PART 1   GENERAL

1.1   SUMMARY

.1   Section Includes.

.1   Requirements and procedures for training program, instructors and training materials, for building Energy Monitoring and Control System (EMCS) Work.

1.2   RELATED SECTIONS

.1   Section 01 33 00 - Submittal Procedures.

.2   Section 25 05 01 - EMCS: General Requirements.

1.3   DEFINITIONS

.1   CDL - Control Description Logic.

.2   For additional acronyms and definitions refer to Section 25 05 01 - EMCS: General Requirements

1.4   SUBMITTALS

.1   Submittals in accordance with Section 01 33 00 - Submittal Procedures and supplemented and modified by requirements of this Section.

.2   Submit training proposal complete with hour-by-hour schedule including brief overview of content of each segment to Department Representative 30 days prior to anticipated date of beginning of training.

.1   List name of trainer, and type of visual and audio aids to be used.
.2   Show co-ordinated interface with other EMCS mechanical and electrical training programs.

.3   Submit reports within one week after completion of Phase 1 and Phase 2 training program that training has been satisfactorily completed.

1.5   QUALITY ASSURANCE

.1   Provide competent instructors thoroughly familiar with aspects of EMCS installed in facility.

.2   Department Representative reserves right to approve instructors.

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1.6   **INSTRUCTIONS**

    .1   Provide instruction to designated personnel in adjustment, operation, maintenance and pertinent safety requirements of EMCS installed.

    .2   Training to be project-specific.

1.7   **TIME FOR INSTRUCTION**

    .1   Number of days of instruction to be as specified in this section (1 day = 7 hours including two 15 minute breaks and excluding lunch time).

1.8   **TRAINING MATERIALS**

    .1   Provide equipment, visual and audio aids, and materials for classroom training.

    .2   Supply manual for each trainee, describing in detail data included in each training program.

        .1   Review contents of manual in detail to explain aspects of operation and maintenance (O&M).

1.9   **TRAINING PROGRAM**

    .1   To be in 2 phases over 6 month period.

    .2   Phase 1: 2 day program to begin before 30 day test period at time mutually agreeable to Contractor, Department Representative and Commissioning Co-ordinator.

        .1   Train O&M personnel in functional operations and procedures to be employed for system operation.

        .2   Supplement with on-the-job training during 30 day test period.

        .3   Include overview of system architecture, communications, operation of computer and peripherals, report generation.

        .4   Include detailed training on operator interface functions for control of mechanical systems, CDL's for each system, and elementary preventive maintenance.

        .5   Introduction to Direct Digital Controls and BACnet protocol.

        .6   Identification of Control Components.

        .7   Review of DDC Network Diagram for building.

        .8   Review of shop drawings for building.

        .9   Detailed discussion of sequences of operation

        .10   Walk through of mechanical systems.

    .3   Phase 2: 5 day program to begin 8 weeks after acceptance for operators, equipment maintenance personnel and programmers.

        .1   Provide multiple instructors on pre-arranged schedule. Include at least

   .1 Operator training: provide operating personnel, maintenance personnel and programmers with condensed version of Phase 1 training.

   .2 Equipment maintenance training: provide personnel with 2 days training within a 5 day period in maintenance of EMCS components, maintenance and calibration of sensors and controls.

   .3 Programmers: provide personnel with 2 days training within a 5 day period in following subjects in approximate percentages of total course shown:

      .1 Software and architecture: 10%

      .2 Application programs: 15%

      .3 Controller programming: 50%

      .4 Trouble shooting and debugging:10%

      .5 Colour graphic generation: 15%

      .6 Display and interpret summaries

      .7 Command points

      .8 Modify points and point groups

      .9 Define trend logs

      .10 Schedule and print reports

1.10   ADDITIONAL TRAINING

  .1 List courses offered by name, duration and approximate cost per person per week. Note courses recommended for training supervisory personnel.

1.11   MONITORING OF TRAINING

  .1 Department Representative to monitor training program and may modify schedule and content.

PART 2   PRODUCTS (NOT USED)

PART 3   EXECUTION (NOT USED)

END OF SECTION