RCR 9/9/10

SETTLEMENT AGREEMENT AND RELEASE SUBJECT TO CONDITIONS SUBSEQUENT

On this ___ day of _____, 2010, this **Settlement Agreement and Release Subject to Conditions Subsequent** ("Agreement") is entered into by the following parties: Jackson County, Missouri ("the County"); BNIM Architects, Inc. ("BNIM"); Rumsey Engineers ("Rumsey").

I. DEFINITIONS

In this Agreement, the following words have the following meanings:

A. "Default" shall be the failure to meet the Performance Verification of the Heating Ventilating and Air Conditioning System criteria (the "PVHVAC"), attached hereto, for the HVAC system at the Fort Osage Education Center after full compliance by the County with the requirements for proper operation of the HVAC system attached hereto.

B. The "Effective Date" shall be the later of: (1) September 1, 2011, or (2) twelve months after all change order work has been performed, and the relevant equipment installed and conditionally accepted by Jackson County (which conditional acceptance shall not be unreasonably withheld or delayed)

C. "Latent Defects" shall mean a material error in the specification of the individual components in relation to the operation of the HVAC system at the Fort Osage Education Center and such error is not discoverable or known on or before the Effective Date.

II. RECITALS

A. The County and BNIM entered into an Agreement to Provide Architectural Services relating to the construction of a new facility at the Fort Osage national landmark site to provide for expanding existing education programs and compliment the existing reconstruction of the fort. The Architectural Services Agreement included providing certain services relating to the heating, ventilation and air conditioning system ("HVAC") at the facility, which is called the Fort Osage Education Center.

B. BNIM and Rumsey entered into an Agreement Between Architect and consultant to provide mechanical and plumbing services relative to the HVAC system for the Fort Osage Education Center.

C. By letter dated July 9, 2009 from legal counsel from the County, the County made demand detailing damages allegedly sustained by the County as a result of purported defects in the HVAC system at the Fort Osage Education Center, as well as other alleged defects and deficiencies

in the facility unrelated to the HVAC system or the services provided by Rumsey.

D. BNIM and Rumsey deny any liability to the County relative to the claims and demands made by the County.

E. All parties to this Agreement wish to compromise and settle all claims and demands between them relative to the HVAC system only at the Fort Osage Education Center, subject to the conditions set forth herein.

III. UNDERTAKINGS AND AGREEMENTS

A. Jackson County, BNIM, J.E. Dunn Construction Company, and KC Mechanical have agreed to enter into Change Order #101 relating to certain additional work to be performed on the HVAC system pursuant to the Contract for construction of the facility of the Fort Osage site, and the Contract for Architectural Services referred to above. A copy of Change Order #101 is attached hereto and incorporated by reference herein as Exhibit A.

B. BNIM and Rumsey have agreed to provide the work and services set forth in Change Order #101F at no cost to the County in accordance with Exhibit B attached hereto and incorporated by reference herein.

C. Rumsey agrees to pay the sum of Seventy-Five Thousand Dollars ($75,000.00), to the County upon the terms and conditions set forth below:

1. Completion of the work and services by Rumsey as set forth in Change Order #101 attached hereto;

2. Performance by the County of the Requirements for Proper Operation of the HVAC System as set forth in Exhibit C, attached hereto, at no cost to Rumsey or BNIM;

3. Operation of the HVAC system in accordance with the requirements of the Performance Verification of the HVAC System as set forth in Exhibit D attached hereto;

4. As of the Effective Date, no Default has been declared by the County.

D. Upon payment of the sum of Seventy-Five Thousand Dollars ($75,000.00), set forth above on the Effective Date, and in consideration of the mutual undertakings and agreements set forth in this Agreement:

1. **The County COMPLETELY AND FOREVER RELEASES AND DISCHARGES Rumsey,** its predecessors-in-interest, members, shareholders, officers, directors, past and present agents,

employees, attorneys, insurers, successors and all subsidiary parents and affiliated companies, successors and assigns, representatives and principals, and all persons acting by, through and in concert with any of them or any and all past, present, and future claims, debts, demands, actions, sums of money, accounts, reckonings, and causes of action for money and for damages of any kind and of whatever nature or basis, whether known or unknown or whether arising in contract or in tort, which the County has asserted, could have asserted, or in the future could assert arising out of the work and services performed by Rumsey related to the Fort Osage Educational Center, including, but not limited to, those claims made by the County, through counsel in counsel's letter of July 9, 2009, **except that this Release shall not operate to preclude claims which in the future might be brought for Latent Defects in the HVAC system, nor shall this Release operate to preclude defenses which in the future might be raised against claims for Latent Defects in the HVAC system.**

