



RFB NO. 320021

CONSTRUCTION DOCUMENTS PROJECT MANUAL

DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HIGHWAY AND TRANSPORTATION

PUBLIC WORKS ENGINEERING DIVISION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WISCONSIN 53713

REQUEST FOR BIDS NO. 320021 COURTHOUSE HVAC CONTROLS REPLACEMENT DANE COUNTY COURTHOUSE 215 SOUTH HAMILTON STREET MADISON, WISCONSIN

Due Date / Time: **TUESDAY, SEPTEMBER 1, 2020 / 2:00 P.M.**

Location: **PUBLIC WORKS OFFICE**

Performance / Payment Bond: **100% OF CONTRACT AMOUNT**

Bid Deposit: **5% OF BID AMOUNT**

FOR INFORMATION ON THIS REQUEST FOR BIDS, PLEASE CONTACT:

TODD DRAPER, PROJECT MANAGER
TELEPHONE NO.: 608/267-0119
FAX NO.: 608/267-1533
E-MAIL: DRAPER@COUNTYOFDANE.COM

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DRAWINGS

Plot drawings on 11" x 17" (ANSI B) or 36" x 48" (ARCH E) paper for correct scale or size.

- Sheets No. 1.3-14.37 and D1-D3 - Johnson Controls Record Drawings
- Sheet H1.1 - HVAC Lower Level 2 Plan
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END OF SECTION

SECTION 01 11 16

INVITATION TO BID

LEGAL NOTICE

Dane County Dept. of Public Works, Hwy & Transp., 1919 Alliant Energy Center Way, Madison, WI 53713, will receive sealed Bids until:

2:00 P.M., TUESDAY, SEPTEMBER 1, 2020

RFB NO. 320021

COURTHOUSE HVAC CONTROLS REPLACEMENT

DANE COUNTY COURTHOUSE

215 SOUTH HAMILTON STREET, MADISON, WI

Dane County is inviting Bids for construction services to replace the existing supervisory and application-specific programmable controllers and associated devices for all building HVAC mechanical systems to replicate existing control sequences in the Dane County Courthouse. Contractor will provide graphical interface for entire Building Automation System using existing virtual server. Only firms with capabilities, experience & expertise with similar projects should obtain this Request for Bids (RFB) document & submit Bids.

RFB document may be obtained after **2:00 p.m. on July 14, 2020** by downloading it from bids-pwht.countyofdane.com. Please call Todd Draper, Project Mgr., at 608/267-0119, or our office at 608/266-4018, for any questions or additional information.

All Bidders must be qualified as a Best Value Contractor before Bid Due Date / Time. Complete Pre-qualification Application for Contractors at publicworks.countyofdane.com/bvc or obtain one by calling 608/267-0119.

A pre-bid facility tour will be held July 29, 2020 at 11:00 a.m. at the Dane County Courthouse, starting in main lobby. Bidders are strongly encouraged to attend this tour.

PUBLISH: JULY 14 & JULY 21, 2020 - WISCONSIN STATE JOURNAL

JULY 15 & JULY 22, 2020 - THE DAILY REPORTER

END OF SECTION

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INSTRUCTIONS TO BIDDERS

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1. GENERAL

- A. Before submitting Bid, bidder shall thoroughly examine all Construction Documents. Successful Bidder shall be required to provide all the Work that is shown on Drawings, set forth in Specifications, or reasonably implied as necessary to complete Contract for this project.
- B. Bidder shall visit site to become acquainted with adjacent areas, means of approach to site, conditions of actual site and facilities for delivering, storing, placing, and handling of materials and equipment.
- C. Pre-bid meeting is scheduled on July 29, 2020 at 11:00 a.m. at the Dane County Courthouse, 215 S Hamilton St., Madison, in main lobby. Attendance by all bidders is optional, however bidders and subcontractors are strongly encouraged to attend.
- D. Failure to visit site or failure to examine any and all Construction Documents will in no way relieve successful Bidder from necessity of furnishing any necessary materials or equipment, or performing any work, that may be required to complete the Work in accordance with Drawings and Specifications. Neglect of above requirements will not be accepted as reason for delay in the Work or additional compensation.

2. DRAWINGS AND SPECIFICATIONS

- A. Drawings and Specifications that form part of this Contract, as stated in Article 1 of General Conditions of Contract, are enumerated in Document Index of these Construction Documents.
- B. Complete sets of Drawings and Specifications for all trades will be available to all Bidders, irrespective of category of work to be bid on, in order that all Bidders may be familiar with work of other trades as they affect their bid.

3. INTERPRETATION

- A. No verbal explanation or instructions will be given in regard to meaning of Drawings or Specifications before Bid Due Date. Bidders shall bring inadequacies, omissions or conflicts to Owner or Architect / Engineer's attention at least ten (10) calendar days before Bid Due Date. Prompt clarification will be available to all bidders by Addendum.
- B. Failure to so request clarification or interpretation of Drawings and Specifications will not relieve successful Bidder of responsibility. Signing of Contract will be considered as implicitly denoting that Contractor has thorough understanding of scope of the Work and comprehension of Construction Documents.
- C. Owner or Architect / Engineer will not be responsible for verbal instructions.

4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)

- A. Before award of Contract can be approved, Owner shall be satisfied that Bidder involved meets following requirements:
 - 1. Has completed at least one (1) project of at least fifty percent (50%) of size or value of Division of work being bid and type of work completed is similar to that being bid. If greater magnitude of experience is deemed necessary, other than size or value of work, such requirements will be described in appropriate section of Specifications.
 - 2. Maintains permanent place of business.
 - 3. Can be bonded for terms of proposed Contract.
 - 4. Meets all applicable Best Value Contractor requirements.
 - 5. Has record of satisfactorily completing past projects and supplies list of no more than three (3) most recent, similar projects, with architect or engineer's and owner's names, addresses and telephone numbers for each project. Submit to Public Works Project Manager within three (3) business days after Bid Due Date. Criteria which will be considered in determining satisfactory completion of projects by bidder will include:
 - a. Completed contracts in accordance with drawings and specifications.
 - b. Diligently pursued execution of work and completed contracts according to established time schedule unless Owner grants extensions.
 - c. Fulfilled guarantee requirements of construction documents.
 - d. Is not presently on ineligible list maintained by County's Department of Administration for noncompliance with equal employment opportunities and affirmative action requirements.
 - e. Authorized to conduct business in Wisconsin. By submitting Bid, bidder warrants that it has: complied with all necessary requirements to do business in State of Wisconsin; that persons executing contract on its behalf are authorized to do so; and, if corporation, that name and address of bidder's registered agent are as set forth in

Contract. Bidder shall notify Owner immediately, in writing, of any change in its registered agent, their address, and bidder's legal status. For partnership, term "registered agent" shall mean general partner.

- B. County's Public Works Project Manager will make such investigations as are deemed necessary to determine ability of bidder to perform the Work, and bidder shall furnish to County's Public Works Project Manager or designee all such information and data for this purpose as County's Public Works Project Manager may request. Owner reserves right to reject Bid if evidence submitted by, or investigation of, bidder fails to satisfy Owner that bidder is responsible and qualified to carry out obligations of Contract and to complete the Work contemplated therein.

5. BID GUARANTEE

- A. Bank certified check, cashier's check or Bid Bond, payable to County in amount not less than five percent (5%) of maximum bid, shall accompany each Bid as guarantee that if Bid is accepted, Bidder will execute and return proposed Contract and Performance and Payment Bonds within ten (10) business days after being notified of acceptance of Bid. Company issuing bonds must be licensed to do business in Wisconsin.
- B. Any bid, which is not accompanied by bid guarantee, will be considered "No Bid" and will not be read at Bid Due Date.
- C. If successful Bidder so delivers Contract, Certificate of Insurance, and Performance and Payment Bonds, check will be returned to Bidder. In case Bidder fails to deliver such Contract, insurance, and bond, amount of bid guarantee will be forfeited to County as liquidated damages.
- D. All checks tendered as bid guarantee, except those of three (3) lowest qualified, responsible bidders, will be returned to their makers within three (3) business days after Bid Due Date. All such retained checks will be returned immediately upon signing of Contract and Performance and Payment Bonds by successful Bidder.

6. WITHDRAWAL OF BIDS

- A. Bids may be withdrawn by written request received from bidder or authorized representative thereof prior to time fixed for Bid Due Date, without prejudice to right of bidder to file new Bid. Withdrawn Bids will be returned unopened. Negligence on part of bidder in preparing their Bid confers no right for withdrawal of Bid after it has been opened.
- B. No Bid may be withdrawn for period of sixty (60) calendar days after Bid Due Date.
- C. If Bid contains error, omission or mistake, bidder may limit liability to amount of bidder's guarantee by giving written Notice of Intent not to execute Contract to Owner within seventy-two (72) hours of Bid Due Date.

7. CONTRACT FORM

- A. Sample copy of contract that successful Bidder will be required to enter into is included in these Construction Documents and bidders are required to familiarize themselves with all conditions contained therein.

8. CONTRACT INTERESTS BY COUNTY PUBLIC OFFICIALS

- A. In accordance with Wisconsin Statute 946.13, county official may not bid for or enter into any contract involving receipts or disbursements of more than \$15,000.00 in a year, in which they have private pecuniary interest, direct or indirect if at same time they are authorized to take official action with respect to making of this Contract. Any contract entered into in violation of this Statute is void and County incurs no liability thereon. This subsection does not affect application and enforcement of Wisconsin Statute 946.13 by state prosecutors in criminal courts of this state.

9. EMERGING SMALL BUSINESS PROVISIONS

- A. **Emerging Small Business Definition.** For purposes of this section, ESB is defined as:
1. Independent business concern that has been in business minimum of one year;
 2. Business located in State of Wisconsin;
 3. Business comprised of less than twenty-five (25) employees;
 4. Business must not have gross sales in excess of three million dollars (\$3,000,000.00) over past three years; and
 5. Business does not have history of failing to complete projects.
- B. **Emerging Small Business (ESB) Involvement.** Bidder shall make good faith effort to award minimum of ten percent (10%) of the Work to ESBs. Bidder shall submit report to Dane County Contract Compliance Specialist within ten (10) business days of Bid Due Date demonstrating such efforts. Good faith efforts means significant contact with ESBs for purposes of soliciting bids from them. Failure to make or demonstrate good faith efforts will be grounds for disqualification.
- C. **Emerging Small Business Report.** Emerging Small Business Enterprise Report is to be submitted by Bidder in separate envelope marked "Emerging Small Business Report". This report is due by 2:00 p.m. following specified ten (10) business days after Bid Due Date. Bidder who fails to submit Emerging Small Business Report shall be deemed not responsive.
- D. **ESB Goal.** Goal of this project is ten percent (10%) ESB participation. ESB utilizations are shown as percentage of total Bid. If Bidder meets or exceeds specified goal, Bidder is only required to submit Form A - Certification, and Form B - Involvement. Goal shall be met if Bidder qualifies as ESB.
- E. **Report Contents.** Following award of Contract, Bidder shall submit copies of executed contracts for all Emerging Small Businesses. Emerging Small Business Report shall consist of these:
1. Form A - Certification;
 2. Form B - Involvement;
 3. Form C - Contacts;
 4. Form D - Certification Statement (if appropriate); and
 5. Supportive documentation (i.e., copies of correspondence, telephone logs, copies of advertisements).

- F. **ESB Listing.** Bidders may solicit bids from the *Dane County Targeted Business Directory* by going to this website. Do not click as a link; copy & paste the address into a web browser.
<https://equity.countyofdane.com/documents/PDFs/Targeted-Business-Directory.xlsx>
- G. **DBE Listing.** Bidders may also solicit bids from the *State of Wisconsin DOT Disadvantaged Business Enterprise Unified Certification Program (DBE / UCP) Directory* by going to this website. These are not only transportation-related designers & contractors. Do not click as a link; copy & paste the address into a web browser.
<https://wisconsin.gov/Documents/doing-bus/civil-rights/dbe/dbe-ucp-directory.xlsx>
- H. **ESB Certification.** All contractors, subcontractors and suppliers seeking ESB certification must complete and submit Emerging Small Business Report to Dane County Contract Compliance Program.
- I. **Certification Statement.** If ESB firm has not been certified by County as ESB prior to submittal of this Bid, ESB Report cannot be used to fulfill ESB goal for this project unless firm provides "Form D - Certification Statement". Certification statement must be completed and signed by ESB firm.
- J. **Questions.** Questions concerning Emerging Small Business provisions shall be directed to:

OEI@countyofdane.com
or
Dane County Contract Compliance Specialist
City-County Building, Room 356
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703
608/266-4192
- K. **Substituting ESBs.** In event of any significant changes in subcontract arrangements or if need arises to substitute ESBs, Bidder shall report such proposed changes to Contract Compliance Specialist to making any official changes and request authorization to substitute ESB firm. Bidder further agrees to make every possible effort to replace ESB firm with another qualified ESB firm.
- L. **Good Faith Efforts.** Good faith efforts can be demonstrated by meeting all of these obligations:
1. Selecting portions of the Work to be performed by ESBs in order to increase likelihood of meeting ESB goal including, where appropriate, breaking down Contract into smaller units to facilitate ESB participation.
 2. Advertising in general circulation, trade associations and women / minority focus media concerning subcontracting opportunities.
 3. Providing written notices to reasonable number of specific ESBs that their interest in Contract was being solicited in sufficient time to allow ESBs to participate effectively.
 4. Following up on initial solicitations of interest by contacting ESBs within five (5) business days prior to Bid Due Date to determine with certainty whether ESB were interested, to allow ESBs to prepare bids.
 5. Providing interested ESB with adequate information about Drawings, Specifications and requirements of Contract.

6. Using services of available minority, women and small business organizations and other organizations that provide assistance in recruitment of MBEs / WBEs / ESBs.
7. Negotiating in good faith with interested ESBs, not rejecting ESBs as unqualified without sound reason based on thorough investigation of their capabilities.
8. Submitting required project reports and accompanying documents to County's Contract Compliance Specialist within twenty-four (24) hours after Bid Due Date.

M. **Appeals Disqualification of Bid.** Bidder who is disqualified may appeal to Public Works & Transportation Committee and Equal Opportunity Commission.

10. METHOD OF AWARD - RESERVATIONS

- A. Following will be basis of award of Contract, providing cost does not exceed amount of funds then estimated by County as available to finance Contract(s):
 1. Lowest dollar amount submitted by qualified responsible bidder on Base Bid for all work comprising project, combined with such additive Owner accepted alternates.
 2. Owner reserves right to reject all bids or any bid, to waive any informality in any bid, and to accept any bid that will best serve interests of County.
 3. Unit Prices and Informational Bids will not be considered in establishing low bidder.

11. SECURITY FOR PERFORMANCE AND PAYMENTS

- A. Simultaneous with delivery of signed Contract, Bidder shall be required to furnish Performance and Payment Bonds as specified in Article 29 of General Conditions of Contract, "Contract Security". Surety Company shall be licensed to do business in Wisconsin. Performance and Payment Bonds must be dated same date or subsequent to date of Contract. Performance and Payment Bonds must emulate information in Sample Performance and Payment Bonds in Construction Documents.
- B. Provide certified copy of power of attorney from Surety Company showing that agent who signs Bond has power of attorney to sign for Surety Company. Secretary or Assistant Secretary of company must sign this certification, not attorney-in-fact. Certification must bear same or later date as Bond. Power of Attorney must emulate model power of attorney information detailed in Sample Performance and Payment Bonds.
- C. If Bidder is partnership or joint venture, State certified list, providing names of individuals constituting partnership or joint venture must be furnished. Contract itself may be signed by one partner of partnership, or one partner of each firm comprising joint venture, but Performance and Payment Bonds must be signed by all partners.
- D. If Bidder is corporation, it is necessary that current certified copy of resolution or other official act of directors of corporation be submitted showing that person who signs Contract is authorized to sign contracts for corporation. It is also necessary that corporate seal be affixed to resolution, contract, and performance and payment bonds. If your corporation has no seal, it is required that above documents include statement or notation to effect that corporation has no seal.

12. TAXES

- A. Wisconsin Statute 77.54 (9m) allows building materials that become part of local unit government facilities to be exempt from sales & use tax. Vendors & materials suppliers may not charge Bidders sales & use tax on these purchases. This does not include highways, streets or roads. Any other Sales, Consumer, Use & other similar taxes or fees required by law shall be included in Bid.
- B. In accordance with Wisconsin Statute 71.80(16)(a), successful nonresident bidder, whether incorporated or not, and not otherwise regularly engaged in business in this state, shall file surety bond with State of Wisconsin Department of Revenue payable to Department of Revenue, to guarantee payment of income taxes, required unemployment compensation contributions, sales and use taxes and income taxes withheld from wages of employees, together with any penalties and interest thereon. Amount of bond shall be three percent (3%) of Contract or subcontract price on all contracts of \$50,000 or more.

13. SUBMISSION OF BIDS

- A. All Bids shall be submitted on standard Bid Form bound herein and only Bids that are made on this Bid Form will be considered. Entire Bid Form and other supporting documents, if any, shall be removed or copied from Construction Documents, filled out, and submitted in manner specified hereinafter. Submit completed Bid Bond with Bid as well.
- B. No bids for any subdivision or any sub-classification of this Work, except as indicated, will be accepted. Any conditional Bid, amendment to Bid Form or appended item thereto, or inclusion of any correspondence, written or printed matter, or details of any nature other than that specifically called for, which would alter any essential provision of Construction Documents, or require consideration of unsolicited material or data in determining award of Contract, will disqualify Bid. Telecommunication alterations to Bid will not be accepted.
- C. Bidders must submit single Bid for all the Work.
- D. Bid amounts shall be inserted in words and in figures in spaces provided on Bid Form; in case of conflict, written word amounts will govern.
- E. Addenda issued after Bid Letting shall become part of Construction Documents. Bidders shall acknowledge receipt of such addenda in appropriate space provided on Bid Form. Bid may be rejected if receipt of any particular addendum applicable to award of Contract has not been acknowledged on Bid Form.
- F. Bids shall be signed, placed in envelope, sealed and delivered before due time to place designated in Invitation to Bid, and identified with project name, bid number, location, category of work being bid upon, Bid Due Date, name and address of bidder.
- G. Bidder shall be responsible for sealed Bid being delivered to place designated for Bid Due Date on or before date and time specified. Bids received after time of closing will be rejected and returned to bidder unopened.
- H. Bid will be considered invalid and will be rejected if bidder has not signed it.
- I. Faxed or emailed Bids will not be accepted.
- J. Bidder's organization shall submit completed with Bid, Fair Labor Practices Certification form, included in these Construction Documents.

14. SUBCONTRACTOR LISTING

- A. Bidders shall be required to submit list of major subcontractors for General Construction, Plumbing, HVAC, and Electrical work proposed for this project to include committed prices for each subcontractor. List shall be placed in separate sealed envelope that must be clearly identified as “Major Subcontractor List”, for named project and name of Bidder submitting it. County must receive envelope no later than date by which successful Bidder is required to submit his or her signed Contract, as established in Construction Documents.

15. ALTERNATE BIDS

- A. Not Applicable.

16. INFORMATIONAL BIDS

- A. Not Applicable.

17. UNIT PRICES

- A. Not Applicable.

18. COMMENCEMENT AND COMPLETION

- A. Successful Bidder shall commence work when schedule and weather permit, but no later than stated in Bid Form. Contractor shall pursue the Work regularly and continuously at reasonable rate to insure completion of the Work within time stated in Bid.
- B. Should it be found impossible to complete the Work on or before time specified for completion, written request may be submitted for extension of time setting forth reasons believed to justify granting of such request. Refer to Article 20 of General Conditions of Contract, titled “Time for Completion”.

19. WORK BY OWNER

- A. Not Applicable.

20. SPECIAL HAZARDS COVERAGE

- A. Not Applicable.

FORM A

**DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CERTIFICATION**

In accordance with General Conditions of Contract, submit this Emerging Small Business Report within ten (10) days after Bid Due Date.

