



Department of Public Works  
**City Engineering Division**

Robert F. Phillips, P.E.  
**City Engineer**

City-County Building, Room 115  
210 Martin Luther King, Jr. Boulevard  
Madison, Wisconsin 53703  
FAX 608 264 9275  
Textnet 866 704 2315  
www.cityofmadison.com

**608 266 4751**

**Assistant City Engineer**  
Michael R. Dailey, P.E.

**Principal Engineers**  
Christina M. Bachmann, P.E.  
John S. Fahrney, P.E.  
Gregory T. Fries, P.E.  
Christopher J. Petykowski, P.E.

**Facilities & Sustainability**  
Jeanne E. Hoffman, Manager  
James C. Whitney, A.I.A.

**Operations Supervisor**  
Kathleen M. Cryan

**GIS Manager**  
David A. Davis, R.L.S.

**Financial Officer**  
Steven B. Danner-Rivers

**Hydrogeologist**  
Brynn Bemis

**April 18, 2012**

**NOTICE OF ADDENDUM**

**ADDENDUM NO. 1**

**CONTRACT 6586**

**FIRE STATION NO. 2 REMODEL**

**SPECIFICATIONS**

**Add Section 10 56 13 – Metal Storage Shelving.**

1. Section 10 56 13 is attached to this Addendum.

**Section 05 50 00 – Metal Fabrications**

1. Under sub-section 2.3 add the following:

“H. Ships' Ladders:

1. Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide grating treads and landing.
  - a. Fabricate exterior ships' ladders including railings from galvanized steel.

“J. Counter Supports:

1. Provide L-shaped steel tube brackets where indicated. Fabricate from 1” x 1” steel tube with welded connections.

**Section 10 28 00 – Toilet Accessories**

1. Under sub-section 2.3 add the following:

“P. Waste Receptacles:

Open Semi-Recessed Stainless Steel Type: Fabricate with seamless exposed flange, removable receptacle with seamless exposed walls, hemmed edges, secured by tumbler lockset. Furnish heavy-duty vinyl removable liner, secured to receptacle at not less than 4 points by means of grommets, stainless steel hooks; minimum 10.5 gallon capacity.

**Section 23 05 93 – Testing, Adjusting and Balancing.**

1. Page 1: 1.3.D – Acceptable Contractors: Replace paragraph with the following:
  - D. “Acceptable contractors: Work shall be performed by an independent firm which specializes in the testing and balancing of HVAC systems, is NEBB certified in the specific area of work to be performed, and has performed testing and balancing work for a minimum of 3 years. Qualifications shall be submitted for approval.”

**Section 23 25 00 – Chemical Treatment**

2. Delete entire section and replace with revised Section 23 25 00 which is attached to this Addendum.

**Section 23 90 00 - Temperature Control System**

1. Page 34: line 11-12, revise as follows: If space temperature falls below 50 deg F. (adj.) override unit heater **HW valve command to maintain 50 deg F. (adj.)** interlock and send an alarm to the BAS.
2. Page 34: line 26-27, revise as follows: Vary pump speed of lead pump VFD to maintain differential pressure set point **(5.0 psi, adj.)** ~~determined by the balancing contractor.~~ **The Balancing contractor shall revise the differential pressure set point.**

**Section 23 90 01 - Temperature Control System Points List**

1. Delete entire section and replace with revised Section 23 90 01 which is attached to this Addendum.

**DRAWINGS**

**Sheet C201**

1. 2/C201 Site Remodeling Plan, add the following note in the east parking lot: “Re-paint all existing parking stall lines with pavement marking paint.”

**Sheet A001**

2. Door/Frame/Hardware Schedule: add Door Number 112 to the Schedule. Except for the swing, Door 112 is to be the same as Door 113.

**Sheet A701**

1. Add soap dish in all shower stalls, constructed of solid surface material to match wall panels and adhesively attached to wall. In handicapped shower provide two soap dishes and Install one to comply with ADA requirements.
2. Drawing 3/A701: add Partition Type E10 to the west wall. Partition E10 extends floor to structure and is located behind Partition F02 to enclose the duct shaft.

**Sheet A801**

1. Delete entire sheet and replace with revised Sheet A801 which is attached to this addendum. [Note: the window installation details on this sheet have been revised to add wood blocking and trim. Other details remain unchanged.)

**Sheet S201**

1. 1/S201, Foundation Plan: add notes for window cut-outs as shown on Sheet AD1-1 which is attached to this Addendum.
2. 2/S201, Upper floor Framing Plan: add notes for lintels over windows as shown on Sheet AD1-2 which is attached to this Addendum.

**ATTACHMENTS**

Section 10 56 13 – Metal Storage Shelving (2 pages)

Section 23 25 00 – Chemical Treatment (6 pages)

Section 23 90 01 - Temperature Control System Points List (5 pages)

Sheets AD1-1 and AD1-2, 8½" x 11" drawings dated 04-16-12.

Sheet A801, 30" x 42" drawing dated 04-16-12.

Electronic version of these documents can be found on the City of Madison web site at:

<http://www.cityofmadison.com/business/pw/requestForProposals.cfm>

If you are unable to download any forms associated with the addendum, please contact the Engineering office at 608-266-4751 to receive the material by another route.

A handwritten signature in black ink, appearing to read 'R. Phillips', is written over a horizontal line.

Robert F Phillips, City Engineer

**SECTION 10 56 13 - METAL STORAGE SHELVING**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS:

- A. Applicable provisions of Division 1 shall govern work under this Section.

1.2 DESCRIPTION OF WORK:

- A. Extent of storage shelving is shown on drawings.
- B. Types of storage shelving required include the following.
1. Bracketed-type cantilevered metal wire units.

