

Arch 463
ECS
Fall 2017

Name _____

Quiz #2

"Corbu Goes to Albuquerque"

For this problem you are the passive cooling consultant for a client who wants to build a near replica of Corbu's Villa Savoye for her summer home in the New Mexico high desert near Albuquerque. Your client, Madame Clouseaux, thinks that the building has great potential for maximum passive cooling if some alterations in the plans are made before construction begins. The site is essentially flat and is without trees. Madame wants to live with her adult son and entertain in the house. Since the site is remote, no electric and gas utilities, nor water and sewer service is available. She wants the building to employ passive techniques for heating and cooling. Because the building was designed for a different era and a different climate, your role is to analyze it for suitability for today's technologies and its new climate and to recommend appropriate changes.

Original Building Design. The original building is lightweight construction, featuring uninsulated stud walls with external stucco and internal plaster finishes. The roof and floor decks are uninsulated, post-tensioned concrete slabs. It used the technology of the day—single pane windows, no insulation, and no caulking or weather-stripping.

The building is raised on pilotis. The windows are all operable. Sill height of the three foot high strip windows is three feet and the flat ceiling is at nine feet.

Climate Context. The designed-for site in France is in a temperate climate typified by cold, cloudy winters and hot, humid summers. The new climate in New Mexico is a temperate climate typified by cold, sunny winters and hot, arid summers. Winters are dry and sunny with short periods of snow cover. Summer afternoon highs are usually in the nineties with low humidity and continual breezes.



Source: Baker, Geoffrey; *Le Corbusier: An Analysis of Form*; 1984.

READ EVERYTHING FIRST!

TEMPERATURE RANGE
California Energy Code

LOCATION: Albuquerque Intl Arpt Isis, NM, USA
Latitude/Longitude: 35.04° North, 106.62° West, Time Zone from Greenwich -7
Data Source: TMY3 723650 WMO Station Number, Elevation 5311 ft

LEGEND

- RECORDED HIGH - ○
- DESIGN HIGH -
- AVERAGE HIGH -
- MEAN -
- AVERAGE LOW -
- DESIGN LOW -
- RECORDED LOW - ○
- COMFORT ZONE -

DESIGN HIGH: Residential

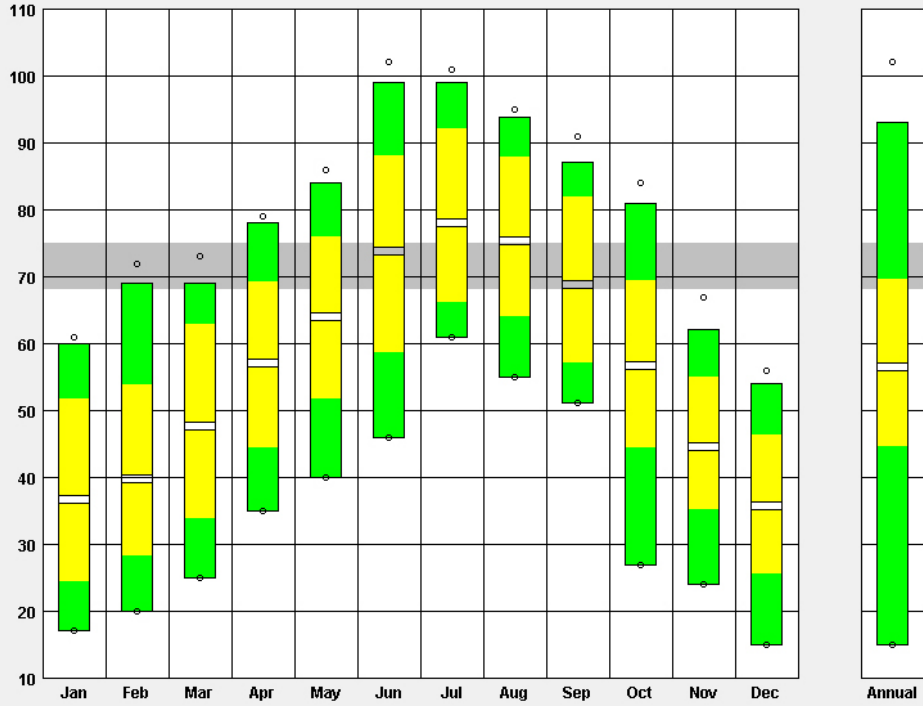
- 1% of Hours Above
- .5% of Hours Above
- 0% of Hours Above

