

Montgomery County Public Schools Facilities Guide  
DIVISION 15 – MECHANICAL

**SECTION 15001 ENERGY CONSERVATION AND ANALYSIS**

**PART 1 – GENERAL**

1.1 SCOPE

- A. The intent of the energy analysis is to comply with the codes listed Section 15000 while incorporating energy efficiency. Montgomery County Public Schools (MCPS) is committed to comply with the letter and intent of these regulations. In addition, MCPS is committed to cost effective energy efficiency including the application and recovery for any available utility company rebates.
- B. Total building design shall improve upon a baseline created in accordance with ASHRAE 90.1 without amendments (LEED baseline) by at least 30% for new construction (20% for rehabilitation) when using the Energy Cost Budget Method.

1.2 CODES, STANDARDS, ENERGY TARGETS: Refer to Section 15000.

**PART 2 - PRODUCTS** (not used)

**PART 3 - EXECUTION**

3.1 GENERAL SCOPE: Design services for capital construction projects shall include energy study of the building design. The study shall include an hourly simulation model of energy demand and consumption for the proposed design. The proposed design shall include energy efficient features determined as described below. This design is to be assigned an energy budget that the study will verify it meets, or a variance is to be applied for with documentation of the reasons that the budget cannot be cost effectively met. This study shall be approved by a professional engineer licensed in Maryland.

3.2 PHASE 1 - SCHEMATIC DESIGN

- A. Energy conservation design strategy: During the schematic development, the architect/engineer shall review the MCPS design standards, any applicable utility company incentive programs, and the energy budget assigned to this project. The development of the energy strategy includes cost effective energy efficiency in the areas of building thermal envelope, HVAC system selection, HVAC equipment efficiencies, lighting system and efficiencies. The strategy shall be shaped to meet the energy budget, employ technologies which are proven and appropriate.
- B. Submit the energy conservation strategy as part of the schematic design submittal. Strategy submittal shall outline energy conservation concepts and technologies that are to be included in the design.
- C. Provide recommendations of energy conserving features that go beyond guidelines that should be considered due to their applicability to that specific project. Include provisions for 2.5% contribution of site-generated energy from Biomass, Solar Thermal, Solar Photovoltaic, Wind, Hydrogen and Fuel Cells for consideration as an add-alternate to the project.
- D. Failure to include the energy strategy with the Schematic Design phase submittal shall render the entire Schematic submittal as incomplete.
- E. MCPS Project Manager will provide copies of the energy conservation design strategy submittal to the MCPS Energy Resources Team and Division of Construction personnel for review and comment. MCPS review comments will be provided to and discussed with the design team at the Pre-Design Development meeting.

3.3 PHASE 2 - DESIGN DEVELOPMENT

- A. Simulate energy consumption and demand. During the design development phase, the architect/engineer will simulate the proposed building design, based on the approved energy strategy from the schematic phase. The simulation shall be modeled using a computer based hourly simulation program. If needed, refinements in the energy strategy shall be made to meet the energy budget, improve life cycle cost effectiveness, and reduce the energy demand. The life cycle cost of the various technologies in the energy strategy shall be analyzed.

- B. Lighting Design Development: A baseline lighting energy budget for each space, based on ASHRAE/IES 90.1, will be calculated. The actual designed lighting watts per square foot shall be compared to the baseline. Refinements in the design shall be made to reduce the lighting demand to meet or surpass the lighting budget given in the MCPS Design Standards. Appropriate controls shall be evaluated for inclusion in the design, such as occupancy sensors and daylight controls. The HVAC systems design and analyses shall employ and be responsive to the lighting systems design.
- C. Design Development Submittal: The architect/engineer shall submit the energy study with the design development submittal. The energy study shall include the following sections:
  - 1. Sec. 1 - Completed MCPS Energy Conservation Analysis - Summary and Compliance Form, attached.
  - 2. Sec. 2 - Study summary identifying the specific conservation measures recommended for installation, the methodology used to perform the analysis, and the economic analysis results. These results should include a tabulation of the annual energy savings, monthly demand savings, estimate of increased initial cost, and the estimated utility company incentives, if any, for each conservation measures.
  - 3. Sec. 3 - Outline of building specifications, which provide in tabular form the design parameters for the energy-conserving building design, versus the alternative design features, such as geothermal systems, modular boilers, etc. A discussion of the important features and improvements of the design should be included.
  - 4. Sec. 4 - Building energy simulation results for proposed design including a tabulation of the loads, demand and energy for principal end uses. Copies of the input forms and the simulation output shall be submitted. Identify and describe the simulation tool.
  - 5. Sec. 5 - Economic analysis results of the proposed design in the form of life cycle cost and engineering economics utilizing simple payback, rate of return (ROR) and/or benefit cost ratio (BCR). These analyses should utilize the appropriate energy rates and impacts of the utility company incentives, if any.
  - 6. Sec. 6 - Lighting calculations from the design development including the baseline lighting budget and the actual lighting watts per square foot for each space listed in tabular form.

