

## COMMISSIONING PROGRESS REPORT



Project: **Greybull Elementary School - Big Horn County School District #3**

Date: **9/24/2007**

Reporting Period: **Week Ending 9/28/2007**

Report No.: **Cx-004**

### 1. Meeting Attended

The following table summarizes meetings attended pertaining to M&E commissioning:

| <i>Meeting &amp; Agenda</i> | <i>EMC Attendees</i> | <i>Meeting Date</i> | <i>Results /Reference</i> |
|-----------------------------|----------------------|---------------------|---------------------------|
| OAC Meeting                 | JT                   | 10/11/2006          |                           |
| OAC Meeting                 | JT                   | 12/13/2006          |                           |
| OAC Meeting                 | JT                   | 1/17/2007           |                           |
| Cx Coordination Meeting     | CMM / TCP            | 9/24/2007           | Cx Progress Report #4     |
|                             |                      |                     |                           |
|                             |                      |                     |                           |
|                             |                      |                     |                           |
|                             |                      |                     |                           |

### 2. Site Visits Accomplished

The following table summarizes site visits made to survey construction progress and to assess any deficiencies pertaining to commissioning and/or project specifications.

| <i>Site Visit Date</i> | <i>Performed By</i> | <i>Purpose</i>                           | <i>Results /Reference</i> |
|------------------------|---------------------|--|---------------------------|
| 4/4/2007               | JT                  | Construction Observation                 |                           |
| 5/23/2007              | JT                  | Construction Observation                 |                           |
| 6/13/2007              | JT                  | Construction Observation                 |                           |
| 6/25/2007              | JT                  | Construction Observation                 |                           |
| 7/17/2007              | JT/CMM              | Functional Testing                       | Cx Progress Report #1     |
| 7/31/2007              | JT/CMM              | Functional Testing                       | Cx Progress Report #2     |
| 8/1/2007               | JT/CMM              | Functional Testing                       | Cx Progress Report #2     |
| 8/2/2007               | JT/CMM              | Witness CSI Room Controls Training       |                           |
| 8/20/2007              | CMM                 | Functional Testing on HRV-1, Efs and GUH | Cx Progress Report #3     |
|                        |                     |  |                           |

### 3. Status of Commissioning Field Report

Date of Last Revision: 7/24/2007  
 Number of issues to date: 33  
 Number of open issues: 9  
 Number of closed issues: 24  
 Oldest open issue to date: 7/18/2007

### 4. Open Action Items

Please refer to:  
**Issues Log--** Sheet attached to this Excel file.

### 5. Status of Commissioning RFI Log:

The following table summarizes the commissioning RFI's to date:

| <i>RFI No.</i> | <i>Topic</i> | <i>Response Received?</i> | <i>Closed?</i> |
|----------------|--------------|---------------------------|----------------|
|                |              |                           |                |
|                |              |                           |                |
|                |              |                           |                |
|                |              |                           |                |
|                |              |                           |                |
|                |              |                           |                |
|                |              |                           |                |

### 6. Upcoming Goals/Milestones

The following table summarizes the estimated dates of completion of upcoming commissioning milestones.

| <i>Milestone</i>                     | <i>Est. Completion Date</i> | <i>Responsible Party</i> |
|--------------------------------------|-----------------------------|--------------------------|
| Mechanical Startups - Heating System | 6/29/2007                   |                          |
| Hydronic Flush/Fill                  | 6/15/2007                   |                          |
| Airside TAB Completion               | 8/10/2007                   | Finn                     |
| Controls Completion                  | 7/27/2007                   | CSI                      |
| Point to Point Testing               | 8/3/2007                    | EMC                      |
| Functional Testing                   | 8/3/2007                    | EMC                      |
| Training                             |                             |                          |
| O&M Review                           |                             |                          |
| Final Cx Report                      |                             |                          |

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**7. Progress of Functional Testing**

The following table summarizes the completion of functional testing for mechanical equipment.

