES SO THAT PIPING BETWEEN VALVES AND CHILLER CAN BE REMOVED FOR TUBE SERVICING.

1 CHILLER INSTALLATION DETAIL
MO02 NTS

| REVISIONS | |
|------------------------------|-------------|
| NO. | DATE |
| 1 | 12/11/15 |
| 2 | 02/11/16 |
| | 02/24/16 |
| DESCRIPTION FOR CONSTRUCTION | |
| 1 | ADDENDUM #1 |
| 2 | ADDENDUM #2 |

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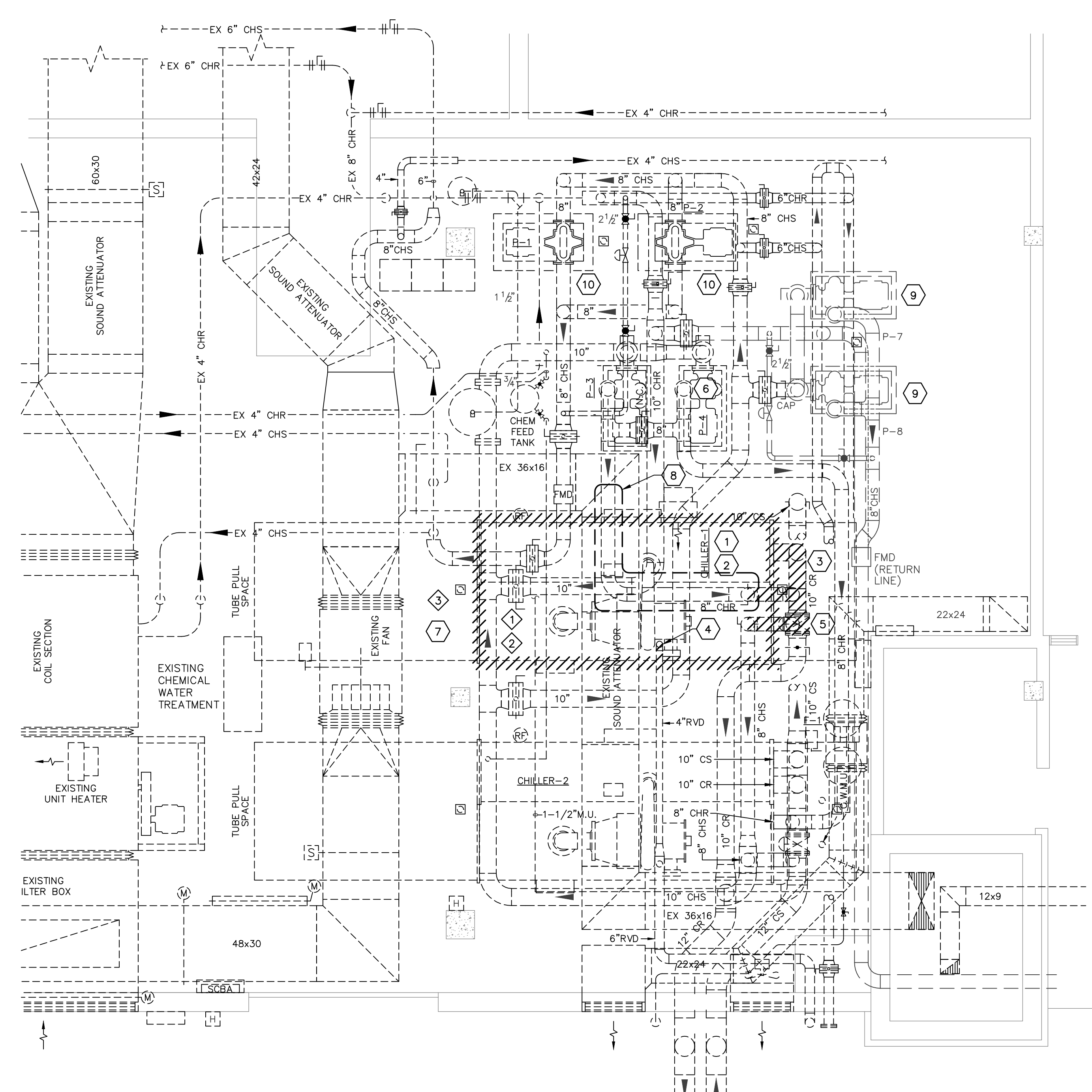
MCENERY BUILDING CHILLER REPLACEMENT
UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE
9201 UNIVERSITY CITY BLVD, CHARLOTTE, NC 28223