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

BIDDER INFORMATION

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE NO.: _____

CONTACT PERSON: _____

EMAIL ADDRESS: _____

FORM B

DANE COUNTY

(Copy this Form as necessary to provide complete information)

EMERGING SMALL BUSINESS REPORT - INVOLVEMENT

COMPANY NAME: _____

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

ESB NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NO & EMAIL.: _____

Indicate percentage of financial commitment to this ESB: _____ % Amount: \$ _____

ESB NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NO & EMAIL.: _____

Indicate percentage of financial commitment to this ESB: _____ % Amount: \$ _____

FORM C

Page ___ of ___

**DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CONTACTS**

(Copy this Form as necessary to provide complete information)

COMPANY NAME: _____

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

	<u>ESB FIRM NAME CONTACTED</u>	<u>DATE</u>	<u>PERSON CONTACTED</u>	<u>DID ESB BID?</u>	<u>ACC- EPT BID?</u>	<u>REASON FOR REJECTION</u>
1)	_____	_____	_____	_____	_____	_____
2)	_____	_____	_____	_____	_____	_____
3)	_____	_____	_____	_____	_____	_____
4)	_____	_____	_____	_____	_____	_____
5)	_____	_____	_____	_____	_____	_____
6)	_____	_____	_____	_____	_____	_____
7)	_____	_____	_____	_____	_____	_____
8)	_____	_____	_____	_____	_____	_____

FORM D

**DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CERTIFICATION STATEMENT**

I, _____, _____ of
Name Title

_____ certify to best of my knowledge and
Company

belief that this business meets Emerging Small Business definition as indicated in Article 9 and
that information contained in this Emerging Small Business Report is true and correct.

Bidder's Signature

Date

Name of Bidding Firm: _____

SECTION 00 41 13

BID FORM

BID NO. 320021

**PROJECT: COURTHOUSE HVAC CONTROLS REPLACEMENT
DANE COUNTY COURTHOUSE**

**TO: DANE COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAY &
TRANSPORTATION PROJECT MANAGER
1919 ALLIANT ENERGY CENTER WAY
MADISON, WISCONSIN 53713**

**NOTE: WISCONSIN STATUTE 77.54 (9M) ALLOWS FOR NO SALES & USE TAX ON
THE PURCHASE OF MATERIALS FOR COUNTY PUBLIC WORKS PROJECTS.**

BASE BID - LUMP SUM:

Dane County is inviting Bids for construction services to replace the existing supervisory and application-specific programmable controllers and associated devices for all building HVAC mechanical systems to replicate existing control sequences in the Dane County Courthouse. Contractor will provide graphical interface for entire Building Automation System using existing virtual server. . The undersigned, having examined the site where the Work is to be executed and having become familiar with local conditions affecting the cost of the Work and having carefully examined the Drawings and Specifications, all other Construction Documents and Addenda thereto prepared by Dane County Department of Public Works, Highway & Transportation hereby agrees to provide all labor, materials, equipment and services necessary for the complete and satisfactory execution of the entire Work, as specified in the Construction Documents, for the Base Bid stipulated sum of:

_____ and ___/100 Dollars
Written Price

\$ _____
Numeric Price

LUMP SUM ALLOWANCE

Provide a lump sum allowance to be included in the Base Bid of thirty-one thousand six hundred fifty-three dollars and eighty-three cents (\$31,653.83). This allowance will be used for AdaptiView controller upgrades to both Trane chillers for integration to the BAS system.. Coordinate this with the Public Works Project Manager.

Thirty-one thousand six hundred fifty-three dollars - - - - - and 83/100 Dollars
Written Price

\$31,653.83
Numeric Price

Receipt of the following addenda and inclusion of their provisions in this Bid is hereby acknowledged:

Addendum No(s). _____ through _____

Dated _____

Dane County Department of Administration must have this project completed by March 5, 2021. Assuming this Work can be started by October 13, 2020, what dates can you commence and complete this job?

Commencement Date: _____ Completion Date: _____
(final, not substantial)

I hereby certify that all statements herein are made on behalf of:

(Name of Corporation, Partnership or Person submitting Bid)

Select one of the following:

- 1. A corporation organized and existing under the laws of the State of _____, or
- 2. A partnership consisting of _____, or
- 3. A person conducting business as _____;

Of the City, Village, or Town of _____ of the State of _____.

I have examined and carefully prepared this Bid from the associated Construction Documents and have checked the same in detail before submitting this Bid; that I have full authority to make such statements and submit this Bid in (its) (their) (my) behalf; and that the said statements are true and correct. In signing this Bid, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a Bid; that this Bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; that this Bid has not been knowingly disclosed prior to the Bids Due Date to another bidder or competitor; that the above statement is accurate under penalty of perjury.

The undersigned is qualified as a Best Value Contractor or has proven their exemption. Qualification or exemption shall be complete before Bid Due Date / Time.

The undersigned further agrees to honor the Base Bid and the Alternate Bid(s) for sixty (60) calendar days from date of Award of Contract.

SIGNATURE: _____
(Bid is invalid without signature)

Print Name: _____ Date: _____

Title: _____

Address: _____

Telephone No.: _____ Fax No.: _____

Email Address: _____

Contact Person: _____

END OF SECTION

THIS PAGE IS FOR BIDDERS' REFERENCE
DO NOT SUBMIT WITH BID FORM.

BID CHECK LIST:

These items **must** be included with Bid:

Bid Form

Bid Bond

Fair Labor Practices Certification

DANE COUNTY BEST VALUE CONTRACTING QUALIFICATION

General Contractors & all Subcontractors must be qualified as a Best Value Contractor with the Dane County Public Works Engineering Division. Qualification & listing is not permanent & must be renewed every 24 months. Complete a *Best Value Contracting Application* online at:

pwht.countyofdane.com/bvc_application.aspx

DANE COUNTY VENDOR REGISTRATION PROGRAM

All bidders are strongly encouraged to be a registered vendor with Dane County. Registering allows vendors an opportunity to receive notifications for RFBs & RFPs issued by the County and provides the County with up-to-date company contact information. Complete a new form or renewal online at:

danepurchasing.com/Account/Login?

COUNTY OF DANE

PUBLIC WORKS CONSTRUCTION CONTRACT

Contract No. _____ Bid No. 320021

Authority: 2020 RES - _____

THIS CONTRACT, made and entered into as of the date by which authorized representatives of both parties have affixed their signatures, by and between the County of Dane (hereafter referred to as "COUNTY") and _____ (hereafter, "CONTRACTOR"), and

WITNESSETH:

WHEREAS, COUNTY, whose address is c/o Deputy Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR furnish Courthouse HVAC Controls Replacement ("the Project"); and

WHEREAS, CONTRACTOR, whose address is _____ is able and willing to construct the Project, in accordance with the Construction Documents;

NOW, THEREFORE, in consideration of the above premises and the mutual covenants of the parties hereinafter set forth, the receipt and sufficiency of which is acknowledged by each party for itself, COUNTY and CONTRACTOR do agree as follows:

1. CONTRACTOR agrees to construct, for the price of \$_____ the Project and at the CONTRACTOR'S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the Bid Form, General Conditions of Contract, the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by Dane County Dept. of Public Works, Highway & Transportation (hereinafter referred to as "the Architect / Engineer"), and as enumerated in the Project Manual Table of Contents, all of which are made a part hereof and collectively evidence and constitute the Contract.
2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the General Conditions of Contract, and to make payments on account thereof as provided in Article entitled, "Payments to Contractor" of the General Conditions of Contract.
3. During the term of this Contract, CONTRACTOR agrees to take affirmative action to ensure equal employment opportunities. The CONTRACTOR agrees in accordance with Wisconsin Statute 111.321 and Chapter 19 of the Dane County Code of Ordinances not to discriminate on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force or any other reserve component of the military forces of the United States, or political beliefs.

Such equal opportunity shall include, but not be limited to, the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation. CONTRACTOR agrees to post in conspicuous places, available to all employees and applicants for employment, notices setting forth the provisions of this paragraph.

4. CONTRACTOR shall file an Affirmative Action Plan with the Dane County Contract Compliance Specialist in accord with Chapter 19 of the Dane County Code of Ordinances. CONTRACTOR must file such plan within fifteen (15) business days of the effective date of this Contract. During the term of this Contract CONTRACTOR shall also provide copies of all announcements of employment opportunities to COUNTY'S Office of Equity & Inclusion, and shall report annually the number of persons, by race, ethnicity, gender, and disability status, which apply for employment and, similarly classified, the number hired and number rejected.

5. During the term of this Contract, all solicitations for employment placed on CONTRACTOR'S behalf shall include a statement to the effect that CONTRACTOR is an "Equal Opportunity Employer".

6. CONTRACTOR agrees to furnish all information and reports required by COUNTY'S Contract Compliance Specialist as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and the provisions of this Contract.

7. This Contract is intended to be a Contract solely between the parties hereto and for their benefit only. No part of this Contract shall be construed to add to, supplement, amend, abridge or repeal existing rights, benefits or privileges of any third party or parties including, but not limited to, employees of either of the parties.

8. The entire agreement of the parties is contained herein and this Contract supersedes any and all oral agreements and negotiations between the parties relating to the subject matter hereof. The parties expressly agree that the express terms of this Contract shall not be amended in any fashion except in writing, executed by both parties.

9. CONTRACTOR must be qualified as a Best Value Contractor or have proven their exemption with Dane County Public Works Engineering Division before Bid Due Date / Time. All contractors and subcontractors must be qualified as a Best Value Contractor or have proven their exemption to perform any work under this Contract.

IN WITNESS WHEREOF, COUNTY and CONTRACTOR, by their respective authorized agents, have caused this Contract and its Schedules to be executed, effective as of the date by which all parties hereto have affixed their respective signatures, as indicated below.

* * * * *

FOR CONTRACTOR:

Signature Date

Printed or Typed Name and Title

Signature Date

Printed or Typed Name and Title

NOTE: If CONTRACTOR is a corporation, Secretary should attest. In accordance with IRS Regulations, unincorporated entities are required to provide either their Social Security or Employer Number in order to receive payment for services rendered.

* * * * *

This Contract is not valid or effectual for any purpose until approved by the appropriate authority designated below, and no work is authorized until the CONTRACTOR has been given notice to proceed by COUNTY'S Deputy Public Works Director.

FOR COUNTY:

Joseph T. Parisi, County Executive Date

Scott McDonell, County Clerk Date

SECTION 00 72 12

GENERAL CONDITIONS OF CONTRACT

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1. CONSTRUCTION DOCUMENTS

- A. Construction Documents, listed in Table of Contents of this Specification volume shall form part of this Contract and provisions of Construction Documents shall be as binding upon parties as if they were fully set forth in Contract itself.
- B. These shall also be considered as part of Construction Documents: Addenda, including additions and modifications incorporated in such addenda before execution of Contract; requests for information; construction bulletins; change orders; and written interpretations by Architect / Engineer or Public Works Project Manager that are made after execution of Contract.
- C. Construction Documents are complementary, and what is required by one shall be as binding as if required by all. Intent of Construction Documents is to include all labor, materials and equipment necessary for proper execution of the Work.

2. DEFINITIONS

- A. These terms as used in this Contract are respectively defined as follows:
 - 1. All uses of term “County” in Construction Documents shall mean Dane County.
 - 2. All uses of term “Department” in Construction Documents shall mean Department of Public Works, Highway & Transportation, which is a unit of Dane County government. Department is County agency overseeing Contract with Contractor.
 - 3. Public Works Project Manager is appointed by and responsible to Department. Public Works Project Manager has authority to act on behalf of Department and will sign change orders, payment requests and other administrative matters related to projects.
 - 4. Public Works Project Manager is responsible for supervision, administration and management of field operations involved in construction phase of this Work.
 - 5. Term “Work” includes all labor, equipment and materials necessary to produce project required by Construction Documents.
 - 6. Term “Substantial Completion” is date when project or specified area of project is certified by Architect / Engineer that construction is sufficiently completed, in accordance with Construction Documents, and as modified by any subsequent changes agreed to by parties, so that County may occupy project or specified area of project for use for which it was intended subject to permit approval for occupancy.
 - 7. Contractor is person, firm, or corporation with whom County makes Contract. Though multiple contracts may be involved, Construction Documents treat them throughout as if each were of singular number.

3. ADDITIONAL INSTRUCTIONS AND DRAWINGS

- A. Contractor may be furnished additional instructions and detail drawings as necessary to carry out the Work included in Contract. Additional drawings and instructions thus supplied to Contractor will coordinate with Construction Documents and will be so prepared that they can be reasonably interpreted as part thereof. Contractor shall carry out the Work in accordance with additional detail drawings and instructions.
- 4.

8. MATERIALS AND WORKMANSHIP

- A. Contractor shall perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, necessary to complete the Work required by this Contract, within time specified, in accordance with provisions of Construction Documents.
- B. All equipment and materials incorporated in the Work covered by this Contract are to be new; use recycled and / or recovered materials to extent that such use is technically and economically feasible. Recovered materials are products recovered from solid waste in form identical to original form for use that is same as, or similar to original use. Recycled materials are products manufactured from solid waste.
- C. If requested, Contractor shall furnish satisfactory evidence as to kind and quality of construction materials proposed or used. Contractor shall furnish to Architect / Engineer, for approval, manufacturer name and model, performance capacities and other pertinent information of machinery, mechanical, electrical or other types of equipment, which Contractor plans to install.
- D. If not otherwise provided, materials and labor called for in this Contract shall be provided and performed in accordance with established practice and standards recognized by Architects, Engineers, Department, and construction industry.
- E. Reference to “Standard” specifications of any association or manufacturer, or codes of County authorities, intends most recent printed edition or catalog in effect on date that corresponds with date of Construction Documents.
- F. Whenever reference is made in Specifications that work shall be “performed”, “applied”, in accordance with “manufacturer’s directions or instructions”, Contractor to whom those instructions are directed shall furnish three (3) printed copies of such instructions to Architect / Engineer before execution of the Work.

9. CONTRACTOR’S TITLE TO MATERIALS

- A. Contractor or any subcontractor shall not purchase materials or supplies for the Work subject to any chattel mortgage or under conditional sale contract or other agreement by which seller retains interest. Contractor warrants that all materials and supplies used in the Work are free from all liens, claims or encumbrances and Contractor has good title to them.

10. “OR EQUAL” CLAUSE

- A. Whenever equipment or materials are identified on Drawings or in Specifications by reference to manufacturer’s or vendor’s name, trade name, catalog number, and other identifying information, it is intended to establish standards; and any equipment or material of other manufacturers and vendors which will perform adequately duties imposed by general design will be considered equally accepted provided equipment or material so proposed is, in opinion of Architect / Engineer, of equal substance and function. Architect / Engineer and Department shall provide written approval before Contractor may purchase or install it.
- B. Equipment or materials of manufacturers, other than those named, may be used only upon following conditions:
 - 1. That, in opinion of Architect / Engineer and Department, proposed material or equipment item is fully equal or superior (in design, materials, construction, workmanship, performance, finish, etc.) to named item. No compromise in quality level, however small, is acceptable.

2. That, in substituting materials or equipment, Contractor assumes responsibility for any changes in system or for modifications required in adjacent or related work to accommodate such substitution despite Architect / Engineer's and Department's approval, and all costs growing out of approval of "or equal" items shall be responsibility of Contractor. No extra costs resulting from such approval shall become responsibility of Department, Architect / Engineer or any other separate Contractor.
 3. It shall be understood that use of materials or equipment other than those specified, or approved equal by Architect / Engineer and Department, shall constitute violation of Contract, and that Architect / Engineer and Department shall have right to require removal of such materials or equipment and their replacement with specified materials or equipment at Contractor's expense.
 4. Product and manufacturer named first in Specifications or on information shown on Drawings is basis of selection of manufactured items and equipment, particularly mechanical equipment. In using other than first named products or manufacturers, including those specified as additionally approved or acceptable, Contractor assumes responsibility for any changes in system and for modifications in any work required to accommodate them. Architect / Engineer's approval of such additionally acceptable products or manufacturers, either in Specifications or in Addendum, does not relieve Contractor from obligation to coordinate such optional products with other Contractors, whose work may be affected by them, and to pay all additional costs resulting from their inclusion into the Work. Contractor's liability shall include payment of Architect / Engineer's fees for any additional services made necessary by or directly connected to such product changes. No extra costs resulting from such changes shall become responsibility of Department, Architect / Engineer or any other separate Contractor.
- C. No request for approval of "or equal" materials will be entertained except from Contractor. Identify any request for substitution as substitution on Contractor's letter of transmittal and give reasons for substitution. Department may in its sole discretion allow substitutions of materials.

11. PATENTS AND ROYALTIES

- A. If Contractor uses any design, device or material covered by letters, patent or copyright, it is mutually agreed and understood, that, without exception, contract prices shall include all royalties or costs arising from use of such design, device or materials, in any way involved in the Work.
- B. Contractor shall indemnify and save harmless County from any and all claims for infringement by reason of use of such patent or copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify County for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during prosecution of the Work or after completion of the Work.

12. SURVEYS, PERMITS, REGULATIONS AND TAXES

- A. Department will furnish to Contractor all site, topography and property surveys necessary for execution of the Work.
- B. Contractor shall procure all permits, licenses and approvals necessary for execution of this Contract.

- C. Contractor shall give all notices and comply with all State of Wisconsin, Federal and local laws, codes, rules and regulations relating to performance of the Work, protection of adjacent property, and maintenance of passageways, guard fences or other protective facilities.
- D. Contractor does not need to pay State and local sales & use taxes. See Wisconsin Statute 77.54 (9m).
- E. Contractor shall promptly notify Architect / Engineer of any variances of Drawings or Specifications with that of any State of Wisconsin, federal or local law, code, rule or regulation. Upon such notification, Architect / Engineer will require correction of variance to comply with applicable law, code, rule or regulation at no additional cost to Contractor.
- F. Work under this Contract shall comply with all applicable State of Wisconsin, Federal and local laws, codes and regulations.
- G. Contractor shall pay charges for water, sewer and other utility connections made by municipalities where required by Specifications.

13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE

- A. Contractor shall provide and pay for all materials, labor, tools, equipment, transportation and superintendence necessary to execute, complete and deliver the Work within specified time. Contractor agrees to secure at their own expense all personnel necessary to carry out the Work. Such personnel shall not be deemed County employees nor shall they have or be deemed to have any direct contractual relationship with County.
- B. Performance of any work necessary after regular working hours, on Sundays or Legal Holidays shall be without additional expense to County. Performance of any work at site at other than normal working hours must be coordinated with Public Works Project Manager.
- C. Contractor shall furnish, erect, maintain and remove such temporary works as may be required.
- D. Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of Construction Documents.
- E. At the Work site, Contractor shall give personal superintendence to the Work or shall employ construction superintendent or foreman, experienced in character of work covered by Contract, who shall have full authority to act for Contractor. Understand that such superintendent or foreman shall be acceptable to Architect / Engineer and Department.
- F. Remove from project or take other corrective action upon notice from Architect / Engineer or Department for Contractor's employees whose work is considered by Architect / Engineer or Department to be unsatisfactory, careless, incompetent, unskilled or otherwise objectionable.
- G. Contractor and subcontractors shall be required to conform to Labor Laws of State of Wisconsin and various acts amendatory and supplementary thereto and to other laws, ordinances and legal requirements applicable to the Work.
- H. Presence and observation of the Work by Architect / Engineer or Public Works Project Manager shall not relieve Contractor of any obligations.

14. WEATHER CONDITIONS

- A. In event of temporary suspension of work, or during inclement weather, or whenever Architect / Engineer shall direct, Contractor shall, and shall cause subcontractors to protect carefully all work and materials against damage or injury from weather. If, in opinion of Architect / Engineer or Department, any work or materials that have been damaged or injured due to failure on part of Contractor or any subcontractors so to protect the Work, such materials shall be removed and replaced at expense of Contractor.

15. PROTECTION OF WORK AND PROPERTY

- A. Contractor shall at all times safely guard County's property from injury or loss in connection with this Contract. Contractor shall at all times safely guard and protect the Work, and adjacent property, from damage. Contractor shall replace or make good any such damage, loss or injury unless such is caused directly by errors contained in Contract, or by County, or County's duly authorized representative.
- B. Contractor may act diligently, without previous instructions from Architect / Engineer and / or Department, in emergency that threatens loss or injury of property, or safety of life. Contractor shall notify Architect / Engineer and / or Department immediately thereafter. Promptly submit any claim for compensation by Contractor due to such extra work to Architect / Engineer and / or Department for approval as provided for in Article 18 herein.

16. INSPECTION AND TESTING OF MATERIALS

- A. Authorized representatives and agents of County government shall have access at all times to the Work wherever it is in preparation or progress and Contractor shall provide facilities for such access and for inspection.
- B. Should it be considered necessary or advisable at any time before final acceptance of the Work to make examination of work already completed, by removing or tearing out same, Contractor shall upon request, promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any aspect, due to fault of Contractor or subcontractors thereof, Contractor shall assume all expenses of such examination and of satisfactory reconstruction. Contractor will be reimbursed for such examination and replacement in accordance with Article 18 - A.3., of these General Conditions of Contract if such work is found to meet requirements of Contract.
- C. If Specifications, Architect / Engineer's, or Public Works Project Manager's instructions require any work to be specially tested or approved, Contractor shall give Architect / Engineer and Public Works Project Manager timely notice of its readiness for testing or inspection. Test all materials and equipment requiring testing in accordance with accepted or specified standards, as applicable. Architect / Engineer shall recommend laboratory or inspection agency and Department will select and pay for all initial laboratory inspection services. Should retesting be required, due to failure of initial testing, cost of such retesting shall be borne by Contractor.
- D. Cost of any testing performed by manufacturers or Contractor for substantiating acceptability of proposed substitution of materials and equipment, or necessary conformance testing in conjunction with manufacturing processes or factory assemblage, shall be borne by Contractor or manufacturer responsible.

17. REPORTS, RECORDS AND DATA

- A. Contractor shall submit to Architect / Engineer and Public Works Project Manager such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, invoices, records and other data as either may request concerning work performed or to be performed under this Contract.

18. CHANGES IN THE WORK

- A. Make no changes, except in cases of emergency, in the Work covered by approved Construction Documents without having prior written approval of Department. Charges or credits for the Work covered by approved change shall be determined by one of these methods:
1. Unit bid prices previously approved.
 2. Agreed lump sum based on actual cost of:
 - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
 - b) Materials entering permanently into the Work.
 - c) Ownership or rental cost of construction tools and equipment during time of use on extra work.
 - d) Power and consumable supplies for operation of power equipment.
 - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
 - f) Social Security and old age and unemployment contributions.
 - g) Add to cost under (2), fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit and any other general expense.
 - h) On that portion of the Work under (2) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit and any other general expense.
 - i) Department may require correct amount of costs with supporting vouchers; Contractor shall keep and present in such form as directed.
 3. Cost-plus work, with not-to-exceed dollar limit, based on actual cost of:
 - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
 - b) Materials entering permanently into the Work.
 - c) Ownership or rental cost of construction tools and equipment during time of use on extra work. Rental cost cannot exceed fifty percent (50%) replacement value of rented equipment.
 - d) Power and consumable supplies for operation of power equipment.
 - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
 - f) Social Security and old age and unemployment contributions.
 - g) To cost under (3), there shall be added fixed fee to be agreed upon but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit, and any other general expense.
 - h) On that portion of the Work under (3) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit, and any other general expense.
 - i) Contractor shall keep and present, in such form as directed, correct amount of cost together with such supporting vouchers as may be required by Department.
- B. If Contractor claims that by any instructions given by Architect / Engineer, Department, by drawings or otherwise, regarding performance of the Work or furnishing of material under

Contract, involves extra cost, Contractor shall give Department written notice of cost thereof within two (2) weeks after receipt of such instructions and in any event before proceeding to execute work, unless delay in executing work would endanger life or property.

- C. No claim for extra work or cost shall be allowed unless it was done in pursuance of written Change Order from Architect / Engineer and approved by Department, as previously mentioned, and claim presented with payment request submitted after changed or extra work is completed.
- D. Negotiation of cost for change in the Work shall not be cause for Contractor to delay prosecution of the Work if Contractor has been authorized in writing by Public Works Project Manager to proceed.

19. EXTRAS

- A. Without invalidating Contract, Department may order extra work or make changes by altering, adding to or deducting from the Work, contract sum being adjusted in accordance with Article 18 herein.

20. TIME FOR COMPLETION

- A. Contractor agrees that the Work shall be prosecuted regularly and diligently and complete the Work as stated in Construction Documents.

21. CORRECTION OF WORK

- A. All work, all materials whether incorporated in the Work or not, and all processes of manufacture shall at all times and places be subject to inspection of Architect / Engineer and Public Works Project Manager who shall be judge of quality and suitability of the Work, materials, and processes of manufacture for purposes for which they are used. Should they fail to meet Architect / Engineer's and Public Works Project Manager's approval they shall be reconstructed, made good, replaced or corrected, by Contractor at Contractor's expense. Immediately remove all rejected material from site.
- B. If Contractor defaults or neglects to carry out the Work in accordance with Construction Documents or fails to perform any provision of Contract, Department may, after ten (10) business days' written notice to Contractor and without prejudice to any other remedy County may have, make good such deficiencies. In such case, appropriate Change Order shall be issued deducting from Contractor's payments then or thereafter, cost of correcting such deficiencies, including cost of Architect / Engineer's additional services made necessary by such default, neglect or failure.

22. SUBSURFACE CONDITIONS FOUND DIFFERENT

- A. If Contractor encounters subsurface or latent conditions at site materially differing from those shown on Drawings or indicated in Specifications, Contractor shall immediately give notice to Architect / Engineer and Public Works Project Manager of such conditions before they are disturbed. Architect / Engineer will thereupon promptly investigate conditions, and if Architect / Engineer finds that they materially differ from those shown on Drawings or indicated in Specifications, Architect / Engineer will at once make such changes as necessary, any increase or decrease of cost resulting from such changes to be adjusted in manner provided in above Article 18 entitled "Changes in the Work".

23. RIGHT OF DEPARTMENT TO TERMINATE CONTRACT

- A. In event that any provisions of this Contract are violated by Contractor or by any subcontractors, County may serve written notice upon Contractor and Surety of its intention to terminate Contract, such notice to contain reasons for such intention to terminate Contract, and unless within ten (10) business days after serving of such notice upon Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, Contract shall, upon expiration of said ten (10) business days, cease and terminate.
- B. In event of any such termination, County shall immediately serve notice thereof upon Surety and Contractor, and Surety shall have right to take over and perform Contract subject to County's approval; provided, however, that if Surety does not commence performance thereof within ten (10) business days from date of mailing to such Surety of notice of termination, County may take over the Work and prosecute same to completion by contract, or by force account, at expense of Contractor; Contractor and Surety shall be liable to County for any excess cost occasioned County thereby, and in such event County may take possession of and utilize in completing the Work, such materials and equipment as may be on the Work site and therefore necessary.

24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

- A. Contractor shall be responsible for Construction Schedule and coordination. Immediately after execution and delivery of Contract and before making first payment, Contractor shall notify all subcontractors to furnish all required information to develop Construction Schedule. Contractor and all subcontractors associated with the Work shall furnish following information from each Division of Specifications:
 - 1. List of construction activities;
 - 2. Start, finish and time required for completion of each activity;
 - 3. Sequential relationships between activities;
 - 4. Identify all long lead-time items, key events, meetings or activities such as required submittals, fabrication and delivery, procurement of materials, installation and testing;
 - 5. Weekly definition of extent of work and areas of activity for each trade or Subcontract; and
 - 6. Other information as determined by Public Works Project Manager.
- B. In addition to above requested items, Contractor shall request delivery dates for all County-furnished equipment, materials or labor. This shall include any work handled by Department under separate contracts such as asbestos abatement, air and water balancing, etc. Indicate on Construction Schedule these associated delivery and installation dates.
- C. Progress Reporting:
 - 1. Contractor shall update and publish Construction Schedule on monthly basis. Revisions to Schedule shall be by Contractor and made in same detail as original Schedule and accompanied by explanation of reasons for revision; and shall be subject to approval by Department.
 - 2. Failure of Contractor to keep Schedule in updated format shall result in County hiring firm specializing in construction schedule development and deducting those costs associated with updating process from payments due Contractor.
 - 3. Contractor shall submit show actual percentage of each activity completed, estimated future progress, and anticipated completion time.
- D. Responsibility for timely completion requires:

1. Contractor and subcontractors understand that performance of each is interdependent upon performance of others.
 2. Whenever it becomes apparent from current schedule, that phasing or progress completion dates will not be met, Contractor must take some or all following actions at no additional cost to County:
 - a) Increase construction labor in such quantities and crafts as will eliminate backlog of work.
 - b) Increase number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination of foregoing to eliminate backlog of work.
 - c) Reschedule work (yet remain in conformance with Drawings and Specifications).
 3. Prior to proceeding with any of above actions, Contractor shall notify Public Works Project Manager.
- E. Maintain current Construction Schedule at all times. Revise Construction Schedule in same detail as original and accompany with explanation of reasons for revision. Schedule shall be subject to approval by Architect / Engineer and Public Works Project Manager.

25. PAYMENTS TO CONTRACTOR

- A. Contractor shall provide:
1. Detailed estimate giving complete breakdown of contract price by Specification Division; and
 2. Periodic itemized estimates of work done for purpose of making partial payments thereon.
- B. Submit these estimates for approval first to Architect / Engineer, then to Public Works Project Manager. Costs employed in making up any of these schedules are for determining basis of partial payments and not considered as fixing basis for additions to or deductions from Contract price.
- C. County will make partial payments to Contractor for value, proportionate to amount of Contract, of all labor and material incorporated in the Work during preceding calendar month upon receipt of Application and Certificate for Payment form from Architect / Engineer and approval of Department.
- D. Contractor shall submit for approval to Public Works Project Manager all Application and Certificate for Payment forms. If requested, Application and Certificate for Payment shall be supported by such additional evidence as may be required, showing Contractor's right to payment claimed.
- E. Application and Certificate for Payment for preparatory work and materials delivered and suitably stored at site to be incorporated into the Work at some future period, will be given due consideration. Requesting payment for materials stored off site, may be rejected, however, if deemed essential for reasons of job progress, protection, or other sufficient cause, requests will be considered, conditional upon submission by Contractor of bills of sale, photographs and such other procedures as will adequately protect County's interest such as storage in bonded warehouse with adequate coverage. If there is any error in payment, Contractor is obligated to notify Department immediately, but no longer than ten (10) business days from receipt of payment.
- F. Payments by County will be due within forty-five (45) business days after receipt by Department of Application and Certificate for Payment.

- G. County will retain five percent (5%) of each Application and Certificate for Payment until final completion and acceptance of all the Work covered by Contract. However, anytime after fifty percent (50%) of the Work has been furnished and installed at site, County will make remaining payments in full if Architect / Engineer and Public Works Project Manager find that progress of the Work corresponds with Construction Schedule. If Architect / Engineer and Public Works Project Manager find that progress of the Work does not correspond with Construction Schedule, County may retain up to ten percent (10%) of each Application and Certificate for Payment for the Work completed.
- H. All material and work covered by partial payments made shall become sole property of County, but this provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made, or restoration of any damaged work, or as waiver of right of County to require fulfillment of all of terms of Contract.
- I. County will make final payment within sixty (60) calendar days after final completion of the Work, and will constitute acceptance thereof.
- J. County may make payment in full, including retained percentages and less authorized deductions, upon completion and acceptance of each Division where price is stated separately in Contract.
- K. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit(s) as required to prove that all debts and claims against this Work are paid in full or otherwise satisfied, and give final evidence of release of all liens against the Work and County.

26. WITHHOLDING OF PAYMENTS

- A. County, after having served written notice on said Contractor, may either pay directly any unpaid bills of which Department has written notice, or withhold from Contractor's unpaid compensation sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged; whereupon, payment to Contractor shall be resumed in accordance with terms of this Contract, but in no event shall these provisions be construed to impose any obligations upon County to either Contractor or Contractor's Surety.
- B. In paying any unpaid bills of Contractor, County shall be deemed agent of Contractor, and any payment so made by County, shall be considered as payment made under Contract by County to Contractor and County shall not be liable to Contractor for any such payment made in good faith.
- C. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all claims growing out of lawful demands of subcontractors, laborers, workers, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in performance of this Contract.
- D. At Department's request, Contractor shall furnish satisfactory evidence that all obligations of nature designated above have been paid, discharged or waived.

27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- A. Making of final payment shall constitute waiver of all claims by County except those arising from:
 - 1. Unsettled lien;
 - 2. Faulty or defective work appearing after substantial completion;
 - 3. Failure of the Work to comply with requirements of Construction Documents; or
 - 4. Terms of any special guarantees required by Construction Documents.
- B. Acceptance of final payment shall constitute waiver of all claims by Contractor.

28. PAYMENTS BY CONTRACTOR

- A. Contractor shall pay following not later than fifth (5th) business day following each payment received from County:
 - 1. All transportation and utility services rendered;
 - 2. All materials, tools, and other expendable equipment that have been delivered at site of the Work to extent of ninety percent (90%) of cost thereof, and balance of cost thereof when said balance is paid to Contractor; and
 - 3. Each subcontractor, respective amount allowed Contractor because of work performed by subcontractor to extent of subcontractor's interest therein.

29. CONTRACT SECURITY

- A. Contractor shall furnish Performance and Payment Bonds in amount at least equal to one hundred percent (100%) of Contract price as security for faithful performance of this Contract and payment of all persons performing labor on project under this Contract and furnishing materials in connection with this Contract.
- B. Sample Performance and Payment Bonds that Contractor will be required to execute is bound into these Construction Documents. Before construction Contract is consummated, completed Performance and Payment Bonds must be approved by Department.

30. ASSIGNMENTS

- A. Contractor shall not assign whole or any part of this Contract or any moneys due or to become due hereunder without written consent of Department. In case Contractor assigns all or any part of any moneys due or to become due under this Contract, instrument of assignment shall contain clause substantially to effect that it is agreed that right of assignee in and to any moneys due or to become due to Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for performance of the Work called for in this Contract.

31. MUTUAL RESPONSIBILITY OF CONTRACTORS

- A. If, through acts of neglect on part of Contractor or any subcontractor shall suffer loss or damage on the Work, Contractor agrees to settle with such subcontractor by agreement or arbitration if such other subcontractor will so settle. If such subcontractor shall assert any claim against County on account of any damage alleged to have been sustained, Department shall notify Contractor, who shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives against any such claim.

32. SEPARATE CONTRACTS

- A. Department may award other contracts for the Work and all Contractors shall fully cooperate with each other and carefully adjust their work to that provided under other contracts as may be directed by Department. No Contractor shall commit or permit any act that will interfere with performance of the Work by any other Contractor.
- B. Contractor shall coordinate the Work with those of other Contractors. Cooperation will be required in arrangement for storage of materials and in detailed execution of the Work. Contractor, including subcontractors, shall keep informed of progress and detail work of others and shall notify Architect / Engineer or Department immediately of lack of progress or defective workmanship on part of others. Failure of Contractor to keep informed of the Work progressing on site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by Contractor of status of the Work as being satisfactory for proper coordination with Contractor's own work.

33. SUBCONTRACTS

- A. Contractor may use services of specialty subcontractors on those parts of the Work that, under normal contracting practices, are performed by specialty subcontractors.
- B. Contractor shall not award any work to any subcontractor without prior approval of Department. Qualifications of subcontractors shall be same as qualifications of Contractor. Request for subcontractor approval shall be submitted to Department fifteen (15) business days before start of subcontractor's work. If subcontractors are changed or added, Contractor shall notify Department in writing.
- C. Contractor shall be as fully responsible to County for acts and omissions of subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for acts and omissions of persons directly employed by Contractor.
- D. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to Contractor by terms of General Conditions of Contract and other Construction Documents insofar as applicable to work of subcontractors and to give Contractor same power as regards terminating any subcontract that Department may exercise over Contractor under any provision of Construction Documents.
- E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and County.
- F. Contractor shall insert in all subcontracts, Articles 26, 33, 43 and 45, respectively entitled: "Withholding of Payments", "Subcontracts", "Affirmative Action Provision and Minority / Women / Disadvantaged Business Enterprises", and "Minimum Wages", and shall further require all subcontractors to incorporate physically these same Articles in all subcontracts.

34. PROJECT MANAGER'S AUTHORITY

- A. Public Works Project Manager shall:
 - 1. Administer and ensure compliance with Construction Documents;

2. Provide responsible on-site observations of construction and have authority to request work and to stop work whenever necessary to insure proper enforcement of Construction Documents;
3. Convene and chair project meetings and foreman's coordination meetings when necessary to coordinate resolution of conflicts between Contractors, Architects, Engineers, Consultants, and Department; and
4. Check and inspect material, equipment and installation procedures of all trades for proper workmanship and for compliance with Drawings, Specifications and Shop Drawings, permit no material on project site that is not satisfactory and reject work not in compliance with Construction Documents.

35.

36. STATED ALLOWANCES

- A. Stated allowances enumerated in Instructions to Bidders shall cover net cost of materials or equipment, and all applicable taxes. Contractor's cost of delivery and unloading at site, handling costs on site, labor, installation costs, overhead, profit and any other incidental costs shall be included in Contractor's bid, but not as part of cash allowance.
- B. Department will solicit at least two (2) bids on materials or equipment for which allowance is stated and select on basis of lowest qualified responsible bid. Contractor will then be instructed to purchase "Allowed Materials". If actual price for purchasing "Allowed Materials", including taxes, is more or less than "Cash Allowance", Contract price shall be adjusted accordingly. Adjustment in Contract price shall not contain any cost items excluded from cash allowance.

37. ESTIMATES OF QUANTITIES

- A. Whenever estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of Construction Documents, they are given for use in comparing bids and right is especially reserved to increase or diminish them as they may be deemed reasonably necessary or desirable by Department to complete the Work included in this Contract, and cost for such increase or diminution shall be adjusted in manner provided for in General Conditions of Contract Article 18 entitled "Changes in the Work".

38. LANDS AND RIGHTS-OF-WAY

- A. Prior to start of construction, County shall furnish all land and rights-of-way necessary for carrying out and completion of the Work to be performed under this Contract.

39. GENERAL GUARANTEE

- A. Neither final certificate of payment nor any provision in Construction Documents nor partial or entire occupancy of premises by County shall constitute acceptance of work not done in accordance with Construction Documents or relieve Contractor of liability in respect to any expressed warranties or responsibility for faulty materials or workmanship.
 1. In no event shall making of any payment required by Contract constitute or be construed as waiver by County of any breach of covenants of Contract or waiver of any default of Contractor and making of any such payment by County while any such default or breach shall exist shall in no way impair or prejudice right of County with respect to recovery of damages or other remedy as result of such breach or default.

- B. Contractor shall remedy and make good all defective workmanship and materials and pay for any damage to other work resulting there from, which appear within period of one (1) year from date of substantial completion, providing such defects are not clearly due to abuse or misuse by County. Department will give notice of observed defects with reasonable promptness.
- C. Guarantee on work executed after certified date of substantial completion will begin on date when such work is inspected and approved by Public Works Project Manager.
- D. Where guarantees or warranties are required in sections of Specifications for periods in excess of one (1) year, such longer terms shall apply; however, Contractor's Performance and Payment Bonds shall not apply to any guarantee or warranty period in excess of one (1) year.

40. CONFLICTING CONDITIONS

- A. Any provision in any of Construction Documents which may be in conflict or inconsistent with any Articles in these General Conditions of Contract or Supplementary Conditions shall be void to extent of such conflict or inconsistency.
- B. In case of ambiguity or conflict between Drawings and Specifications, Specifications shall govern.
- C. Printed dimensions shall be followed in preference to measurements by scale. Large-scale drawings take precedence over small-scale drawings. Dimensions on Drawings and details are subject to field measurements of adjacent work.

41. NOTICE AND SERVICE THEREOF

- A. Any notice to Contractor from Department relative to any part of this Contract shall be in writing and considered delivered and service thereof completed, when said notice is posted, by certified or registered mail, to Contractor at Contractor's last given address, or delivered in person to said Contractor, or Contractor's authorized representative on the Work.

42. PROTECTION OF LIVES AND HEALTH

- A. In order to protect lives and health of Contractor's employees under Contract, Contractor shall comply with all pertinent provisions of Wisconsin Administrative Code, Rules of Department of Commerce, relating to Safety and Health.
- B. Contractor alone shall be responsible for safety, efficiency and adequacy of Contractor's tools, equipment and methods, and for any damage that may result from their failure or their improper construction, maintenance or operation.

43. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES

- A. Affirmative Action Provisions.
 - 1. During term of their Contract, Contractor agrees not to discriminate on basis of race, religion, color, sex, handicap, age, sexual preference, marital status, physical appearance, or national origin against any person, whether recipient of services (actual or potential), employee, or applicant for employment. Such equal opportunity shall include but not be limited to following: employment, upgrading, demotion, transfer, recruitment,

advertising, layoff, termination, training, rates of pay, and any other form of compensation or level of service(s). Contractor agrees to post in conspicuous places, these affirmative action standards so as to be visible to all employees, service recipients and applicants for this paragraph. Listing of prohibited bases for discrimination shall not be construed to amend in any fashion state or federal law setting forth additional bases and exceptions shall be permitted only to extent allowable in state or federal law.

2. Contractor is subject to this Article only if Contractor has twenty (20) or more employees and receives \$20,000.00 or more in annual aggregate contracts with County. Contractor shall file and Affirmative Action Plan with Dane County Contract Compliance Specialist in accord with Chapter 19 of Dane County Code of Ordinances. Such plan must be filed within fifteen (15) business days of effective date of this Contract and failure to do so by said date shall constitute ground for immediate termination of Contract by County. Contractor shall also, during term of this Contract, provide copies of all announcements of employment opportunities to County's Office of Equity & Inclusion, and shall report annually number of persons, by race, sex and handicap status, who apply for employment, and, similarly classified, number hired and number rejected.
3. Contact Dane County Contract Compliance Specialist at Dane County Office of Equity & Inclusion, 210 Martin Luther King, Jr. Blvd., Room 356, Madison, WI 53703, 608/266-4192.
4. In all solicitations for employment placed on Contractor's behalf during term of this Contract, Contractor shall include statement to affect Contractor is "Equal Opportunity Employer". Contractor agrees to furnish all information and reports required by County's Contract Compliance Specialist as same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and provision of this Contract.

B. Minority / Women / Disadvantaged / Emerging Small Business Enterprises.

1. Chapter 19.508 of Dane County Code of Ordinances is official policy of Dane County regarding utilization of, to fullest extent of, Minority Business Enterprises (MBEs), Women Business Enterprises (WBEs) Disadvantage Business Enterprises (DBEs) and Emerging Small Business Enterprises (ESBEs).
2. Contractor may utilize MBEs / WBEs / DBEs / ESBEs as subcontractors or suppliers. List of subcontractors will be required of low bidder as stated in this Contract. List shall indicate which are MBEs / WBEs / DBEs / ESBEs and percentage of subcontract awarded, shown as percentage of total dollar amount of bid.

44. COMPLIANCE WITH FAIR LABOR STANDARDS

- A. During term of this Contract, Contractor shall report to County Contract Compliance Specialist, within ten (10) business days, any allegations to, or findings by National Labor Relations Board (NLRB) or Wisconsin Employment Relations Commission (WERC) that Contractor has violated statute or regulation regarding labor standards or relations. If investigation by Contract Compliance Specialist results in final determination that matter adversely affects Contractor's responsibilities under this Contract, and which recommends termination, suspension or cancellation of this Contract, County may take such action.
- B. Contractor may appeal any adverse finding by Contract Compliance Specialist as set forth in Dane County Ordinance 25.015(11)(c) through (e).
- C. Contractor shall post this statement in prominent place visible to employees: "As condition of receiving and maintaining contract with Dane County, this employer shall comply with federal, state and all other applicable laws prohibiting retaliation or union organizing."

45. DOMESTIC PARTNERSHIP BENEFITS

A. Not Used.

46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE

- A. Contractor agrees to use and occupancy of portion or unit of the Work before formal acceptance by Department, provided Department:
1. Secures written consent of Contractor; except when in opinion of Public Works Project Manager, Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other Contract requirements.
 2. Secures endorsement from insurance carrier and consent of Surety permitting occupancy of building or use of the Work during remaining period of construction, or, secures consent of Surety.
 3. Assumes all costs and maintenance of heat, electricity and water.
 4. Accepts all work completed within that portion or unit of the Work to be occupied, at time of occupancy.

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48. CLAIMS

A. No claim may be made until Department's Deputy Public Works Director has reviewed decision as provided for in Article 35 of General Conditions of Contract. If any claim remains unresolved after such review by Department's Deputy Public Works Director, the claim may be filed under Wisconsin Statute 893.80. Work shall progress during period of any dispute or claim. Unless specifically agreed between parties, venue will be in Dane County, Wisconsin.

49. ANTITRUST AGREEMENT

A. Contractor and County recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by County. Therefore, Contractor hereby assigns to County any and all claims for such overcharges as to goods and materials purchased in connection with this Contract, except as to overcharges which result from antitrust violations commencing after price is established under this Contract and any change order thereto.

50. INSURANCE

- A. Contractor Carried Insurance:
1. Contractor shall not commence work under this Contract until Contractor has obtained all insurance required under this Article and has provided evidence of such insurance to Risk Manager, 425 City-County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53703. Contractor shall not allow any subcontractor to commence work until insurance required of subcontractor has been so obtained and approved. Company providing insurance must be licensed to do business in Wisconsin.
 2. Worker's Compensation Insurance:
 - a) Contractor shall procure and shall maintain during life of this Contract, Worker's Compensation Insurance as required by statute for all of Contractor's employees engaged in work at site of project under this Contract and, in case of any such work sublet, Contractor shall require subcontractor similarly to provide Worker's

- Compensation Insurance for all of latter's employees to be engaged in such work unless such employees are covered by protection afforded by Contractor's Worker's Compensation Insurance.
- b) If any claim of employees engaged in hazardous work on project under this Contract is not protected under Worker's Compensation Statute, Contractor shall provide and shall cause each subcontractor to provide adequate Employer's Liability Insurance for protection of such of Contractor's employees as are not otherwise protected.
3. Contractor's Public Liability and Property Damage Insurance:
- a) Contractor shall procure and maintain during life of this Contract, Contractor's Public Liability Insurance and Contractor's Property Damage Insurance in amount not less than \$1,000,000 bodily injury, including accidental death, to any one person, and subject to same limit for each person, in amount not less than \$1,000,000 on account of one accident, and Contractor's Property Damage Insurance in amount not less than \$1,000,000 or combined single limit of at least \$1,000,000 with excess coverage over and above general liability in amount not less than \$5,000,000. Contractor shall add "Dane County" as additional insured for each project.
 - b) Contractor's Public Liability and Property Damage Insurance shall include Products, Completed Operation, and Contractual Liability under Insurance Contract. "Contractor shall in all instances save, defend, indemnify and hold harmless County and Architect / Engineer against all claims, demands, liabilities, damages or any other costs which may accrue in prosecution of the Work and that Contractor will save, defend, indemnify and hold harmless County and Architect / Engineer from all damages caused by or as result of Contractor's operations" and each shall be listed as additional insured on Contractor's and subcontractors' insurance policies.
 - c) Obligations of Contractor under Article 50.A.2.b) shall not extend to liability of Architect / Engineer, agents or employees thereof, arising out of:
 - 1) Preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or
 - 2) Giving of or failure to give directions or instructions by Architect / Engineer, agents or employees thereof provided such giving or failure to give is primary cause of injury or damage.
 - d) Contractor shall procure and shall maintain during life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 each accident single limit, bodily injury and property damage combined with excess coverage over and above general liability in amount not less than \$5,000,000.
 - e) Contractor shall either:
 - 1) Require each subcontractor to procure and to maintain during life of subcontract, subcontractor's Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or
 - 2) Insure activities of subcontractors in Contractor's own policy.
4. Scope of Insurance and Special Hazards: Insurance required under Article 50.A.2 & 50.A.3. hereof shall provide adequate protection for Contractor and subcontractors, respectively, against damage claims which may arise from operations under this Contract, whether such operation be by insured or by anyone directly or indirectly employed by insured and also against any of special hazards which may be encountered in performance of this Contract as enumerated in Supplementary Conditions.
5. Proof of Carriage of Insurance: Contractor shall furnish Risk Manager with certificates showing type, amount, class of operations covered, effective dates, dates of expiration of policies and "Dane County" listed as additional insured. Such certificates shall also contain (substantially) following statement: "Insurance covered by this certificate will not be canceled or materially altered, except after ten (10) business days written notice has been received by Risk Manager."

B. Builder's Risk:

1. County shall provide Builder's Risk insurance coverage for its insurable interests in construction or renovation projects with completed value of \$1,000,000 or less. Therefore, if project completed value is more than \$1,000,000, Contractor shall obtain and maintain in force, at its own expense, Builder's Risk Insurance on all risks for amount equal to full completed value of covered structure or replacement value of alterations or additions. Any deductible shall not exceed \$25,000 for each loss. Policy shall include occupancy clause and list Dane County as loss payee.

C. Indemnification / Hold Harmless:

1. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from performance of the Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, and is caused in whole or in part by any act or omission of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by part indemnified hereunder.
2. In any and all claims against Dane County, its boards, commissions, agencies, officers, employees and representatives or by any employee of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, indemnification obligation under this Contract shall not be limited in any way by any limitation on amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under worker's compensation acts, disability benefits or other employee benefit acts.
3. Obligations of Contractor under this Contract shall not extend to liability of Architect / Engineer, its agents or employees arising out of:
 - a) Preparation or approval of maps, drawings, opinion, reports, surveys, change orders, designs or specifications; or
 - b) Giving of or failure to give directions or instruction by Architect / Engineer, its agents or employees provided such giving or failure to give is primary cause of injury or damage.
4. Dane County shall not be liable to Contractor for damages or delays resulting from work by third parties or by injunctions or other restraining orders obtained by third parties.

51. WISCONSIN LAW CONTROLLING

- A. It is expressly understood and agreed to by parties hereto that in event of any disagreement or controversy between parties, Wisconsin law shall be controlling.


END OF SECTION

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

1. APPLICATION & CERTIFICATE FOR PAYMENT

- A. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit partial and final Application & Certificate for Payment for work under said contract. Form shall provide similar information as shown on AIA G702™ and G703™ forms (samples shown below). Forms shall be submitted to Public Works Project Manager for approval.


AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO:	Distribution to:
		PERIOD TO:	OWNER <input type="checkbox"/>
FROM CONTRACTOR:	VIA ARCHITECT:	CONTRACT FOR:	ARCHITECT <input type="checkbox"/>
		CONTRACT DATE:	CONTRACTOR <input type="checkbox"/>
		PROJECT NOS:	FIELD <input type="checkbox"/>
			OTHER <input type="checkbox"/>

CONTRACTOR'S APPLICATION FOR PAYMENT
Application is made for payment, as shown below, in connection with the Contract. AIA Document G703™, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM	\$
2. NET CHANGE BY CHANGE ORDERS	\$
3. CONTRACT SUM TO DATE (Line 1 + 2)	\$
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	\$
5. RETAINAGE:	
a. _____ % of Completed Work (Columns D + E on G703)	\$
b. _____ % of Stored Material (Column F on G703)	\$
Total Retainage (Lines 5a + 5b, or Total in Column I of G703)	\$
6. TOTAL EARNED LESS RETAINAGE	\$
(Line 4 minus Line 5 Total)	
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$
(Line 6 from prior Certificate)	
8. CURRENT PAYMENT DUE	\$
9. BALANCE TO FINISH, INCLUDING RETAINAGE	\$
(Line 3 minus Line 6)	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$	\$
Total approved this month	\$	\$
TOTAL	\$	\$
NET CHANGES by Change Order	\$	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:
By: _____ Date: _____
State of: _____
County of: _____
Subscribed and sworn to before me this _____ day of _____

Notary Public:
My commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT
In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:
By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.
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 **AIA** Document G703™ – 1992

Continuation Sheet

AIA Document G702™-1992, Application and Certificate for Payment, or G732™-2009, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached. In tabulations below, amounts are in US dollars. Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED <i>(Not in D or E)</i>	G TOTAL COMPLETED AND STORED TO DATE <i>(D+E+F)</i>	H BALANCE TO FINISH <i>(C-G)</i>	I RETAINAGE <i>(if variable rate)</i>
			FROM PREVIOUS APPLICATION <i>(D-E)</i>	THIS PERIOD				
GRAND TOTAL								

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

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SUBMITTAL

END OF SECTION



Department of Public Works, Highway & Transportation
Public Works Engineering Division

608/266-4018

Gerald J. Mandli, P.E.
Commissioner / Director

Joseph T. Parisi
County Executive

Deputy Director
Todd Draper

1919 Alliant Energy Center Way
Madison, Wisconsin 53713
Fax: 608/267-1533
www.countyofdane.com/pwht/public_works.aspx

BEST VALUE CONTRACTING APPLICATION

CONTRACTORS / LICENSURE APPLICANTS

The Dane County Department of Public Works requires contractors & subcontractors to be a Best Value Contractor before being hired. Contractor & subcontractor application documents should be turned in immediately. Contractor approval or exemption must be complete prior to Bid Due Date / Time. All subcontractors must also be approved or prove their exemption before performing any work under a County contract. This document shall be completed, properly executed, along with the necessary attachments and additional information that the County requires for the protection and welfare of the public in the performance of a County contract.

Contractors or subcontractors of any tier who attain qualification status will retain that status for a period of two (2) years from the date of qualification. Contractors shall notify the Dane County Department of Public Works, Highway & Transportation within fifteen (15) days of any changes to its business or operations that are relevant to the application. Failure to do so could result in suspension, revocation of the contractor's qualification, debarment from County contracts for up to three (3) years and / or other sanctions available under the law.

No contracts will be awarded for construction work performed on Dane County projects unless the contractor is currently approved as a Wisconsin Trade Trainer or has applied for approval as an Apprenticeship Trade Trainer to the Wisconsin Department of Workforce Development and agrees to an acceptable apprenticeship program. If you are not currently approved as a Wisconsin Trade Trainer, or have not applied for approval as an Apprenticeship Trade Trainer, please contact the Department of Workforce Development - Bureau of Apprenticeship Standards at 608/266-3133 or visit their web site at: <https://dwd.wisconsin.gov/apprenticeship/>.

EXEMPTIONS

- Contractors who employ less than five (5) apprenticeable trade workers are not required to qualify.
- Contractors performing work that does not apply to an apprenticeable trade, as outlined in Appendix A.
- The contractor / subcontractor provides sufficient documentation to demonstrate one or more of the following:
 - apprentices are not available in a specific geographic area;
 - the applicable apprenticeship program is unsuitable or unavailable; or
 - there is a documented depression of the local construction market which prevents compliance.

SEC.	PROOF OF RESPONSIBILITY	CHECK IF APPLICABLE
1	Does your firm possess all technical qualifications and resources, including equipment, personnel and financial resources, necessary to perform the work required for any project or obtain the same through the use of responsible, qualified subcontractors?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
2	Will your firm possess all valid, effective licenses, registrations or certificates required by federal, state, county, or local law, which are necessary for the type of work to be performed including, but not limited to, those for any type of trade work or specialty work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
3	Will your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
4	Will your firm meet all insurance requirements as required by applicable law or specifications, including general liability insurance, workers compensation insurance and unemployment insurance requirements?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
5	Will your firm maintain a substance abuse policy for employees hired for public works contracts that comply with Wis. Stats. Sec. 103.503?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
6	Will your firm fully abide by the equal opportunity and affirmative action requirements of all applicable laws, including County ordinances?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
7	In the past three (3) years, has your firm had control or has another corporation, partnership or other business entity operating in the construction industry controlled it? If so, please attach a statement explaining the nature of the firm relationship?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
8	In the past three (3) years, has your firm had any type of business, contracting or trade license, certification or registration revoked or suspended?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
9	In the past three (3) years, has your firm been debarred by any federal, state or local government agency?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
10	In the past three (3) years, has your firm defaulted or failed to complete any contract?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
11	In the past three (3) years, has your firm committed a willful violation of federal, state or local government safety laws as determined by a final decision of a court or government agency authority.	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
12	In the past three (3) years, has your firm been in violation of any law relating to your contracting business where the penalty for such violation resulted in the imposition of a penalty greater than \$10,000?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
13	Is your firm an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
14	Is your firm exempt from being qualified with Dane County?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach reason for exemption.
15	Does your firm acknowledge that in doing work under any County Public Works Contract, it will be required to use as subcontractors only those contractors that are also qualified with the County or become so within five (5) days after the Bid Due Date?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
16	Contractor has been in business less than one year?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
17	Is your firm a first time Contractor requesting a one time exemption, but, intend to comply on all future contracts and are taking steps typical of a "good faith" effort?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>

SIGNATURE SECTION

Your firm's Officer, or the individual who would sign a bid and / or contract documents must sign this document.

I do hereby certify that all statements herein contained are true and correct to the best of my knowledge:

Signature: _____

(Application is invalid without signature)

Print Name: _____ Date: _____

Title: _____

NAME AND ADDRESS OF CONTRACTOR	
Name of Firm:	
Address:	
City, State, Zip:	
Phone Number:	
Fax Number:	
E-mail Address:	

REMEMBER!

RETURN ALL TO FORMS AND ATTACHMENTS, OR QUESTIONS TO:

**TODD DRAPER
EMAIL: DRAPER@COUNTYOFDANE.COM
OFFICE: (608) 267-0119, FAX: (608) 267-1533**

**DANE COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAY & TRANSPORTATION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WI 53713**

APPENDIX A

APPRENTICEABLE TRADES:

- Bricklayer
- Carpenter
- Cement Mason (Concrete Finisher)
- Cement Mason (Heavy Highway)
- Construction Craft Laborer
- Data Communications Installer
- Electrician
- Elevator Mechanic / Technician
- Environmental Systems Technician / HVAC Service Technician / HVAC Install & Service
- Glazier
- Heavy Equipment Operator / Operating Engineer
- Insulation Worker (Heat & Frost)
- Iron Worker (Assembler, Metal Buildings)
- Painter / Decorator
- Plasterer
- Plumber
- Roofer / Waterproofer
- Sheet Metal Worker
- Sprinkler Fitter
- Steamfitter (Service & Refrigeration)
- Taper & Finisher
- Telecommunications (Voice, Data & Video) Installer / Technician
- Tile Setter

END OF SECTION

SECTION 00 73 11

FAIR LABOR PRACTICES CERTIFICATION

The undersigned, for and on behalf of the BIDDER, APPLICANT or PROPOSER named herein, certifies as follows:

A. That he or she is an officer or duly authorized agent of the above-referenced BIDDER, APPLICANT or PROPOSER, which has a submitted a bid, application or proposal for a contract or agreement with the county of Dane.

B. That BIDDER, APPLICANT or PROPOSER has (check one):

_____ not been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

_____ been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

Officer or Authorized Agent Signature

Date

Printed or Typed Name and Title

Printed or Typed Business Name

NOTE: You can find information regarding the violations described above at: www.nlr.gov and werc.wi.gov.

For reference, Dane County Ordinance 25.09 is as follows:

(1) BIDDER RESPONSIBILITY. (a) Any bid, application or proposal for any contract with the county, including public works contracts regulated under chapter 40, shall include a certification indicating whether the bidder has been found by the National Labor Relations Board (NLRB) or the Wisconsin Employment Relations Committee (WERC) to have violated any statute or regulation regarding labor standards or relations within the last seven years. The Controller shall investigate any such finding and make a recommendation to the committee, which shall determine whether the conduct resulting in the finding affects the bidder’s responsibility to perform the contract.

If you indicated that the NLRB or WERC have found you to have such a violation, you must include copies of any relevant information regarding such violation with your proposal, bid or application.

Include this completed Certification with your bid, application or proposal.

END OF SECTION

SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Summary
 2. Summary of the Work
 3. Contractor Use of Premises
 4. Applications for Payment
 5. Change Procedures
 6. Alternates
 7. Lump Sum Allowances for Work
 8. Coordination
 9. Cutting and Patching
 10. Conferences
 11. Progress Meetings
 12. Job Site Administration
 13. Submittal Procedures
 14. Proposed Products List
 15. Shop Drawings
 16. Product Data
 17. Samples
 18. Manufacturers' Instructions
 19. Manufacturers' Certificates
 20. Quality Assurance / Quality Control of Installation
 21. References
 22. Interior Enclosures
 23. Protection of Installed Work
 24. Parking
 25. Staging Areas
 26. Occupancy During Construction and Conduct of Work
 27. Protection
 28. Progress Cleaning
 29. Products
 30. Transportation, Handling, Storage and Protection
 31. Product Options
 32. Substitutions
 33. Starting Systems
 34. Demonstration and Instructions
 35. Contract Closeout Procedures
 36. Final Cleaning
 37. Adjusting
 38. Operation and Maintenance Data
 39. Spare Parts and Maintenance Materials

40. As-Built and Record Drawings and Specifications

1.2 SUMMARY OF THE WORK

- A. Project Description: Perform the Work as specified and detailed in Construction Documents package. Contractor to provide construction services to replace the existing supervisory and application-specific programmable controllers and associated devices for all building HVAC mechanical systems to replicate existing control sequences in the Dane County Courthouse. Contractor will provide graphical interface for entire Building Automation System using existing virtual server.
- B. Permits: Prior to commencement of the Work, Contractor to secure any and all necessary permits for completion of the Work and facility occupancy. Provide Public Works Project Manager with copies of all permits.

1.3 CONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow work by others and work by Owner.
- B. Coordinate utility outages and shutdowns with Owner.

1.4 APPLICATIONS FOR PAYMENT

- A. Submit one (1) original copies with “wet” signatures of each application on AIA G702™ and G703™ forms or approved contractors invoice form.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Monthly.
- D. Submit Applications for Payment to Public Works Project Manager for approval & processing for payment.

1.5 CHANGE PROCEDURES

- A. Contractor's costs for Products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from contingency allowance.
- B. Change Order Forms: Dane County Contract Change Order, Form 014-32-20.

1.6 ALTERNATES

- A. Schedule of Alternates: there are no alternates proposed for this project.

1.7 LUMP SUM ALLOWANCES FOR WORK

- A. Include in Base Bid lump sum allowance of \$31,653.83. This allowance will be used for AdaptiView controller upgrades to both Trane chillers for integration to the BAS system. Coordinate this with Public Works Project Manager.

1.8 COORDINATION

- A. Coordinate scheduling, submittals, and work of various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work that are indicated diagrammatically on Drawings.
- D. Contractor shall provide Public Works Project Manager with work plan that ensures the Work will be completed within required time of completion.
- E. Public Works Project Manager may choose to photograph or videotape site or workers as the Work progresses.

1.9 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching new work; restore work with new Products.
- B. Submit written request in advance of cutting or altering structural or building enclosure elements.
- C. Fit work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- D. Refinish surfaces to match adjacent finishes.

1.10 CONFERENCES

- A. Project shall have pre-bid conference; see Instructions to Bidders.
- B. Owner will schedule preconstruction conference after Award of Contract for all affected parties.
- C. Contractor shall submit Construction Schedule at pre-construction meeting.

- D. When required in individual Specification section, convene pre-installation conference at project site prior to commencing work of Section.

1.11 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at minimum of one (1) per week with Public Works Project Manager].
- B. Preside at meetings, record minutes, and distribute copies within two (2) business days to those affected by decisions made.
- C. Attendance at progress meetings by General Contractor, subcontractors, or their authorized representative, is mandatory.
- D. Contractors shall give verbal reports of progress on the Work, discuss schedule for upcoming period and present all conflicts, discrepancies or other difficulties for resolution.
- E. Day & time of progress meetings to be determined at pre-construction meeting.

1.12 JOB SITE ADMINISTRATION

- A. Contractor shall have project superintendent on site minimum of four (4) hours per week during progress of the Work.
- B. Contractor shall not change their project superintendent or project manager for duration of the Work without written permission of Public Works Project Manager.

1.13 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Construction Documents references.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Work and Construction Documents.
- C. Identify variations from Construction Documents and Product or system limitations that may be detrimental to successful performance of completing the Work.
- D. Revise and resubmit submittals as required; identify all changes made since previous submittal.

1.14 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) business days after date of Award of Contract, submit complete list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

1.15 SHOP DRAWINGS

- A. Submit number of copies that Contractor requires, plus three (3) copies that shall be retained by Public Works Project Manager.

1.16 PRODUCT DATA

- A. Submit number of copies that Contractor requires, plus two (2) copies that shall be retained by Public Works Project Manager.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

1.17 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of Product.
- B. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Public Works Project Manager's selection.

1.18 MANUFACTURERS' INSTRUCTIONS

- A. When specified in individual Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.19 MANUFACTURERS' CERTIFICATES

- A. When specified in individual Specification sections, submit manufacturers' certificate to Public Works Project Manager for review, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.20 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.21 REFERENCES

- A. Conform to reference standard by date of issue current as of date for receiving bids.

- B. Should specified reference standard conflict with Construction Documents, request clarification from Public Works Project Manager before proceeding.

1.22 INTERIOR ENCLOSURES

- A. Provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent distribution of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

1.23 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual Specification sections.

1.24 PARKING

- A. Arrange for temporary parking areas to accommodate construction personnel.
- B. All contractors and their employees shall cooperate with General Contractor and others in parking of vehicles to avoid interference with normal operations and construction activities.
- C. Do not obstruct existing service drives and parking lots with equipment, materials and / or vehicles. Keep accessible for Owner's use at all times.

1.25 STAGING AREAS

- A. Coordinate staging areas with Public Works Project Manager prior to starting the Work.
- B. On-site space for use as staging areas and storage of materials is limited and will be apportioned among various Contractors as their needs dictate with due regard for storage requirements of each Contractor. Each Contractor shall be responsible for safety of equipment and materials that are stored on site.

1.26 OCCUPANCY DURING CONSTRUCTION AND CONDUCT OF WORK

- A. Contractors are asked to not work at facility if they are ill with something contagious.
- B. Owner reserves right at any time to dismiss from premises any Contractor or construction personnel that do not uphold requirements of this Section.
- C. Owner shall not be held liable for any lost time, wages, or impacts to construction schedule by any Contractor or construction personnel dismissed for failure to uphold requirements of this Section.
- D. Areas of existing facility will be occupied during period when the Work is in progress. Work may be done during normal business hours (8:00 am to 4:30 pm), but confer with Owner, schedule work and store materials so as to interfere as little as possible with normal use of premises. Work performed on Saturday shall be by permission of Owner.

Notify Owner when coring or similar noise making work is to be done and obtain Owner's written approval of schedule. If schedule is not convenient for Owner, reschedule and resubmit new times for Owner approval. Coring of floor along with other noisy work may have to be done on second and third shifts.

- E. Work shall be done and temporary facilities furnished so as not to interfere with access to any occupied area and so as to cause least possible interference with normal operation of facility or any essential service thereof.
- F. Contractor shall, at all times, provide approved, safe walkways and facility entrances for use by Owner, employees and public.
- G. Contractor shall provide adequate protection for all parts of facility, its contents and occupants wherever the Work under this Contract is to be performed.
- H. Each Contractor shall arrange with Owner to make necessary alterations, do new work, make connections to all utilities, etc., and at such times as will not cause interruption of utility services to facility. Contractor doing this work shall protect, cap, cut off and / or replace and relocate existing pipes, electrical work and other active utilities encountered which may interfere with new construction work.
- I. New work in extension of existing work shall correspond in all respects with that to which it connects or similar existing work unless otherwise indicated or specified.
 - 1. Existing work shall be cut, altered, removed or replaced as necessary for performance of Contract obligations.
 - 2. Work remaining in place, damaged or defaced by reason of work done under this Contract shall be restored equal to its condition at time of Award of Contract.
 - 3. If removal of work exposes discolored or unfinished surfaces or work out of alignment, such surfaces shall be refinished or materials replaced as necessary to make continuous work uniform and harmonious.
- J. Contractor is not responsible for providing & maintaining temporary toilet facilities.

1.27 PROTECTION

- A. Contractor shall protect from damage / injury all trees, shrubs, hedges, plantings, grass, mechanical, electrical & plumbing equipment, walks and driveways and pay for any damage to same resulting from insufficient or improper protection.
- B. Contractor shall provide and maintain barricades & signage to prohibit public access to construction site.

1.28 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

1.29 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by Construction Documents.

1.30 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

- A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.

1.31 PRODUCT OPTIONS

- A. Where definite material is specified, it is not intentional to discriminate against "equal" product made by another manufacturer. Intention is to set definite standard of material quality. Should bidder choose to bid materials other than those specified, bidder shall submit said materials specifications to Public Works Project Manager for approval at least seven (7) business days prior to Bid Due Date.
- B. Products and materials that are not specified, but have been approved for use by Public Works Project Manager shall be identified in addenda to all bidding contractors.
- C. Requests for material or product substitutions submitted after Bid Due Date may be considered. Owner reserves right to approve or reject substitutions based on Specification requirements and intended use.

1.32 SUBSTITUTIONS

- A. Public Works Project Manager shall consider requests for Substitutions only within fifteen (15) calendar days after date of Public Works Construction Contract.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Construction Documents.
- C. Submit three (3) copies of requests for Substitution for consideration. Limit each request to one (1) proposed Substitution.
- D. Substitutions shall not change contract price established at Bid Due Date.

1.33 STARTING SYSTEMS

- A. Provide written notification prior to start-up of each equipment item or system.
- B. Ensure that each piece of equipment or system is ready for operation.

- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.
- D. Submit written report that equipment or system has been properly installed and is functioning correctly.

1.34 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.
- C. Owner may choose to photograph or videotape demonstration session; demonstration and demonstrator shall be to level of satisfaction of Owner.

1.35 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Construction Documents have been reviewed, the Work has been inspected, and the Work is complete in accordance with Construction Documents and ready for Public Works Project Manager's inspection.
- B. Submit final Application for Payment identifying total adjusted Contract Sum / Price, previous payments, and amount remaining due.

1.36 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior surfaces exposed to view.
- C. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.37 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.38 OPERATION AND MAINTENANCE MANUAL

- A. Provide two (2) bound, hard-copy operation and maintenance manuals that include all systems, materials, products, equipment, mechanical and electrical equipment and systems supplied and installed in the Work. Provide electronic version of operation and maintenance manual also.

1.39 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.
- B. Deliver to the Work site and place in location as directed.

1.40 AS-BUILT AND RECORD DRAWINGS AND SPECIFICATIONS

- A. Contractor-produced Drawings and Specifications shall remain property of Contractor whether Project for which they are made is executed or not. Contractor shall furnish Public Works Project Manager with original marked up redlines of Construction Documents' drawings and specifications that shall include all Addendums, Change Orders, Construction Bulletins, on-site changes, field corrections, etc. These are project As-Built Drawings & Specifications. Record Drawings & Specifications shall be created from these As-Built by Public Works.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT, DISPOSAL & RECYCLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Summary
 - 2. Waste Management Goals
 - 3. Construction and / or Demolition Waste Management
 - 4. Waste Management Plan
 - 5. Reuse
 - 6. Recycling
 - 7. Materials Sorting and Storage On Site
 - 8. Lists of Recycling Facilities Processors and Haulers
 - 9. Waste Management Plan Form
- B. Related Sections:
 - 1. Section 01 00 00 - General Requirements

1.2 WASTE MANAGEMENT GOALS

- A. Dane County requires that as many waste materials as possible produced as result of this project be salvaged, reused or recycled in order to minimize impact of construction waste on landfills and to minimize expenditure of energy and cost in fabricating new materials. Additional information may be found in Dane County Green Building Policy, Resolution 299, 1999-2000.

1.3 CONSTRUCTION AND / OR DEMOLITION WASTE MANAGEMENT

- A. All construction and demolition waste suitable for recycling may go to Dane County Construction & Demolition Recycling Facility located at 7102 US Hwy 12, Madison, located across from Yahara Hills Golf Course. This facility can receive mixed loads of construction and demolition waste. For complete list of acceptable materials see www.countyofdane.com/pwht/recycle/CD_Recycle.aspx.
- B. Dane County Landfill, also at 7102 US Hwy 12, Madison, must receive all other waste from this project. www.countyofdane.com/pwht/recycle/landfill.aspx.

1.4 WASTE MANAGEMENT PLAN

- A. Contractor shall develop Waste Management Plan (WMP) for this project. Dane County's Special Projects & Materials Manager may be contacted with questions. Outlined in RECYCLING section of this specification are examples of materials that can be recycled or reused as well as recommendations for waste sorting methods.
- B. Contractor shall complete WMP and include cost of recycling / reuse in Bid. WMP will be submitted to Public Works Project Manager within fifteen (15)

business days of Bid Due date. Copy of blank WMP form is in this Section. Submittal shall include cover letter and WMP form with:

1. Information on:
 - a. Types of waste materials produced as result of work performed on site;
 - b. Estimated quantities of waste produced;
 - c. Identification of materials with potential to be recycled or reused;
 - d. How materials will be recycled or reused;
 - e. On-site storage and separation requirements (on site containers);
 - f. Transportation methods; and
 - g. Destinations.

1.5 REUSE

- A. Contractors and subcontractors are encouraged to reuse as many waste materials as possible. Salvage should be investigated for materials not reusable on site.

1.6 RECYCLING

- A. These materials may be recycled at Dane County Construction & Demolition Recycling Facility:
 1. Wood.
 2. Wood Pallets.
 3. PVC Plastic (pipe, siding, etc.).
 4. Asphalt & Concrete.
 5. Bricks & Masonry.
 6. Vinyl Siding.
 7. Cardboard.
 8. Metal.
 9. Unpainted Gypsum Drywall.
 10. Shingles.
- B. These materials can be recycled elsewhere in Dane County area:
 1. Fluorescent Lamps.
 2. Foam Insulation & Packaging (extruded and expanded).
 3. Carpet Padding.
 4. Barrels & Drums.
- C. All materials must be recycled at WDNR permitted waste processing facilities that adhere to all State Statutes.

1.7 MATERIALS SORTING AND STORAGE ON SITE

- A. Contractor shall provide separate containers for recyclable materials. Number of containers will be dependent upon project and site conditions.
- B. Contractor shall provide on-site locations for subcontractors supplied recycling containers to help facilitate recycling.
- C. Mixed loads of recycled materials are allowed only per instructions at www.countyofdane.com/pwht/recycle/CD_Recycle.aspx.

1.8 LISTS OF RECYCLING FACILITIES PROCESSORS AND HAULERS

- A. Refer to www.countyofdane.com/pwht/recycle/CD_Recycle.aspx for information on Dane County Construction & Demolition Recycling Facility.
- B. Web site www.countyofdane.com/pwht/recycle/categories.aspx lists current information for Dane County Recycling Markets. Contractors can also contact Allison Rathack at 608/266-4990, or local city, village, town recycling staff listed at site www.countyofdane.com/pwht/recycle/contacts.aspx. Statewide listings of recycling / reuse markets are available from UW Extension at <https://www.uwgb.edu/shwec/>.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

WASTE MANAGEMENT PLAN FORM



Contractor Name: _____

Address: _____

Phone No.: _____ Recycling Coordinator: _____

MATERIAL	ESTIMATED QUANTITY	DISPOSAL METHOD (CHECK ONE)	RECYCLING / REUSE COMPANY OR DISPOSAL SITE
Salvaged & reused building materials	_____ cu. yds. _____ tons	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Wood	_____ cu. yds. _____ tons	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Wood Pallets	_____ units	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
PVC Plastic	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Asphalt & Concrete	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Bricks & Masonry	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Vinyl Siding	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Cardboard	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Metals	_____ cu. yds. _____ tons	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Unpainted Gypsum / Drywall	_____ cu. yds. _____ tons	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Shingles	_____ cu. yds. _____ tons	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Fluorescent Lamps	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Foam Insulation	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Carpet Padding	_____ cu. ft. _____ lbs.	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Barrels & Drums	_____ units	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____
Glass	_____ cu. yds. _____ tons	____ Recycled ____ Reused ____ Landfilled ____ Other	Name: _____

WASTE MANAGEMENT PLAN FORM

Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing adjusting, and balancing of air systems.
 - 2. Measurement of final operating condition of HVAC systems.

1.2 REFERENCES

- A. Associated Air Balance Council:
 - 1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems.
- C. Natural Environmental Balancing Bureau:
 - 1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
- D.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements : Closeout procedures.
- B. Project Record Documents: Record actual locations of balancing dampers and rough setting.
- C. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with State of Wisconsin and Public Work's standard.
- B. Perform Work in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.5 QUALIFICATIONS

- A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience Certified by NEBB.
- B. Perform Work under supervision of NEBB Certified Testing, Balancing and Adjusting Supervisor in State of Wisconsin.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements : Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements Coordination and project conditions.
- B. Verify systems are complete and operable before commencing work. Verify the following:
 - 1. Systems are started and operating in safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 4. Fire and volume dampers are in place and open.
 - 5. Air coil fins are cleaned and combed.
 - 6. Access doors are closed and duct end caps are in place.
 - 7. Air outlets are installed and connected.
 - 8. Duct system leakage is minimized.

2.2 PREPARATION

- A. Furnish instruments required for testing, adjusting, and balancing operations.
- B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

2.3 INSTALLATION TOLERANCES

- A. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

2.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements : Testing, adjusting, and balancing.
- B. Verify recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
- E. Report defects and deficiencies noted during performance of services, preventing system balance.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

2.5 AIR SYSTEM PROCEDURE

- A. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts.
- B. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
- C. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- D. At modulating damper locations, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- E. For variable air volume system powered units set volume controller to airflow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable-air-volume temperature control.

2.6 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
 - 1. Air Terminal Units.
 - 2. Air Inlets and Outlets.
- B. Report Forms
 - 1. Title Page:

- a. Name of Testing, Adjusting, and Balancing Agency
- b. Address of Testing, Adjusting, and Balancing Agency
- c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
- d. Project name
- e. Project location
- f. Report date
2. Summary Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Nomenclature used throughout report
 - d. Test conditions
3. Instrument List:
 - a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range
 - f. Calibration date
4. Terminal Unit Data:
 - a. Manufacturer
 - b. Type, constant, variable, single, dual duct
 - c. Identification/number
 - d. Location
 - e. Model number
 - f. Size
 - g. Minimum static pressure
 - h. Minimum design air flow
 - i. Maximum design air flow
 - j. Maximum actual air flow
 - k. Inlet static pressure
5. Air Distribution Test Sheet:
 - a. Air terminal number
 - b. Room number/location
 - c. Terminal type
 - d. Terminal size
 - e. Area factor
 - f. Design air flow
 - g. Test (final) air flow
 - h. Percent of design air flow

END OF SECTION

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SECTION 23 09 24
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

SCOPE

Work in this section includes Direct Digital Control (DDC) panels, main communication trunk, software programming, and other equipment and accessories necessary to constitute a completely coordinated extension of the existing campus or building Direct Digital Control (DDC) system. This system interfaced with pneumatic/electric controls (Section 23 09 14) utilizing Direct Digital Control signals to operate actuated control devices will meet, in every respect, all operational and quality standards specified herein, a fully coordinated modification and extension via DDC of the existing Central Campus Automation System.