1.3 QUALITY ASSURANCE:

- A. Manufacturers: Provide each type of storage shelving by one manufacturer for entire project.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of storage shelving.

**PART 2 - PRODUCTS**

2.1 MATERIALS:

- A. Shelving system base metal: Steel.
- B. Fasteners: Cadmium-plated steel, manufacturer's standard types and sizes.

2.2 FABRICATION:

- A. General: Fabricate work in shop to greatest extent possible, before application of finishes. Remove sharp and rough edges and corners from cut metal and grind welds smooth. Design components, joints, and connections to withstand most severe possible loading condition, with normal safety factor.
- B. Bracketed-type Cantilevered Metal Wire Units:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Metro "SuperErectra" shelving system or approved equal.
2. Wall mounting system:
- a. Wall mounted shelving system: Erectra Shelf.
- b. 12" deep shelf unit.
- c. Post type wall mounts and brackets.
- d. Provide attachment hardware.

- e. Provide lengths as indicated in a single span when available.
- f. Provide vertical assembly to accommodate number of shelves indicated.
- g. Provide all major system components with Chrome Plated Steel finish.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION:**

##### **A. Bracketed Cantilevered Metal Wire Units:**

1. Install units at locations shown, in continuous ranges made up of single units shown, complying with manufacturer's instructions. Set units plumb and level, using adjustable leveling devices.
2. Assemble bracing system as necessary for stability, extending and fastening frame members to supporting structure.
3. Install shelves at vertical spacing indicated or, if not indicated, at equal spacing in each unit.
4. Install accessory items in locations indicated.

#### **3.2 ADJUST AND CLEAN:**

- ##### **A. Verify that moving parts are operating freely. Clean exposed surfaces and touch-up marred finishes or replace components as necessary to eliminate evidence of damage or deterioration.**

**END SECTION 10 56 13**

**DIVISION 23 - HVAC**

**SECTION 23 25 00 - CHEMICAL TREATMENT**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Applicable provisions of Division 1 shall govern work under this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of chemical treatment equipment work required by this section is indicated on drawings and schedules and by requirements of this section.
- B. Refer to other Division 23 sections for boilers, piping, specialties, concrete pads and field applied tank insulation, required for installation of chemical treatment equipment; not work of this section.
- C. Electrical Work: Provide the following wiring as work of this section, in accordance with requirements of Division 26:
1. Low voltage control wiring between chemical treatment equipment units and remote mounted thermostats and controls.
  2. Provide factory mounted and factory wired controls and electrical devices as specified in this section.
- D. Refer to Division 26 sections for other electrical wiring including motor starters, disconnects, wires/cables, raceways and other required electrical devices; not work of this section.

1.3 SUBMITTALS

- A. Manufacturer's Literature and Data including:
1. Cleaning compounds and recommended procedures for their use.
  2. Chemical treatment for closed systems, including installation and operating instructions.
  3. Chemical data to include the description of the chemical, its composition, its function, and the associated material safety data sheet.
- B. Maintenance Data: Submit maintenance data and parts lists for each chemical treatment equipment item, including "trouble shooting" maintenance guide. Include this data, product data, shop drawings and wiring diagram in maintenance manual; in accordance with requirements of Division 1.

1.4 OPERATION AND MAINTENANCE DATA

Provide for the services of the manufacturer's trained representative to approve the installation and instruct the user agency in the operation of each system.

Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures

1 including target concentrations.

## 2 3 1.5 DESIGN CRITERIA

4 Recommend a periodic test procedure and chemical treatment program for each system.

5 Treat the following systems:

- 6 • Hot water

7  
8 Provide the initial chemical treatment for all systems based on a complete system fluid analysis  
9 prior to the equipment installation. The initial chemical treatment supply of chemicals for each  
10 system shall be adequate for the start-up and testing period, for the time the systems are being  
11 operated by the Contractor for temporary heating and cooling, and for one year after start-up of  
12 the system.

13 The chemicals used in the water treatment system shall use only liquid chemicals and shall  
14 contain no phosphates, sodium nitrates or chromates. Chemicals shall be non-toxic approved by  
15 local authorities and meeting applicable EPA requirements.

16 Provide electrical devices, motors, wiring and conduit in accordance with the applicable sections  
17 of the Electrical Specifications.

## 18 MAINTENANCE SERVICE

19 Furnish service and maintenance of treatment systems for one year from date of substantial  
20 completion.

21 Provide monthly technical service visits to perform field inspections and make water analysis on  
22 site. Detail findings in writing on proper practices, chemical treating requirements, and corrective  
23 actions needed. Submit two copies of field service report after each visit.

24 Provide laboratory and technical assistance services for the warranty period.

25 Include two hour training course for operating personnel, instructing them on installation, care,  
26 maintenance, testing, and operation of the treatment systems. Arrange course at startup of  
27 systems.

28 Provide site inspection of equipment during scheduled shutdown to evaluate success of the  
29 treatment program. Make recommendations in writing based on these inspections.

## 30 1.6 QUALITY ASSURANCE

31 A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of chemical  
32 treatment equipment, of types and capacities required, whose products have been in  
33 satisfactory use in similar service not less than 5 years.

34 B. Installer's Qualifications: Firm with at least 3 years of successful installation experience  
35 on projects with chemical treatment equipment work similar to that required for project.

36 C. Codes and Standards:

37 1. UL and NEMA Compliance: Provide electric motors and ancillary electrical  
38 components which are UL listed and labeled and which comply with NEMA  
39 standards.

40 2. NEC Compliance: Install chemical treatment equipment in accordance with  
41 applicable electrical requirements of NFPA 70, "National Electrical Code."

3. ASME Compliance: Comply with applicable requirements of ASME Boiler and Pressure Vessel Code.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Fremont Industries, Mitco Water Labs, Nalco Chemical Co., or approved equal.  
Coordinate chemical treatment with City of Madison Engineering.