MECHANICAL DETAILS

| | |
|----------|------------|
| DRAWN | LPM |
| DESIGNED | LPM |
| CHECKED | SRC |
| DATE | 10/16/2015 |
| SCALE | AS NOTED |
| JOB NO | 15593 |
| SHEET | M003 |



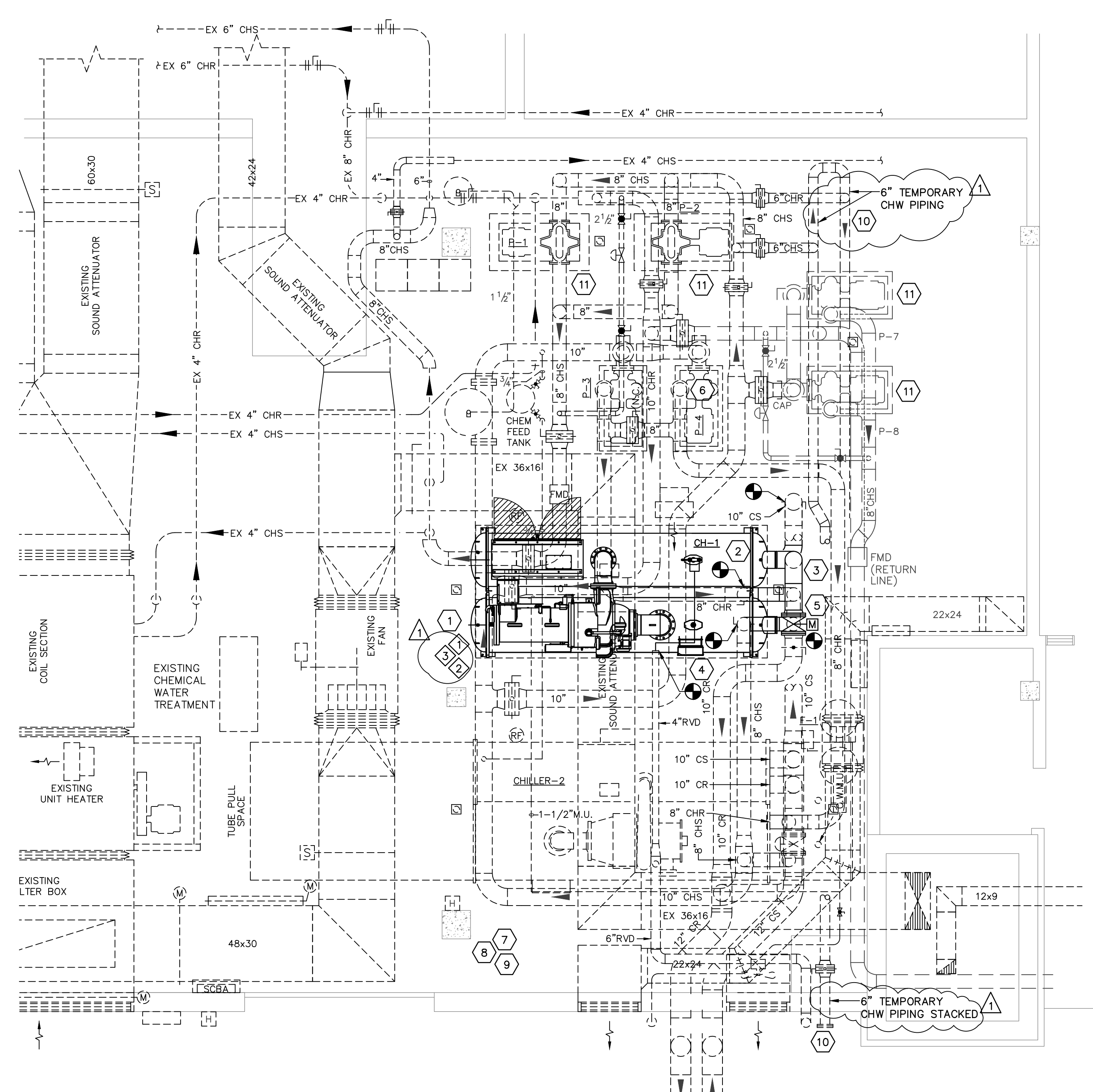
C:\Users\mccwilliams\opdata\local\temp\AcPublish_6944\AcPublish_6944.dwg, 02/24/2016 10:55 AM, mccwilliams
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1 DEMO FLOOR PLAN – MECHANICAL
 M101 SCALE: 1/4" = 1'-0"

