

Arch 464  
ECS  
Spring 2002

Name \_\_\_\_\_

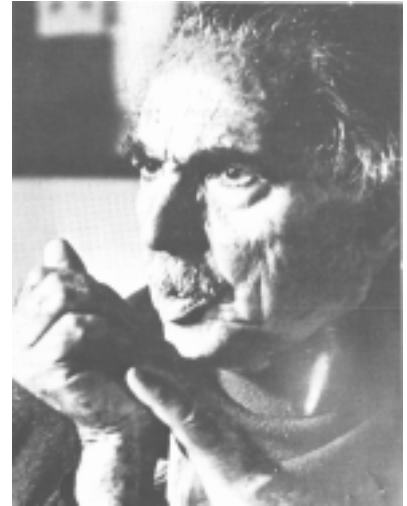
Quiz #4

## "Alive with Natural Energy"

For this problem you are the acoustics consultant for the remodel of the Greiss Resthouse (1980), Abusir, Egypt, designed by Hassan Fahty. The Egyptian Architectural Society (EAS) has purchased the house to commemorate Fathy's career. The 1984 UIA Gold Medalist, Hassan Fahty, advocated the use of vernacular architectural principals in modern architecture in order to provide human comfort, attain environmental quality, and save energy. His landmark book, *Natural Energy and Vernacular Architecture* (1986) illustrated these principles through vernacular work and contemporary projects. The Greiss Resthouse is constructed in the traditional manner, from mud bricks formed into walls, vaults, and domes, then covered by plaster to smooth and finish the walls and ceilings. Floors are of stone pavers, often covered with wool plush "oriental" carpets ( $\alpha = 0.80$ ). Egyptian interiors typically contrast the hard materials of man with the filtered light and soft vegetation of nature. The massive materials of the building are a key to maintaining comfort in a desert climate with large diurnal temperature differences in summer and significant solar gains in winter. Your focus in this project is to help decide on the best use of the main room of the resthouse—the EAS is in a quandry; should it be a library or a lecture hall?

The main room has walls and ceiling of plaster ( $\alpha = 0.04$ ), a floor of stone pavers ( $\alpha = 0.10$ ), and windows of glass ( $\alpha = 0.15$ ). The space is 900 sqft. and 16,200 cuft. It features a 16 foot diameter dome that soars to 22' above the floor. If used as a lecture hall or reading room the occupants ( $\alpha = 0.96$ ) and the book shelves ( $\alpha = 0.70$ ) will be the only true sound absorbers in the space. The wall area is 2200 sq.ft.; the ceiling is 900 sq.ft.; the windows ( $\alpha = 0.15$ ) are 200 sq.ft.; the doors, always open, are 3' x 7', 6' x 7' and 3' x 7'.

Your job is to critique the existing main room as a venue for a library or a lecture hall and to suggest improvements that can be made without altering the architectural and climatic effects of the space.