2. **BNIM COMPLETELY AND FOREVER RELEASES AND DISCHARGES Rumsey**, its predecessors-in-interest, members, shareholders, officers, directors, past and present agents, employees, attorneys, insurers, successors and all subsidiary, parent and affiliated companies, successors and assigns, representatives and principals, and all persons acting by, through and in concert with any of them for any and all past, present, and future claims, debts, demands, actions, sums of money, accounts, reckonings, and causes of action for money and for damages of any kind and of whatever nature or basis, whether known or unknown or whether arising in contract or in tort, which BNIM has asserted, could have asserted, or in the future could assert arising out of the work and services performed by Rumsey related to the Fort Osage Educational Center, including, but not limited to, claims related to or arising out of those claims made by the County, through counsel in counsel's letter of July 9, 2009, **except that this Release shall not operate to preclude claims which in the future might be brought for Latent Defects in the HVAC system, nor shall this Release operate to preclude defenses which in the future might be raised against claims for Latent Defects in the HVAC system..**

3. **The County PARTIALLY RELEASES AND PARTIALLY DISCHARGES BNIM**, its predecessors-in-interest, members, shareholders, officers, directors, past and present agents, employees, attorneys, insurers, successors, and all subsidiary, parent and affiliated corporations, successors and assigns, representatives and principals, and all persons acting by, through and in concert with any of them from any and all past, present, or

future claims, debts, demands, actions, sums of money, accounts, reckonings, and causes of action for money and for damages, of any kind and of whatever nature or basis, whether known or unknown or whether arising in contract or in tort, which the County has asserted, could have asserted, or in the future could assert, arising out work and services performed by BNIM related to the HVAC system at the Fort Osage Education Center, including, but not limited to, those claims made by the County, through counsel, relative to the HVAC system in counsel's letter of July 9, 2009, **except that this Release shall not operate to preclude claims which in the future may be brought for Latent Defects in HVAC system, nor shall this Release operate to preclude defenses which in the future might be raised against claims for Latent Defects in the HVAC system, nor shall this Release operate to preclude claims which the County has asserted or may assert against BNIM relative to alleged design and construction defects in the concrete, parapet walls, slab on grade, structural walls, retaining walls, or any other aspect of the Fort Osage Education Center other than the HVAC system, including those design and construction defects not involving the HVAC system set forth in the letter of July 9, 2009 from the County's counsel, which claims are specifically reserved by the County.**

4. **BNIM AND RUMSEY PARTIALLY RELEASE AND PARTIALLY DISCHARGE The County,** and its executives, officers, directors, past and present agents, employees, attorneys, insurers, and all persons acting by, through and in concert with any of them from any and all past, present, and future claims, debts, demands, actions, sums of money, accounts, reckonings, and causes of action for money and for damages of any kind and of whatever nature or basis, whether known or unknown or whether arising in contract or in tort, which BNIM and/or Rumsey has asserted, could have asserted, or in the future could assert arising out of the work and services performed by BNIM and/or Rumsey related to the HVAC system at the Fort Osage Educational Center, including, but not limited to, HVAC claims made by the County, through counsel, in counsel's letter of July 9, 2009, **except that this Release shall not operate to preclude claims which in the future might be brought for Latent Defects in the HVAC system, nor shall this Release operate to preclude defenses which in the future might be raised against claims for Latent Defects in the HVAC system, nor shall this Release operate to preclude claims or defenses arising out of or related to claims which the County has asserted or may assert against BNIM relative to alleged design and construction defects in the concrete, parapet walls, slab on grade, structural walls,**

retaining walls, or any other aspect of the Fort Osage Education Center other than the HVAC System, including those design and construction defects not involving the HVAC system set forth in the letter of July 9, 2009 from the County's counsel, which claims and all defenses thereto are specifically reserved and excepted here from.

