SECTION 230901 – BUILDING AUTOMATION SYSTEM GRAPHICAL USER INTERFACE

PART 1 - GENERAL

1.1 INSTRUCTIONS TO VENDORS

A. Vendor is cautioned that the Owner reserves the right to reject any Vendor, which in the Owner's sole judgment, takes meaningful deviation or exception to Division 23 Direct Digital Control (DDC) Standards. The Charlotte-Mecklenburg Schools' (CMS) Energy Manager and/or designated representative of the Energy Management Department (EMD) shall review all vendor substitution submittals. Vendor substitution approval/disapproval shall be returned via the project architect in writing from Charlotte-Mecklenburg Schools' Energy Manager and designated EMD Project Manager.

1.2 RELATED DOCUMENTS

A. Drawings (both mechanical and electrical project manual drawings) and general provisions (within Divisions 23, 26, 27) of the Contract, including General Conditions apply to this Section.

B. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as through bound herein.

C. Sections within Division 23 – Mechanical and Division 26 – Electrical apply, including though not limited to

D. 1. 23 09 00 – Energy Management System (EMS) and Building Automation System (BAS) Control for HVAC and Lighting

E. 2. 23 09 02 – BAS Point Naming and Tagging Guideline

F. 3. 23 09 93 – Sequences of Operation for HVAC controls

1.3 SUMMARY

A. This Section includes the proposed structure of the Charlotte Mecklenburg Schools Building Automation System Graphical User Interface.

1.4 ABBREVIATIONS AND ACRONYMS

A. RTU: Roof Top Unit

B. GUI: Graphical User Interface

C. IP: Internet Protocol

D. PC: Personal Computer

1.5 SYSTEM PERFORMANCE

A. The GUI shall be accessible by entering individual unique user ID's and passwords with varying levels of administrator functionality from any IP connected user device without the need for special software or a dedicated PC.

B. Navigation shall be via point and click mouse selection and keyboard entry by personnel requiring little or no formal training.

C. A navigation tree shall be provided for selection of Graphics being pulled up by School name, listed in descending Alphabetical Order with an initial Summery Graphic at the top of the Tree Listing all Schools by Grade. Subgroups by grade and/or building function shall also be provided.

D. Selecting subsequent branches for each school shall depict the individual Schools GUI Summery Page showing the Site Plan for the School's entire Campus Buildings in a dynamic key plan to allow the user to drill down to further levels of zoom and sub-branches from the tree.

E. Zoom of plan GUI screens shall be either mouse wheel or subsequent point-n-click levels of plan drawings to provide the sufficient level of details. The layout and structure for all equipment and subsequent devices should be consistent for both enumeration and format regardless of vendor.

F. All GUI plan drawings shall be oriented so that the front of the school's main entrance is at the bottom of the page. All subsequent levels of zoom for floor plans shall retain the same orientation.

G. All GUI screens shall be titled on every page in sequence by the School Courier Code; Formal assigned Name; and further branches down the tree by Type of major piece of equipment; Individual Device; separated by hash marks. Each Schools initial Summery page shall also provide the US Postal Address of the building in its entirety and an orientation indicator to due North

H. School summary page should also show Primary Central Plant equipment status and primary AHU's general status with site wide combined selected high-level alarms status. Hyperlinks shall be provided to allow for global parameters to be set, monitored, and modified.

I. Subsequent branches down from the school summary page shall depict the Building(s,) then Floor Plans from lowest elevation to the highest elevation, including lofts and Mezzanines. The geographic location of every major monitored, and controlled piece of equipment placed in its physically installed position shall be shown on overlays of the site/floorplan and/or riser/line diagrams by School. The building overall floor plans shall also show each individual controlled spaces temperature with relevant thermographic color infills depicting controlled spaces actual temperature in relation to setpoints. Green within range, Blue cooler than rage, Red warmer than range. Colors out of range shall show in 2-degree gradients. Deeper colors of Red and Blue shall show the greatest range deviations from setpoints.

J. All building floor plans used for GUI base drawings must show all fixed structural elements, doors, room designations, stairs, and shaft ways. Mechanical background drawings showing equipment locations such as RTU, VAV, and associated ductwork are preferred.