|                     | Point  | Alarm | Occ. | Heating Mode | Econo. Mode | Cooling Mode | Unocc. Mode | Night Setback | Lighting Controls | Issue Number |
|---------------------|--|-------|------|--------------|-------------|--------------|-------------|---------------|-------------------|--------------|
| <b>AHUs</b>         |  |       |      |              |             |              |             |               |                   |              |
| AHU-1               |  |       |      |              |             |              |             |               |                   |              |
| <b>HRVs</b>         |  |       |      |              |             |              |             |               |                   |              |
| HRV-1               |  |       |      |              |             |              |             |               |                   |              |
| HRV-2               |  |       |      |              |             |              |             |               |                   |              |
| <b>Heat Pumps</b>   |  |       |      |              |             |              |             |               |                   |              |
| HP 1-1              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-2              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-3              |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 1-4              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-5              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-6              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-7              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-8              |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 1-9              |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-10             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-11             |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 1-12             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-13             |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 1-14             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-15             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-16             |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 1-17             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-18             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-19             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 1-20             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 2-1              |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-2              |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 2-3              |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-4              |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 2-5              |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-6              |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-7              |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 2-8              |  |       |      |              | NA          |              |             | NA            |                   |              |
| HP 2-9              |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-10             |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-11             |  | NT    | NT   | NT           | NT          | NT           | NT          | NA            | NT                |              |
| HP 2-12             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 2-13             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 2-14             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 2-15             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| HP 2-16             |  | NT    | NT   | NT           | NA          | NT           | NT          | NA            | NT                |              |
| <b>UH's</b>         |  |       |      |              |             |              |             |               |                   |              |
| GUH-1               |  |       |      |              | NA          | NA           | NA          | NA            | NA                |              |
| <b>Pumps</b>        |  |       |      |              |             |              |             |               |                   |              |
| HPDP-1              |  |       |      |              | NA          | NA           |             |               |                   |              |
| HPDP-2              |  |       |      |              | NA          | NA           |             |               |                   |              |
| CP-1                |  |       |      |              |             |              |             |               |                   |              |
| <b>Exhaust Fans</b> |  |       |      |              |             |              |             |               |                   |              |
| EF-1                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| EF-2                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| EF-3                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| EF-4                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| EF-5                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| EF-6                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| EF-7                |  | NA    |      | NA           | NA          | NA           | NA          | NA            | NA                |              |
| DF-1                |  | NA    |      | NA           | NA          | NA           |             |               | NA                |              |
| DF-2                |  | NA    |      | NA           | NA          | NA           |             |               | NA                |              |
| 1                   | Refer to Open Issues Log for reason testing is not complete.   |       |      |              |             |              |             |               |                   |              |
| <b>Legend</b>       |  |       |      |              |             |              |             |               |                   |              |
|                     | System mode has been tested, and system test has passed.   |       |      |              |             |              |             |               |                   |              |
|                     | System mode has been tested, but system test did not pass. Or test is only partially completed. Retest required. |       |      |              |             |              |             |               |                   |              |
|                     | System mode has not been tested.   |       |      |              |             |              |             |               |                   |              |
|                     | NA System mode does not apply to this piece of equipment.  |       |      |              |             |              |             |               |                   |              |
|                     | NT Unit not selected for testing, contract requires 30% of heat pumps.   |       |      |              |             |              |             |               |                   |              |

