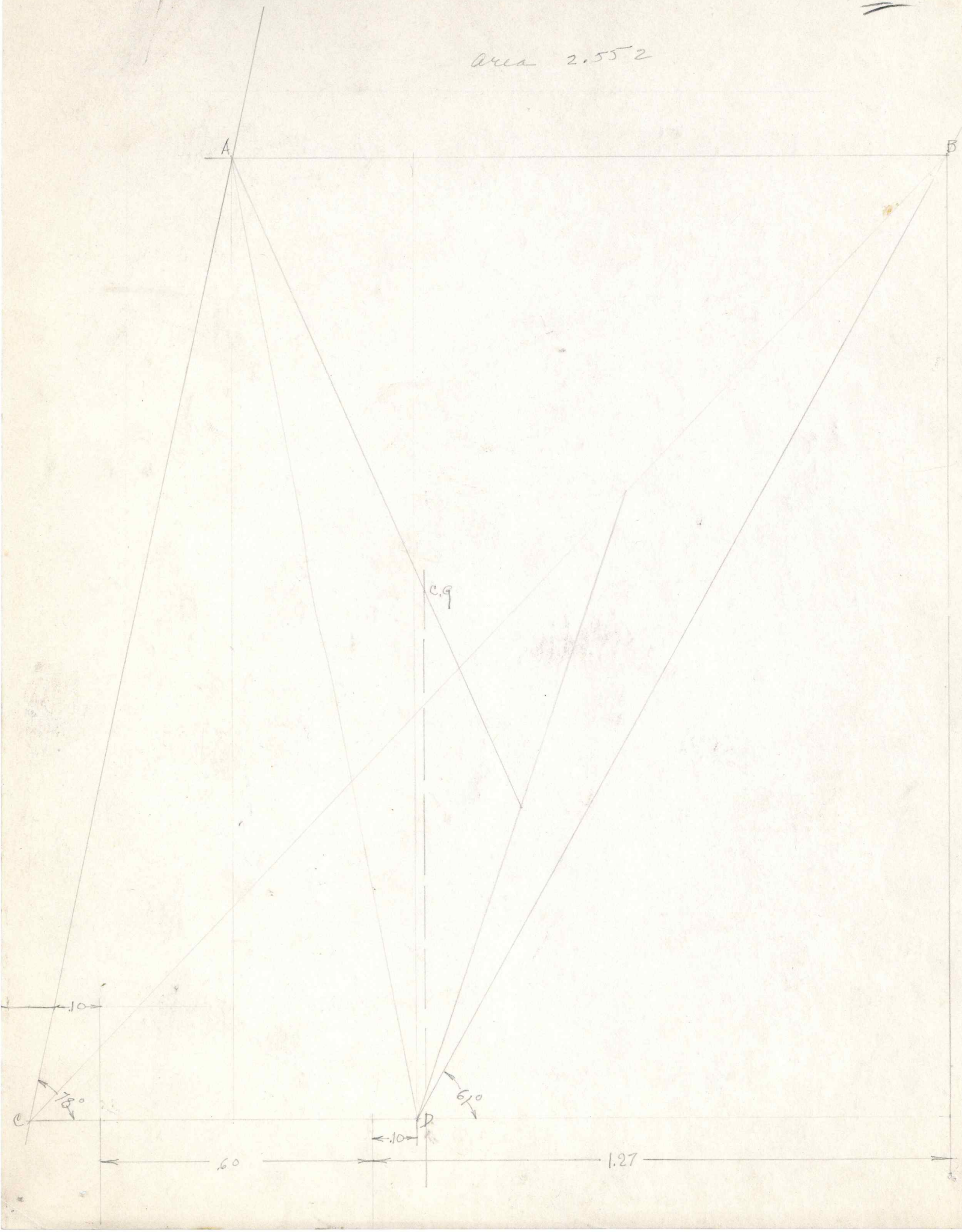
