NEW FOUR STORY MEDICAL CENTER

OWNER'S PROJECT REQUIREMENTS

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INTRODUCTION

A local jurisdiction (owner) has decided to build a new 70,000 square feet (6,503 square meter), four-story medical complex located in Budapest, Hungary which is located near Semmelweis University by the Klinikak metro station. The facility features in and outpatient surgeries, office spaces, laboratories and emergency services to serve a population of 1,735,041 people of Budapest which has a mortality rate of 12.8 per 1000, life expectancy of 75.9 years, and an infectious disease classification of "intermediate." The facility is expected to be completed in 2020.

THE PROJECT

The project involves building a new four-story medical, clinical, surgical, and office building in Budapest. The project will be conducted as a design/bid/build project with a design team, a general contractor and an independent commissioning authority. The new facility is connected to an existing building through the south wall. (The shaded portions in the drawings are of the existing building and not being considered in this project.)

The building will feature administrative offices, patient rooms, surgical operating rooms, information technology/computer room areas, break rooms, storage areas, and laboratory areas.

The building is open 24-hours per day, 7 days per week on a limited basis. Typical building operating hours, where patients are seen, are 08:00-18:00 Monday through Friday. There is typically full-time staff, patients and students in the building Monday through Sunday and only administrative and support staff for the office portion. The building shall facilitate functions that accommodate the operations of the administrative and medical staff including some individual private offices, laboratory spaces, operating rooms, and shared spaces consisting of a reception area, storage and copier areas, small meeting and break areas, and larger meeting areas.

In order to achieve the objectives for low maintenance and operating costs, the owner has determined that the building exterior should be designed to minimize and resist long term degradation from nature. Construction materials selected for the project should be based on long term serviceability in the local climate.

The use of potable water for irrigation purposes beyond what is required for initial establishment of site vegetation is strictly prohibited. Indigenous and adapted plant species shall be selected to minimize watering, fertilization, and pest management requirements. Design and construction of the building should be done to minimize maintenance requirements.

The facility shall utilize daylighting to the maximum extent possible to minimize the installed lighting power density requirements.

OWNERS DIRECTIVES

Every effort should be made to provide a sustainable design taking into account, energy efficiency, health and safety, occupant comfort, functionality, longevity, flexibility, and serviceability/maintainability. Systems shall be selected based on the lowest possible life cycle cost that includes first cost of materials and long term operating costs, as well as other Owner goals.

- This project should use the latest innovative technologies and concept to meet ASHRAE Standard 189.1.
- Excellent indoor environmental quality that facilitate occupants' use of the space by providing a comfortable and safe environment while avoiding the design attributes related to poor HVAC system performance, poor space utilization, poor acoustical qualities, inconsistent interior style, and low durability of finishes.
- Maximize usable space including reducing the amount of space needed above ceilings in order to provide maximum ceiling heights
- Operation and maintenance needs are for an easily serviceable, maintainable, and secure facility that has low utility and maintenance costs
- Provide a building which has the best life cycle cost for the applicable climate and the Owner's budget
- Operating rooms shall have the design capability of achieving 62°F and 55% Relative Humidity with 20 air changes per hour (ACH) of supply air.

DESIGN REQUIREMENTS

The HVAC systems should be selected based upon the following design criteria:

	Office & Administrative Support Spaces	**Laboratory**	**Clinical**	**Operating Rooms**
Occupancy	08:00-18:00 Monday - Friday	24 hours/ day 7 days / week	07:00-22:00 Monday – Saturday	24 hours/ day 7 Days / week
Interior Conditions				
Summer	73.4°F (23°C) DB/50%RH	73.4°F (23°C) DB/50%RH	73.4°F (23°C) DB/50%RH	62.0°F (17°C) DB/55%RH
Winter	70°F (21°C) DB	70°F (21°C) DB	70°F (21°C) DB	62°F (17°C) DB
Sound	NC 35	NC 30	NC 30	N/A

Information Technology (IT) support spaces shall be maintained at 80.6 (27°C) DB/50%RH 24 hours per day, 365 days per year.

Exterior design conditions should be based on the ASHRAE 2% criteria for the climate of Budapest, Hungary.

Mechanical systems shall function seamlessly to deliver the performance levels needed to maintain space comfort within specifications set forth by ASHRAE Standard 55.

Energy Conservation: The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements prescribed in ASHRAE Standard 189.1. Design Teams may also show compliance to ASHRAE Standard 189.1 by meeting the Mandatory Provisions and the Performance Path requirements.

Cooling and Heating System Selection: Mechanical systems for the facility shall be selected based on a Life Cycle Cost Analysis (LCCA). Evaluation shall include a comparison of two or more system types based on the region, specific building design features and available energy sources. The final design shall include a short summary report discussing assumptions, calculations, results and interpretation of results for each system analyzed.