### **2.2 SYSTEM CLEANER**

Blend of organic alkaline penetrants, emulsifiers, surfactants and corrosion inhibitors that remove grease and petroleum products from the interior of piping systems. Cleaners that contain trisodium phosphate are specifically **NOT** acceptable. (Trisodium phosphate will react with calcium to form a calcium phosphate precipitate in most Wisconsin water. This will reduce heat transfer and increase system pressure drop.)

### **2.3 SYSTEM INHIBITOR**

Scale and corrosion inhibitor consisting of boron nitrite, benzol thiazol, benzotriazole, mercapto-benzo-thiazole, and tolyltrizole silicates.

### **2.4 ALGAECIDES**

Chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or microbiocides such as quaternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones, all in a liquid format.

### **2.5 CLOSED WATER SYSTEM TREATMENT**

- A. Sequestering agent to reduce deposits and adjust pH: polyphosphate.
- B. Corrosion inhibitors:
1. Molybdate based inhibitors.
  2. Sodium nitrate will not be acceptable
  3. Inhibitor must be compatible with all metals in system inc. stainless steel and aluminum
  4. pH Control: Inhibitor formulation shall include adequate buffer to maintain pH range of 8.0 to 10.5
  5. Performance: Protect various wetted, coupled, materials of construction including ferrous, and red and yellow metals. Maintain system essentially free of scale, corrosion, and fouling. Corrosion rate of following metals shall not exceed specified mills per year penetration; ferrous, 0-2; brass, 0-1; copper, 0-1. Inhibitor shall be stable at equipment skin surface temperatures and bulk water temperatures of not less than 121 degrees C (250 degrees F) and 52 degrees C (125 degrees Fahrenheit) respectively. Heat exchanger fouling and capacity reduction shall not exceed that allowed by fouling factor 0.0005.

- C. Conductivity enhancers: phosphates or phosphonates.

### **2.6 CLOSED WATER SYSTEM TREATMENT EQUIPMENT**

- A. General: Provide shot feeders of 5 gallon capacity or otherwise as indicated, constructed of cast iron or steel, for introducing chemicals in hydronic system. Provide funnel and valve on top for loading, drain valve in bottom and recirculating valves on side. Construct for pressure rating of 125 psi.
- B. Manufacturer: Subject to compliance with requirements, provide shot feeders of one of the following: Culligan USA; Vulcan Laboratories, Subsidiary of Clow Corp.; York-Shipley,



1 Inc.; or approved equal.

2  
3 C. Install a separate bypass type feeder at the pumps for each closed hot water heating and  
4 chilled water cooling system. Provide a separate set of supply and return lines from each  
5 pump in the system and install ball valves in each of these lines. Locate the system  
6 connection that supplies the feeder upstream of the discharge shutoff valve for the pump.  
7 Locate the system connection that returns treatment back to the system at a convenient  
8 point downstream of the pump discharge shutoff valve. Provide a drain valve at the  
9 bottom of the feeder.

10  
11 D. Install a water meter upstream of the pressure reducing valve in the makeup line to each  
12 closed system. Locate the meter on the domestic water side of the pressure reducing  
13 valve and in such a manner that the meter can be easily read.

### 14 **PART 3 - EXECUTION**

#### 15 **3.1 EXAMINATION**

16  
17 A. Examine areas and conditions under which chemical treatment equipment is to be installed. Do  
18 not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable  
19 to Installer.

#### 20 **3.2 INSTALLATION OF CHEMICAL TREATMENT EQUIPMENT**

21  
22 A. General: Install chemical treatment equipment in accordance with manufacturer's installation  
23 instructions. Install units plumb and level, firmly anchored in locations indicated and maintain  
24 manufacturer's recommended clearances.

25  
26 B. System shall include all the chemicals required during the first year of operation and the man-  
27 hours required for system monitoring every 30 days. Chemicals shall provide for control caustic  
28 and alkaline properties of water as required for the systems.

29  
30 C. Accessories: Install chemical treatment equipment accessories not installed at factory.

#### 31 **3.3. CLEANING SEQUENCE**

32  
33 A. Systems are to be cleaned before they are used for any purpose except conduct pressure test  
34 before cleaning. Add cleaner to closed systems at concentrations as recommended by the  
35 manufacturer. Remove water filter elements from the system before starting circulation. For  
36 steam systems, fill boilers only, using the water and cleaner solution.

37  
38 1. Before adding cleaning chemical to the closed system, all air handling coils and fan coil  
39 units should be isolated by closing the inlet and outlet valves and opening the bypass  
40 valves. This is done to prevent dirt and solids from lodging the coils.

41  
42 2. Do not valve in or operate system pumps until after system has been cleaned.

43  
44 3. After chemical cleaning is satisfactorily completed, open the inlet and outlet valves to  
45 each coil and close the by-pass valves. Also, clean all strainers.

46  
47 B. Use neutralizer agents on recommendation of the system cleaner supplier and approval of the  
48 Architect/Engineer.

49  
50 C. Flush open systems with clean water for one hour minimum. Drain completely and refill.

51  
52 D. Remove, clean, and replace strainer screens.

53  
54 E. Inspect, remove sludge, and flush low points with clean water after cleaning process is  
55 completed. Include disassembly of components as required.