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Work Not Included
- Quality Assurance
- Submittals
- Operation and Maintenance Data
- Material Delivery and Storage

PART 2 - PRODUCTS

- General
- Local Control Panels
- Direct Digital Controls (DDC)
- Networking/Communications
- BACnet Requirements
- Supervisory Controllers
- Software License Agreement
- System Software Features
- Programmable Controllers
- Application Specific Controllers - HVAC
- Operator Interface Requirements
- Operator Workstation & DDC Server
- Web Based HTML Interface
- Portable Operator Terminal
- ASC Portable Service Terminal
- Uninterruptible Power Supply

PART 3 - EXECUTION

- General
- Installation
- Construction Verification
- Functional Performance Testing
- Agency Training

RELATED WORK

Division 23 - HVAC - Equipment provided to be controlled or monitored

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

FCC Part 15, Subpart J, Class A - Digital Electronic Equipment to Radio Communication Interference

WORK NOT INCLUDED

1 Section 23 09 14 work includes furnishing and installing all field devices, including electronic sensors for
2 the DDC of this section, equipment, and all related field wiring, interlocking control wiring between
3 equipment, pneumatic tubing, sensor mounting, etc., that is covered in that section.
4

5 Motorized control dampers and actuators, thermowells (temperature sensing wells), automatic control valves
6 and their actuators are also covered in Section 23 09 14.
7

8 **QUALITY ASSURANCE**

9
10 **MANUFACTURERS:** *Distech*

11 **INSTALLER:**

12 CBRE-ESI, 3410 Gateway Rd, Brookfield WE, 53045-5115; Mechanical Technologies INC, 701 Morley
13 Rd, Green Bay WI 54303; J F Ahern, 2111 North Sandra Street, Appleton, WI 54911. All engineering and
14 commissioning work shall be done by qualified personnel in the direct employ of this manufacturer, or of an
15 Authorized Representative of that manufacturer that provides engineering and commissioning of the
16 manufacturers control equipment. Where installing contractor is an authorized representative of the control
17 equipment manufacturer, submit written confirmation of such authorization. Indicate in letter of authorization
18 that the installing contractor has successfully completed all necessary training required for the engineering,
19 installation, and commissioning of equipment and systems to be provided for the project, and that such
20 authorization has been in effect for a period of not less than three years. The letter of authorization should
21 also indicate that the installing contractor is authorized to install the manufacturer's DDC equipment at the
22 project location at the time the project is bid. Installation of the equipment shall be done by qualified
23 mechanics and/or electricians in the direct employ or be directly subcontracted and under the supervision of
24 the manufacturer or Authorized Representative.
25

26 **RESPONSE TIME:**

27 During warrantee period, four (4) hours or less, 24-hours/day, 7 days/week.
28
29

30 **ELECTRICAL STANDARDS:**

31 Provide electrical products, which have been tested, listed and labeled by Underwriters' Laboratories (UL)
32 and comply with NEMA standards.
33

34 **DDC Standards:** DDC manufacturer shall provide written proof with shop drawings that the equipment being
35 provided is in compliance with FCC rules governing the control of interference caused by Digital Electronic
36 Equipment to Radio Communications (Part 15, Subpart J, Class A).
37

38 **SUBMITTALS**

39 Include the following information:
40

41 Details of construction, layout, and location of each temperature control panel within the building, including
42 instruments location in panel and labeling. Indicate which piece of mechanical equipment is associated with
43 each controller and what area within the building is being served by that equipment. For terminal unit control,
44 provide a room schedule that lists mechanical equipment tag, room number of space served, address of DDC
45 controller, and any other pertinent information required for service.
46

47 **PRODUCT DATA:**

48 Submit manufacturer's specifications for each control device furnished, including installation instructions
49 and startup instructions. General catalog sheets showing a series of the same device is not acceptable unless
50 the specific model is clearly marked. Annotated software program documentation shall be submitted for
51 system sequences, along with descriptive narratives of the sequence of operation of the entire system
52 involved. Submit wiring diagram for each electrical control device along with other details required to
53 demonstrate that the system has been coordinated and will function as a system.
54

55 **MAINTENANCE DATA:**

56 Submit maintenance data and spare parts lists for each control device. Include this data in maintenance
57 manual.
58

59 **RECORD DRAWINGS:**

60 Prior to request for final payment provide complete composite record drawings to incorporate the DDC and
61 Pneumatic/Electric fieldwork. Accurate Section 23 09 14 record drawings to be supplied by the Section 23
62 09 14 contractor with the accuracy of these drawings being the responsibility of the 23 09 14 contractor. In
63 the event that changes are required to the 23 09 14 supplied record drawings after they have been compiled
64 by the 23 09 24 contractor, it shall be the 23 09 14 contractor's responsibility to provide updated composite

1 record drawings incorporating the 23 09 24 record drawings. All software addressing for device
2 communication shall be noted for all devices provided under this section and the communication addressing
3 required for devices provided by others that are integrated into the direct digital control system provided
4 under this section. Point to point routing of communication trunks and power wiring between DDC
5 controllers, DDC communication devices, control panels, and Ethernet switches shall be documented. For
6 systems that have additions to existing communication networks, provide complete DDC network diagrams
7 for the entire building with new work clearly delineated. Coordinate with the supplier of the equipment
8 specified to be interfaced through digital communications for communication addressing. Provide circuit
9 number of 120VAC panel power circuit(s) feeding each control panel on record drawings. Label circuit
10 number(s) inside the panel served.

11 12 13 **OPERATION AND MAINTENANCE DATA**

14 All operations and maintenance data shall comply with the submission and content requirements specified
15 under section GENERAL REQUIREMENTS.

16 17 **MATERIAL DELIVERY AND STORAGE**

18 Provide factory-shipping cartons for each piece of equipment and control device. This contractor is
19 responsible for storage of equipment and materials inside and protected from the weather.

20 21 **PART 2 - PRODUCTS**

22 23 **GENERAL**

24 Provide DDC control products in sizes and of capacities as required, conforming to manufacturer's standard
25 materials and components as published in their product information, designed and constructed as
26 recommended by the manufacturer and as required for application indicate.

27
28 System shall be capable of operating with 120 VAC power supply, fully protected with a shutdown-restart
29 circuit, and associated hardware and software.

30
31 All DDC controllers shall use screw terminals for termination of individual wires. Spade lugs are not
32 acceptable.

33 34 **LOCAL CONTROL PANELS**

35 Use control panels with suitable mounting brackets for each supply fan system. Locate panel adjacent to
36 system served. Existing panels may be reused if space is limited or compatible pre wired insert can be
37 installed.

38
39 Fabricate panels of 14 gauge furniture grade steel or 6063-T5 extruded aluminum alloy, totally enclosed on
40 six sides, hinged door and keyed lock, with manufacturer's standard shop painted finish and color.

41
42 Provide UL listed cabinets for use with line voltage devices.

43
44 Control panels that have devices or terminations that are fed or switch 50V or higher shall enclose the devices,
45 terminations, and wiring so that Personal Protective Equipment (PPE) is not required to service the under
46 50V devices and terminations within the control panel. As an alternative, a separate panel for only the 50V
47 and higher devices may be provided and mounted adjacent to the under 50V control panel. For DDC
48 controllers that are directly fed by 120VAC, provide an externally mounted 120VAC, 5A fast blow fuse to
49 feed these controllers.

50
51 Plastic control enclosures will be approved provided all conduits are bonded and grounded.

52
53 Use existing control panels for all DDC Controllers, ASC's and associated function modules. All controls to
54 be in control panels provided under this Section except for the following:

- 55
- 56 • Terminal unit controllers mounted within the terminal unit equipment enclosure as specified
 - 57 under Section 23 09 14.
 - 58 • Above accessible lay-in tile ceilings where VAV box controllers designed to be directly
 - 59 mounted on air terminals.
 - 60 • Above accessible lay-in tile ceilings where additional controllers are required for air terminal
 - 61 unit control. Where additional controllers are required, they shall not be mounted directly to
 - 62 the ductwork but be mounted on din rail or back panel in an accessible location as close as
 - 63 possible to the terminal unit(s) being controlled.

- 1 • Any devices other than DDC controllers, i.e. relays, pressure switches, etc. shall be installed in
2 an enclosure.

3
4 All wiring for controllers shall be managed in a neat and workmanlike manner.

5
6 All cabling and electrical wiring terminated at controllers, devices and terminal strips are to be permanently
7 tagged or labeled with permanent adhesive labels within one inch of terminal strip with a numbering system
8 to correspond exactly with the "Record Drawings". Jumpers where the both ends of the wire are visible and
9 terminations are within 6" of each other do not need to be labeled. Spare wires are to be labeled as "Spare"
10 with unique number designations.

11 **DIRECT DIGITAL CONTROLS**

12 System to be capable of integrating multiple building functions, including equipment supervision and control,
13 alarm management, energy management, and trend data collection.

14
15 DDC to consist of Supervisory Controllers, Programmable Controllers, stand-alone Application Specific
16 Controllers (ASC's), Operator Terminals, Operator Workstations, DDC system servers, and other operator
17 interface devices.

18
19 The vendor of the system provided under this Section shall provide all software and communication interface
20 hardware necessary to program and upload/download programmable and application specific controllers
21 from a laptop computer and make additional copies and future software revisions available for sale directly
22 to the user Agency.

23
24 The system shall be modular in nature, and shall permit expansion of both capacity and functionality through
25 the addition of sensors, actuators, ASC's, and operator devices.

26
27 The failure of any single component or network connection shall not interrupt the execution of control
28 strategies at other operational devices.

29 **NETWORKING/COMMUNICATIONS**

30
31 The design of the DDC shall be networked. The highest level networking shall use Ethernet and the sub-
32 level networking shall use serial communications. Inherent in the system's design shall be the ability to
33 expand or modify the highest network either via a local area network (LAN), wide area network (WAN), or
34 a combination of the two schemes.

35
36 The highest level DDC communications network shall be capable of direct connection to and communication
37 with a high-speed LAN or WAN utilizing an Ethernet connection.

38
39 The supervisory controller shall directly oversee a local network such that communications may be executed
40 directly to and between programmable controllers and ASC's. All operator devices, either network resident
41 or connected via dial-up modems, shall have the ability to access all points and application reports on the
42 network.

43
44 Provide serial communication ports on all ASC's for operator's terminal communications with the DDC
45 Controller.

46
47 Access to system data shall not be restricted by the hardware configuration of the DDC system.

48
49 Global data sharing or global point broadcasting shall allow point data to be shared between programmable
50 controllers and ASC's when it would be impractical to locate multiple sensors.

51
52 Network design shall include the following provisions:

- 53
- 54 • Data transfer rates for alarm reporting and quick point status from multiple programmable
55 controllers and ASC's. The minimum baud rate shall be 9600 baud.
 - 56
 - 57 • Support of any combination of programmable controllers and ASC's. A minimum of 32
58 programmable controllers and ASC's shall be supported on a single local network. The buss
59 shall be addressable for up to 32 ASC's.
 - 60
 - 61 • Detection of single or multiple failures of programmable controllers and ASC's or the network
62 media.
 - 63
 - 64 • Error detection, correction, and re-transmission to guarantee data integrity.

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- Use commonly available, multiple-sourced, networking components.
- Use of an industry standard communication transport, such as ARCNET, Ethernet, and IEEE RS-485 communications interface.

Provide a temporary Ethernet network for communications between supervisory controllers and operator workstation until the building IT network is available for use by the DDC system. The temporary Ethernet network and all other communications required for the DDC system shall be installed as required for specified operation of mechanical equipment so check out and commissioning of the equipment can occur in a timely manner.

BACNET REQUIREMENTS

BACnet of highest level network communications shall be capable of BACnet/IP over Ethernet and field level communications shall utilize BACnet MSTP

Supervisory controllers shall provide a Protocol Implementation Conformance Statement (PICS) and BACnet Interoperability Building Blocks (BIBB”S) as required by the American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ASHRAE) Standard 135-2001, BACnet protocol.

In general, all highest level networked supervisory devices shall support the following

Segmentation Capability
Segmentation requests supported
Segmentation responses supported

Standard Object Types Supported

- Analog input
- Analog output
- Analog value
- Binary input
- Binary output
- Binary value
- Calendar
- Device
- Event enrollment
- Group
- Multistate input
- Multistate output
- Multistate value
- Notification class
- Schedule

Data Link Layer Option

- BACnet Internet Protocol (IP) (Annex J)

Networking Options

BACnet/IP Broadcast Management Device (BBDM)

Character Sets supported

- ANSI X3.4
- ISO 10646 Universal Character Set-2

BACnet object name and description shall match the existing naming conventions used by the state Agency for their existing Building Automation System. Coordinate with Agency control personnel to establish the naming conventions prior to programming of any controllers provided under this specification section. All controllers shall have object names, descriptions, and engineering units that are writable at the controller level and shall be programmed so that the object names, descriptions, and engineering units match the desired

1 naming standards as specified above. Ensure that the BACnet object attributes for object name, object
 2 description, engineering units and other required attributes will be transferred through to the Supervisory
 3 Controller when the auto-discovery function is executed.

4
 5 Coordinate BACnet device instance numbering with the agency facility personnel for controllers provided
 6 under this Section that are being connected to an existing building automation system. This contractor shall
 7 be responsible for correcting any conflicts with existing devices that may occur or changing the device
 8 instance numbers to comply to follow the agency BACnet device instance numbering scheme.

9
 10 The following table indicates the minimum VAV terminal unit objects, the associated naming, and the object
 11 values that are required to be writable that shall be provided for all VAV terminals. If the agency does not
 12 have a convention for VAV terminal object names and descriptions that it prefers, use the naming standards
 13 as listed below. Provide similar naming and descriptions that are approved by the agency for other types of
 14 terminal units and mechanical systems.

Object Type	Object Name	Object	Units	Object
Description		Writeable		
BV	DEVICE-S	DEVICES STATUS - SERVED BY		
AHU#	ONLINE/OFFLINE			
MV	OCC-MODE	OCCUPIED		
MODE	OCC/UNOCC/STNDBY			
BV	OCC-SCHED	OCCUPIED SCHEDULE Xam-		
Xpm	OCC/UNOCC	Yes		
DI	OCC-S	OCCUPANCY SENSOR		
STATUS	OCC/UNOCC			
AV	ZN-SP	ZONE TEMPERATURE SETPOINT		DEG
F	Yes			
AI	RM#-T	ROOM #### TEMPERATURE		DEG
F				
AI	DA-T	DISCHARGE AIR TEMPERATURE		DEG
F				
AO	HTG-VLV	HEATING VALVE		%
OPEN	Yes			
AO	RAD-VLV	RADIATION VALVE		%
OPEN	Yes			
AO	SA-DPR	SUPPLY AIR DAMPER		%
OPEN	Yes			
AV	CFM-SP	ACTUAL FLOW		
SETPOINT	CFM			
AI	CFM-FLOW	SUPPLY AIR		
FLOW	CFM			
AV	HTG-SP	HEATING TEMPERATURE SETPOINT		DEG
F	Yes			
AV	CLG-SP	COOLING TEMPERATURE SETPOINT		DEG
F	Yes			
AV	OCC-C-CFM-MIN	OCCUPIED CLG CFM MIN		
SETPOINT	CFM	Yes		
AV	OCC-C-CFM-MAX	OCCUPIED CLG CFM MAX		
SETPOINT	CFM	Yes		

51
 52 **SUPERVISORY CONTROLLERS**

53 Supervisory controllers shall be microprocessor-based, Niagara N4 compatible, multi-tasking, multi-user
 54 and digital control processors.

55
 56 Each supervisory controller shall have sufficient memory to support its own operating system and databases
 57 including:

- 58
- 59 • Control processes
- 60 • Energy management application
- 61 • Alarm management
- 62 • Trend data
- 63 • Maintenance support applications
- 64 • Operator I/O

- 1 • Dial-up communications
- 2 • Manual override monitoring

3
4 The system shall be modular in nature, and shall permit easy expansion through the addition of field
5 controllers, sensors, and actuators.

6
7 Supervisory controllers shall provide at least two RS-232C, USB serial communication ports, or Ethernet
8 ports for simultaneous operation of multiple operator I/O devices, such as laptop computers, personal
9 computers, and video display terminals.

10
11 Supervisory controllers shall monitor the status of all overrides and include this information in the logs and
12 summaries to inform the operator that automatic control has been inhibited.

13
14 Each supervisory controller shall continuously perform self-diagnostics, communications diagnostics, and
15 diagnostics of all subsidiary equipment. Supervisory controllers shall provide both local and remote
16 annunciation of any detected component failures, or repeated failure to establish communication. Indication
17 of the diagnostic results shall be provided at each supervisory controller.

18
19 Isolation shall be provided at all network terminations, as well as all field point terminations, to suppress
20 induced voltage transients consistent with IEEE Standard 587-1980. Isolation levels shall be sufficiently
21 high to allow all signal wiring to be run in the same conduit as high voltage wiring acceptable by electrical
22 code.

23
24 In the event of the loss of normal power, there shall be an orderly shutdown of the supervisory controller to
25 prevent the loss of data base or operating system software. Non-volatile memory shall be incorporated for
26 all critical controller configuration data, and battery backup shall be provided to support the real-time clock
27 and all volatile memory for a minimum of 72 hours.

28
29 Upon restoration of normal power, the supervisory controller shall automatically resume full operation
30 without manual intervention.

31
32 Should supervisory controller memory be lost for any reason, the supervisory controller shall have the
33 capability of reloading the it's programming via high speed local area network from the control system
34 archive workstation or server, the local RS-232C port, or telephone line dial-in.

35
36
37 **SOFTWARE LICENSE AGREEMENT**

38 For Niagara based systems, it is the express goal of this specification to implement an open system that will
39 allow products from various suppliers to be integrated into a unified system in order to provide flexibility for
40 expansion, maintenance, and service of the system. The user Agency shall be the named license holder of all
41 software associated with any and all incremental work on the project(s). All Niagara software licenses shall
42 have the "accept.station.in=*"; "accept.station.out=*"; "accept.wb.in=*"; and "accept.wb.out=*" section
43 of the software licenses. The intent is to insure that the installed Niagara products may be completely open
44 for integrations. The user Agency shall be free to direct the modification of the any software license,
45 regardless of supplier. In addition, the user Agency shall receive ownership of all job specific software
46 configuration documentation, data files, and application-level software developed for the project. This shall
47 include all custom, job specific software code and documentation for all configuration and programming that
48 is generated for a given project and /or configured for use within Niagara Framework (Niagara) based
49 controllers and/or servers and any related LAN / WAN / Intranet and Internet connected routers and devices.
50 Any and all required Ids and passwords for access to any component or software program shall be provided
51 to the user Agency. Provide all software necessary for developing software algorithms in all supervisory,
52 programmable, and application specific direct digital controllers which is licensed to the owner

53
54 Programming tools for programmable and application specific controllers that utilize the Niagara Framework
55 shall not be restricted to any specific brand of Jace. Tools and controllers shall be able to connect to any
56 brand of Jace that are provided under this specification Section.

57
58 **SYSTEM SOFTWARE FEATURES**

59 All necessary software to form a complete operating system, as described in this specification, shall be
60 provided as an integral part of the supervisory controller, and shall not be dependent upon higher level
61 computer for execution.

62
63 Programming tools for programmable and application specific controllers that utilize the Niagara Framework
64 shall not be restricted to any specific brand of Jace. Tools and controllers shall be able to connect to any

1 brand of Jace that are provided under this specification Section. Vendor of the system provided under this
2 Section shall provide all software and hardware necessary to program programmable and application specific
3 controllers and make additional copies and future software revisions available for sale directly to the user
4 Agency.

5
6 Control software shall include a provision for limiting the number of times that each piece of equipment may
7 be cycled within any one-hour period.

8
9 The system shall provide protection against excessive demand situations during start-up periods by
10 automatically introducing time delays between successive start commands to heavy electrical loads.

11
12 Supervisory controllers shall have the ability to perform any or all of the following energy management
13 routines:

- 14
- 15 • Time of day scheduling
- 16 • Calendar based scheduling
- 17 • Holiday scheduling
- 18 • Optimal start
- 19 • Optimal stop
- 20 • Demand limiting
- 21 • Load rolling
- 22 • Heating/cooling interlock
- 23

24 All programs to be executed automatically without the need for operator intervention, and be flexible enough
25 to allow user customization. Programs shall be applied to building equipment described in Section 23 09 93
26 of this specification.

27
28 Supervisory controllers shall be able to execute configured processes defined by the user to automatically
29 perform calculations and control routines.

30
31 It shall be possible to use any of the following in a configured process:

- 32
- 33 • Any system-measured point data or status
- 34 • Any calculated data
- 35 • Any results from other processes
- 36 • Boolean logic operators (and, or)
- 37

38 Configured processes may be triggered based on any combination of the following:

- 39 • Time of day
- 40 • Calendar date
- 41 • Other processes
- 42 • Events (e.g., point alarms)
- 43
- 44

45 A single process shall be able to incorporate measured or calculated data from any and all other ASC's.

46
47 A single process shall be able to issue commands to points in any and all other programmable controllers and
48 ASC's on the local network.

49
50 Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and
51 memory files. Each supervisory controller shall perform distributed; independent alarm analysis and filtering
52 to minimize network traffic and prevent alarms from being lost. At no time shall the ability of supervisory
53 controllers to report alarms be affected by either operator activity at the local I/O device or communications
54 with other ASC's on the network.

55
56 All alarm or point change reports shall include the English language description of each point and the time
57 and date of the occurrence.

