courtyards.

Discription of Experiment

A specific area of Old Cairo had to be chosen which was representa of the typical case and which contained the important elements of: a section of the main street, a side street & intesection point and a court yard hose. The area around Sihaymi House suited our purposes.

Eight test locations were chosen as representative of all the varying conditions in the immediate area.

- An open space on the roof of Sihaymi House allowed us to note the free air direction and velocity.
- Location A gave us an indication of wind flow on the main street
- Location B was at the open space where the side street intersects with the main street.
- Location C at the entrance to the narrow side street

The apparatus used in this experiment included: a dry bulb thermometer to record air temperature and a velometer which records the velocity of air moving from the direction of maximum intensity.

Measurements were made at three different times of day. Firstly at 10:30 in the morning, secondly at 14'30 in the early afternoon (hottest time of day) and thirdly at 18:30 a few minutes after sunset.

This experiment was carried out on May 1, 1973.

Resistance = Resistivity × Thickness

External Surface Resistance = 0.050 m^2 deg c/w

$U = \frac{1}{\text{sum of resistances}}$

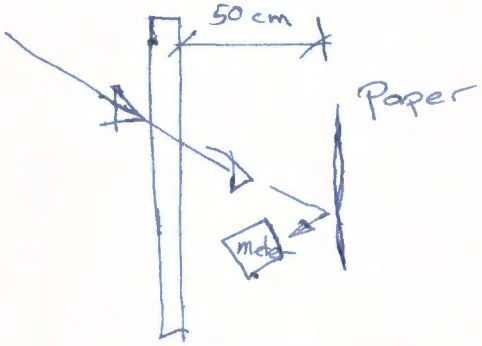
Resistivity = ± 2

Sol - Air Temp = A I r_o + t_o

= Surface absorbtivity ✱
Intensity of radiation X
outside surface resistance
+
temp of outside air.

1) How to show graphicly air movement in baildings. (Ka & Test Room)

2) Elevation of Mushrabeya.



measurments at different heights

How to show in charts and drawings.

Since readings are taken of white paper what are real values.

Is there a way of measuring pressure in a baildings.
ie Barometer, to help determine air movement.

CAIRO - PSYCLOMETRIC CHART

		Dry	RH	WB	ET 6 a/m
J	AM	8 1/2	69	6	8 1/4
	PM	18 1/2	40	11 1/2	16 1/2
F	AM	9	64	6 1/4	9
	PM	20 1/2	33	12	17 1/2
M	A	11	63	7 1/2	10 1/2
	P	24	27	13	20
A	A	14	55	9 1/2	13
	P	28	21	14 1/2	22 1/2
M	A	17 1/2	50	12	16
	P	33	18	17 1/2	25
J	A	20	55	14 1/2	18
	P	35	20	19	26
J	R	21	65	10 1/2	19 1/4
	P	35 1/2	24	20 1/2	26 1/2
A	A	21 1/2	69	18	20 1/2
	P	35	28	21 1/2	27
S	A	20	68	10	19 1/2
	P	32	31	20	25 1/2
O	A	18 1/2	67	15	17
	P	30	31	18	24
N	A	14	68	11	13
	P	25 1/2	38	16 1/2	22
D	A	10	70	7 1/2	9 1/4
	P	20	41	13	17 3/4

6 45 A
5 15 P

	5	6	7	8	9	10	11	12	1	2	3	4	5
J			8 3/4	11 1/2	13	14 1/2	15 1/2	16	16 1/2	16 1/2	16 1/4	15 3/4	15
F			10	12	13 1/2	15	16	16 1/2	17	17 1/2	17	16 1/2	15 1/2
M		10 1/2	12 1/4	14	16	17 1/4	18	19	19 1/2	20	19 3/4	19	18
A		13	15	17	18	19 1/2	21	21 1/2	22	22 1/2	22	21 1/2	21
m		16 1/2	18	19 1/2	21	22 1/2	23 1/2	24 1/4	25	25	24	24	23 1/2
J	18	18 3/4	20 1/2	21 1/2	22 1/2	24	25 1/2	26	26	26	25 3/4	25 1/2	25
J	19 1/4	19 3/4	21 1/2	22 1/2	23 1/2	24 1/2	25 1/2	25 3/4	26	26	25 3/4	25 1/2	25 1/4
A		21	22	23	24	25	26	26	26 1/2	26	26 1/2	26	25 1/2
S		19 1/2	21	22	23	24	24 1/2	25	25 1/4	25 1/2	25 1/4	25	24
O		17	18	19 1/2	21 1/2	22	23	23 1/2	24	24	24	23 1/4	22 1/2
N			13 1/2	16	18	19	20	21	21 3/4	22	22	21	20
D			9 1/2	12	14	15 1/4	16	16 1/2	17	17 3/4	17 1/2	17	15