1 F. Use attached form to document system cleaning, flushing, and proper startup.  
2

3 A. HOT WATER HEATING SYSTEMS:

- 4 1. Add cleaner to the system water until the M alkalinity value is 250 above that of the initial  
5 fill water. Verify the M alkalinity level before and after the addition of the cleaner by  
6 means of chemical tests that are observed by the Owner's construction representative;  
7 include results of all tests in the Operating and Maintenance manuals. Apply heat while  
8 circulating, slowly raising temperature to 160°F and maintain for 12 hours minimum; vent  
9 all high points to assure 100% system circulation. Remove heat and circulate to 100°F or  
10 less; drain system as quickly as possible and refill with clean water. Circulate for 6 hours  
11 at design temperature, vent air at all high points, then drain. Refill with clean water and  
12 repeat until the system cleaner is removed and the M alkalinity level returns to normal.  
13 Remove and clean all strainers. Re-vent the system and install clean filter elements in  
14 water filters. Treat with scale and corrosion inhibitors before using the system for  
15 building heating or cooling.  
16

17 3.3 CLOSEOUT PROCEDURES  
18

- 19 A. Training: Provide services of manufacturer's technical representative for a 4-hour period  
20 to instruct owner's personnel in operation and maintenance of chemical treatment  
21 equipment. Schedule training with owner, provide at least 7-day notice to contractor and  
22 engineer of training date.  
23

24 END SECTION 23 25 00

# PIPE CLEANING AND TREATMENT REPORT

|                            |  |                   |  |                       |  |
|----------------------------|--|-------------------|--|-----------------------|--|
| <b>Project Name:</b>       |  | <b>Test Date:</b> |  | <b>Location:</b>      |  |
| <b>Testing Contractor:</b> |  | <b>System:</b>    |  | <b>System Volume:</b> |  |

|                                      |  |                  |  |
|--------------------------------------|--|------------------|--|
| <b>Cleaner:</b>                      |  | <b>Quantity:</b> |  |
| <b>Inhibitor:</b>                    |  | <b>Quantity:</b> |  |
| <b>Sequestering Agent:</b>           |  | <b>Quantity:</b> |  |
| <b>Algaecide:</b>                    |  | <b>Quantity:</b> |  |
| <b>Neutralizer:</b>                  |  | <b>Quantity:</b> |  |
| <b>Glycol:</b>                       |  | <b>Quantity:</b> |  |
| <b>Glycol Solution Water Source:</b> |  | <b>% glycol:</b> |  |

| Local Water Test:            |  |                     |  |                         |  |
|------------------------------|--|---------------------|--|-------------------------|--|
| Sodium (Na) & Potassium (K): |  | Bicarbonate (HC03): |  | Non Carbonate Hardness: |  |
| Iron & Aluminum:             |  | Carbonate (C03):    |  | Total Hardness:         |  |
| Calcium (Ca):                |  | Silica (SiO2):      |  | Total Alkalinity:       |  |
| Magnesium (Mg):              |  | Sulfate (S04):      |  | Dissolved Solids:       |  |
| Chloride (C1):               |  | Nitrate (N03):      |  | pH:                     |  |
| Residual Chlorine:           |  | Turbidity:          |  |                         |  |

|                        | Date / Time Start | Date / Time Start |
|------------------------|-------------------|-------------------|
| Initial Circulation:   |                   |                   |
| Draindown:             |                   |                   |
| System Refill:         |                   |                   |
| Final Circulation:     |                   |                   |
| Heating System Warmup: |                   |                   |

| Component Checklist (Describe procedures performed at each) |  |
|---|--|
| Strainers:  |  |
| Filters:  |  |
| Vents:  |  |
| Drains:   |  |
| Traps:  |  |
| Branch Lines:   |  |
| Boilers / Chillers:   |  |
| Terminal Units:   |  |

# **DIVISION 23 HVAC**

## **SECTION 23 90 01 – TEMPERATURE CONTROL SYSTEM POINTS LISTS**

| System                         | VAV Terminal Unit W/ Reheat |                |                         |                  |     |         |  |
|--------------------------------|-----------------------------|----------------|-------------------------|------------------|-----|---------|--|
| Point                          | Type                        | Field Device   | Modify Value by Admin   | Alarm            | Log | Comment |  |
| Zone Temperature               | Analog Input                | Sensor Space   |                         | High / Low Limit | X   |         |  |
| Temperature Set Point Adjust   | Analog Input                | Sensor Space   | Range                   |                  |     |         |  |
| Unoccupied Override Button     | Digital Input               | Switch Closure | Hours Override          |                  |     |         |  |
| Supply Air Damper              | Analog Output               | Mod. Actuator  |                         |                  |     |         |  |
| Supply Air Flow                | Analog Input                | Sensor         |                         | High / Low Limit | X   |         |  |
| Discharge Air Temperature      | Analog Input                | Sensor         | High / Low Limit Values | High / Low Limit | X   |         |  |
| Reheat Valve                   | Analog Output               | Mod. Actuator  |                         |                  | X   |         |  |
| Occupied Cooling Temperature   | Setpoint                    | Software       | degrees                 |                  |     |         |  |
| Unoccupied Cooling Temperature | Setpoint                    | Software       | degrees                 |                  |     |         |  |
| Occupied Heating Temperature   | Setpoint                    | Software       | degrees                 |                  |     |         |  |
| Unoccupied Heating Temperature | Setpoint                    | Software       | degrees                 |                  |     |         |  |
| Occ Max Cooling Airflow        | Setpoint                    | Software       | cfm                     |                  |     |         |  |
| Occ Max Heating Airflow        | Setpoint                    | Software       | cfm                     |                  |     |         |  |
| Occ Min Airflow                | Setpoint                    | Software       | cfm                     |                  |     |         |  |
| Unocc Max Airflow              | Setpoint                    | Software       | cfm                     |                  |     |         |  |
| Unocc Min Airflow              | Setpoint                    | Software       | cfm                     |                  |     |         |  |
| Actual Flow Setpoint           |                             | Software       |                         |                  | X   |         |  |
| Actual Temperature Setpoint    |                             | Software       |                         |                  | X   |         |  |
| Occupied/Unoccupied            | Command                     | Software       | Override                |                  | X   |         |  |