5. In the event Default is declared by the County before the Effective Date, the parties reserve all rights, claims, and defenses relative to the claims made by the County as set forth herein and those claims to be released by the parties hereto including those claims set forth in the letter of July 9, 2009 from the County's counsel. BNIM and Rumsey specifically reserve the right to challenge any Default declared by the County.

E. The parties to this Agreement consent and agree that any and all applicable statutes of limitation and other time limitations governing the assertion of claims or filing of pleadings are tolled for a time period of sixty (60) days following the "Effective date" of this Agreement with respect to: (i) any and all claims that may be asserted by any of the parties hereto and (ii) any defenses and counterclaims that may be asserted thereto.

F. This Agreement represents compromises of disputed claims, and no payment or other consideration referred to in this Agreement is an admission of liability on the part of any party to this Agreement, all of whom deny any liability.

G. This Agreement constitutes the entire understanding among he parties with regard to the matters herein. There are no representations, warranties, agreements, arrangements, undertakings, oral or written, among the parties relating to the subject matter of this Agreement that are not fully expressed in this Agreement.

H. This Agreement may not be modified, amended, or supplemented except by written instrument, specifically identifying this Agreement and signed by all of the parties or their successors or assigns.

I. The parties and their counsel shall cooperate fully and execute any supplementary documents and take any additional actions that may be necessary or appropriate to give full force and effect to the terms of this Agreement.

J. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.

K. Each party represents and warrants that all corporate and legal actions necessary to approve the making and performance of this Agreement by that party have been taken and that the person executing this Agreement for that Party is duly authorized to do so.

L. Each party represents and warrants that this Agreement constitutes a valid and binding obligation of that party and that this Agreement is binding upon and inures to the benefit of successors and assigns.

M. This Agreement and its enforcement shall be governed by the laws of the State of Missouri, without giving effect to the choice of law or conflicts of law provisions thereof. Any action to enforce this Agreement shall be brought in The Circuit Court of Jackson County, Missouri at Independence. For the avoidance of doubt, however, it is understood by the parties that the declaration of a Default pursuant to Article III(D)(4) shall not give rise to an action to enforce this Agreement. The prevailing party to any such action to enforce this Agreement shall be entitled to its attorneys' fees and costs related to such action and, the prevailing party's attorneys' fees and costs shall be paid by the non-prevailing party.

IN WITNESS WHEREOF, the PARTIES have subscribed their names on the day and year indicated below.

Jackson County, Missouri

By _____

Title: **County Executive**

Date: **September 9, 2010**

APPROVED AS TO FORM
COUNTY COUNSELOR

BNIM Architects, Inc.

By Charles Cannon

Title: Principal

Date: July 8, 2010

ATTEST:
Mary Jo Spino
CLERK OF COUNTY LEGISLATURE

CC 2257691v1
wsabeop0 101096322 v.1

Rumsey Engineers

By _____

Title: PRINCIPAL

Date: 7/22/10

CC 2257691v1
wsabeop0 101096322 v.1

Fort Osage Education Center No. 9037 ATTACHMENT #1

Change Order No. 101
April 15, 2010

Description:

Approved Potential Change Items Included in Change Order (C.O. #101)

1	PCI No. 81 Add buffer tank in the mechanical room per Engineer's direction	$0
	Grand Total	$0

Fort Osage Education Center

HVAC Dehumidification System Upgrade as recommended by Rumsey Engineers

Scope of Work

November 10, 2009

Prepared by Rumsey Engineers, Inc.

Description:

The following modifications impact the dehumidification coil system, which currently consists of 1 variable speed water pump, 4 water-to-water heat pumps (5 ton nominal units), and an air handler coil, all located in a single mechanical room. The coil is currently controlled by staging three heat pumps on and off.

The proposed system configuration would convert the dehumidification coil loop to a buffer tank configuration. This would simplify the heat pump control to eliminate low temperature heat pump trip problems, in addition to providing for easier control of the off coil temperature.

Buffer Tank Addition

Note: DO NOT fasten or drill into the floor slab for any purpose to any depth. The slab has radiant tubing routing throughout the mechanical room.

A 140-160 gallon buffer tank shall be located in the mechanical room on slab level and externally insulated to R-19. See diagram for connections required. A vertical tank with stand shall be required due to site space limitations. The tank insulation shall include an exterior vapor barrier equivalent to that used on piping to prevent condensation on the tank, which shall frequently be below dewpoint temperature.