DESIGN LOW: Residential

- 1% of Hours Below
- .5% of Hours Below
- 0% of Hours Below

TEMPERATURE RANGE:

- 10 to 110 °F
- Fit to Data



LEGEND

TEMPERATURE (Deg. F)

- < 32
- 32 - 68
- 68 - 75
- 75 - 100
- > 100

RELATIVE HUMIDITY (%)

- <30
- 30-70
- >70

All Hours Selected Hours

1 a.m. through midnight

All Months Selected Months

JUN through SEP

One Month JAN Next Month

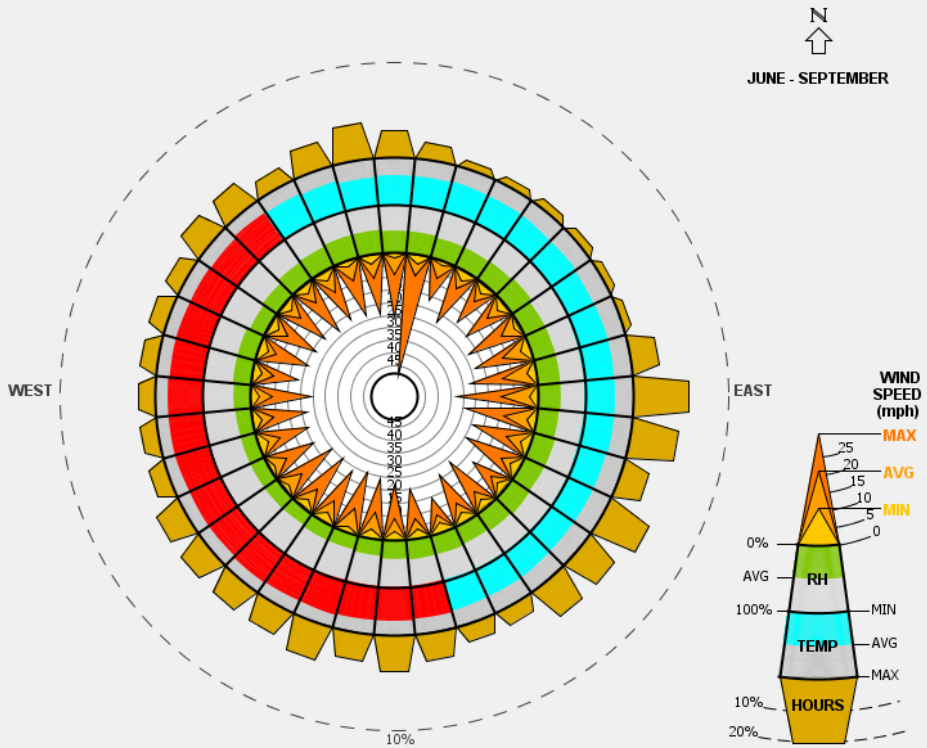
One Day 1 Next Day

Animate

Monthly Start

Daily Pause

Hourly Stop



4 points

Analysis

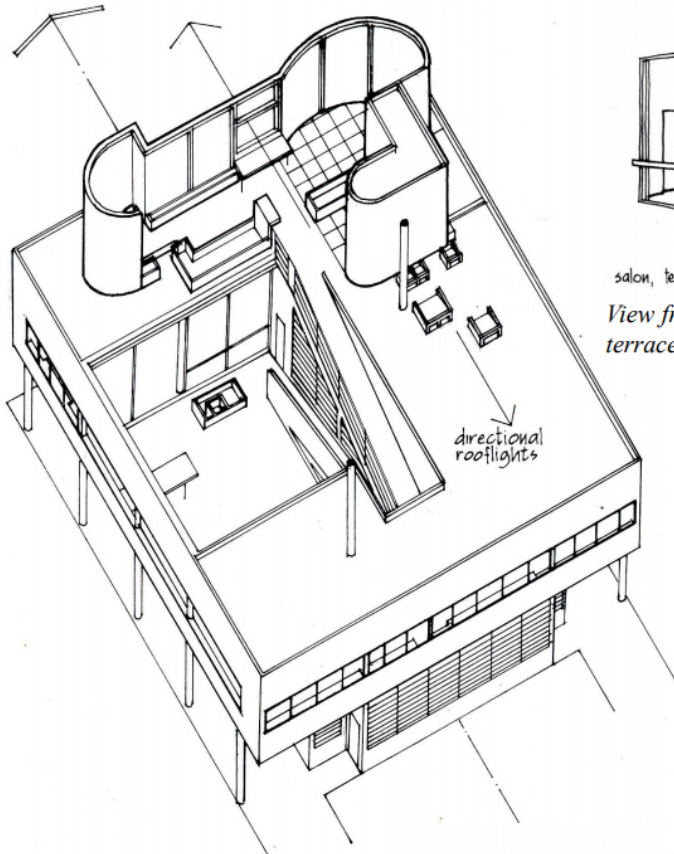
1. Based on the temperature range chart and the summer wind wheel, discuss four passive cooling strategies that would be effective during the summer months in Albuquerque.