K. Subsequent branches drilling down into major pieces of equipment shall depict sub-component and end of line devices in their geographic position within a room and/or in proper alignment on equipment pictographs as installed over layered on one line flow diagrams, mechanical floorplan details, or the detailed equipment graphics.

L. Tree Layout. The navigation tree consists of tabs that contain nodes, legible display text, graphical links, and icons. It shall be assembled and built by choosing display text for nodes, arranging the nodes, and assigning associated graphics to them.

M. Branch Layout. Shall be arranged first by School Site, then by Building, then by Floor and further, if necessary, by Room. Branches shall also be provided for diagnostic and programming tables for individual equipment for use by technicians.

N. All branches shall be constructed in a consistent logical, flow and format as follows:

O. a) First Branch; The CMS name and courier address of the campus grouped by grade in descending alphabetical order; (Linked to sites Summery Page /Campus Overview)

P. b) Second Branches; ALL Sub-buildings number/letter within a Campus (where applicable); (Linked to Ground Level Elevation of the selected building.)

Q. c) Third Branches; ALL Individual elevations of the building including Roof Elevations, (Links to specific elevation.)

R. d) Fourth Branch; Spaces (by Room number based on the designation from the architectural plans.)

S. e) Subsequent Branches; Sub-branches of Central Plants, grouped equipment and components with navigation links to upstream/downstream system components; Relevant links to troubleshooting aids, setpoints and pdf's. (Linked to individual specific components and/or Central Plants)

T. BAS Global Navigation Task Bar. Provide task bar for Global Set Points, Alarm, User, Admin and Help Functions queries. Global Navigation shall be at the top of the tree and transfer data to and from all subsequent branches of the tree.

U. System Navigation Links: Provide links to point's status, graphics, data logs, alarms and events, equipment, spaces, systems, points, schedules, reports, tools
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V. All equipment ID's shall be enumerated based on a sequence starting from left to right with the major equipment type abbreviation, floor elevation, then the specific units building zone and/or room number. Dedicated pumps and fans shall be enumerated with the same numerical designation as the major equipment upstream the pump or fan serves. If more than one of the same types of pumps or device exists in parallel an alpha character shall also be sub-assigned to differentiate each device. Where multiple rooms are served by a single piece of equipment, the area containing the controlling device shall dictate primary upstream equipment's unique enumeration.

W. All equipment down to the end line devices shall be clearly identified with sufficient branches, zoom and scale to make it clear to the operator specifically where in a building or room the equipment is physically located relevant to the building drawings.

X. All relevant documentation derived from installation, including operational design parameters, sequences, point to point wiring diagrams, device catalogue cuts, plan mechanical drawings, riser drawings, device details, maintenance manuals and repair procedures shall be segregated then embedded with a point-n-click navigation from the Site Summery Page and/or the lowest zoom level where the device depicted resides.

Y. For each piece of equipment, a GUI screen hyperlink shall be provided to display a drill down screen showing the technical parameters of the device for troubleshooting and diagnostics.

Z. The layout for every GUI screen shall be consistent for each like piece of equipment regarding positioning of relevant information. The One Line diagram and flow of Central plant piping shall be as close as possible to a direct representation of actual field conditions.

AA. The grouping of GUI parameters for each screen shall be consistent throughout all similar screens for ALL schools.

1.6 SUBMITTALS

A. Product Data: Include manufacturer's examples of graphics for each type of system indicated.

1. Control System Software: Include technical data for operating system software, operator interface, color graphics, programming, sequence of operations, and other third-party applications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 WARRANTY REQUIREMENTS

A. TWO-YEAR WARRANTY: Provide all labor, material, and equipment necessary to maintain beneficial performance of the entire control system for a period of two (2) years after DELIVERY OF THE COMPLETED FLAWLESS GRAPHICAL USER INTERFACE as accepted by no less than two EM/EMS staff members. The controls subcontractor at no charge to the Owner shall promptly correct any defects in workmanship or material during the warranty period. All work shall be accomplished during normal working hours M-F if possible. Precaution shall be taken to minimize disruption of facility operations.
   1. Provide an alternate price to extend this warranty to five (5) years.

END OF SECTION 23 09 01