Add connections to the tank as required to achieve the diagrammed configuration. Connection at top of tank shall be within 2-12" of top. Connections at bottom of tank shall be within 2-12" of bottom of tank. Connections shall be radially spaced a minimum of 12 perimeter inches apart with exact locations chosen to simplify piping. Added fittings shall be painted for rust protection prior to insulation.

Installer shall coordinate location of tank in room plan for with engineer prior to installation. This tank shall be located near the current heating coil buffer tank, however care must be taken to ensure code required clearance from electrical panels is provided,

acceptable access to filling station is maintained, and access corridor for removal of heat pumps is maintained.

Piping

Heatpumps shall be repiped to serve a buffer tank rather than coil as shown in diagram. Existing shutoff valves, control isolation valves and pete's plugs shall be reused, and existing pipe shall be reused when possible. Piping shall be modified to accommodate a small primary circulator pump on each heat pump (see Primary Pump section).

Note that HP 3 shall be repurposed from slab to dehumidification air handler duty. The existing piping connection to the radiant slab system shall remain but be isolated by manual shutoff valves.

Primary loop piping serving a single heat pump shall be 1.5 inch copper; headers shall be 2.5 – 3" copper. All piping and fittings shall be insulated with fiberglass insulation with FSK jacket to match existing.

All connections between dissimilar materials, in particular the copper piping to steel tank, shall be made with dielectric unions equivalent to those used on present system.

Piping shall be insulated to match existing and use equivalent hangers and hanging techniques. Reuse of existing piping is encouraged. Fitting count shall be minimized and 45 degree fittings and long radius 90's used where possible to minimize pressure drop. This is a very low-pumping power loop that will be sensitive to excessive piping pressure drop that could result from use of short radius 90's.

Maintain existing chemical feed, although connection points can be moved if required.

Circulation (Primary) Pumps

Four 14 gpm / 14.5 ft w.g. primary circulator pumps shall be added. These small circulator pumps shall be added in a dedicated primary configuration for each heat pump. For each primary pump, provide and install 2 full port ball valves for shutoff on the pump outlet and inlet, respectively. Pump bodies shall be insulated with vapor barrier on the insulation exterior to prevent sweating. Submit pump selection to engineer for approval.

Coil Pump 8 (E)

The existing pump 8 shall remain, with the original PID control to maintain CC setpoint temperature.

Water to water heat pumps (E)

The current heat pumps shall remain, with no changes to wiring or location.

Expansion Tank

Add 2 gallon (minimum) rubber diaphragm, Bell and Gossett HFT-30 or equivalent, expansion tank. Minimum system pressure at operating temperature of 40F shall be 10 psig at the tank and maximum system pressure at fill temperature shall be 25 psig. A pressure gauge shall be included within 5 feet of the expansion tank to measure the range of 0 – 30 psig.

Air Vents

Add 2-5 manual air vents. One at each high point (minimum of 1 at top of tank, and 1 at coil connection). Bleed system fully upon fill, startup and after 7 days of operation. Bleed from all vent points, including at coil, and ensure flow from pumps.

Fill System

The current manual fill system shall be maintained.

Startup

Fill system with water and appropriate closed loop water treatment. Bleed system of all air fully upon fill. Perform an additional bleed after 7 days of system operation.

Controls

Add control for 4 new primary pumps:
Pumps shall be commanded on when associated heat pump is commanded on and remain on for 4-6 minutes after associated heat pump is commanded off.

Additional sensors:
Two new temperatures sensors shall be required for monitoring the tank temperature at the top of tank and bottom of tank. These sensors shall be located in the tank within 8" of the top or bottom.

Four new differential pressure sensors shall be installed to measure the differential pressure across HP3, 5, 6, and 7. The differential pressure is the manufacturer-documented parameter to measure and prove flow across these heat pump unit.

Change heat pump staging:
Heat pumps shall be staged to maintain the buffer tank temperature at or below setpoint. All temperature setpoints shall be adjustable by owner via a graphical control screen.