OBSERVATIONS MADE MARCH 29, 1973

AM	6	7	8	9	10	11	12	1	2	3	4	5	6	7	PM
DB AIR TEM	15	17.5	20	23	24.5	26.5	27	27.5	28	27.5	27	26	24½		
WB	13.4	16	19	22	24	26	27.5	28.3	28.3	28.3	29.5	26	24.5		
SOUTH WALL SURFACE TEMP	15.4 15	17 18.5	21 22	26 27	29 30.5	33 33.5	34 34	34 34.5	34 34	31 31.5	29 29	27 27	24 24.5		
EAST WALL SURFACE TEMP	16	26	33	34.5	33	31.5	30	29	28	27.5	27	26	24.5		
WEST WALL SURFACE TEMP	15	17.5	19	21	23	25	27	32.5	36.5	39	40	34.5	25.5		
NORTH WALL SURFACE TEMP	15	17.5	19	21	23	25	27	27.5	28	27.5	27	26	24.5		
ROOF SURFACE TEMP	15	20	27	33.5	38	42	43	43	41.5	38	34	28.5	24.5		

Note:
Transpose Grafs
for 6 to 6

	AM 1	2	3	4	5	6	7	8	9	10	11	12	PM 1	2	3	4	5	6	7	8	9	10	11	12
ROOF EXTERIOR	18	16.7	16	15	14.5	15	20	27	33.5	38	42	43	43	41.5	38	39	28.5	24.5	23.5	22	21	20.5	20	19
INTERIOR	28.5	28	27.5	27	26.5	26	25.5	25	24.5	24	23.7	23.5	23.3	23	23.3	24	26	27.3	28.7	29.5	30.5	30	29.5	29
SOUTH WALL EXTERIOR	18	16.7	16	15	14.5	15	18.5	22	27	30.5	33.5	39	34.5	34	31.5	29	27	24.5	23.5	22	21	20.5	20	19
INTERIOR	24.5	24	23.5	23.2	22.7	22.2	22	21.5	21	20.5	20.2	20	20	20	21	22	23	24	25.5	26.2	26.5	27	26.5	26	25
EAST WALL EXTERIOR																								
	16.7	17	17.1	19	23	26	28	29	30	31	32	32.8	33	32.8	31	29	27	24	21	20.2	19	18	17.5	17	16.8
	20.5	20.8	20.8	21	21.4	21.8	22	22.3	22.5	22.5	22.4	22.3	22.2	22.2	22	21.8	21.6	21.4	21.2	21	20.8	20.8	20.5	20.5
	40	45	45	48	39	32	26	27	31	32	38	43	50	55	66	73	80	83	85	83	84	99	90	91
	13.4	16	19	22	24	26.5	27.5	28.3	28.8	28.5	27.5	26	24.8	24	23	21	20	19	17	15.2	14	13.5	13	12.5
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5

March 29 | March 30

Mud Brick

Air Temp into Mud Brick House

R.H.

TEMP AIR

External Surface .05

Conc.

.75 × .15
.123
= .1125
.05
.2855

.0615
.05
.1115

.75
.15
3,75
75
.1125

Time Lag 3½ hours

.286

Decrement Factor .75

			Velocity	Volume	Average Velocity	
Inlets						
a) Malkaf	1.7	1.7	1.4	2.38 (2.4)	1.4	1
b) Window	closed					
Outlets						
a) Doorway	closed					
b) Window	closed	1.6	1.5	2.4	1.5	1.07
c) Vent	1.6					

ratio of inlet to outlet 1.7 : 1.6

~~0.94~~ 1 : 0.94

Areas of openings	Each Area sq. m.	Area case A	velocity	Volume		Average Inlet Velocity
1 Inlets						
a) Malkaf	1.7	2.8	3.5	6.0		3.3 m/sec
b) North Window	1.1		3	3.3	9.3	1
2. Outlets						
a) Door way	2.2	4.8	2.5	5.5		.57 1.9 m/sec
b) Window	1.0		3	3.0	9.3	
c) Vent (High)	1.6		.5	.8		

ratio $\frac{\text{Average Inlet Velocity}}{\text{Average outlet velocity}}$ = 1.7 : 1 ?

ratio of opening Inlet to outlet m^2 2.8 : 4.8

Factor = ratio openings x ratio velocities 1 : 1.7

B.