#### 3.4 PHASE 3 - CONSTRUCTION DOCUMENTS

- A. Revisions of energy study results: The architect/engineer shall certify that final design adheres to the performances of the energy study approved at design development. If final design deviates appreciably from the design development approved energy profiles, whether due to mechanical or lighting systems, the architect/engineer shall submit a revised energy study providing all necessary calculations to document the deviations.
- B. Minimum energy efficiencies for chillers, boilers, motors, direct expansion equipment, etc. shall be shown on plans or in specifications and those specified efficiencies shall be consistent in the energy study.
- C. The submittal of any design phase of a project to MCPS that fail to include all energy conservation requirements stated above is considered incomplete.

**END OF SECTION**

Original Date \_\_\_\_\_

Revised Date \_\_\_\_\_

MONTGOMERY COUNTY PUBLIC SCHOOLS

Energy Conservation Analysis - Summary

Project Identification: \_\_\_\_\_

School Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Project type: New \_\_\_\_\_ Mod. \_\_\_\_\_ Add. \_\_\_\_\_

Architect \_\_\_\_\_ Tel. # \_\_\_\_\_ Contact \_\_\_\_\_

Mechanical \_\_\_\_\_ Tel. # \_\_\_\_\_ Contact \_\_\_\_\_

Electrical Engineer \_\_\_\_\_ Tel. # \_\_\_\_\_ Contact \_\_\_\_\_

Facility area (sq. ft.) \_\_\_\_\_ Affected area (sq. ft.) \_\_\_\_\_

Cooling area (sq. ft.) \_\_\_\_\_ Cooling load (MBTU) \_\_\_\_\_

Heating area (sq. ft.) \_\_\_\_\_ Heating load (MBTU) \_\_\_\_\_

Educational facility energy use (MBTU/SF/Yr):

Cooling \_\_\_\_\_ Heating \_\_\_\_\_ Lighting \_\_\_\_\_

Total energy use \_\_\_\_\_ Energy budget \_\_\_\_\_

Chiller(s) capacity tons \_\_\_\_\_ IPLV \_\_\_\_\_ Description \_\_\_\_\_

Unitary A/C systems tons \_\_\_\_\_ SEER/EER \_\_\_\_\_ Description \_\_\_\_\_

Boilers capacity MBTU \_\_\_\_\_ AFUE \_\_\_\_\_ Description

\_\_\_\_\_

Fuel type \_\_\_\_\_

H.V.A.C. system detail descriptions (Water-source HP, FCU, etc.) \_\_\_\_\_

Energy efficient features (insulation, lighting, renewable's, etc.) \_\_\_\_\_

Special features (ground-source units, pulse boilers, etc.) \_\_\_\_\_

THIS IS A DESIGN GUIDE NOT A SPECIFICATION

Original Date \_\_\_\_\_

Revised Date \_\_\_\_\_

Project Identification: \_\_\_\_\_

School Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I hereby certify that to the best of my knowledge the project identified above meet or exceed the Building Energy Budget mandated by Montgomery County Public Schools. Furthermore, I certify that the building energy use computation complies with the Montgomery County Public Schools' Energy Conservation Guidelines and Requirements.

Building Energy Use Budget: \_\_\_\_\_ KBtu  
per square feet of building gross interior area per year

Calculated Building Energy Use: \_\_\_\_\_ KBtu  
per square feet of building gross interior area per year

Acknowledged:

Signature: \_\_\_\_\_ Dated: \_\_\_\_\_

County Authority

Signature: \_\_\_\_\_ Dated: \_\_\_\_\_

Registered Professional Engineer

Seal

THIS IS A DESIGN GUIDE NOT A SPECIFICATION