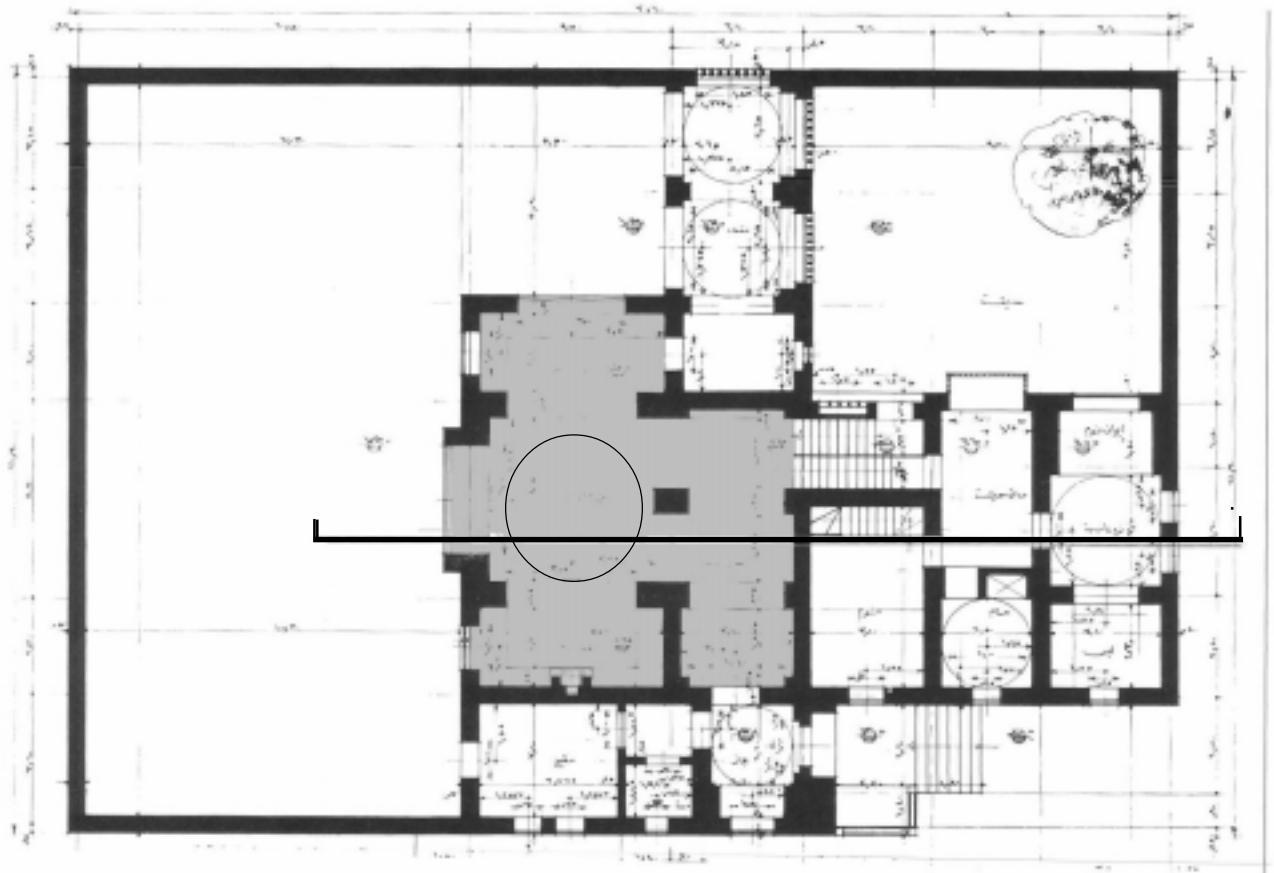
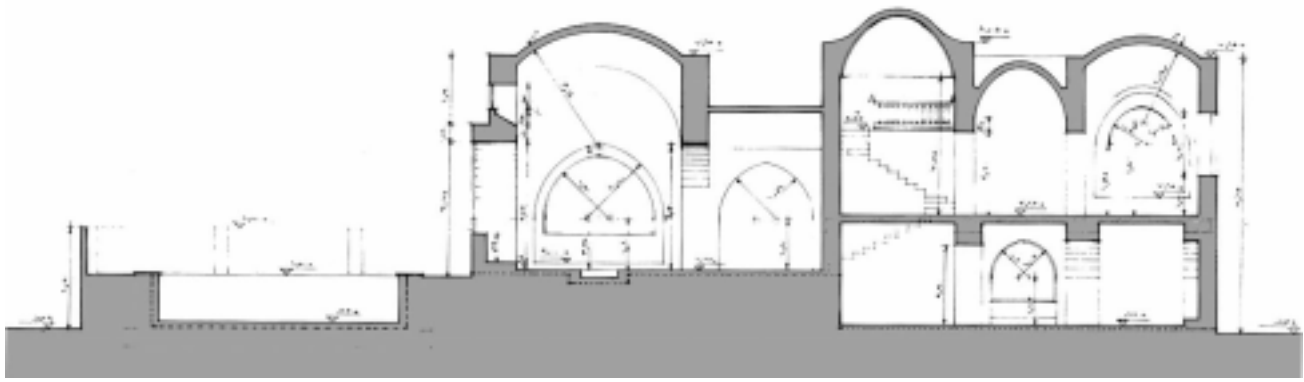


Hassan Fathy



Interior view of a Fathy-designed house near Cairo.

Source—Hassan Fathy, James Steele, 1988



*Floor plan. North is up. Main room is poched in gray in plan. Section cuts through west window, oculus, and dome.*



*Greiss Resthouse from the northeast—main room dome in background.*

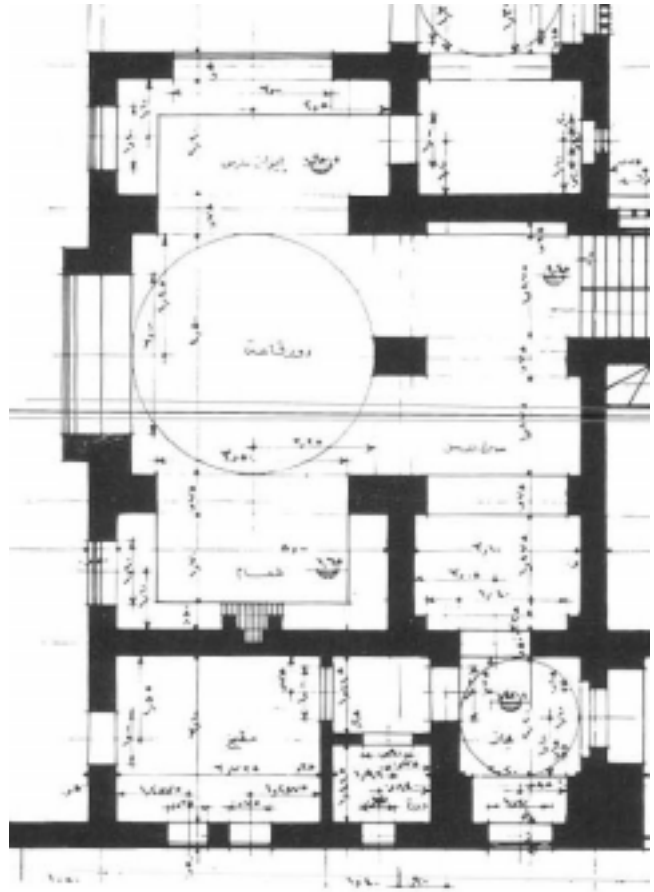
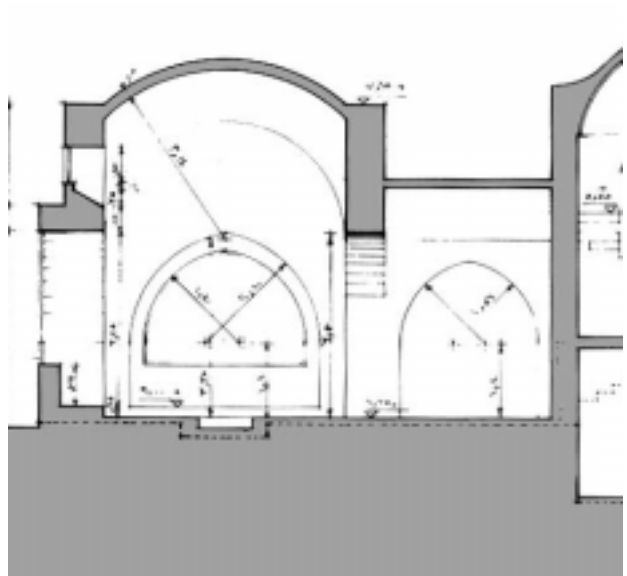


*Greiss Resthouse from the west—windows to the main room.*

## Critique of Existing Space

5 pts

1. **Calculate** the reverberation time for the existing space and **discuss** its strengths and weaknesses as (a) a library or (b) a lecture hall. **Rationalize** your choice use for this room. **Categorize** this use by its acoustic goal—silence or quiet—and explain your characterization and the changes to the design required to meet the goal.



*West-east section of the main room*

## Suggested Improvements

5 pts

2. **Show**, in plan and section (page 4), how you would convert the room to your preferred use. Program for library—one large and one small reading table with wooden chairs, two overstuffed chairs, book shelves. Program for lecture hall—seating for 60 people. **Describe** 3 installations you intend to make in the studio that will improve its acoustics while maintaining the spatial and environmental quality of the space. **Explain** what acoustic problem each installation addresses and how it mitigates the problem.