Lead Heat pump:

If Th-Tl >= 6F then turn on
If Th-Tl = 0F then turn off
If Tl >=46F then turn on
If Tl = 39F then turn off

Lag Heat pumps: If Lead heat pump is on then:

If Tl >= 49F then Lag 1 on
If Tl = 41F then Lag 1 off
If Tl >=51F then Lag 2 on
If Tl = 43F then Lag 2 off
If Tl >=53 then Lag 3 on (command on associated condenser ground loop if required)
If Tl = 45F then Lag 3 off

All heat pumps shall be cycled through lead position, with the lead heat pump unit changing once every two weeks. Any heat pump in alarm for 5 minutes shall be moved to the Lag 3 position.

The radiant slab heat pump control loop shall be modified to allow for HP3 to be switched from being staged by the radiant loop (current control) to being staged by the dehumidification loop. To maintain future flexibility, HP3 shall be piped to allow it to be reconfigured to serve the radiant floor loop in future if required, for example to compensate for failure of HP1 or 2 temporarily, and controls shall allow for it to be manually returned to the radiant floor loop.

Dehumidification lockout: When OSA Dewpoint is less than 44F for 2 hours and there is no demand from cooling coil, the buffer tank setpoint shall be reset to 60F.

Delay of 3 minutes (adjustable) between each stage up. Delay of 3 minutes (adjustable) between each stage down.
Operate P-10 through P-13 for 3 minutes after associated heat pump is commanded off.

Dehumidification enable: The dehumidification control loop (including coil pump P-8) shall be enable whenever outside air dewpoint is greater than 48F.

Electrical

Provide all electrical connection and start up of circulation pumps on same day as installation of system to minimize downtime. Electrical is limited to connecting the four new primary pumps serving the heat pumps.

Install Scheduling

Installation work shall be scheduled to minimize system down time. Stage work to allow cut over to new system to occur in one day, with the majority of new piping pre-staged and the new primary pumps wired and ready for operation primary to cutting over to the new piping system. The facility is unoccupied on Mondays; system down time shall be limited to Monday or off business hours.

Equipment Locations

Install all components to maintaining adequate access to existing equipment, including hung equipment and air handler access. Maintain a minimum of 40" from any electrical or control panel and new equipment. Verify site locations with engineer as required.

Balance

All balance devices on the coil loop fed by P-8 shall be wide open; the flow on this side of the loop shall be controlled exclusively by the VFD on P-8.

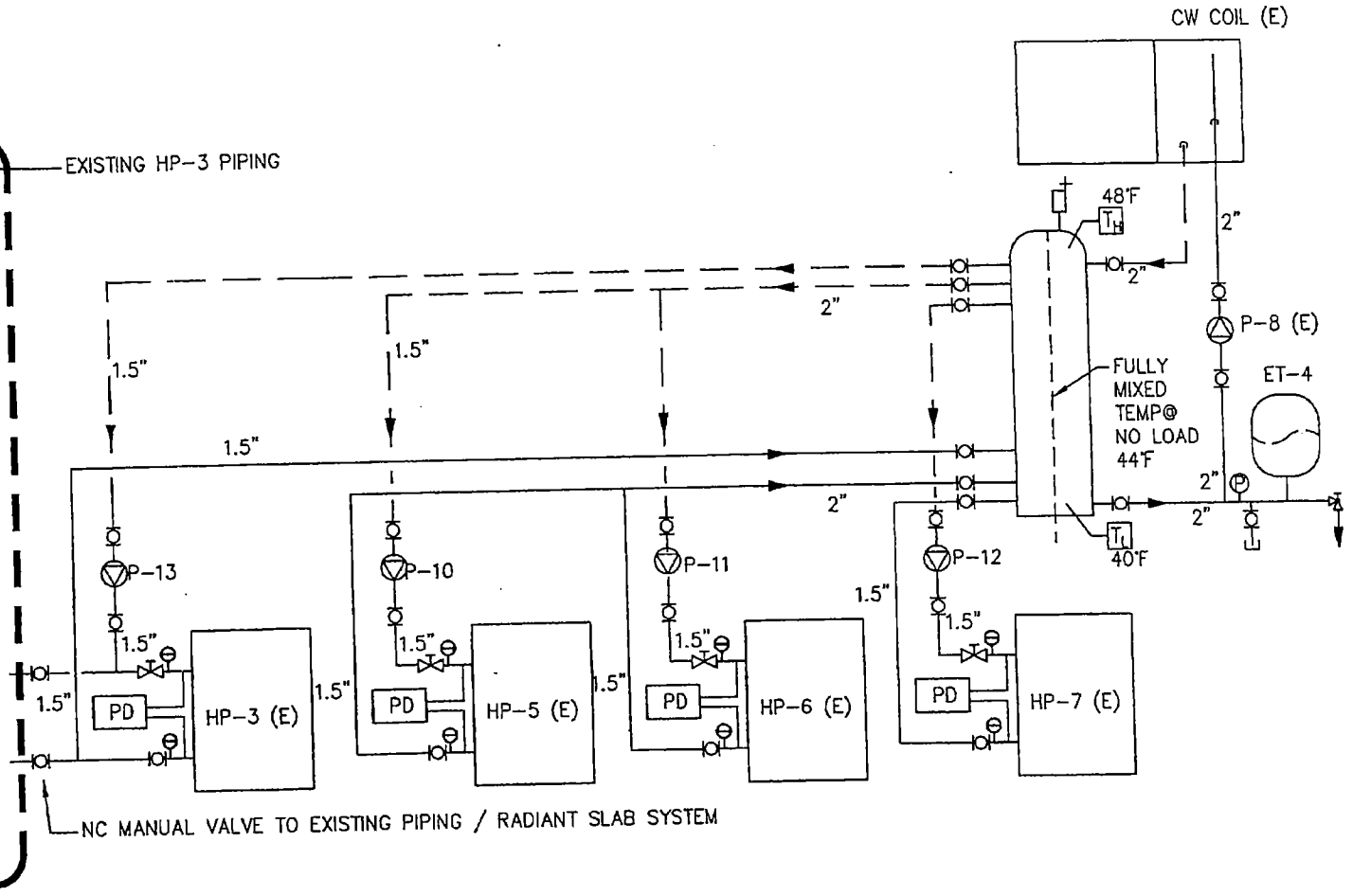
The primary pumps between each heat pump and the buffer tank shall be balanced to 12 gpm per pump.

Submittal Review

Provide submittals for all equipment to Rumsey Engineers for review prior to purchase and start of work.

Summary List of New Equipment
4 Primary circulation pumps with ball valve and manual balance valve
1 Insulated buffer tank, 140-160 gallons
1 Expansion tank, min 2 gallons
4 Differential Pressure Sensors
2 Temperature sensors
Piping as required

Summary List of Existing Equipment
4 Water to water heat pumps
1 Pump P-8
1 Air handler Cooling coil
Piping as feasible for reuse



MAINTAIN EXISTING CONNECTIONS TO CHEMICAL FEED SYSTEM

MAINTAIN EXISTING CONNECTIONS TO FILL STATION

CONNECTIONS TO TANK SAME SIZE AS PIPE; IF PIPES COMBINED PRIOR TO TANK CONNECTION, ENGINEER TO APPROVE UPSIZING REQUIRED

PD = PRESSURE DIFFERENTIAL SENSOR

Rumsey Engineers, Inc

99 Linden Street, Oakland, CA 94607

RUMSEY ENGINEERS

Date: 11.12.09 Project No:

FORT OSAGE - DEHUMIDIFICATION LOOP BUFFER TANK UPGRADE Revision :

Rev. to Dwg/Sht. No: M501

Rev. Dtl. ☐ New Dtl. ☐

1

RUMSEY
ENGINEERS
99 Linden Street
Oakland, CA 94607

Fort Osage

Requirements for Proper Operation of the Heating Ventilating and Air Conditioning System

The Heating Ventilating and Air Conditioning (HVAC) system at Fort Osage will be reviewed over the coming year for proper temperature and humidity control in the Artifact Storage and Curatorial rooms. In addition, the maximum humidity in the general areas of the facility will be monitored in order to verify that maximum humidity requirements are not exceeded. The following key operational requirements must be met by June 1, 2010 and continue throughout the one year verification period to maintain control. Key among the requirements are the following:

1. Maintenance (County): Implement a standard HVAC preventative maintenance schedule based on manufacturer's recommendations in O&M manuals supplied by the contractors. This O&M schedule should be reviewed by Rumsey Engineer's. Maintenance shall include bleeding air from hydronic loops and topping up as required using the fill station on an annual basis. Any equipment failure, such as a failed motor, must be repaired promptly even if a redundant system is providing full control (system shall be repaired upon a component failure, not after full system failure leads to loss of building control).