- MECHANICAL KEYNOTES TO PLAN:**
- CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING DEMOLITION.
 - DEMOLISH AND REMOVE EXISTING CHILLER. PREP EXISTING EQUIPMENT PAD FOR INSTALLATION OF NEW CHILLER.
 - DEMOLISH AND REMOVE EXISTING PIPING, INSULATION, HANGERS, AND ASSOCIATED ACCESSORIES FROM EXISTING CHILLER BACK TO SHUTOFF VALVE. PREP PIPING FOR CONNECTION TO NEW PIPING.
 - DEMOLISH AND REMOVE EXISTING REFRIGERANT VENT PIPING TO EXTENT SHOWN. PREP PIPING FOR CONNECTION TO NEW PIPING.
 - DEMOLISH AND REMOVE EXISTING PNEUMATIC CONTROL VALVE IN CONDENSER WATER RETURN SERVING CHILLER #1. PNEUMATIC TUBING SHALL BE REMOVED ALL THE WAY BACK TO THE SOURCE.
 - DEMOLISH AND REMOVE EXISTING TRIPLE DUTY VALVE ON DISCHARGE OF PRIMARY CHILLED WATER PUMP, P-4. PREP EXISTING PIPING FOR INSTALLATION OF NEW TRIPLE DUTY VALVE.
 - MECHANICAL CONTRACTOR TO REMOVE ALL EXISTING CONTROL PANELS NOT CURRENTLY IN USE AND ALL ABANDONED CONTROL WIRING IN MECHANICAL ROOM. AT A MINIMUM, THIS INCLUDES THE EXISTING CONTROLS THAT USED TO SERVE VIVARIUM AND THE EXISTING TRANE CONTROL PANEL. VERIFY WITH OWNER PRIOR TO REMOVING EXISTING CONTROLS.
 - IF CHILLER MANUFACTURER OTHER THAN BASIS OF DESIGN IS BID, THEN THIS PORTION OF 8" CHR PIPING MAY BE REQUIRED TO BE REMOVED IN ORDER TO INSTALL NEW CHILLER. THIS ADDITIONAL INSTALLATION COST MUST BE CAPTURED IN THE LIFE CYCLE COST ANALYSIS.
 - ALTERNATE #3:** REMOVE EXISTING PUMP PACKAGE CONTROLLER FROM EXISTING PUMPS P-7 & P-8. PREP EXISTING VFDs FOR INSTALLATION OF NEW DDC CONTROLS.
 - ALTERNATE #3:** REMOVE STAND-ALONE DIFFERENTIAL PRESSURE CONTROL FROM EXISTING PUMPS P-1 & P-2. PREP EXISTING VFDs FOR INSTALLATION OF NEW DDC CONTROLS.

- ELECTRICAL KEYNOTES TO PLAN:**
- CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING DEMOLITION.
 - DISCONNECT POWER TO EXISTING CHILLER #1. PREP FOR POWER CONNECTION TO NEW CHILLER.
 - ELECTRICAL CONTRACTOR TO REMOVE ALL EXISTING JUNCTION BOXES IN MECHANICAL ROOM THAT ARE NOT CURRENTLY IN USE. REMOVE ALL CONDUIT AND ABANDONED WIRING BACK TO THE ASSOCIATED PANEL OR POINT OF ORIGIN.



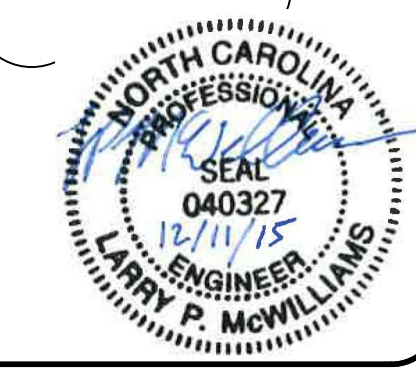
2 NEW WORK FLOOR PLAN – MECHANICAL
 M101 SCALE: 1/4" = 1'-0"