| System                        | Apparatus Bay  |               |                       |            |     |                    |  |
|-------------------------------|----------------|---------------|-----------------------|------------|-----|--------------------|--|
| Point                         | Type           | Field Device  | Modify Value by Admin | Alarm      | Log | Comment            |  |
| Zone Temperature              | Analog Input   | Sensor Space  |                       | Low Limit  | X   | UH sensors         |  |
| Door Position Sensor          | Digital Input  | Contact Relay |                       |            | X   | Typ. 4             |  |
| Carbon Monoxide (CO) Sensor   | Analog Input   | Sensor Space  |                       | High Limit | X   |                    |  |
| Nitrogen Dioxide (NO2) Sensor | Analog Input   | Sensor Space  |                       | High Limit | X   |                    |  |
| Exhaust Fan Runtime Window    | Counter        | Software      |                       |            | X   | EF Status          |  |
| EF Enable                     | Digital Output | Contact Relay |                       |            |     | See EF Point List  |  |
| MAU Enable                    | Digital Output | Contact Relay |                       |            |     | See MAU Point List |  |

| System                       | Air Handler AHU-1 |                              |   |                                |     |                                      |  |
|------------------------------|-------------------|------------------------------|---|--------------------------------|-----|--------------------------------------|--|
| Point                        | Type              | Field Device                 | Modify Value by Admin                     | Alarm                          | Log | Comment                              |  |
| Supply Air Temperature       | Analog Input      | Sensor Duct                  | High / Low Limit Values                   | High / Low Limit               | X   |                                      |  |
| Mixed Air Temperature        | Analog Input      | Sensor Duct                  | High / Low Limit Values                   | High / Low Limit               | X   |                                      |  |
| Return Air Temperature       | Analog Input      | Sensor Duct                  | High / Low Limit Values                   | High / Low Limit               | X   |                                      |  |
| Ambient Air Temperature      | Analog Input      | Sensor Ambient               |   |                                | X   | Common OA Sensor                     |  |
| Heating Coil Discharge Temp  | Analog Input      | Sensor Duct                  | High / Low Limit Values                   | High / Low Limit               |     |                                      |  |
| Cooling Coil discharge Temp  | Analog Input      | Sensor Duct                  | High / Low Limit Values                   | High / Low Limit               |     |                                      |  |
| Return Air RH                | Analog Input      | Sensor Duct                  | High Limit Values                         | High Limit                     |     |                                      |  |
| Heating Coil Valve           | Analog Output     | Actuator                     | % difference to set point                 | Actual Position different by % |     |                                      |  |
| Base Load Compressor         | Analog Output     | Starter                      |   | Fail                           | X   | constant capacity compressor circuit |  |
| Variable Load Compressor     | Analog Output     | Starter, capacity controller |   | Fail                           | X   | Variable capacity compressor circuit |  |
| Discharge Air Temp Setpoint  | Setpoint          | Software                     | degrees                                   |                                |     |                                      |  |
| Return Air Damper            | Analog Output     | Mod. Actuator                |   |                                |     |                                      |  |
| Relief Air Damper            | Analog Output     | Mod. Actuator                |   |                                |     |                                      |  |
| Economizer OA Damper         | Analog Output     | Mod. Actuator                |   |                                |     |                                      |  |
| Supply Fan Speed             | Analog Output     | Motor controller             |   |                                |     | 0-10 V                               |  |
| Supply Fan Status            | Digital Input     | Current                      |   | Fail                           |     |                                      |  |
| Supply Fan Start / Stop      | Digital Input     | Control Relay                |   |                                | X   |                                      |  |
| Supply Air Static Pressure   | Analog Input      | Sensor Duct                  | High / Low Limit Values; max set pressure | High / Low Limit               |     |                                      |  |
| Filter Differential Pressure | Analog Input      | Sensor Duct                  | High Limit / Maintenance                  | High Limit / Maintenance       |     |                                      |  |
| Freeze Stat                  | Digital Input     | Auxiliary Contact            |   | Status                         |     | Hard-wire to fan                     |  |
| Fire Alarm Shutdown          | Digital Input     | Auxiliary Contact            |   | Status                         |     | Hard-wire to fan                     |  |
| Service Shutdown Switch      | Digital Input     | Closure Switch               |   |                                |     |                                      |  |

| System                         | Hot Water Heating System |                   |                              |                                |     |   |
|--------------------------------|--------------------------|-------------------|------------------------------|--------------------------------|-----|---|
| Point                          | Type                     | Field Device      | Modify Value by Admin        | Alarm                          | Log | Comment                                       |
| Boiler Start/Stop              | Digital Output           | Control Relay     |                              |                                |     |   |
| Boiler Status                  | Digital Input            | Auxiliary Contact |                              | Fail                           | X   |   |
| Boiler Flow Switch             | Analog Input             | Flow Switch       |                              |                                |     |   |
| System Flow                    | Analog Input             | Flow Sensor       |                              |                                | X   |   |
| HW Supply Temperature Reset    | Analog Output            | Boiler            | Upper and Lower Temperatures |                                |     |   |
| HW Supply Temperature Setpoint | Analog Output            | Boiler            |                              |                                |     |   |
| HW Supply Temperature          | Analog Input             | Sensor Pipe       |                              |                                | X   |   |
| HW Return Temperature          | Analog Input             | Sensor Pipe       |                              |                                | X   |   |
| HW Differential Pressure       | Analog Output            | VFD               | Maximum Pressure             |                                |     |   |
| HW Differential Pressure       | Analog Input             | Sensor Pipe       | % difference to set point    | Actual Pressure Different by % | X   |   |
| HW Pump Start / Stop           | Digital Output           | Control Relay     |                              |                                |     |   |
| HW Pump Status                 | Digital Input            | Current VFD       |                              | Fail                           | X   |   |
| HW Pump VFD Speed              | Analog Input / Output    | VFD               |                              |                                | X   |   |
| HW Pump VFD Fault              | Digital Input            | Auxiliary Relay   |                              | Fail                           |     |   |
| HW Pump Power                  | Analog Input             | VFD               |                              |                                |     |   |
| Ambient Air Temperature        | Analog Input             | Sensor Ambient    |                              |                                |     | Common OA Sensor                              |
| Boiler Plant BTU Output        | Calculation              | Software          |                              |                                | X   | Total hourly BTU based on flow and HWS&R Temp |