2. Setpoints must be correct (County): The humidity and temperature setpoints in the artifact and curatorial rooms shall be set to 47.5%RH and 70 F. The humidifiers have their own controller that has to set in addition to the Johnson Controls system. The monthly slab temperature schedule shall also be adjusted as necessary to fine tune comfort in the remaining of the facility. Changes greater than one degree from the original setpoint as laid out in the specifications shall be reviewed and approved by both the county and Rumsey Engineers.

3. Respond to alarms (County): System failures are typically identified and preceded by system alarms. Respond to system alarms with timely maintenance. Any system alarms shall be noted and addressed (the cause identified) within 2 weeks of them being generated. System alarms are presented in a red popup box upon logging into the system locally or remotely. A log of all alarms shall be printed each month and sent to Rumsey Engineers for review.

4. Sensor calibrations (County and Controls): Control to the desired tight tolerance requires frequent calibration (or replacement if the cost is lower) of humidity sensors. Calibrate the relative humidity sensors twice a year. All known humidity sensors available for this type of application require regular calibration to maintain the desired tolerances. The calibration should be accompanied by a calibration certificate from a third party calibration facility. An accuracy check of all humidity sensors using a calibrated hand held sensor should be performed monthly. The recommended handheld temperature and humidity sensor is the Vaisala HM70 (http://www.vaisala.com/instruments/products/hp-hm70.html). In addition, the off cooling coil sensor must also be calibrated annually; this temperature sensor is a critical part of the humidity control system, and should be fundamentally more stable than the humidity sensors. Calibration certificates for all humidity sensors inside the building, outside of the building, hand held humidity sensor and temperature sensor after the cooling coil shall be shared with Rumsey Engineers twice a year. Calibration of these sensors shall be completed at the start of the monitoring period. Monthly reports on the comparison of the handheld humidity sensor reading to the wall mounted sensors shall be shared with Rumsey Engineers at the end of each month.

5. Perform regular water filter maintenance on the humidifier and air filter maintenance on the air handler (County): Excessive water filter fouling will result in the humidifier shutting off to protect the ultrasonic elements from costly damage. Excessive air filter fouling will reduce the air supply quantity and negatively impact the space control.

6. The doors to the humidity controlled spaces must be kept closed to allow for control (County). The door to the curatorial area is frequently left open for long periods of time. In order for humidity to be maintained the door needs to be kept closed at all times except for when entering or leaving the room. In order to insure that the door is closed at all times a door proximity sensor shall be installed in the Johnson Control system.

7. Correct pressure control (Controls): The building was observed to be consistently operating at negative pressure during normal fan operation. This indicates an error in the pressure sensor (calibration, location of sample points, clogged tube, etc) or an error in the balance report. Operation at negative pressure impacts the humidity load and control capability of the space, as well as reducing the effectiveness of the heat recover wheel. The building pressurization sensor needs to be checked and calibrated as necessary. If the sensor is correct, the balance of the HVAC system is faulty and needs to be redone.

8. Intermittent failure of Heat Pump 4 shall be corrected (Warranty Issue). Initial investigation and discussion with factory indicates these nuisance trips are a result of a control board malfunction. While these alarms are currently only a nuisance, they could eventually develop into a problem that causes poor space control if not corrected.

9. If any heat pump alarms occur, they shall be addressed and a manual heat pump reset performed within one business day of the alarm. Heat pumps can be reset through the automatic control system remotely.

10. All outstanding items identified in the commissioning report shall be addressed.

11. System must be monitored to identify problems prior to any impact on control (County, Controls, Rumsey): The very tight control desired requires the system receive a minimum of monitoring. The system allows this monitoring to be done remotely, but the County, Controls Contractor and Rumsey Engineers all need the ability to login and review all points and trends in real time.

12. The heat pump changeover sequence must be verified to not cycle between heat pump heating and heat pump cooling rapidly (more than once in a 24 hour period).

13. Heat pump supply water temperature sensors must be properly calibrated and configured to respond rapidly to changes in supply water temperature. Internal heat pump sensors shall also be verified to be accurate.

14. During the one year monitoring period, Rumsey will not be responsible for any of Johnson Controls time in assisting in data collection. Johnson Controls will be responsible for trending and collecting the data required for verification, as described in the Performance Verification Method. Clarifications as required will be documented in writing and agreed to by both the County and Rumsey Engineers.