1

2

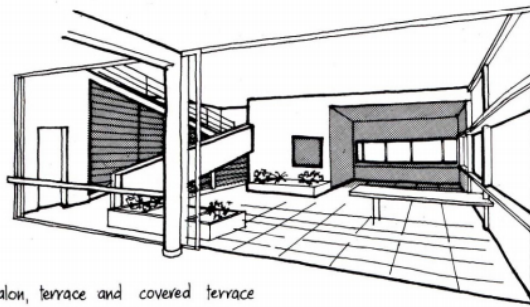
3

4



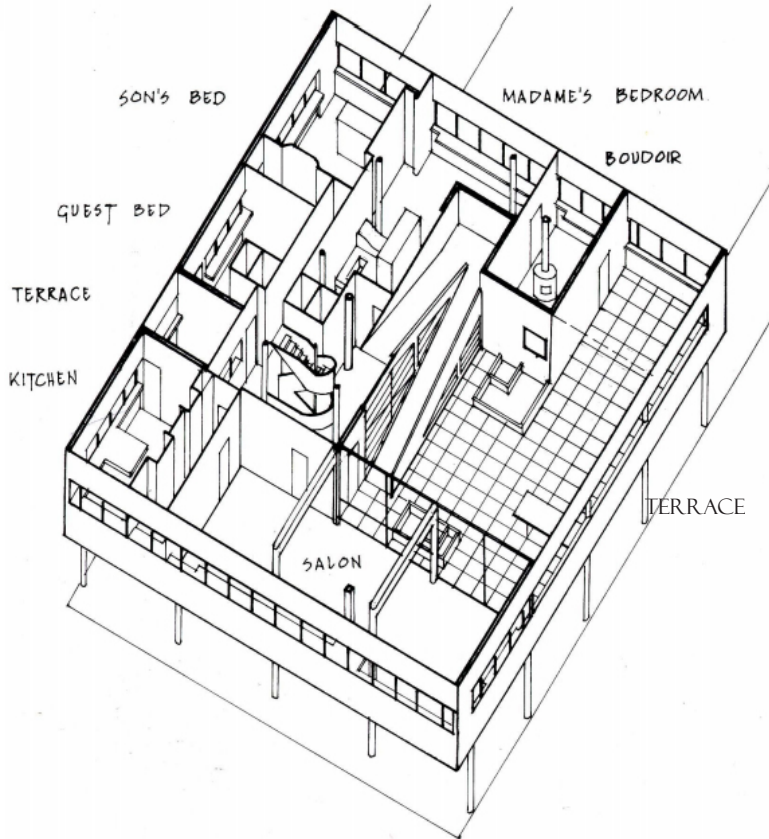
directional rooflights

Building paraline. View from the Northeast..



salon, terrace and covered terrace

View from salon through open terrace to covered terrace..



SON'S BED

MADAME'S BEDROOM

BOUDOIR

GUEST BED

TERRACE

KITCHEN

SALON

TERRACE

Roofless paraline. View from the Southeast.