The design team may utilize any commonly accepted energy modeling software meeting the requirements of ASHRAE Standard 90.1 Appendix G to provide whole building energy consumptions and comparisons. Provide reasonably detailed narratives and cost estimates for each system studied as part of the design analysis to include first costs, operations and maintenance costs, and replacement costs over a 50 year study period. Document all assumptions and escalation costs requires for a reasonable LCCA.

Indoor Air Quality: Indoor Air Quality: Follow the requirements of ASHRAE Standard 170. Use the default population guidelines in Standard 62.1 for determining population and default ventilation rates. Operating rooms require 20 air changes per hour of supply air and 4 air changes per hour of outdoor air. Discuss any measures for air treatment required to produce acceptable indoor air quality. Use Standard 62.1 for spaces not covered by Standard 170.

Space Specific Loading: HVAC zones shall be selected based on the occupancy for each space. Where possible, spaces of similar occupancy shall be considered a single zone. Spaces with varying occupant loads (i.e. office spaces, surgical suites) shall be provided with individual zone equipment. Personnel loads for each space are based on the actual expected occupancy provided by the installation. Where occupancy loads are not provided, assume people densities are estimated per ASHRAE Standard. 62.1. Cooling and heating loads shall be calculated from ASHRAE Fundamentals. Develop and include in the design assumed values for miscellaneous plug loads to cover typical equipment not listed. If a space is shown on the drawings but not listed here, make assumptions and document them.

Space Type	Misc. Loads
Break Areas	Refrigerator Microwave/Coffee Vending Machine
I.T./Computer Rooms	4 typical racks of blade servers 2 typical racks of networking equipment
Conference	CPU/Monitor LCD TV 2 Projectors
Operating Rooms	Lights, equipment
Mech/Elec	Loads as per required equipment
Laboratory	Lights, equipment
Offices Executive	CPU/Monitor LCD TV
Office, Open Areas	CPU/Monitor per workstation/person One High volume copy machine
Clinics	CPU/Monitor: 1 workstation for every 10 people 2 LCD TV Copy machine

Environmental Requirements for Computer Server and Data Rooms: Maintain environmental conditions at the Class 1 and 2 Recommended Operating Environment. Maintain rooms under positive pressure relative to surrounding spaces. Design computer room air conditioning units specifically for telecommunications room applications. A complete air handling system shall provide ventilation, air filtration, cooling and dehumidification, humidification, and heating. The system shall be independent of other facility HVAC systems and shall be required year round.

Service hot water systems: Design any solar hot water systems in accordance with ASHRAE Handbook Series (appropriate chapters), ASHRAE Standards 90.1, and 189.1. Size and place equipment so that it is easily accessible and removable for repair or replacement. Utilize solar hot water if life cycle cost effective and provide justification for including or not including the system.

Building Water Reduction: Reduce building potable water use in the building by 30 percent from the Baseline, using the Manufacturing Performance Requirements for Plumbing Fixtures from the Energy Policy Act of 1992.

BUDGET COSIDERATIONS AND LIMITATIONS

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

- Assume the Owner's budget is 200 USD/ft^2 (2,153 USD/m^2) for the renovation.
- Life of the building = 50 years
- Return on investment = 7%
- Inflation rate = 3%
- Utility escalation rate should be based on a 10 year average increase for utility provider (water, gas, etc.) in the area.

BUILDING ASSUMPTIONS

Every effort should be made to provide a sustainable design taking into account energy efficiency, health and safety, occupant comfort, functionality, longevity, flexibility, and serviceability/maintainability. Systems shall be selected based on the lowest possible life cycle cost that includes first cost of materials and long term operating costs, as well as low environmental impact. Assume building envelope construction as follows and all insulating values meet ASHRAE Standard 189.1 minimum values listed in the standard. Owner's primary goals for the building:

- 24 Hour operating rooms and laboratory operation.
- 7 day a week clinical spaces with operating from 7 AM until 10 PM.
- 5 day week office spaces with operating from 8 AM until 6 PM.
- Synergy with surrounding architecture including red tile style roof.
- Exterior walls to be masonry mass wall construction.
- All floors to be concrete poured as slab on grade.
- Double glazed, fixed windows, one-half inch air space, low emissivity coating on third surface, bronze tint.
- Superior acoustic criteria in office spaces, restaurant and sleeping rooms with minimal sound transmission from the adjacent spaces and low noise produced from HVAC systems.
- Assume utilities are available on site including natural gas (5 psig from main), electrical power (480V/3) with expected kW demand required to connect, city water (20 psig), and city sewer.

CODES AND STANDARDS

Codes as determined by the local Authority Having Jurisdiction (AHJ)

- ASHRAE Standard 15
- ASHRAE Standard 34
- ASHRAE Standard 55
- ASHRAE Standard 62.1
- ASHRAE Standard 90.1
- ASHRAE Standard 129
- ASHRAE Standard 154
- ASHRAE Standard 170
- ASHRAE Standard 189.1
- ASHRAE Handbooks

Use the latest available versions of all ASHRAE Standards