15. Any problems with the sequence of operation that are identified by Rumsey Engineers or the county that are deviations from the original specified sequence of operation will need to be rectified by Johnson Controls at their cost.

16. The County will provide a log of all maintenance and breakdowns to Rumsey Engineers on a monthly basis.

RUMSEY ENGINEERS INC
99 Linden Street
Oakland, CA 94607

Fort Osage

Performance Verification of the Heating Ventilating and Air Conditioning System

The performance criteria below are designed to verify correct control of the temperature and humidity in the artifact storage and curatorial rooms at Fort Osage as well as the maximum humidity in the remainder of the facility. The performance of the system shall be verified over a one year period from the date of installation of the equipment identified in the "Dehumidification Loop Buffer Tank Upgrade" scope.

1. Control of the Artifact Storage and Conservation rooms shall meet the indoor criteria of 70 F +/-4F and 47.5% +/- 5% RH when the outdoor air conditions are at or below the ASHRAE 2005 1% Evaporation design condition. These bands shall not be exceeded more than 8 hours in a seven day period.

   Due to humidity sensor accuracy (approximately +/-2%) only one humidity sensor per room will be used to verify the humidity conditions. In the artifact storage room the sensor closest to the humidifier will be used. In the conservation room the sensor on the far wall near the curator's desk will be used. The other humidity sensors will be tracked and calibrated for redundancy purposes but will not be used for compliance verification

2. Control of the relative humidity throughout the entire building shall not exceed 60% RH more than 12 hours in a seven day period.

Humidity readings shall be averaged over 30 minutes to eliminate transient effects (breathing on the sensor, etc.). Wet mopping and other high latent load activities shall be noted and avoided during peak humidity periods (high occupancy). In the open exhibit areas only one relative humidity sensor per floor will be used to verify performance.

Notwithstanding the foregoing, hours of operation of the system when certain events occur shall be excluded from the verification of the above performance standards. Reasons for not counting hours as out of the specified temperature and/or humidity ranges:

1) Equipment failure such as breakdown of key HVAC equipment, control system failure or power outages

2) Maintenance of Equipment that results in disturbance of any of the HVAC systems that affect the temperature and humidity in the areas being measured

3) Humidity sensors have not been calibrated

4) Doors to the curatorial room are left open

5) Outdoor design conditions are beyond the ASHRAE 2005 1% Evaporation Design Condition (88.5 DB, 77.7 WB)

6) Failure of the Johnson Controls system to operate under the sequence of operations as specified in the original construction documents and in subsequent changes provided to Johnson Controls in writing.

7) Added abnormal sources of humidity such as coffee pots or wet mopping are present

8) Fume hood to the curatorial room is left running for more than one hour

9) Design occupancy of the building of 185 people is exceeded or the use is changed such as large dining and dancing event

10) The items in the "Requirements for Proper Operation" are not met

11) Doors to facility on the first or second floor are left open

12) Other operational conditions not to be considered normal.

13) Acts of God or other conditions outside the control of the parties which make it impossible to maintain the specified temperature and/or humidity ranges.

In addition, any 30 minute period following the door being opened to the Conservation Room shall be excluded from the time period counted for humidity control.

The site outdoor air sensors shall be calibrated and maintained to monitor this condition; site conditions can vary significantly from local weather station due to the proximity of the river and other site characteristics.

The only temperature and humidity sensors used to verify acceptable performance will be those connected to the Johnson Control System. Other sensors or loggers will not be used.

County will be responsible for setting up the monitoring of the building HVAC system including the temperatures and humidities. All points in the Johnson Controls system that relate to the HVAC system will be monitored on at least a 15 minute interval. As needed Rumsey Engineers will request that some points be monitored on one minute intervals. Either Rumsey Engineers will be given the ability to implement this or County will implement it. All data will be presented by the County to Rumsey Engineers on a monthly basis for review and verification. This data will be presented in printed graphs and electronic format. Rumsey Engineers will be

given the ability to log into the Johnson Controls system throughout the verification period. At any time if the remote login capability is not maintained, the humidity verification will be suspended during the time that Rumsey Engineers is not able to log in.

Monitoring Start Date: Estimated 9/1/10 – Monitoring will start after new equipment is installed and tested and commissioned.

Monitoring End Date: Estimated 8/31/11