3 points

Building Critique

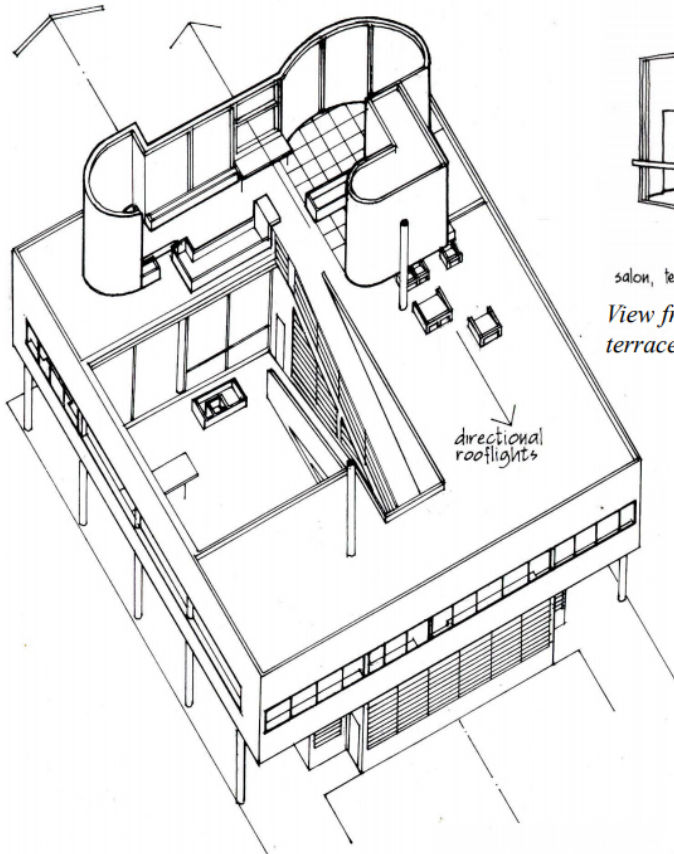
2. All the living spaces are on the upper floor adjacent to a courtyard (terrace) and above maid's quarters, a garage, and storage below. The ground floor has a smaller footprint than the upper floor. There is also a roof deck above the southwest corner accessed by a ramp.

Discuss three ways that the original design fails to adequately address passive cooling needs.

1

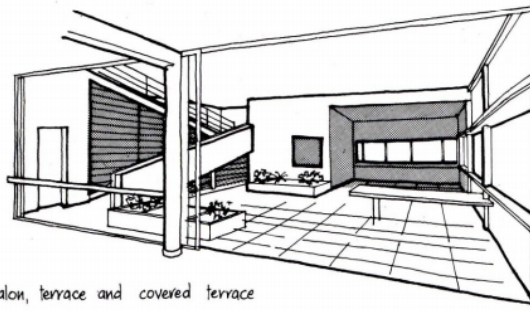
2

3



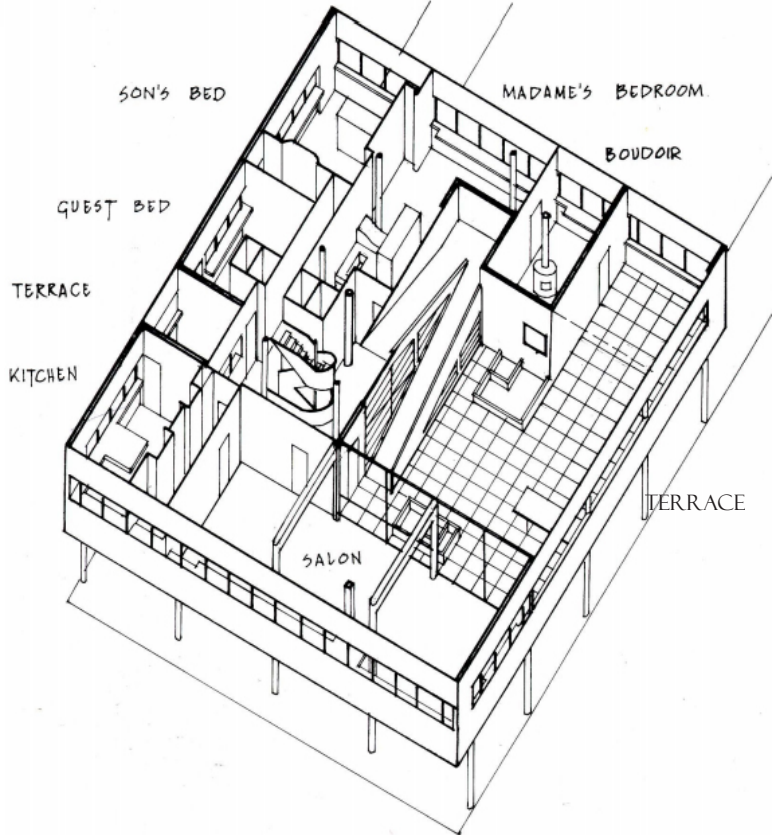
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KITCHEN

SALON

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Roofless paraline. View from the Southeast.

Building Design

3 points

3. Suggest and explain three improvements that should be made for better passive cooling. Use sketches (and words) on page 6 or below to illustrate your ideas.

1

2

3