| System                       | Wall Fin Heater |               |                       |                  |     |         |  |
|------------------------------|-----------------|---------------|-----------------------|------------------|-----|---------|--|
| Point                        | Type            | Field Device  | Modify Value by Admin | Alarm            | Log | Comment |  |
| Zone Temperature             | Analog Input    | Sensor Space  |                       | High / Low Limit | X   |         |  |
| Temperature Set Point Adjust | Analog Input    | Sensor Space  | Range                 |                  |     |         |  |
| Heating Valve                | Analog Output   | Mod. Actuator |                       |                  | X   |         |  |

| System                       | Unit Heaters, Cabinet Unit Heaters |               |                       |                  |             |         |  |
|------------------------------|------------------------------------|---------------|-----------------------|------------------|-------------|---------|--|
| Point                        | Type                               | Field Device  | Modify Value by Admin | Alarm            | Log         | Comment |  |
| Zone Temperature             | Analog Input                       | Sensor Space  |                       | High / Low Limit | X           |         |  |
| Temperature Set Point Adjust | Analog Input                       | Sensor Space  | Range                 |                  |             |         |  |
| Fan Start/Stop               | Digital Output                     | Control Relay |                       |                  |             |         |  |
| Fan Status                   | Digital Input                      | Current       |                       | Fail             | Runtime hrs |         |  |
| Heating Valve                | Analog Output                      | Mod. Actuator |                       |                  | X           |         |  |

| System                             | Kitchen Hood   |                          |                       |       |     |                        |  |
|------------------------------------|----------------|--------------------------|-----------------------|-------|-----|------------------------|--|
| Point                              | Type           | Field Device             | Modify Value by Admin | Alarm | Log | Comment                |  |
| Exhaust Fan Status                 | Digital Input  | Current                  |                       | Fail  |     | From EF                |  |
| Supply Status                      | Digital Input  | Current                  |                       | Fail  |     | From MAU               |  |
| Supply/Exhaust Enable              | Digital Output | EF/MAU                   |                       |       | X   |                        |  |
| Hood Outlet Heat Sensor            | Digital Input  | Manf. Controller         |                       |       | X   | By Hood Manufacturer   |  |
| Hood Operator Push Button          | Digital Input  | Momentary Contact Switch |                       |       | X   | Hood Mounted           |  |
| Hood Run Timer                     | Timer          | Software                 | Run Time mins.        |       |     |                        |  |
| Fire Suppression System Activation | Digital Input  | Contact                  | Reset                 | X     |     | Run EF upon activation |  |

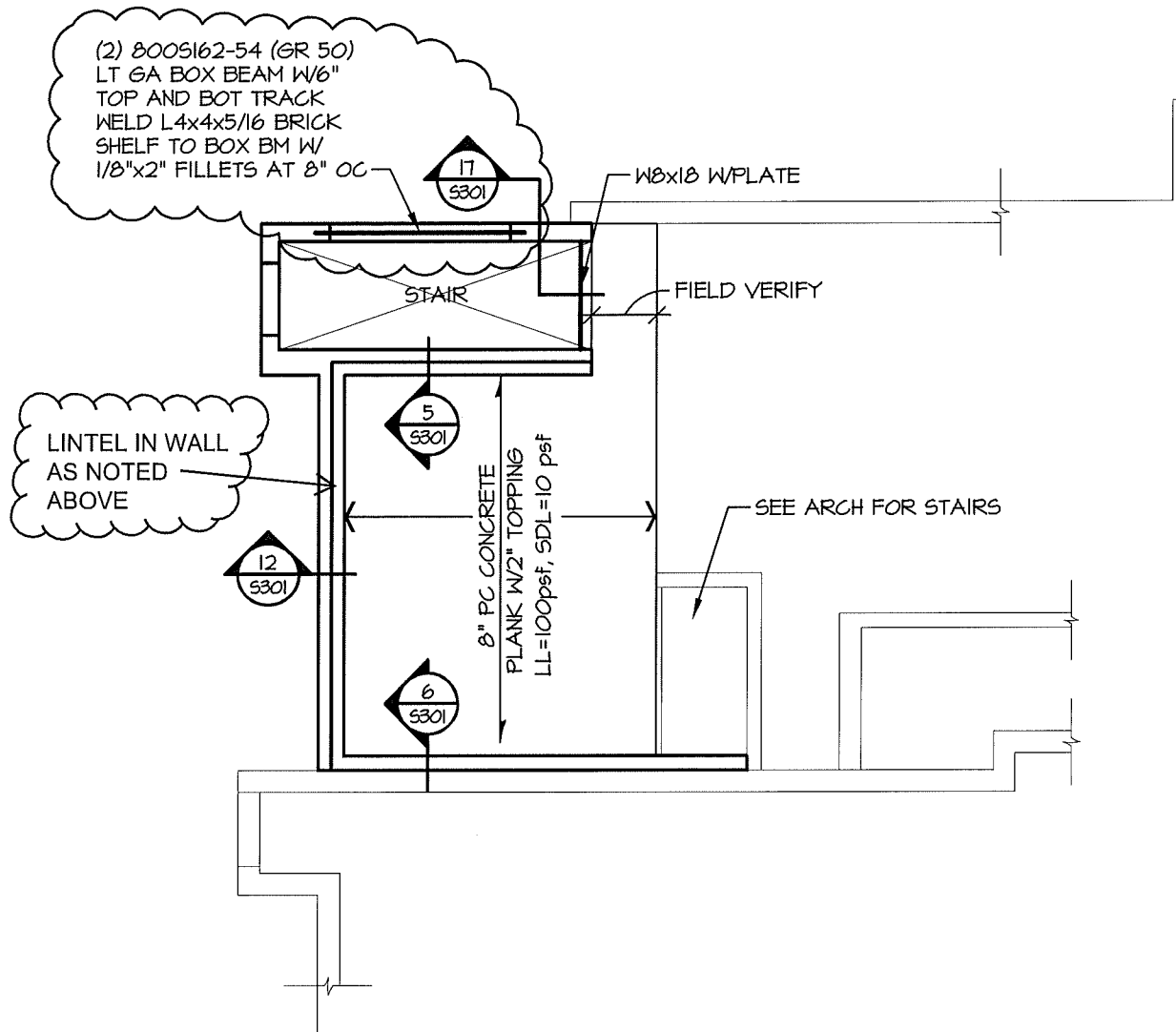
| System                   | Exhaust Fan EF-1, EF-2 |                 |                       |       |     |           |  |
|--------------------------|------------------------|-----------------|-----------------------|-------|-----|-----------|--|
| Point                    | Type                   | Field Device    | Modify Value by Admin | Alarm | Log | Comment   |  |
| Fan Start/Stop           | Digital Output         | Control Relay   |                       |       |     |           |  |
| Fan Status               | Digital Input          | Current         |                       | Fail  | X   |           |  |
| Isolation Damper Command | Digital Output         | 2-Pos. Actuator |                       |       |     | EF-2 Only |  |

| System                           | Energy Recovery Ventilator ERV-1 |                 |                       |       |     |         |  |
|----------------------------------|----------------------------------|-----------------|-----------------------|-------|-----|---------|--|
| Point                            | Type                             | Field Device    | Modify Value by Admin | Alarm | Log | Comment |  |
| Supply Fan Start/Stop            | Digital Output                   | Control Relay   |                       |       |     |         |  |
| Supply Fan Status                | Digital Input                    | Current         |                       | Fail  | X   |         |  |
| Supply Isolation Damper Command  | Digital Output                   | 2-Pos. Actuator |                       |       |     |         |  |
| Exhaust Fan Start/Stop           | Digital Output                   | Control Relay   |                       |       |     |         |  |
| Exhaust Fan Status               | Digital Input                    | Current         |                       | Fail  | X   |         |  |
| Exhaust Isolation Damper Command | Digital Output                   | 2-Pos. Actuator |                       |       |     |         |  |
| OA Leaving Temp                  | Analog Input                     | Duct Sensor     |                       |       | X   |         |  |
| Exhaust Leaving Temp             | Analog Input                     | Duct Sensor     |                       |       | X   |         |  |

| System                             | Make-Up Air Unit MAU-1,2 |                 |                          |                          |     |         |  |
|------------------------------------|--------------------------|-----------------|--------------------------|--------------------------|-----|---------|--|
| Point                              | Type                     | Field Device    | Modify Value by Admin    | Alarm                    | Log | Comment |  |
| Supply Fan Start/Stop              | Digital Output           | Control Relay   |                          |                          |     |         |  |
| Supply Fan Status                  | Digital Input            | Current         |                          | Fail                     | X   |         |  |
| Supply Isolation Damper Command    | Digital Output           | 2-Pos. Actuator |                          |                          |     |         |  |
| Supply Isolation Damper End Switch | Digital Input            | End Switch      |                          |                          |     |         |  |
| Burner Enable                      | Digital Output           | Control Relay   |                          |                          |     |         |  |
| Burner Modulation                  | Analog Output            | Mod. Valve      |                          |                          |     |         |  |
| Filter Differential Pressure       | Analog Input             | Sensor Duct     | High Limit / Maintenance | High Limit / Maintenance |     |         |  |
| Pilot/Main Flame Status            | Digital Input            | Flame Detector  |                          |                          |     |         |  |
| Discharge Air Temperature          | Analog Input             | Duct Sensor     |                          |                          | X   |         |  |
| Discharge Air Setpoint             | Setpoint                 | Software        |                          |                          |     |         |  |



CITY OF MADISON FIRE STATION #2  
ADDITION AND REMODELING  
421 Grand Canyon Drive  
Madison, wisconsin  
04-16-12



## **SHEET AD1-2**

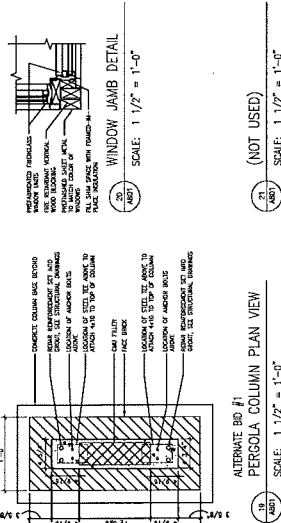
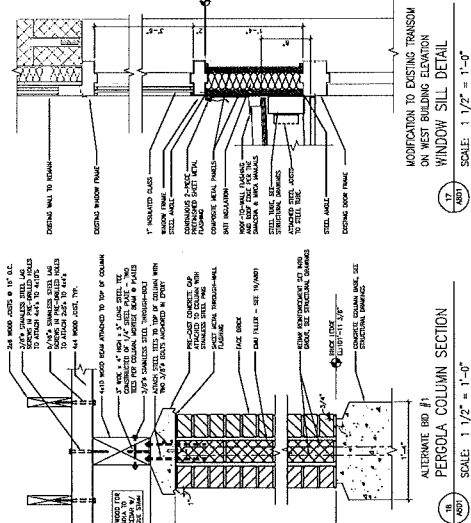
CITY OF MADISON FIRE STATION #2  
ADDITION AND REMODELING  
421 Grand Canyon Drive  
Madison, wisconsin  
04-16-12