- KEYNOTES TO PLAN:**
- CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
 - INSTALL NEW CHILLER ON EXISTING EQUIPMENT PAD. PROVIDE NEW NEOPRENE ISOLATORS. ENLARGE EQUIPMENT PAD IF REQUIRED.
 - CONNECT NEW PIPING TO NEW CHILLER. SEE DETAIL 1/M002 FOR REQUIRED ACCESSORIES. PROVIDE NEW ANY ITEMS THAT ARE NOT EXISTING.
 - CONNECT REFRIGERANT VENT PIPING FROM NEW CHILLER TO EXISTING REFRIGERANT VENT PIPING. INSTALL PIPING PER CHILLER MANUFACTURER'S INSTRUCTIONS.
 - INSTALL NEW, MOTORIZED DDC CONTROL VALVE ON CONDENSER WATER RETURN TO NEW CHILLER #1. TIE INTO BUILDING AUTOMATION SYSTEM.
 - INSTALL NEW TRIPLE DUTY VALVE AT EXISTING PUMP, P-4. INSULATE VALVE. INSULATION SHALL MATCH ADJACENT PIPING INSULATION.
 - IF EQUIPMENT PROVIDED USES A REFRIGERANT OTHER THAN R-134A, CONTRACTOR SHALL FIELD VERIFY WHETHER EXISTING REFRIGERANT MONITORING SYSTEM IS CAPABLE OF SENSING MULTIPLE REFRIGERANTS. IF IT IS NOT CAPABLE OF MONITORING ALL REFRIGERANTS PRESENT IN MECHANICAL ROOM, THEN CONTRACTOR SHALL PROVIDE A NEW MONITORING SYSTEM AND ALL REQUIRED ACCESSORIES.

- ELECTRICAL KEYNOTES TO PLAN:**
- CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
 - ELECTRICAL CONTRACTOR SHALL CONFIRM NEW CHILLER REQUIREMENTS PRIOR TO PERFORMING WORK. NEW CHILLER MINIMUM CIRCUIT AMPS SHALL NOT EXCEED 587 AMPS. PRIOR TO REUSING EXISTING CONDUCTORS, CONTRACTOR SHALL PERFORM AN INSULATION TEST. IF INSULATION TEST FAILS, NEW CONDUCTORS SHALL BE REQUIRED. CONTACT ELECTRICAL ENGINEER WITH ANY DISCREPANCIES. UPON CONFIRMATION OF NEW CHILLER LOAD (AMPS) AND POSITIVE INSULATION TEST RESULTS, MAINTAIN EXISTING (2 SETS) 3/4\"/>

- REPLACE ALL EXISTING PNEUMATIC ACTUATORS ON CONTROLS VALVES IN MECHANICAL ROOM AND COOLING TOWER YARD WITH NEW, MOTORIZED DDC CONTROL ACTUATORS. AT A MINIMUM, THIS IS TO INCLUDE THE CONDENSER WATER SHUTOFF VALVES, SECONDARY CHILLED WATER PRESSURE RELIEF VALVE, 3-WAY CONDENSER WATER BYPASS VALVE, AND AHU CONTROL VALVE. TIE INTO BUILDING AUTOMATION SYSTEM.
- ALTERNATE #4:** UPGRADE ALL CHILLED WATER DIFFERENTIAL PRESSURE SENSORS IN EXISTING CHILLED WATER SYSTEM. NEW SENSORS SHALL BE SCHNEIDER EPW2104-LCD, 0-100PSI, 0-24VDC WITH LOCAL LCD DISPLAYS OR EQUAL.
- ALTERNATE #5:** REPLACE ALL EXISTING 6" TEMPORARY CHILLER CONNECTION PIPING BETWEEN ISOLATION VALVES NEAR EXISTING PUMP P-2 AND EXTERIOR OF BUILDING, WITH NEW 8" PIPING.
- ALTERNATE #3:** INSTALL NEW DDC CONTROLS FOR VFDs CONTROLLING EXISTING PUMPS P-1, P-2, P-7, & P-8. TIE INTO BUILDING AUTOMATION SYSTEM.

- EXTEND EXISTING CONDUCTORS TO SUPPLY THE NEW EQUIPMENT. ALL SPLICES SHALL BE MADE IN ACCESSIBLE JUNCTION BOXES PER SCO REQUIREMENTS. IF THE REQUIREMENTS FOR SPLICING CANNOT BE MET, NEW CONDUCTORS SHALL BE PULLED.



| NO. | DATE | DESCRIPTION |
|-----|----------|-------------------------|
| 1 | 12/11/15 | ISSUED FOR CONSTRUCTION |
| | 02/24/16 | ADDENDUM #2 |

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MCENERY BUILDING CHILLER REPLACEMENT
 UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE
 9201 UNIVERSITY CITY BLVD., CHARLOTTE, NC 28223

MECHANICAL FLOOR PLANS

| | |
|----------|------------|
| DRAWN | LPM |
| DESIGNED | LPM |
| CHECKED | SRG |
| DATE | 10/16/2015 |
| SCALE | AS NOTED |
| JOB NO | 15593 |
| SHEET | M101 |