

Arch 464  
ECS  
Spring 98

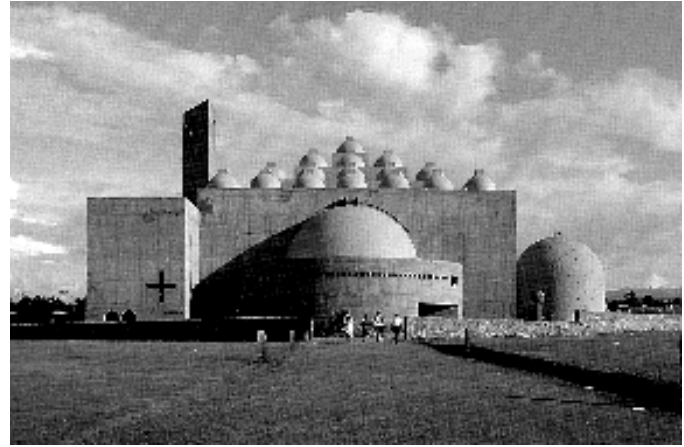
Name \_\_\_\_\_

Quiz #1

## "Passive Building Retrofit"

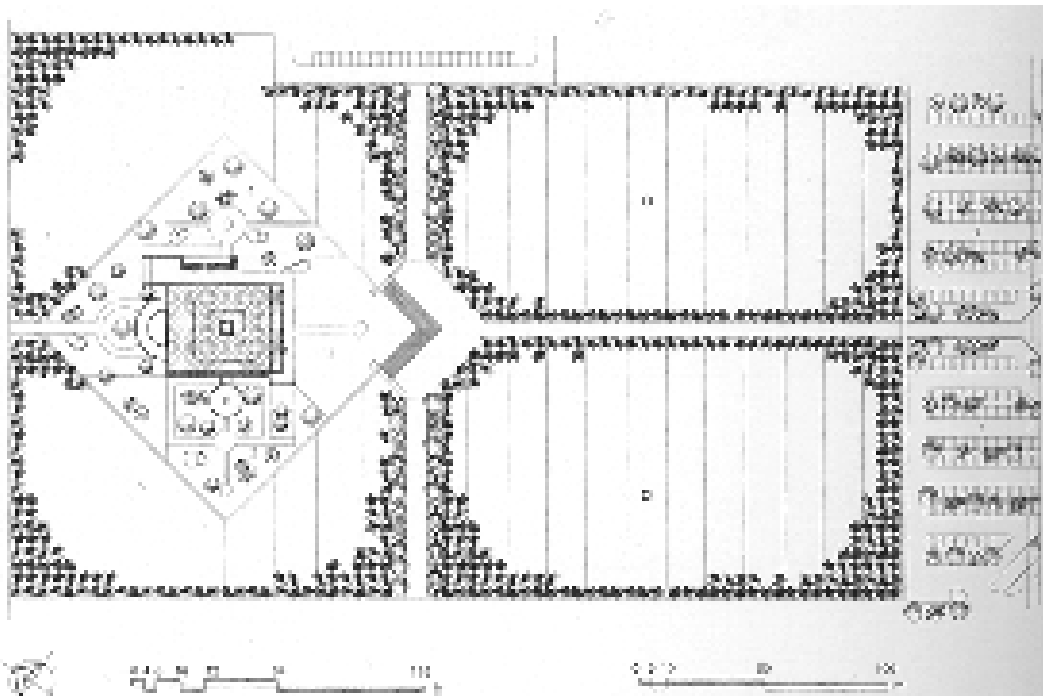
For this problem you are the HVAC consultant for the retrofit and integration of a mechanical system into the passively heated and cooled Metropolitan Cathedral in Managua, Nicaragua, designed by Ricardo Legorreta Architects.

Currently, the cathedral, essentially one large space, is topped by "sixty-three domes [that] . . . provide light and ventilation." Additional light and ventilation are provided by large sets of opposing doors with wooden grills above located on the east and west facades. The construction is exposed reinforced concrete with a clay tile floor on a concrete slab.