58
59 The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to
60 minimize nuisance reporting and to speed operator response to critical alarms. A minimum of three priority
61 levels shall be provided. Users shall have the ability to manually inhibit alarm reporting for each point.

62
63 The user shall also be able to define conditions under which point changes need to be acknowledged by an
64 operator and/or logged for analysis at a later date.

1
2 Alarms reports and messages shall be directed to an operator device.
3
4 In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a
5 60-character alarm message to more fully describe the alarm condition or direct operator response.
6
7 Each supervisory controller shall be capable of storing a library of at least 100 messages. Each message may
8 be assignable to any number of points in the panel.
9
10 A data collection utility shall be provided to automatically sample, store, and display system data.
11
12 Measured and calculated analog and binary data shall be assignable to user definable trends for the purpose
13 of collecting operator specified performance data over extended periods of time. Sample intervals of 1 minute
14 to 24 hours, in one minute or one hour intervals, shall be provided. Each supervisory controller shall have a
15 dedicated buffer for trend data and shall be capable of storing 16 trend logs. Each trend log shall have up to
16 four points trended at 48 data samples each. Data shall be stored at the supervisory controller and up-loaded
17 to the DDC system server when archiving is desired.
18
19 Supervisory controllers shall automatically accumulate and store runtime hours for binary input and output
20 points specified in Section 23 09 14 of this specification.
21
22 Supervisory controllers shall automatically sample, calculate and store consumption totals on a daily, weekly,
23 or monthly basis, user defined, for user-selected analog and binary pulse input type points.
24
25 Totalization shall provide calculation and storage accumulations of up to 9,999,999 units (e.g., KWH, gallons
26 KBTU, tons, etc.).
27
28 The totalization routine shall have a sampling resolution of one minute.
29
30 The user shall have the ability to define a warning limit. Unique, user specified messages shall be generated
31 when the limit is reached.
32
33 The information available from pulse totalization shall include, but not be limited to, the following:
34
35 • Peak demand, with date and time stamp
36 • 24-hour demand log
37 • Accumulated KWH for day
38 • Sunday through Saturday KWH usage
39 • Demand KW annual history for past 12 periods
40 • KWH annual history for past periods
41
42 Supervisory controllers shall have the ability to count events, such as the number of times a pump or fan
43 system is cycled on and off.
44
45 The event totalization feature shall be able to store the records associated with a minimum of 9,999,999
46 events before reset.
47
48 **PROGRAMMABLE CONTROLLERS**
49 Programmable controllers shall be provided with a software program that shall allow the user to design
50 flexible software algorithms for the control sequences as described in Sections 23 09 14 and 23 09 93 portions
51 of this specification.
52
53 Programmable controllers shall support all necessary point inputs and outputs to perform the specified control
54 sequence in a totally stand-alone fashion.
55
56 Each programmable controller shall perform its own limit and status monitoring and analysis to maximize
57 network performance by reducing unnecessary communications.
58
59 Each programmable controller shall support the use of a locally mounted status and adjust panel interface to
60 allow for the local adjustment of all setpoints, temporary override of any input or output points and status of
61 all points directly at the controller. The capabilities of the locally mounted status and adjust panel shall
62 include, but not be limited to, the following information for the programmable controllers to which:
63
64 • Display temperatures

- 1 • Display status
- 2 • Display setpoints
- 3 • Display control parameters
- 4 • Override binary output control
- 5 • Override analog output control
- 6 • Override analog setpoints
- 7 • Modification of gain and offset constants

8
9 All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall
10 be stored such that a power failure of any duration does not necessitate reprogramming the programmable
11 controller.

12
13 Programmable controllers shall support, but not be limited to, the following configurations of systems to
14 address current requirements as described in Sections 23 09 14 and 23 09 93 portions of this specification,
15 and for future expansion of air handling units:

- 16 • Mixed air handling units
- 17 • 100 percent outside air handling units
- 18 • Boiler or chiller plants with pump logic
- 19 • Hot water heat exchangers
- 20 • Cooling towers
- 21 • Zone pressurization of labs
- 22 • Smoke control systems
- 23 • Generic system interlocking through hardware

24 **APPLICATION SPECIFIC CONTROLLERS - HVAC APPLICATIONS**

25
26 Each supervisory controller shall be able to extend its monitoring and control through the use of stand-alone
27 application specific controllers (ASC's).

28
29 Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities
30 independently of other controllers in the network. Each ASC shall be a microprocessor based, multi-tasking,
31 real-time digital control processor.

32
33 Each ASC shall have sufficient memory to support its own operating system and databases including:

- 34 • Control Processes
- 35 • Energy Management Applications
- 36 • Operator I/O (Portable Service Terminal)

37
38 The operator interface to any ASC point or program shall be through the supervisory controller connection
39 to any ASC on the network.

40
41 ASC's shall directly support the temporary use of a portable service terminal that can be connected to the
42 ASC via zone temperature or directly at the controller. The capabilities of the portable service terminal shall
43 include, but not be limited to, the following information for the ASC:

- 44 • Display temperatures
- 45 • Display status
- 46 • Display setpoints
- 47 • Display control parameters
- 48 • Override binary output control
- 49 • Override analog output control
- 50 • Override analog setpoints
- 51 • Modification of gain and offset constants

52
53 All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall
54 be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

55
56 ASC's shall support, but not be limited to, the following configurations of systems to address current
57 requirements as described in Sections 23 09 14 and 23 09 93 portions of this specification, and for future
58 expansion of air handling units:

- 59 • Variable Air Volume Terminals
- 60 • Reheat Terminals

- 1 • Fan Coils
- 2 • Unit Ventilators
- 3 • Packaged Air Handling Units
- 4

5 For butterfly type Variable Air Volume (VAV) Terminals, provide differential pressure transducers and
6 damper actuators for flow measurement and actuation of the VAV terminal damper. Pressure transducers
7 for VAV box flow applications do not need to have adjustable pressure ranges or integral display. Provide
8 filter on high side of flow pickups if flow measurement device requires airflow through the device.
9

10
11 Terminal unit space temperature sensors shall be furnished under this Section if they are specified to be
12 provided with digital displays with setpoint adjustments and/or manual occupancy override and indication of
13 occupancy status. Provide information to the AE on sensor colors offered by the manufacturer and obtain
14 approval on what color should be provided on the project. Provide setpoint adjustment as specified in the
15 DDC Input/Output Summary Table and sequence of operation.
16

17 Provide a method to view and print a summary of current K-factors for flow correction for each VAV terminal
18 through the DDC system. The summary shall have a minimum of 50 K-factors per group of VAV terminals.
19

20 **OPERATOR INTERFACE REQUIREMENTS**

21 COMMAND ENTRY/MENU SELECTION PROCESS:

22 Operator interface software shall minimize operator training through the use of English language prompting
23 and English language point identification.
24

25 TEXT-BASED DISPLAYS:

26 The operator interface shall provide consistent text-based displays of all system point and application data
27 described in this specification. Point identification, engineering units, status indication, and application-
28 naming conventions shall be the same at all operator devices.
29

30 GRAPHIC-BASED DISPLAYS:

31 The operator interface shall include graphic based displays of each system on DDC systems that currently
32 employ graphic based displays. The point data associated with each system shall dynamically update at a
33 minimum of every 30 seconds. Graphic displays shall have the ability to be linked to each other to provide
34 a “drill down” capability from main graphic displays to more specific system based displays. Provide a
35 building level graphic display that links to system graphics. For systems that have ASC controlled terminal
36 unit controls, provide a building floor plan with dynamic temperatures shown on the graphic that can be
37 drilled into for more specific terminal information. Points provided in the graphic shall have the override and
38 adjust capability specified under operator commands.
39

40 PASSWORD PROTECTION:

41 Multiple-level password access protection shall be provided to allow the user/manager to limit control,
42 display, and data base manipulation capabilities as he deems appropriate for each user, based upon an
43 assigned password.
44

45 Passwords shall be exactly the same for all operator devices.

46 A minimum of three levels of access shall be supported:

- 47
- 48
- 49 • Level 1: Data access and display
- 50 • Level 2 = Level 1 + operator overrides and commands
- 51 • Level 3 = Level 2 + database generation and modification
- 52

53 A minimum of 4 passwords shall be supported at each supervisory controller.

54 Operators will be able to perform only those commands available for their respective passwords. Menu
55 selections displayed at any operator device shall be limited to only those items defined for the access level
56 of the password used to log-on.
57

58 Provide user definable, automatic log-off timers of from 1 to 60 minutes to prevent operators from
59 inadvertently leaving devices on-line.
60

61 OPERATOR COMMANDS:

62 The operator interface shall allow the operator to perform commands including, but not limited to, the
63 following:
64

- Start-up or shutdown selected equipment
- Adjust setpoints
- Override analog and binary outputs
- Add/modify/delete time programming
- Enable/disable process execution
- Lock/unlock alarm reporting for each point
- Enable/disable totalization for each point
- Enable/disable trending
- Enter temporary override schedules
- Define holiday schedules
- Change time/date
- Enter/modify analog alarm limits
- Enable/disable analog alarm limits
- Enable/disable demand limiting
- Enable/disable duty cycle

17
18 LOGS AND SUMMMARIES:

19 Reports shall be generated manually, and directed to the displays. As a minimum, the system shall allow the
20 user to easily obtain the following general listing of all points in the system, which shall include, but not be
21 limited to:

- Points currently in alarm
- Off-line points
- Points currently in override status
- Points in weekly schedules
- Holiday programming

22
23
24
25
26
27
28
29 Summaries shall be provided for specific points, for a logical point group, for a user-selected group of groups,
30 or for the entire facility without restriction due to the hardware configuration on the facility management
31 system. Under no conditions shall the operator need to specify the address of hardware controller to obtain
32 system information.

33
34 SYSTEM CONFIGURATION AND DEFINITION:

35 All temperature and equipment control strategies and energy management routines shall be definable by the
36 operator. System definition and modification procedures shall not interfere with normal system operation
37 and control.

38
39 The system shall be provided complete with all equipment, software, and documentation necessary to allow
40 an operator to independently perform the following functions:

- Add/delete/modify application specific controllers
- Add/delete/modify points of any type, and all associated point parameters, and tuning constants
- Add/delete/modify alarm reporting definition for each point
- Add/delete/modify energy management applications
- Add/delete/modify time and calendar-based programming
- Add/delete/modify totalization for every point
- Add/delete/modify historical data trending for every point
- Add/delete/modify configured control processes
- Add/delete/modify dial-up telecommunication definition
- Add/delete/modify all operator passwords
- Add/delete/modify alarm messages

53
54
55 NETWORK WIDE STRATEGY DEVELOPMENT:

56 Inputs and outputs for any process shall not be restricted to a single programmable controller or ASC, but
57 shall be able to include data from any and all other programmable controller or ASC's to allow the
58 development of network-wide control strategies.

59
60 SYSTEM DEFINITION/CONTROL SEQUENCE:

61 All portions of system definition shall be self-documenting and capable of providing hardcopy printouts of
62 all configuration and application data.

63
64 DATA BASE SAVE/RESTORE/BACK-UP:

1 Backup copies of all programmable controller, ASC and supervisory controller databases shall be stored in
2 at least one personal computer or laptop. Users shall also have the ability to manually execute downloading
3 of a programmable controller, ASC or supervisory controller database.
4

5 **OPERATOR WORK STATION & DDC SYSTEM SERVER**

6 A Personal Computer (PC) Operator Workstation and DDC System Server software shall be provided for
7 command entry, information management, network alarm management, and database management and
8 archiving functions. The functions of the operator workstation and DDC system server may reside on a single
9 personal computer. Provide a separate DDC System Server PC if required to perform the specified
10 requirements. All functions specified under the Operator Interface section of this specification must be met.
11

12 All real-time control functions shall be resident in the stand-alone supervisory controllers to facilitate greater
13 fault tolerance and reliability.
14

15 Workstation shall be general purpose, commercially available, personal computers with a dual core processor
16 with a minimum speed of 2.5 GHz, a minimum of 4GB of RAM, a minimum hard drive size of 1TB, and a
17 DVDRW/CDRW drive. Provide more memory and/or a faster processor if necessary to perform all the
18 functions described in this specification.
19

20 Sufficient storage shall be provided to accommodate all fully configured point databases all application
21 databases, all graphics databases, all user-defined reports, and all historical data archived as described in this
22 specification.
23

24 The flat panel display provided for system operation shall have a diagonal screen measurement of no less
25 than 20" and have a minimum display resolution of no less than 1280 x 1024 pixels. Separate controls shall
26 be provided for color, contrast, and brightness.
27

28 Printer shall be a current production model.
29

30 Provide software, including but not limited to functions such as:
31

- 32 • Grouping point data by systems or types
- 33 • Displaying trends in textual and graphical format
- 34 • Application software for programming all DDC controllers specified herein
- 35 • Graphics definition and development
- 36 • Managing archive data and programs
37

38 This contractor shall provide all labor and software upgrades required so that the manufacturer's current
39 software revision is provided at substantial completion. If the manufacturer will be upgrading within three
40 months after substantial completion, the contractor must notify the agency that this will occur before
41 substantial completion and provide a quote for upgrading to the current revision.
42

43 Prior to installation of any Operator Workstation or DDC System server, the contractor shall work with the
44 owner to ensure that proper virus protection software and security measures are in place before the system is
45 put online.
46

47 **WEB BASED HTML BROWSER INTERFACE**

48 Provide a HTML based browser interface (Web Server) for accessing the DDC system. This shall include
49 all hardware and software to provide an Ethernet twisted pair connection to the owners local or wide area
50 network (LAN or WAN) that can be used to access the DDC system through a standard internet browser.
51

52 All information shall be provided to the owners IT staff to facilitate connection through the owners
53 LAN/WAN.
54

55 At a minimum, this interface shall be capable of all functions described under the Operator Interface section,
56 Password Protection, Operator Commands, and Logs and Summary subsections of this specification.
57
58
59

60 **PART 3 - EXECUTION**

61 **GENERAL**

62 All electronic work required as an integral part of the central campus automation system work is the
63 responsibility of this section unless specifically indicated otherwise in this section, Section 23 09 14..
64

1
2 This contractor shall provide all labor, materials, engineering, software permits, tools, check-out and
3 certificates required to install a complete DDC upgrade to the existing central campus automation system as
4 herein specified. This system upgrade shall be compatible with and interfaced to the existing computer driven
5 automation center on campus, and shall operate through all the existing I/O devices, central processing unit
6 (CPU), and digital communication trunks. This connection to the digital communications trunk shall be true
7 bi-directional analog and digital communications with the existing central campus automation system.
8

9 Any and all points added with this project shall be properly interfaced into the existing central campus
10 automation system format and grouped for display purposes into the system such that all points associated
11 with a new or existing DDC system can appear together on the CRT display or printed log. Assignment of
12 points to a group shall not be restricted by hardware configuration of the points of direct digital control. It
13 shall be possible to assign a point to appear in more than one system. An English descriptor and an
14 alpha/numeric identifier shall identify each system.
15

16 This central campus automation system expansion as herein specified shall be fully integrated and completely
17 installed by this section. It shall include all required computer CPU software and hardware. Include the
18 engineering, installation, supervision, calibration, software programming, and checkout necessary for a fully
19 operational system.
20

21 **INSTALLATION**

22 All work and materials are to conform in every detail to the rules and requirements of the National Electrical
23 Code and present manufacturing standards. All wiring and cable installation shall conform with the wiring
24 installation as specified in the installation section of Section 23 09 14. All material shall be UL approved.
25

26 The addition of this specified system expansion shall in no way impair the future capabilities of any existing
27 functions of the computer driven central campus automation system. A system expansion with lesser
28 capabilities will not be accepted. Further, this contractor will not put in jeopardy the normal, uninterruptable
29 operation of the entire campus automation system the time it is interfaced through the completion of this
30 project.
31

32 Install system and materials in accordance with manufacturer's instructions, rough-in drawings and details
33 on drawings.
34
35

36 Line voltage wiring to power the DDC Controllers, to be by this contractor.

37
38 Control panels serving equipment fed by emergency power shall also be served by emergency power.
39

40 Provide uninterruptable power supplies where necessary to provide proper startup of equipment or to
41 accomplish power restart control sequences specified.
42

43 Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron
44 supports. One cabinet may accommodate more than one system in same equipment room. Provide printed
45 plastic tags for instruments and controls inside cabinet and on engraved plastic nameplates cabinet face.
46

47 Provide as-built control drawings of all systems served by each local panel in a location adjacent to or
48 inside of panel cover. Provide a protective cover or envelope for drawings.
49

50 Cable tray routing of the communication trunks is acceptable.
51

52 Provide all necessary routers and or repeaters to accomplish connection to the LAN via the panel-mounted
53 port provided.
54

55 Provide two data jacks in control panels housing supervisory controllers and allocate 6"x6" for each data
56 jack in the panel. The first jack will be used for connecting the supervisory controller to the Building
57 Automation Network (BAN). The second jack will be used as a spare for connecting to the BAN by service
58 personnel.
59
60
61

62 **END OF SECTION**

1
2
3
4
5

**SECTION 23 09 25
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC
INTEGRATED TERMINAL UNITS**

6
7

PART 1 - GENERAL

8

SCOPE

9 Work in this section includes Direct Digital Control (DDC) terminal unit application specific controllers
10 (ASC's), field level communication trunk, software programming, and other equipment and accessories
11 necessary to integrate ASC's into a supervisory controller provided under Section 23 09 24. This system
12 interfaced with electric controls (Section 23 09 14) utilizing Direct Digital Control signals to operate
13 actuated control devices will meet, in every respect, all operational and quality standards specified herein.
14 Provide TAB services on all terminal units installed per section 23 05 93.

15
16

PART 1 - GENERAL

17 Scope
18 Related Work
19 Reference
20 Reference Standards
21 Work Not Included
22 Quality Assurance
23 Submittal
24 Operation and Maintenance Data
25 Material Delivery and Storage

26
27

PART 2 - PRODUCTS

28 General
29 Control Panels
30 Direct Digital Controls
31 Networking/Communications
32 BACnet Requirements
33 Application Specific Controllers – Terminal Unit Control

34
35

PART 3 - EXECUTION

36 General
37 Installation
38 Construction Verification
39 Functional Performance Testing
40 Agency Training

41
42

RELATED WORK

43 Applicable provisions of Division 1 govern work under this section.

44
45 Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC – Coordination

46
47 Division 23 - HVAC - Equipment provided to be controlled or monitored

48
49

REFERENCE

50 Applicable provisions of Division 1 govern work under this section.

51
52

REFERENCE STANDARDS

53 FCC Part 15, Subpart J, Class A - Digital Electronic Equipment to Radio Communication Interference
54 ANSI/ASHRAE Standard 135-2001 BACnet - A Data Communication Protocol for Building Automation
55 and Control Networks

56
57

WORK NOT INCLUDED

58 Section 23 09 24 work includes furnishing and installing all field devices, including electronic sensors for
59 the DDC of this section, equipment, and all related field wiring, interlocking control wiring between
60 equipment, pneumatic tubing, sensor mounting, etc., that is covered in that section.

61
62 Motorized control dampers and actuators, temperature sensors, automatic control valves and their actuators
63 are also covered in Section 23 09 14.

1
2 **QUALITY ASSURANCE**

3 MANUFACTURER:: Distech

4
5 INSTALLER:

6 A firm specializing and experienced in DDC control system installation for no less than 3 years. All
7 engineering and commissioning work shall be done by qualified employees of this manufacturer, or
8 qualified employees of an Authorized Representative of that manufacturer that provides engineering and
9 commissioning of the manufacturer's control equipment. Where installing contractor is an authorized
10 representative of the control equipment manufacturer, submit written confirmation of such authorization.
11 Indicate in letter of authorization that the installing contractor has successfully completed all necessary
12 training required for the engineering, installation, and commissioning of equipment and systems to be
13 provided for the project and that such authorization has been in effect for a period of not less than three
14 years. The letter of authorization should also indicate that the installing contractor is authorized to install
15 the manufacturer's DDC equipment at the project location at the time the project is bid. Installation of the
16 equipment shall be done by qualified mechanics and/or electricians in the direct employ or be directly
17 subcontracted and under the supervision of the manufacturer or Authorized Representative. The contractor
18 providing and installing the equipment under this specification section shall be the same contractor
19 providing and installing equipment under the 23 09 14 specification section.
20

21 RESPONSE TIME:

22 During warranty period, four (4) hours or less, 24-hours/day, 7 days/week.
23

24 ELECTRICAL STANDARDS:

25 Provide electrical products, which have been tested, listed and labeled by Underwriters' Laboratories (UL)
26 and comply with NEMA standards.
27

28 DDC STANDARDS: DDC manufacturer shall provide written proof with shop drawings that the
29 equipment being provided is in compliance with F.C.C. rules governing the control of interference caused
30 by Digital Electronic Equipment to Radio Communications (1979 Amendment to Part 15, Subpart J).
31

32 **SUBMITTALS**

33 Include the following information:
34

35 Details of construction, layout, and location of each temperature control panel within the building,
36 including instruments location in panel and labeling. Indicate which piece of mechanical equipment is
37 associated with each controller and what area within the building is being served by that equipment. For
38 terminal unit control, provide a room schedule that would list mechanical equipment tag, room number of
39 space served, address of DDC controller, and any other pertinent information required for service.
40

41 PRODUCT DATA

42 Submit manufacturer's specifications for each control device furnished, including installation instructions
43 and startup instructions. General catalog sheets showing a series of the same device is not acceptable
44 unless the specific model is clearly marked. Annotated software program documentation shall be submitted
45 for system sequences, along with descriptive narratives of the sequence of operation of the entire system
46 involved. Submit wiring diagram for each electrical control device along with other details required to
47 demonstrate that the system has been coordinated and will function as a system.
48

49 MAINTENANCE DATA

50 Submit maintenance data and spare parts lists for each control device. Include this data in maintenance
51 manual.
52

53 RECORD DRAWINGS

54 Prior to request for final payment provide complete composite record drawings to incorporate the DDC and
55 Pneumatic/Electric field work. Schedules and other interface information specified below for integration of
56 the equipment specified in this section to the ELDM shall be updated and included in the record drawings
57 provided under this specification section. All software addressing for device communication shall be noted
58 for all devices provided under this section and the communication addressing required for devices provided
59 by others that are integrated into the direct digital control system provided under this section. Point to point
60 routing of communication trunks and power wiring between DDC controllers, DDC communication
61 devices, control panels, and Ethernet switches shall be documented. Coordinate with the supplier of the
62 equipment specified to be interfaced through digital communications for communication addressing.
63 Provide circuit number of 120VAC panel power circuit(s) feeding each control panel on record drawings.
64 Label circuit number(s) inside the panel served.

1
2 **OPERATION AND MAINTENANCE DATA**

3 All operations and maintenance data shall comply with the submission and content requirements specified
4 under section GENERAL REQUIREMENTS.
5

6 **MATERIAL DELIVERY AND STORAGE**

7 Provide factory shipping cartons for each piece of equipment and control device. This contractor is
8 responsible for storage of equipment and materials inside and protected from the weather.
9

10 **PART 2 - PRODUCTS**

11
12 **GENERAL**

13 Provide DDC control products in sizes and of capacities as required, conforming to manufacturer's standard
14 materials and components as published in their product information, designed and constructed as
15 recommended by the manufacturer and as required for application indicate.
16

17 The system components shall be capable of operating with 120 VAC and/or 24VAC/DC power supply and
18 shall be fully overcurrent protected with resettable shutdown-restart circuitry. These circuits shall be
19 implemented with the proper hardware and associated software functions. When the devices or
20 components require 24VAC/DC, the controls contractor shall provide the proper power supplies and/or
21 transformers. All transformers shall have resettable overload protection.
22

23 All DDC controllers shall use screw terminals for termination of individual wires. Spade lugs are not
24 acceptable.
25

26 **CONTROL PANELS**

27 Fabricate panels of 14 gauge furniture grade steel or 6063-T5 extruded aluminum alloy, totally enclosed on
28 six sides, hinged door and keyed lock, with manufacturer's standard shop painted finish and color.
29

30 Provide UL listed cabinets for use with line voltage devices.
31

32 Control panels that have devices or terminations that are fed or switch 50V or higher shall enclose the
33 devices, terminations, and wiring so that Personal Protective Equipment (PPE) is not required to service the
34 under 50V devices and terminations within the control panel. As an alternative, a separate panel for only
35 the 50V and higher devices may be provided and mounted adjacent to the under 50V control panel. For
36 DDC controllers that are directly fed by 120VAC, provide an externally mounted 120VAC, 5A fast blow
37 fuse to feed these controllers.
38

39 Plastic control enclosures will be approved provided all conduits are bonded and grounded.
40

41 Use existing control panels for all DDC Controllers, ASC's and associated function modules. All controls
42 to be in control panels provided under this Section except for the following:
43

- 44 • Terminal unit controllers mounted within the terminal unit equipment enclosure as specified
45 under Section 23 09 14.
- 46 • or Above accessible lay-in tile ceilings where VAV box controllers designed to be directly
47 mounted on air terminals.
- 48 • Above accessible lay-in tile ceilings where additional controllers are required for air terminal
49 unit control. Where additional controllers are required, they shall not be mounted directly to
50 the ductwork but be mounted on din rail or back panel in an accessible location as close as
51 possible to the terminal unit(s) being controlled.
- 52 • Any devices other than DDC controllers, i.e. relays, pressure switches, etc. shall be installed
53 in an enclosure.
54

55 All wiring for controllers shall be managed in a neat and workmanlike manner.
56

57 Permanently label all controls; tag all control wiring, and document both on control drawings.
58

59 **DIRECT DIGITAL CONTROLS**

60 DDC system to consist of a supervisory controller provided under 23 09 24, stand-alone terminal unit DDC
61 Application Specific Controllers (ASC's).
62

63 The vendor of the system provided under this Section shall provide all software and communication
64 interface hardware necessary to program and upload/download programmable and application specific

1 controllers from a laptop computer and make additional copies and future software revisions available for
2 sale directly to the user Agency.

3
4 The integration of the DDC terminal controllers provided in this section and the supervisory controller
5 provided under Section 23 09 24 shall be capable of terminal unit equipment supervision and control, time
6 scheduling, alarm management, energy management functions, trend data collection and reporting, and
7 controller integrity monitoring.

8
9 Control logic necessary for DDC terminal unit control as specified in Section 23 09 15 point charts and
10 Section 23 09 93 control sequences shall reside within the DDC terminal unit controller or the Section 23
11 09 24 supervisory controller.

12
13 Time schedules for occupancy and other functions specified in Section 23 09 93 shall be programmed in
14 the 23 09 24 supervisory controller. Time schedules shall be programmed so that all terminal units served
15 by a given AHU shall be indexed by the same schedule unless otherwise directed in the 23 09 93 sequence
16 of operation. When specified, grouping of terminals shall be provided under this section so a single data
17 point provided under this section associated with the grouped terminals can be scheduled in the supervisory
18 controller.

19
20 When specified, flow totalization for AHU outside air ventilation reset shall be provided by the Section 23
21 09 24 supervisory controller.

22
23 When specified, static pressure reset strategies that poll the terminal units shall be provided by the Section
24 23 09 24 supervisory controller.

25
26 Trend data shall be collected by the 23 09 24 supervisory controller by polling the appropriate controllers
27 provided in this section.

28
29 Alarms will be monitored by the 23 09 24 supervisory controller by polling the appropriate controllers
30 provided in this section. Special programming shall not be required by this contractor for alarm monitoring.

31
32 The system shall be modular in nature, and shall permit expansion of both capacity and functionality
33 through the addition of sensors, actuators, ASC's, and operator devices.

34
35 The failure of any single component or network connection shall not interrupt the execution of control
36 strategies at other operational devices.

37 **NETWORKING/COMMUNICATIONS**

38
39 The intent of this specification is to provide a networked, stand-alone, distributed control system with the
40 capability to integrate the ANSI/ASHRAE Standard 135-2001 BACnet communication protocols, in one
41 open, interoperable system.

42 The supplied computer software shall employ object-oriented technology (OOT) for representation of all
43 data and control devices within the system. In addition, adherence to industry standards including
44 ANSI/ASHRAE Standard 135-2001, BACnet to assure interoperability between all system components is
45 required. For each BACnet device, the device supplier must provide a Protocol Implementation
46 Conformance Statement (PICS) document showing the installed device's compliance level. Minimum
47 compliance is Level 3; with the ability to support data read and write functionality.

48
49 The DDC terminal unit communications network shall be capable of direct connection to and
50 communication with the supervisory controller furnished in Section 23 09 24.

51 Provide communication ports on all terminal unit ASC's for operator's terminal interface.

52
53 Access to system data shall not be restricted by the hardware configuration of the DDC system.

54
55 Global data sharing as facilitated through a 23 09 24 supervisory controller or through peer to peer
56 communication of the ASC's shall allow point data to be shared between ASC's when it would be
57 impractical to locate multiple sensors.

58
59 Network design shall include the following provisions:

- 60
61
62 • Data transfer rates for alarm reporting and quick point status from multiple BACnet devices.
63 The minimum baud rate shall be 9600 baud.
64

- 1 • Support of any combination of BACnet devices. A maximum of 32 BACnet devices shall be
- 2 supported on a single BACnet MSTP segment. Up to 64 BACnet devices can be connected to
- 3 a single BACnet MSTP trunk.
- 4
- 5 • Detection of single or multiple failures of ASC's or the network media.
- 6
- 7 • Error detection, correction, and re-transmission to guarantee data integrity.
- 8
- 9 • Use BACnet MSTP protocol that utilizes IEEE RS-485 communications interface.
- 10
- 11 • The ASC device and software object count limits shall be coordinated with the Section 23 09
- 12 24 contractor so that the required number of communication trunks are routed to the Section
- 13 23 09 24 supervisory controllers.
- 14 .
- 15

16 **BACNET REQUIREMENTS**

17 Integration to the supervisory controller provided under Section 23 09 24 shall be via BACnet MSTP.
 18 Field level communications for ASC's shall utilize BACnet MSTP - no other protocol is acceptable. All
 19 controllers to be integrated shall provide a Protocol Implementation Conformance Statement (PICS) and
 20 BACnet Interoperability Building Blocks (BIBB'S) as required by the American National Standards
 21 Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ASHRAE)
 22 Standard 135-2001, BACnet protocol.

23
 24 In general all devices shall support the following:

25
 26 Segmentation Capability
 27 Segmentation requests supported
 28 Segmentation responses supported

29
 30 Standard Object Types Supported

- 31
- 32 • Analog input
- 33 • Analog output
- 34 • Analog value
- 35 • Binary input
- 36 • Binary output
- 37 • Binary value
- 38 • Calendar
- 39 • Device
- 40 • Event enrollment
- 41 • Group
- 42 • Multistate input
- 43 • Multistate output
- 44 • Multistate value
- 45 • Notification class
- 46 • Schedule

47 Character Sets supported

- 48
- 49 • ANSI X3.4
- 50 • ISO 10646 Universal Character Set-2
- 51

52 For all controllers other than Communicating Thermostats that are not programmable, BACnet object name
 53 and description shall match the existing naming conventions used by the state agency for their existing
 54 Building Automation System. Coordinate with the agency and the 23 09 24 contractor to establish the
 55 naming conventions prior to programming of any controllers provided under this specification section. If
 56 the agency does not have a naming standard for a point type, the BACnet object name shall match the point
 57 description as listed in the DDC Input / Output Summary Table as listed in 23 09 15 unless the agency
 58 preference is different. All controllers, with the exception of non-programmable Communicating
 59 Thermostats, shall have object names, descriptions, and engineering units that are writable at the controller
 60 level and shall be programmed so that the object names, descriptions, and engineering units match the
 61 desired naming standards as specified above. Ensure that these point names will be transferred through to
 62 the 23 09 24 supervisory when the auto-discovery function is executed.

63
 64 A test integration of a single terminal unit controller provided under this Section shall be performed with

the Section 23 09 24 contractor to ensure that the BACnet object attributes in the terminal unit controllers are correctly edited to provide the naming this is noted above will be transferred to the 23 09 24 supervisory controller during auto-discovery and will be properly presented on the Section 23 09 24 building automation system. This test integration shall be performed before this contractor programs the remaining terminal unit controllers or this contractor shall reprogram the controllers to comply with the above specification.

Coordinate BACnet device instance numbering with the agency facility personnel for controllers provided under this Section that are being connected to an existing building automation system. This contractor shall be responsible for correcting any conflicts with existing devices that may occur or changing the device instance numbers to comply to follow the agency BACnet device instance numbering scheme.

The following table indicates the minimum VAV terminal unit objects, the associated naming, and the object values that are required to be writable that shall be provided for all VAV terminals. If the agency does not have a convention for VAV terminal object names and descriptions that it prefers, use the naming standards as listed below. Provide similar naming and descriptions that are approved by the agency for other types of terminal units.

Object Type	Object Name	Object Description	Units	Writable
BV	DEVICE-S	DEVICE STATUS - SERVED BY AHU#	ONLINE/OFFLINE	
MV	OCC-MODE	OCCUPIED MODE	OCC/UNOCC/STNDBY	
BV	OCC-SCHED	OCCUPIED SCHEDULE Xam-Xpm	OCC/UNOCC	Yes
DI	OCC-S	OCCUPANCY SENSOR STATUS	OCC/UNOCC	
AV	ZN-SP	ZONE TEMPERATURE SETPOINT	DEG F	Yes
AI	RM#-T	ROOM ##### TEMPERATURE	DEG F	
AI	DA-T	DISCHARGE AIR TEMPERATURE	DEG F	
AO	HTG-VLV	HEATING VALVE	% OPEN	Yes
AO	RAD-VLV	RADIATION VALVE	% OPEN	Yes
AO	SA-DPR	SUPPLY AIR DAMPER	% OPEN	Yes
AV	CFM-SP	ACTUAL FLOW SETPOINT	CFM	
AI	CFM-FLOW	SUPPLY AIR FLOW	CFM	
AV	HTG-SP	HEATING TEMPERATURE SETPOINT	DEG F	Yes
AV	CLG-SP	COOLING TEMPERATURE SETPOINT	DEG F	Yes
AV	OCC-C-CFM-MIN	OCCUPIED CLG CFM MIN SETPOINT	CFM	Yes
AV	OCC-C-CFM-MAX	OCCUPIED CLG CFM MAX SETPOINT	CFM	Yes

APPLICATION SPECIFIC CONTROLLERS - TERMINAL UNIT CONTROL

Each terminal unit ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor based, multi-tasking, real-time digital control processor.

Each ASC shall have sufficient memory to support its own operating system and databases including:

- Control Processes
- Energy Management Applications
- Operator I/O (Portable Service Terminal)

Provide a portable service terminal or laptop with the necessary software that can be connected to the ASC via zone temperature sensor or directly at the controller. The capabilities of the portable service terminal shall include, but not be limited to, the following information for the ASC to which connected but also any other ASC, or digital panel on the network:

- Display temperatures
- Display status
- Display setpoints
- Display control parameters
- Override binary output control
- Override analog output control
- Override and adjust analog setpoints
- Modification of tuning and offset calibration constants

All temperature inputs shall have calibration offsets that can be adjusted from the portable service terminal.

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For butterfly type Variable Air Volume (VAV) Terminals, provide differential pressure transducers and damper actuators for flow measurement and actuation of the VAV terminal damper. Pressure transducers for VAV box flow applications do not need to have adjustable pressure ranges or integral display. Provide filter on high side of flow pickups if flow measurement device requires airflow through the device. All differential pressure transducer inputs for airflow measurement shall have a method to compensate for sensor drift to calibrate the zero point of the input. The differential pressure transducers and damper actuators can be integrated into the terminal unit controller or be discrete devices.

Terminal unit space sensors shall be provided with digital displays with setpoint adjustments and manual occupancy override and indication of occupancy status. Provide information to the AE on sensor colors offered by the manufacturer and obtain approval on what color should be provided on the project. Provide setpoint adjustment as specified in the DDC Input/Output Summary Table and sequence of operation.

Provide a method to view and print a summary of current K-factors for flow correction for each VAV terminal through the DDC system. The summary shall have a minimum of 50 K-factors per group of VAV terminals.

All system setpoints, proportional bands, control algorithms, calibration constants, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

All application specific controllers shall be fully programmable. Question and answer or template programming is not acceptable. Control sequences for terminal unit control that utilize devices wired directly to the terminal unit application controller shall be programmed in the application specific controller and shall be stand-alone in function, i.e. occupancy sensing, temperature setpoint setback, etc. Supervisory controllers shall not be involved in the control sequence logic unless it involves sharing data between or from individual terminal unit controllers to be utilized in a global sequence, i.e. trim and respond strategies, terminal unit grouping, etc.

All application software loaded in the controllers shall be provided to the agency along with all hardware (cabling, convertors, etc.) and software required to modify and download the ASC application software. If this software requires a PC to download the controllers, this contractor shall include labor to install this on an agency provided PC. Training specified under this Section shall include how to accomplish this function.

PART 3 - EXECUTION

GENERAL

All electronic work required as part of the Direct Digital Control system work for DDC terminal unit control is the responsibility of this section unless specifically indicated otherwise in this section, Section 23 09 24, Section 23 09 14, 23 09 15, or in Division 26.

This contractor shall provide all labor, materials, engineering, software, permits, tools, checkout and certificates required to install a complete Direct Digital Control terminal unit system as herein specified.

This Direct Digital Control system as herein specified shall be fully integrated with the 23 09 24 supervisory controller and completely installed by this section. Include the engineering, installation, supervision, calibration, software programming, and checkout necessary for a fully operational system.

INSTALLATION

All work and materials are to conform in every detail to the rules and requirements of the National Electrical Code and present manufacturing standards. All material shall be UL approved.

Install system and materials in accordance with manufacturer's instructions, rough-in drawings and details on drawings.

Line voltage wiring to power the DDC Controllers, not provided by the Division 26 contractor, to be by this contractor.

1 Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron
2 supports. One cabinet may accommodate power for multiple terminal unit controllers. Provide engraved
3 plastic nameplates for instruments and controls inside cabinet and on cabinet face.

4
5 All cable and individual wiring is to be permanently tagged, with numbers corresponding with "Record
6 Drawings", spares are to be labelled as "Spare".

7
8 The portable service terminal shall be utilised by the balancing contractor to set all the necessary
9 parameters necessary for accurate airflow control of the DDC terminal unit. Provide necessary training to
10 the balancing contractor so he can perform this function without assistance.

11
12 Provide all BACnet MSTP communication wiring to the supervisory controllers provided under Section 23
13 09 24 in the locations shown on the plans. Coordinate with the 23 09 24 for determining device limits and
14 trunk routing to supervisory controllers.

15
16 Provide technician to work with 23 09 24 contractor to coordinate connection of terminal unit DDC system
17 to the supervisory controller furnished by the 23 09 24 contractor.

18
19 This contractor shall be responsible for coordination with the mechanical contractor and providing for all
20 valves that are controlled by the terminal unit controllers provided under this section to be overridden open
21 for system cleaning of water piping.

22
23 Provide documentation to demonstrate that all points, input and output, have been checked out and verified
24 operational, note any points not operating properly with notation of reason.

25
26 **CONSTRUCTION VERIFICATION**

27 Contractor is responsible for utilizing the construction verification checklists supplied under specification
28 Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91
29 01 or 01 91 02.

30
31 **FUNCTIONAL PERFORMANCE TESTING**

32 Contractor is responsible for utilizing the functional performance test forms supplied under specification
33 Section 23 08 00 in accordance with the procedures defined for functional performance testing in Section
34 01 91 01 or 01 91 02.

35
36 **AGENCY TRAINING**

37 All training provided for agency shall comply with the format, general content requirements and
38 submission guidelines specified under Section 01 91 01 or 01 91 02.

39
40 Contractor to provide factory authorized representative and/or field personnel knowledgeable with the
41 operations, maintenance and troubleshooting of the system and/or components defined within this section
42 for a minimum period of 2 hours.

43
44 Provide two follow-up visits for troubleshooting and instruction, one six months after substantial
45 completion and the other at the end of the warranty period. Length of each visit to be not less than [XX]
46 hours or the time necessary to provide required information and complete troubleshooting and inspection
47 activity for all controls installed under this section. Coordinate the visit with the owner/Agency and
48 provide an inspection report to the owner of any deficiencies found.

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