**Open Issues Log**

Updated on: **9/24/2007**

by: **CMM**

Number of issues: **9**

| Item No.* | Date Noted | Vendor or Contractor      | Affected Equipment   | Issue Description   | Issue Status   | Resolution Date |
|-----------|------------|---------------------------|----------------------|---|--|-----------------|
| 1         | 7/18/2007  | Elec                      | Lighting             | In the room served by HP 2-8 two of the overhead fixture lamps turned off when dimmed.  | Cx recommends the light fixture be checked for loose/faulty connections, or replaced.  |                 |
| 2         | 7/18/2007  | Elec                      | Lighting             | The room controller in room 321 would not allow the occupant to dim the all the lights. One of the ballasts would not dim.  | Cx recommends the electrician check the ballast connections and fix any lose or faulty connections.  |                 |
| 3         | 7/31/2007  | Elec                      | Lighting             | A single ballast in the computer room is not allowing power to be supplied to the lamps. When the lights are dimmed, the lamps to this ballast flicker.   | Cx recommends the electrician verify that the light ballast was installed correctly and check for any faulty wiring.   |                 |
| 4         | 7/31/2007  | Elec                      | Lighting             | The fixtures in room 305 is not providing enough power to the lamps although a 10V signal is being sent to the ballasts.  | Cx recommends these fixtures be checked for faulty connections and/or faulty hardware.   |                 |
| 5         | 8/1/2007   | GC                        | GUH-1                | The prefunctional checklist has not been filled out by any of the sub-contractors.  | Cx recommends the GC inform the sub-contractors about the issue and ask them to fill out the prefunctional checklist for the specified equipment.  |                 |
| 6         | 8/1/2007   | Mech.                     | HWR Pipe             | Cx was unable to locate the T-P valve to measure the HWR Temperature in the pipe.   | Cx recommends the Mechanical contractor or CSI locate either the T-P valve or a location near the sensor where the Cx can determine the HWR temperature inside the pipe.   |                 |
| 7         | 8/20/2007  | Mech.                     | DHM Pipe             | Domestic hot water piping may be installed incorrectly. The domestic cold water pipe feels hot to the touch close to the domestic hot water heater just after the "Hot-Cold" valve in the mechanical room. The 110°F domestic hot water pipe reads 132°F on the pipe temperature gauge.   | Cx recommends the mechanical contractor inspect the piping installation again to insure that domestic hot water isn't bleeding off into the cold water stream.   |                 |
| 8         | 8/20/2007  | GC                        | Roof                 | Shingles are missing on the roof near both of the HRV's.  | Cx recommends these shingles be installed.   |                 |
| 9         | 8/20/2007  | TAB / Mechanical Engineer | Ground Source piping | The ground source piping was not balanced by TAB contractor. CSI reports that heat pumps are tripping out when the ground source water exceeds ~80°F to 85°F. TAB claims the ground source piping balancing was not in their scope of work per the specifications. TAB also claims their wasn't any specifications to balance the fields. | Cx will investigate TAB's claim regarding the specifications and their scope of work. Cx also recommends the mechanical engineer investigate the lack of TAB specification for the ground source water loop. Cx recommends the ground source loop be balanced to ensure proper heat pump function. |                 |

**Closed Issues Log**

Updated on: **9/24/2007**

by: **CMM**

Number of issues: **24**

| Item No.* | Date Noted | Vendor or Contractor | Affected Equipment            | Issue Description  | Issue Status   | Resolution Date |
|-----------|------------|----------------------|-------------------------------|--|--|-----------------|
| 1         | 7/18/2007  | CSI                  | HP 2-7                        | The discharge air temp sensor read 5.9 degrees low.  | Recalibrated by CSI.   | 7/18/2007       |
| 2         | 7/18/2007  | CSI                  | HP 2-11                       | The discharge air temp sensor read 3.7 degrees low.  | Recalibrated by CSI.   | 7/18/2007       |
| 3         | 7/18/2007  | CSI                  | HP 2-4                        | The space temp sensor read 3.9 degrees high.   | Recalibrated by CSI.   | 7/18/2007       |
| 4         | 7/18/2007  | CSI                  | HP 2-4                        | The room controller was not allowing the user to manual adjust the room lighting level.  | CSI released the lamps from the 100 hour burn in   | 7/18/2007       |
| 5         | 7/18/2007  | Elec/CSI             | Lighting                      | In room 321 when motion was not detected in the room two lamps remained at full brightness and the remainder were dimmed to a very low level. All lamps should have been turned off. | The motion sensor was re-adjusted by CSI.  | 7/31/2007       |
| 6         | 7/31/2007  | CSI                  | HP 1-11                       | The room controller was not allowing the user to manual adjust the room lighting level.  | CSI released the lamps from the 100 hour burn in   | 7/31/2007       |
| 7         | 7/31/2007  | CSI                  | Computer Room lighting sensor | The lighting sensor was not providing the DDC with a reading. Further investigation revealed the input/output wires were reversed.   | CSI corrected the reversed wiring.   | 7/31/2007       |
| 8         | 7/31/2007  | CSI                  | OT/PT room Lights             | There wasn't a signal being received from the lighting sensor to the DDC. Further investigation revealed that the sensor was wired incorrectly.                                      | CSI/Elec corrected the issue.  | 7/31/2007       |
| 9         | 7/18/2007  | CSI                  | Controls                      | When the north and south wings controls LANs were connected a programming problem caused the system to lose control of the heat pumps. EMC had to quit testing at this time.         | 7/20/2007 - The programming problem has been found and repaired, testing will resume on 31 July  | 8/1/2007        |
| 10        | 7/31/2007  | CSI/Elec             | Lighting                      | Lighting level setpoint is 50 foot candles, but most of the lights peaked at ~30 foot candles.   | CSI talked to Kevin Pope, Greybull ES GC supervisor, about the lighting level. Kevin Pope said the lights were only sized for 30 foot candles, not 50 foot candles.    | 8/1/2007        |
| 11        | 8/1/2007   | CSI                  | Lighting                      | Lights in room 311 would not dim when commanded to by the room controller.   | CSI corrected the issue  | 8/1/2007        |
| 12        | 8/1/2007   | CSI                  | AHU-1                         | The Multipurpose room temperature sensor was out of calibration compared to Cx thermocouple reading.   | CSI recalibrated the temperature sensor.   | 8/1/2007        |
| 13        | 8/1/2007   | CSI                  | AHU-1                         | The Unoccupied Mode Multipurpose room heating call did not enable the supply fan, DF-2, or actuate the mixed air or discharge air dampers.   | Investigation into the issue revealed missing code in the program logic. CSI corrected the issue and the functionality of the item in question was verified by the Cx. | 8/1/2007        |

Updated on: 9/24/2007

by: CMM

Number of issues: 24

| Item No.* | Date Noted | Vendor or Contractor                | Affected Equipment   | Issue Description  | Issue Status   | Resolution Date |
|-----------|------------|-------------------------------------|----------------------|--|--|-----------------|
| 14        | 8/1/2007   | CSI                                 | Pumps                | When P-2 was made lead pump and power loss was simulated, a program error occurred that prevented P-1 from enabling after the alarm was signaled in the DDC. The logic was missing the alarm special case operation programming. | The logic was missing the alarm special case operation programming. CSI inserted the missing code and the Cx was able to verify the code's functionality.                | 8/1/2007        |
| 15        | 8/1/2007   | CSI                                 | HP 1-11              | Heat pump did not go to constant fan when motion was detected by the motion sensor.  | CSI discovered the heat pump was not linked to the occupancy program. CSI corrected a programming error.   | 8/1/2007        |
| 16        | 8/1/2007   | CSI                                 | HP 1-6               | Lights would not dim when commanded to.  | CSI fixed the programming error.   | 8/2/2007        |
| 17        | 8/1/2007   | Elec/JCI/<br>Mechanical<br>Engineer | HRV-1                | HRV-1 SF current exceeded the name plate data for the motor. The VFD Display read 17.5 Amps @ 87% motor speed. The motor is rated at 14.5 Amps @ 100% motor speed. The HRV was shut down until this issue is resolved.           | The excess current was caused by an incorrect parameter input into the VFD for both of the HRV supply fans. The issue was resolved by CSI.                               | 8/10/2007       |
| 18        | 8/1/2007   | CSI                                 | Heat Pumps           | When the lights for all the classrooms are manually commanded off, the heat pump fan is disabled.  | CSI corrected the programming issue.   | 8/2/2007        |
| 19        | 8/1/2007   | Elec/CSI                            | DF-1, 2              | Cx was unable to verify the duct furnaces were enabling when commanded to do so by the controls. CSI suspects the power supply/breakers to the duct furnaces were disconnected.  | The power supply was connected to the duct furnaces. Duct furnaces were retested by Cx and CSI. The results of the test indicate the duct furnaces are fully functional. | 8/2/2007        |
| 20        | 7/31/2007  | CSI                                 | HP 2-4 Motion sensor | The motion sensor has a longer time delay than the other motion sensors in the building. Instead of a 5 minute delay before the unit is controlled to Stand-by Mode, the unit takes 10 minutes for Stand-by to be enabled.       | CSI made adjustments to the sensor. The sensor is operating normally.  | 8/2/2007        |
| 21        | 6/25/2007  | LMO                                 | Ceiling              | In two places in the Music Room the ceiling grid is directly suspended from the ductwork.  | Ceiling grid suspended from duct has been moved.   | 9/24/2007       |
| 22        | 8/1/2007   | Elec                                | Lighting             | Outside Lighting is not installed  | Exterior lights have been installed  | 9/24/2007       |
| 23        | 8/20/2007  | GC                                  | Dishwasher           | The dishwasher is not working. Unable to test the hood exhaust fan.  | Dishwasher is operational.   | 9/24/2007       |
| 24        | 8/20/2007  | Elec.                               | GUH-1                | Power supply is not connected to the unit.   | Power has been connected to the unit.  | 9/24/2007       |