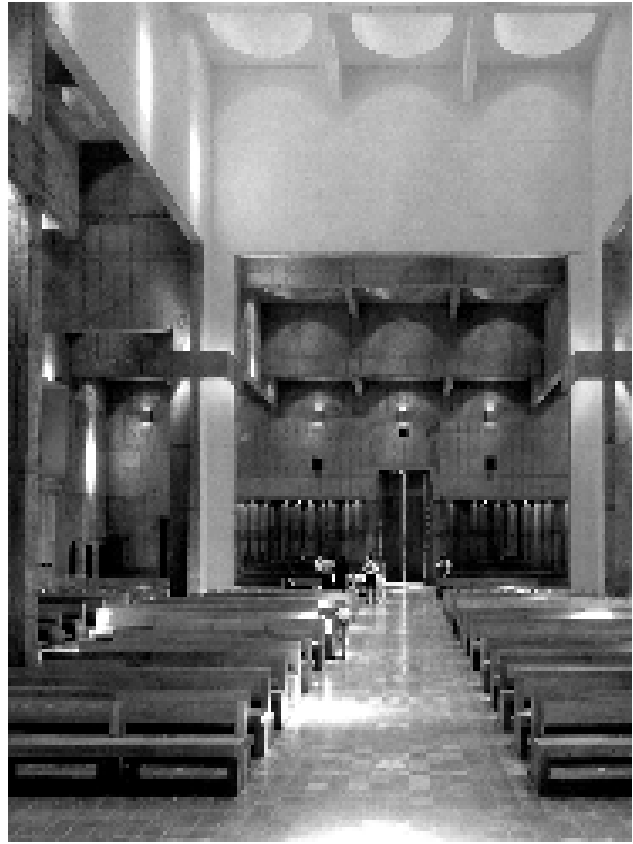
*North facade of the cathedral.*

Your client, the priest, wants an appropriate HVAC system which can be integrated into the building without compromising Legorreta's magnificent design.



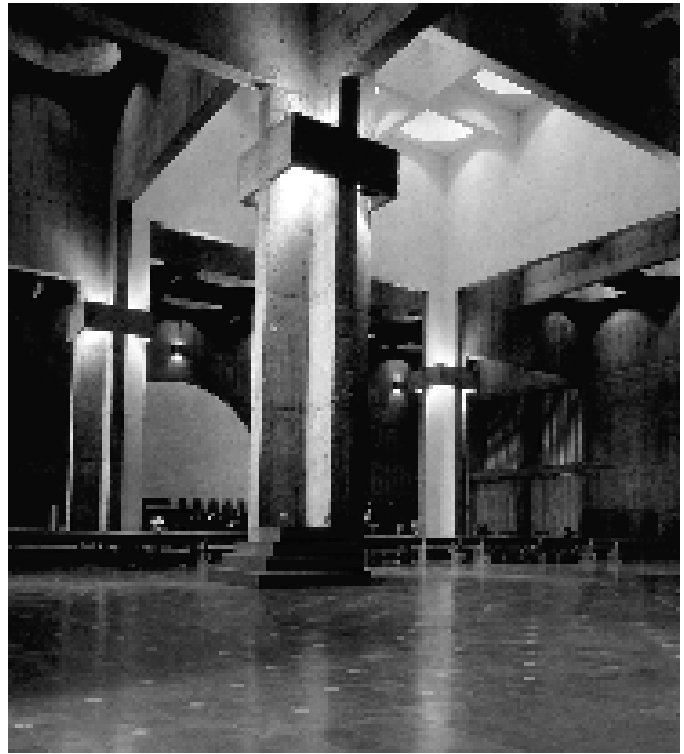
*Site and roof plan of the cathedral.*

1. Discuss one water-based system and one air-based system that you think have the potential for integration into the building. Explain why each is appropriate for the thermal needs of the building and the configuration of the space. Indicate which system you would choose for the building and explain why it's better.



*Interior space looking south.*

2. Name the major components of the HVAC system you chose and explain where you would place each component in order to attain the best integration with the building, while retaining its architectural character. You may use sketches to illustrate your ideas.



*Interior space looking northeast. Note doors with grills above on east wall.*