STRANG

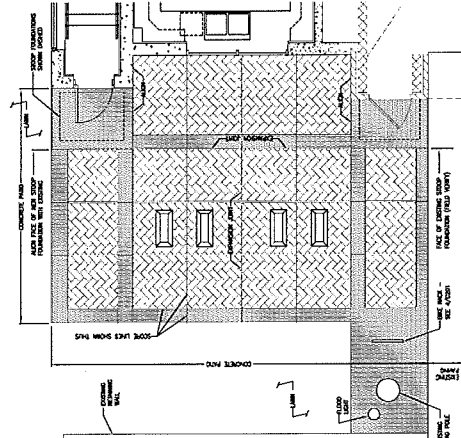
ALTERNATE B1  
PERGOLA COLUMN SECTION

STRANG  
10000 1<sup>ST</sup> AVENUE  
MADISON, WISCONSIN 53703  
TEL: 608 784 8800  
FAX: 608 784 8801



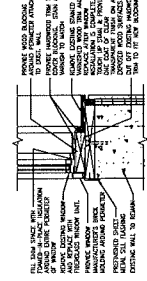
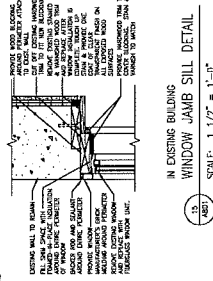
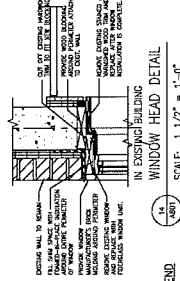
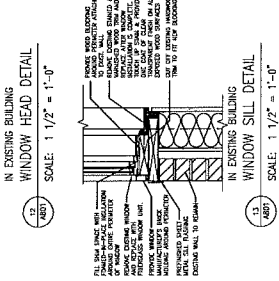
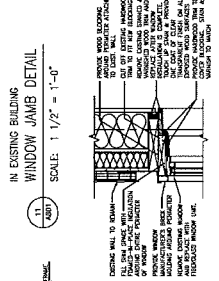
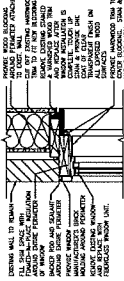
(NOT USED)

SCALE: 1 1/2" = 1'-0"



PATIO CONSTRUCTION NOTES:

1. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
2. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
3. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
4. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
5. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
6. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
7. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
8. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
9. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING
10. PERGOLA COLUMN AND JOINT FINISHES TO MATCH EXISTING

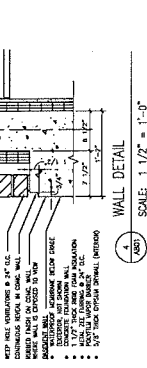
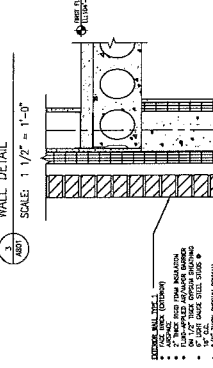
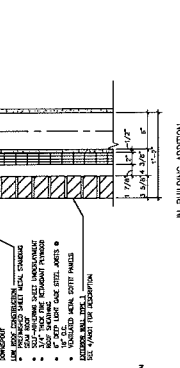
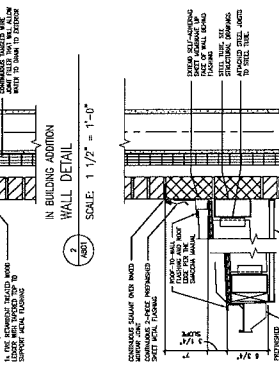
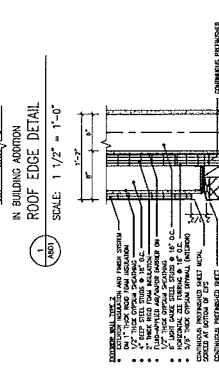
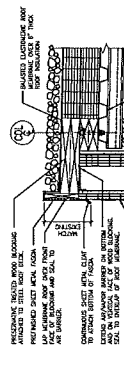


IN EXISTING BUILDING

WINDOW SILL DETAIL

SCALE: 1 1/2" = 1'-0"

17  
A01



IN BUILDING ADDITION

WALL DETAIL

SCALE: 1 1/2" = 1'-0"

7  
A01

|                        |             |
|------------------------|-------------|
| DRAWING SET            | ADDENDUM 1  |
| COPYRIGHT              | STRANG INC. |
| FILE NAME              | PERGOLA     |
| REVISIONS              |             |
| DRAWN                  | AE, ES      |
| CHECKED                | EN, LB      |
| DATE                   | 04-15-10    |
| PROJECT NO.            | 201000      |
| PROJECT TITLE          |             |
| CITY OF MADISON        |             |
| FIRE STATION #2        |             |
| ADDITION AND           |             |
| REMODELING             |             |
| 401 GRAND CANYON DRIVE |             |
| MADISON, WISCONSIN     |             |
| SHEET TITLE            |             |
| EXTERIOR               |             |
| DETAILS                |             |
| SHEET NO.              | A801        |