Medical Office Building

Owner's Project Requirements – 2025 ASHRAE Design Competition

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1. Introduction

The city of Manchester, England is building a new medical office building in the heart of the city. The medical office building will consist of a three-story structure. The goal of the project is to provide local access to doctors and out-patient treatment locations.

2. The Project

As part of the project, new HVAC systems are to be designed for this medical office building. The building consists of clinical administrative support offices, exam rooms, waiting rooms, nurses' stations, clinical laboratory, non-compounding pharmacy, dental, primary care, and women's health services, along with numerous support spaces such as restrooms, utility rooms (mechanical, water, electrical, telecom, etc.) and storage rooms. Please refer to the attached drawings and additional requirements in the OPR.

3. Owner's Requirements

The design team shall make every effort to provide a safe and sustainable design, taking into account: energy efficiency, occupant health and safety, occupant comfort, functionality, future flexibility as well as maintainability and a 50-year service life.

Space Temperature and Space humidity requirements are defined below, if a space is not listed a general assumption of the space conditions should be made by the design team:

Area Name	Associated use/ space	Temperature and Relative Humidity Requirements:
Behavioral Health	Office space, professional therapist/patient meetings	Summer: 75 F (24 C) DB Winter: 72 F (22 C) DB RH: 30-50%
Circulation	Circulation	
Clinical Admin Support	reception, waiting areas, back areas break rooms, etc.	
Clinical Laboratory	labs, blood draws, centrifuge, refrigerators, supplies	
Dental	Dental office	
Group Rooms	conference and meeting rooms, group patient care	
Heatlth Education	offices, nutritionist, small classroom	
Pharmacy	Pharmacy	
Primary Care	Doctors' offices	
Women's Services	Exam Rooms	
Mechanical/Electrical Rooms		55 F DB (13 C) to 85 F DB (30 C) No RH requirement

Expected Hours of Operations

1. Estimated hours of operation are:
    a. 7am- 7pm Monday through Friday, 7am-12pm Saturday, Closed Sunday.

The design team shall select systems based on the lowest life cycle cost as well as the below goals of the Owner.

1. Design the system to meet ASHRAE standards as listed in the Codes and Standards section.
2. The Owner has a desire to follow the ASHRAE Advanced Energy Design Guide for Small to Medium Office Buildings.

facility

3. Strive to achieve reduced energy consumption and carbon footprint for a high-performance ~~library space~~ that approaches a Net Zero Energy Building and/or Carbon Neutral Building. Carbon Neutral Building needs to be defined by the design team if it is used in the design.
4. Provide excellent indoor environmental quality that provides a comfortable and safe environment for all occupants.
5. Incorporate design attributes related to improved HVAC system performance, space utilization, acoustical qualities, interior style, and durability of finishes.
6. Meet the operation and maintenance needs for an easily serviceable, maintainable, and secure facility that has low utility and maintenance costs.
7. Design that meets the Owner's project budget.
8. Maintain thermal comfort in each space per ASHRAE Standard 55.
9. Provide ventilation to each space per ASHRAE Standard 62.1.
10. Provide acoustical controls per ASHRAE Handbooks (i.e. the Chapters on Noise and Vibration Control in HVAC Application, and Sound and Vibration in Fundamentals).

overall

11. Operate the building at positive pressure to prevent unwanted infiltration.
12. Propose the optimum orientation to minimize energy consumption. Currently plan North is shown on the drawings.

4. Budget Considerations and Limitations

The approach to allocating resources for the HVAC systems is to examine life cycle costs, including capital investments, operating costs, maintenance costs, and employee productivity. The key values are

1. Assume the owner's mechanical budget of $10,000,000 US, equal to £7,877,800 or €9,233,400.
2. Life of the HVAC system: 30 years minimum
3. General inflation rate and rate of return as defined in the Utility and Service Life Overview.
4. Utility escalation rate as defined in the Utility and Service Life Overview.

5. Utility and Service Life Overview

General

The purpose of this document is to setup the utility rate structures and elements of the energy economy used in the system selection competition for life cycle costing. It should be noted that the stated situation and numbers may not reflect the reality of the actual energy situation or rates in this region. Regardless, teams should use the values below for the 2025 Design Competition.

Utilities

The average electric business rate in Manchester, England:

- Day Rate Period 07:00 – 11:00 – 0.35 USD/kWh or £0.28/kWh or €0.32/kWh
- Night Rate Period 11:00 – 07:00 – 0.23 USD/kWh or £0.18/kWh or €0.21/kWh

The average natural gas Business Rate is 3.42 USD/m^3 or £2.69/m^3 or €3.15/m^3.

Purchase guarantee renewables:

England has the Renewable Energy Guarantees of Origin to provide transparency to consumers about the proportion of electricity that suppliers source from renewable electricity. This scheme provides certificates called REGOs which demonstrate electricity has been generated from renewable sources.

England has different implementation strategies for renewable energy, the electricity sector's primary source of electricity for England comes from fossil fuels, wind, solar, nuclear, and hydropower.

Utility rate structures shall be expected to rise at the following rates of escalation:

- Electrical costs are estimated to rise at the annual rate 3.5%
- Natural Gas costs are estimated to rise at the annual rate of 7%
- Water and Sewer costs are estimated to rise at the annual rate of 3%

Building Service Life

The building is considered a "Long Life" service building and therefore is defined by ASHRAE Standard 189.1 (latest addition) to have an expected minimum service life of 50 years. All building decisions related to the building composition, building structural elements, building systems, and building operation shall include a 50-year life cycle study as the building owner expects a sustainable approach to all building design, construction, and operational elements. Student teams shall include this basis with all building analysis. To complete the life cycle study, the building owner expects the following elements to be included with any analysis.

- General Inflation rate for future cost items (replacement items, maintenance and anticipated future costs) will be 3%
- Owner's Rate of Return for monetary decisions (this is to be used for bringing future costs back to present net worth dollars) will be 4%.

The Life Cycle Analysis shall illustrate a 50-year study and bring all costs back to a total present value sum for each alternative, so the building owner understands in present dollars which alternatives represent the best life cycle value.

6. Building Assumptions

It is assumed that the new building envelope construction and other building systems (e.g. lighting and plumbing) meet ASHRAE 90.1 requirements, while incorporating the owner's project requirements.

1. Compliment surrounding architecture.
2. Superior acoustic criteria in all spaces with minimal sound transmission from the adjacent spaces and low noise production from the HVAC systems.
3. Assume the building is standalone, and therefore the HVAC systems are not tied to any central or district energy systems.
4. Assume all the utilities are provided on site (e.g. electricity, natural gas, water and sewer).
5. Envelope and Electrical Assumptions

7. Codes and Standards

~~Codes as determined by the local Authority Having Jurisdiction (AHJ).~~ Design teams should ~~also~~ utilize the following ASHRAE Standards in the project:

1. ASHRAE Standard 15 and 34
2. ASHRAE standard 55
3. ASHRAE Standard 62.1
4. ASHRAE Standard 90.1
5. ASHRAE Standard 170
6. ASHRAE Standard 189.1
7. ASHRAE Standard 241
8. ASHRAE Advanced Energy Design Guide for Achieving Zero Energy in Small to Medium Office Buildings

Use the latest available versions of all ASHRAE Standards and Handbooks.

8. References

https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards