Case Studies:

"It ain't easy being green!"

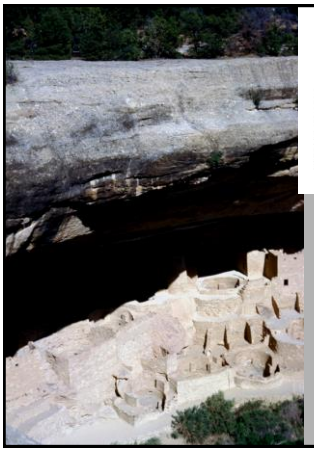
But it's worth it!

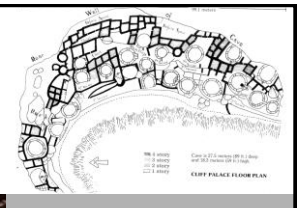
1

And we'll attempt to answer four questions…

	What's the best solar house?
	Is passive heating in the desert reasonable?
	Is sustainability sustainable?
	Can large American buildings be naturally ventilated?

2





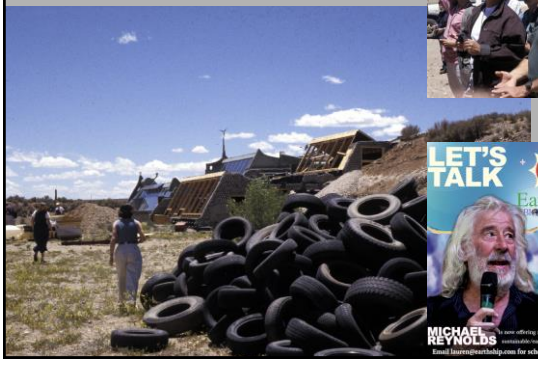
Cliff Palace
Mesa Verde N.P.
SW Vernacular Solar…
Ooooooooooops!

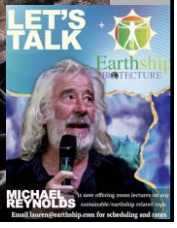
My theory: It was an art and architecture school.

3

What's the best solar house?

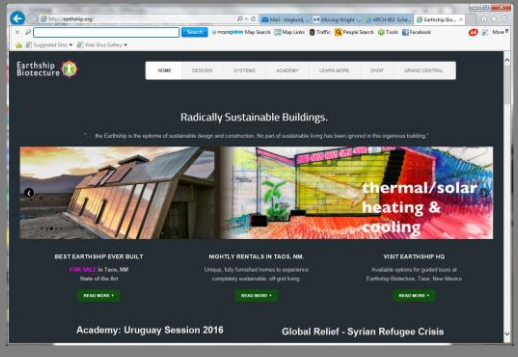
Mike Reynolds + ECS + Old Tires





4

Imagine sustainable solar life…

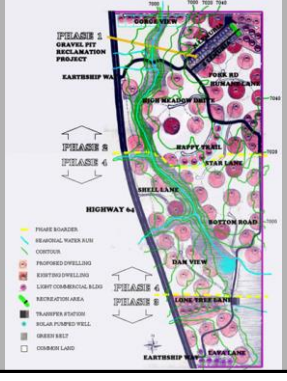


Now <https://www.earthshipglobal.com/>

5

Greater World Earthship Community

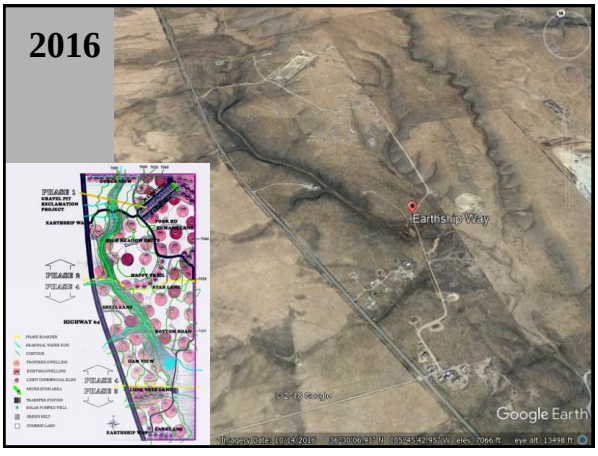
located near Taos, NM, USA



Gravel pit reclamation project in Phase I of the Greater World Earthship Community.

6

2016



7

Greater World Earthship Community—1998

8

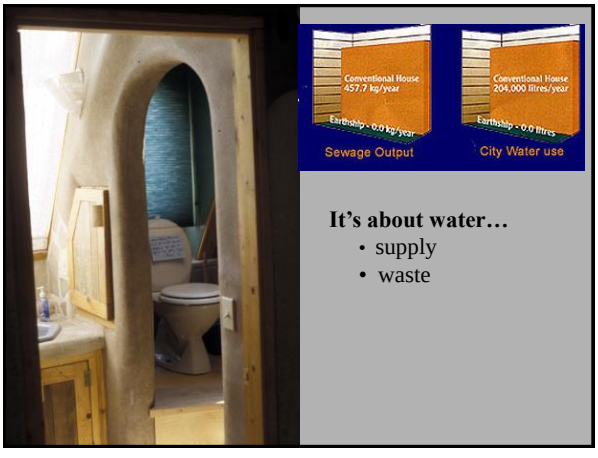
North façades of three earthships.

9

10


BEDROOM
DINING
KITCHEN
BATH
UTILITY
BEDROOM

11


Conventional House
457.7 kg/year
Earthship - 0.0 kg/year
Sewage Output
Conventional House
204,000 litres/year
Earthship - 0.0 litres
City Water use
It's about water…
• supply
• waste

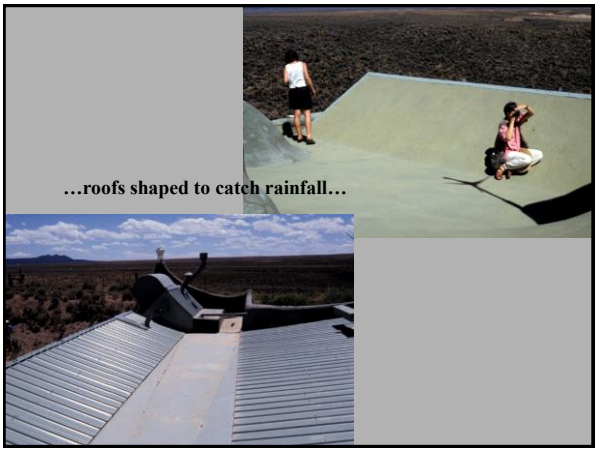
12


Greenhouses treat gray water…

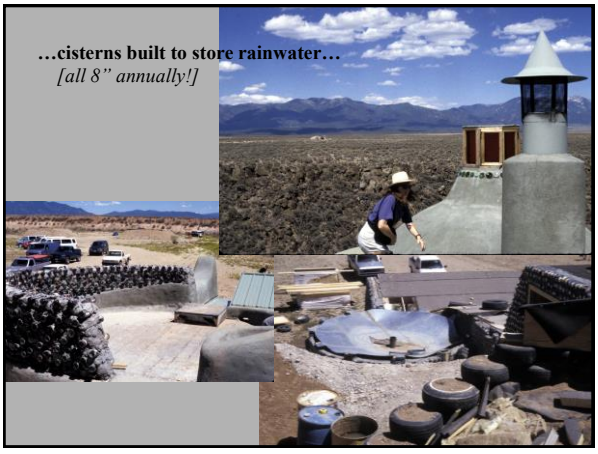
13


Solar Composting toilet treats black water…

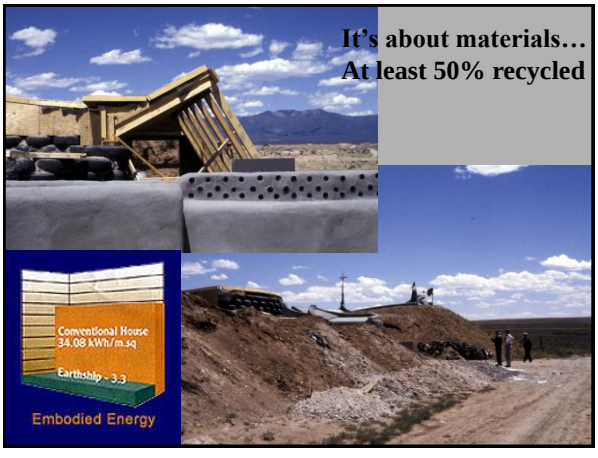
14


…roofs shaped to catch rainfall…

15


…cisterns built to store rainwater…
[all 8" annually!]

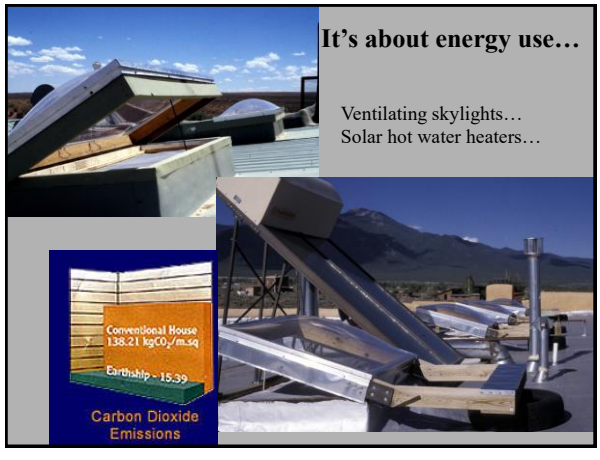
16


It's about materials…
At least 50% recycled
Conventional House
34.08 kWh/m.sq
Earthship - 3.3
Embodied Energy

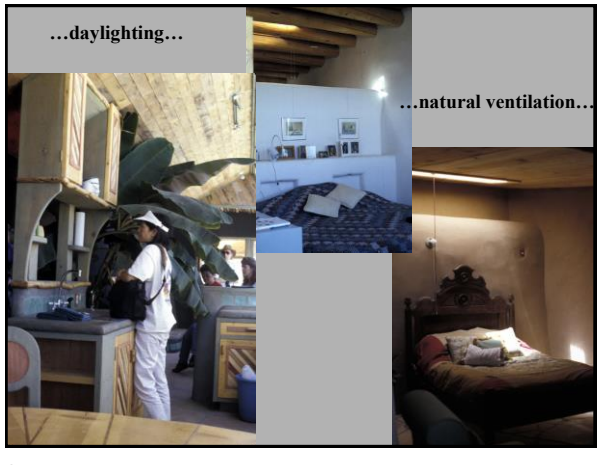
17

18

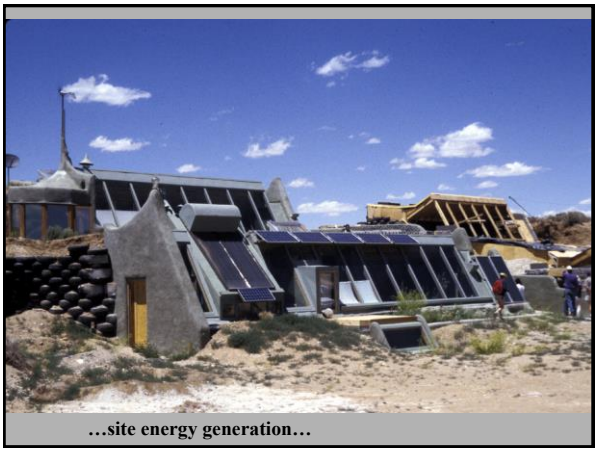
19


It's about energy use…
Ventilating skylights…
Solar hot water heaters…
Conventional House
138.21 kgCO2/m.sq
Earthship ~ 15.39
Carbon Dioxide
Emissions

20


…daylighting…
…natural ventilation…

21



…site energy generation…

22

23

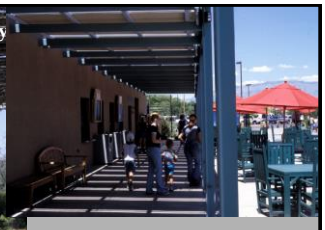
24

Is passive heating in the desert reasonable?

Albuquerque Biological Park by Ed Mazria

25

On the path to the conservatory Vernacular shading…



26

Toldos

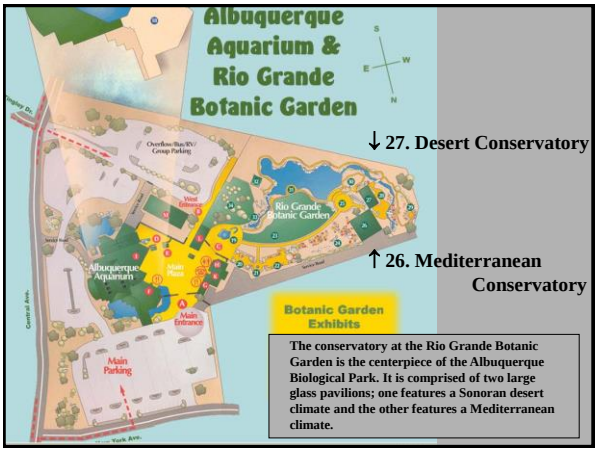
27

Shade and water…

28

Edward Mazria Architects

29



30

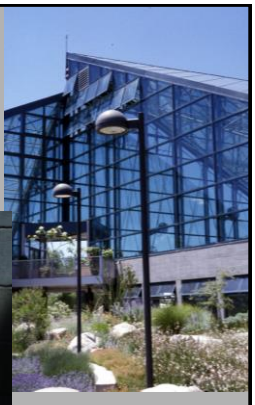
Mediterranean—Sonoran Desert

Computer modeling determined the necessary solar and thermal properties of glazing for each side of the building to provide the proper balance of heat and light to the plants inside. Plans called for a 7,500 square foot building, but due to the efficiency and lower cost for the building's environmental control systems, a 10,000 square foot structure was provided for the same cost.

31

Solar heated and naturally ventilated…

The conservatory was open to the public and monitored for its first two years and the results are impressive. Each pavilion sustained winter temperatures 20 to 30 degrees above outdoor lows and maintains the internal conditions that are required for desert and Mediterranean plant growth with little or no outside energy input.

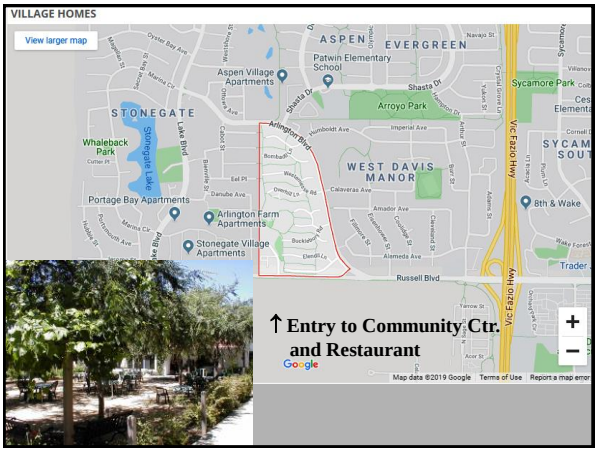


32

Is sustainability sustainable?

Village Homes
Davis, CA
Michael Corbett
1975

33


VILLAGE HOMES
View larger map
ASPEN
EVERGREEN
Patwin Elementary School
Aspen Village Apartments
STONEGATE
Whaleback Park
Stonegate Lake
Portage Bay Apartments
Arlington Farm Apartments
Stonegate Village Apartments
Arroyo Park
Sycamore Park
WEST DAVIS MANOR
8th & Wake
Trader
Russell Blvd
Arlington Blvd
Shasta Dr
Lake Blvd
Vic Fazio Hwy
↑ Entry to Community Ctr. and Restaurant
Google
Map data ©2019 Google
Terms of Use
Report a map error

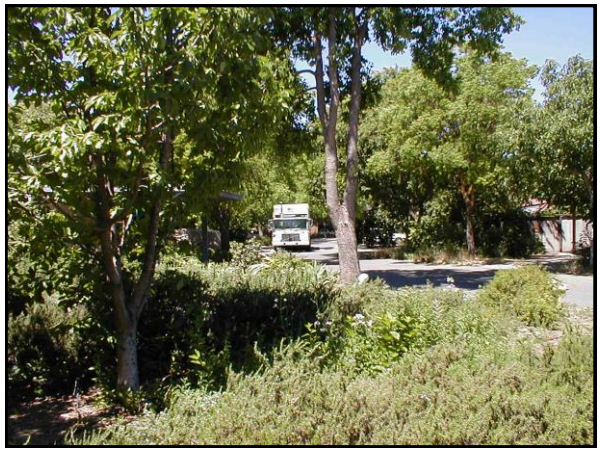
34


…solar homes…

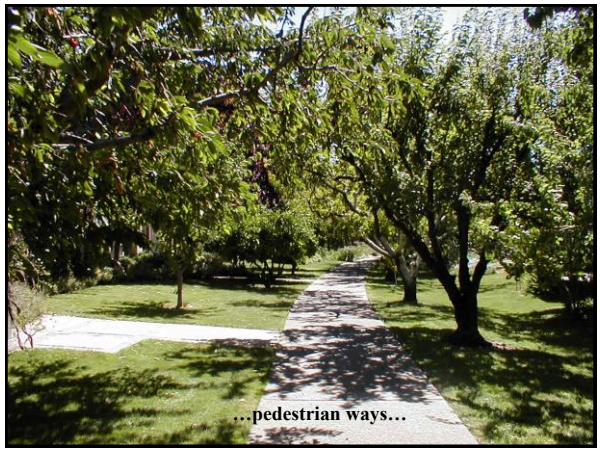
35


…narrow streets…

36



37



38

39

40


…community space…

41


PROJECTS
Home
List of Projects
David L. Lawrence Convention Center
Pittsburgh, Pennsylvania, 2003
Civic/Government, Commercial, Convention Center
Under Construction
141,750 sq meters (1,525,797 sq feet)
The building occupies a 300-meter-long site on the river's southern bank, which extends approximately 150 meters south where it abuts the dense urban grid of the city. The main entrance is located within the Tenth Street Bypass, a sheltered passage that includes vehicular drop off and a visual and pedestrian
Rafael Viñoly
Rafael Viñoly Architects
Projects / Works
news
Images
Aerial
General View
Can large American buildings be naturally ventilated?
Pittsburgh Convention Center
Rafael Viñoly Architects

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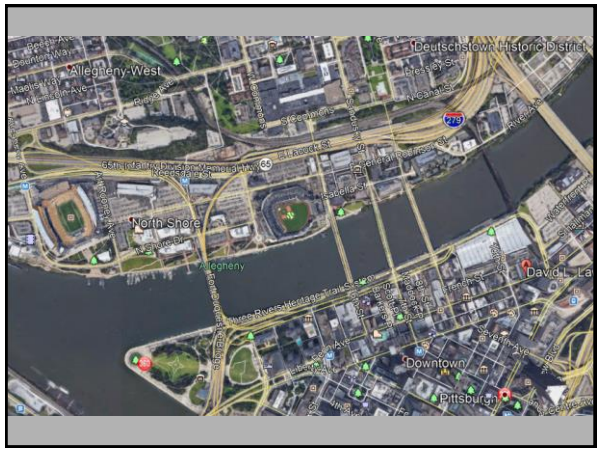
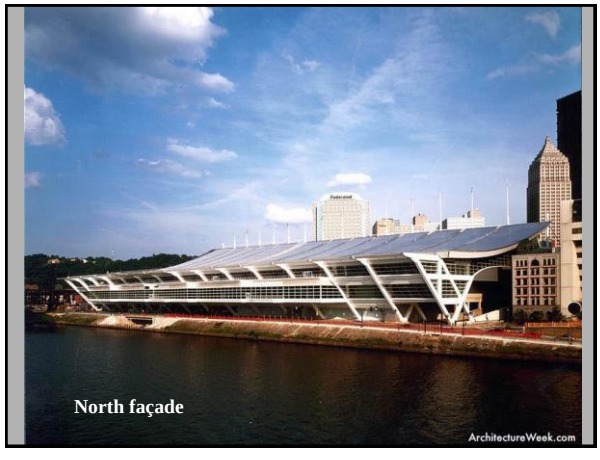
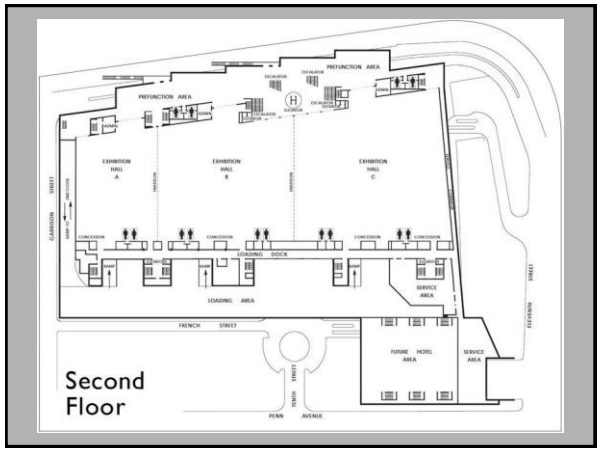

Deutschstown Historic District
Allegheny-West
North Shore
Allegheny
Downtown
Pittsburgh

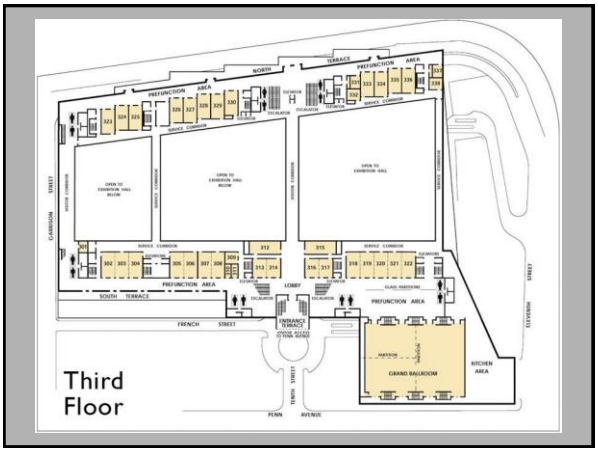
43


North façade
ArchitectureWeek.com

44


Second
Floor

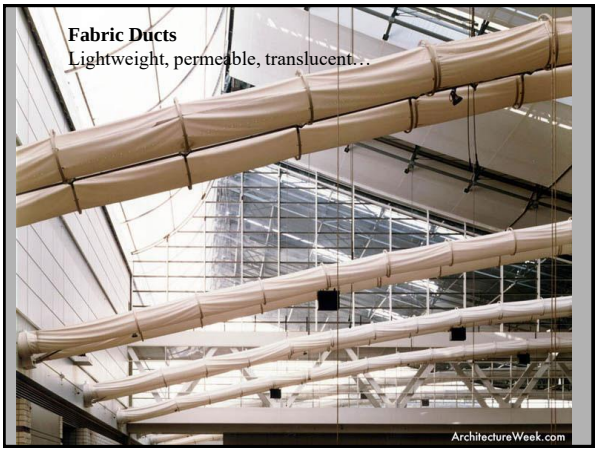
45


Third
Floor

46


…conceived of as a light and airy open space…

47


Fabric Ducts
Lightweight, permeable, translucent…
ArchitectureWeek.com

48

Natural Ventilation

The building has a weather station near the roof to measure air temperature, humidity, and wind speed and direction. When conditions are right, the 20 air-handling units serving the exhibit halls shut off, the vents open, and outside air flows into the exhibit area.

The convention center also uses natural ventilation to flush air from the exhibit halls at night during warmer periods, which further reduces the time during which the conventional cooling system is needed.

Natural ventilation saves 3.8 million kWh of electricity a year.

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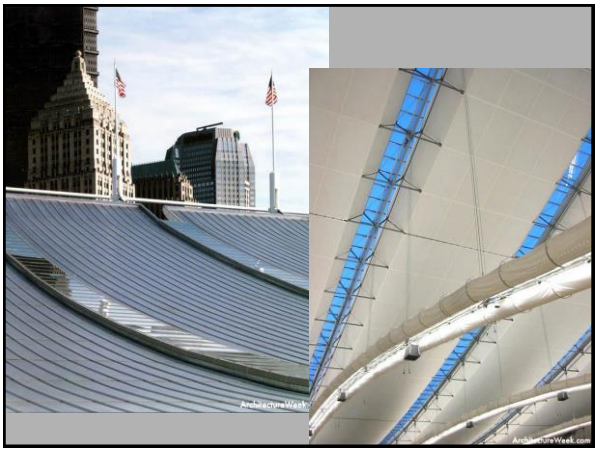

50

Natural Lighting

Clerestory windows where the walls and roof meet and long, 6-foot- (1.8-meter) wide ribbon skylights covering 10 percent of the roof area provide daylight for 75 percent of the convention center's exhibition space.

This glazing is projected to save 9.5 million kilowatt hours of electricity per year.

Sum of two strategies:

3.8 + 9.5 = 13.3 million kilowatt hours @15 cents/kwh =

$2,000,000 per year

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Late afternoon summer sun in the parking garage…
ArchitectureWeek.com

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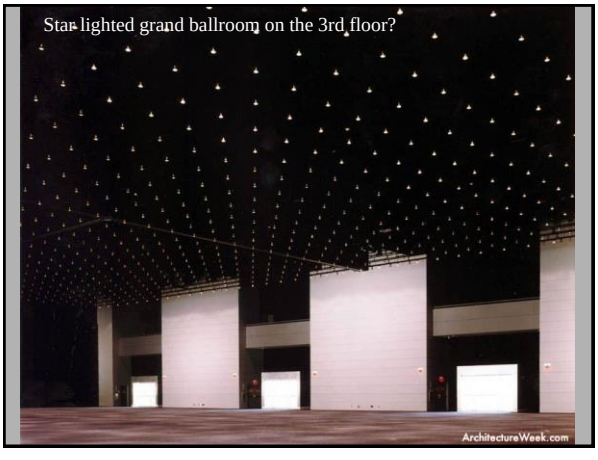
Star lighted grand ballroom on the 3rd floor?
ArchitectureWeek.com

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