Areas Openings	Total Area		Velocity x opening	Volume of outlet	m³/sec	Average Velocity	
1. Inlets							
a) Malkaf	1.7	1.7	3	5.1	5.1	3	1
b) N. Window	closed						
2 Outlets							
a) Door	2.2	3.8	2	4.4	5.2	1.36	.45
b) Window	closed						
c) Vent	1.6		.5	.8			

ratio of inlet to outlet 1.7 to 3.8

1 : 2.2

Per unit of inlet volume of air

Resistivity = 1.5

Resistance = .75

.375
.05
.025
.45

	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Temp	15	17.5	20	23	24.5	26.5	27	27½	28	28.5	27	26	24.5	
South wall	15	19	23.3	29.6	34.5	38	38.5	39	38	33	30.3	27.7	24.5	
E. wall	16.7	21.7	31.5	41	38.5	34.7	27	27.5	28	27.5	27	26	24.5	
W. wall	15	17.5	20	23	24.5	26.5	27	35.7	42	45.7	48.5	40	26.5	
Roof	15	21.7	31.5	40	47	52.2	54	53.2	50.5	44.5	38.5	30	24.5	

26.7

15

680
33
2040
2040
2244

130
33
390
390
4290

50
.033
150
0150
.01650

100
11.5
9.9

430
.033
1290
01290
14190

780
33
2340
2340
25740

520
33
1560
1560
17160

810
33
2430
26730
18144

680
33
1740
1740
650
33
950
195

8250

250
33
750
750

TAM = 22

$$T_{cc} = \frac{22}{4} + 17.2$$

$$= 5.5 + 17.2$$

$$= 22.7$$

$$22.7 - 3 = 19.7$$

Range ~~106~~

108 - 39

42.5 - 4

6

38.5

Comfort Zone Cairo = 19.7°C - 25.7°

0 Unloading Bricks

1 ~~Vault~~ Practice Vault.

Radiation

March 29-30-31 South

South wall Mar 30	6	7	8	9	10	11	12	1	2	3	4	5	6
South	0	50	100	200	300	350	350	350	300	200	100	50	0
N	0	0	0										
Roof	0	130	350	520	680	780	810	780	680	520	350	130	0
E	50	430	650	580	420	250	0						
W								250	430	580	650	430	50
Temp	15	17.5	20	23	24.5	26½	27	27½	28	27½	27	26	24½
S.A. Roof	15	20	27	33.5	38	42	43	43	41.5	38	34	28.5	24.5
Wall	15	18.5	22	27	30.5	33.5	34	34.5	34	31.5	29	27	24.5
EW	16	26	33	34.5	33	31.5	27	32½	36.5	39	40	34.5	25.5

External surface resistance = .05 m² deg C./w

Absobtivity — .40

.02

.05
.65
25
030
.0336

.05
.40
0020

135
24.5
380

680
02
013.60

680

136
28
41

810
.02
16.20
27

130
.02
2.60

2.1

15.6
26.5
420

Sol-Air temp = A I ro + to
= 2

520
10.5
27.5
380

16
27
43

7

15.5
27.5
43

- Location D is at a point on the side street where a certain amount of turbulence was noted. The turbulence seems to have resulted from two special conditions, firstly the intersection of a narrow lane with the street an secondly due to the fact that the building on the south side of the street at D, not being the original building, projected several stories above the roof level of Sihaymi House arrass the street. The first building acted as a wind catch and deflected a current of air down at D. See the photo for the profile of this street.
- Location E is a point on the side street in front of Sihaymi House.
- Location F is in a tunnel-like passage way which is typical of the transition space between the street and courtyard of the Islamic house.
- Location G is the centre of one of the courtyards of Sihaymi House.