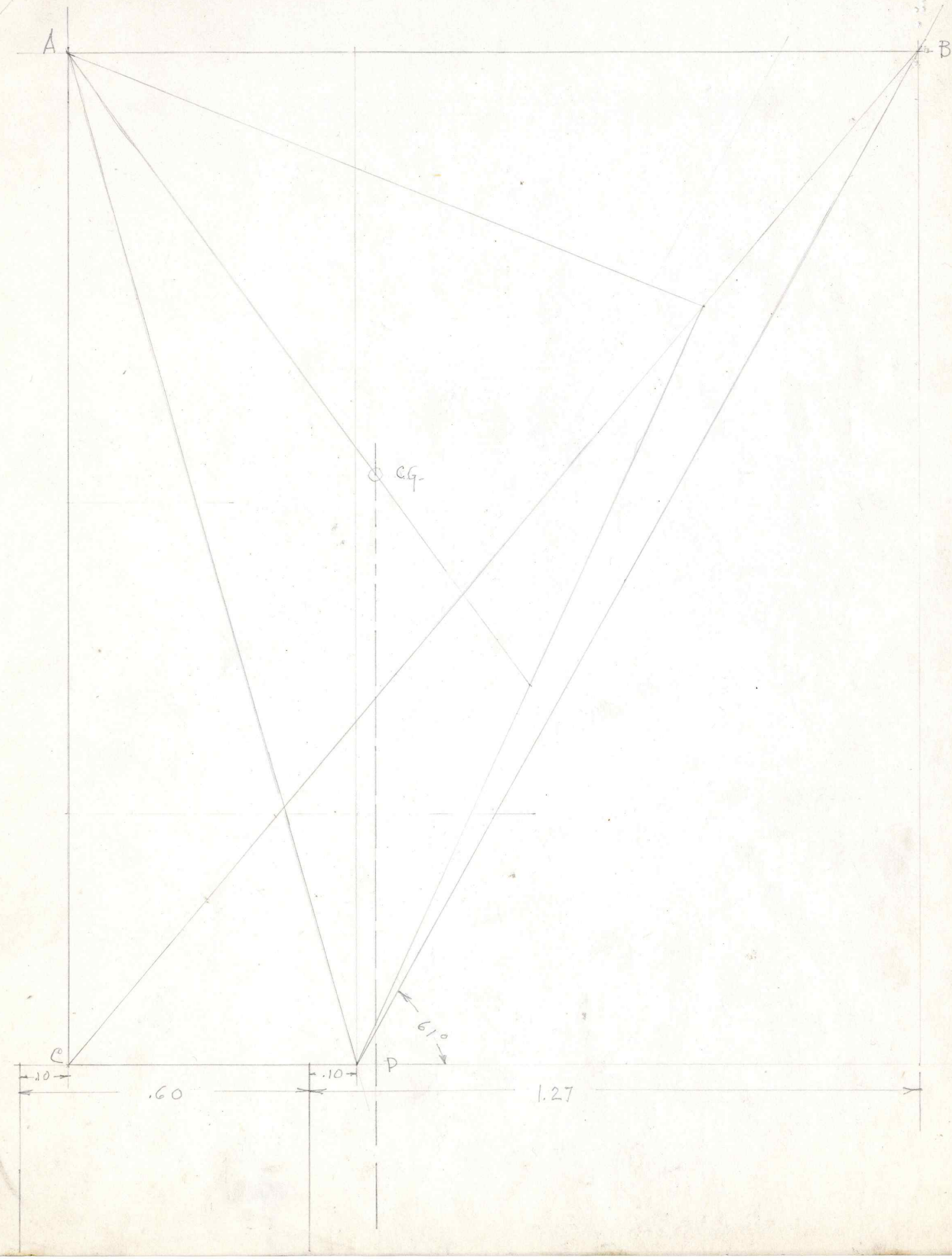
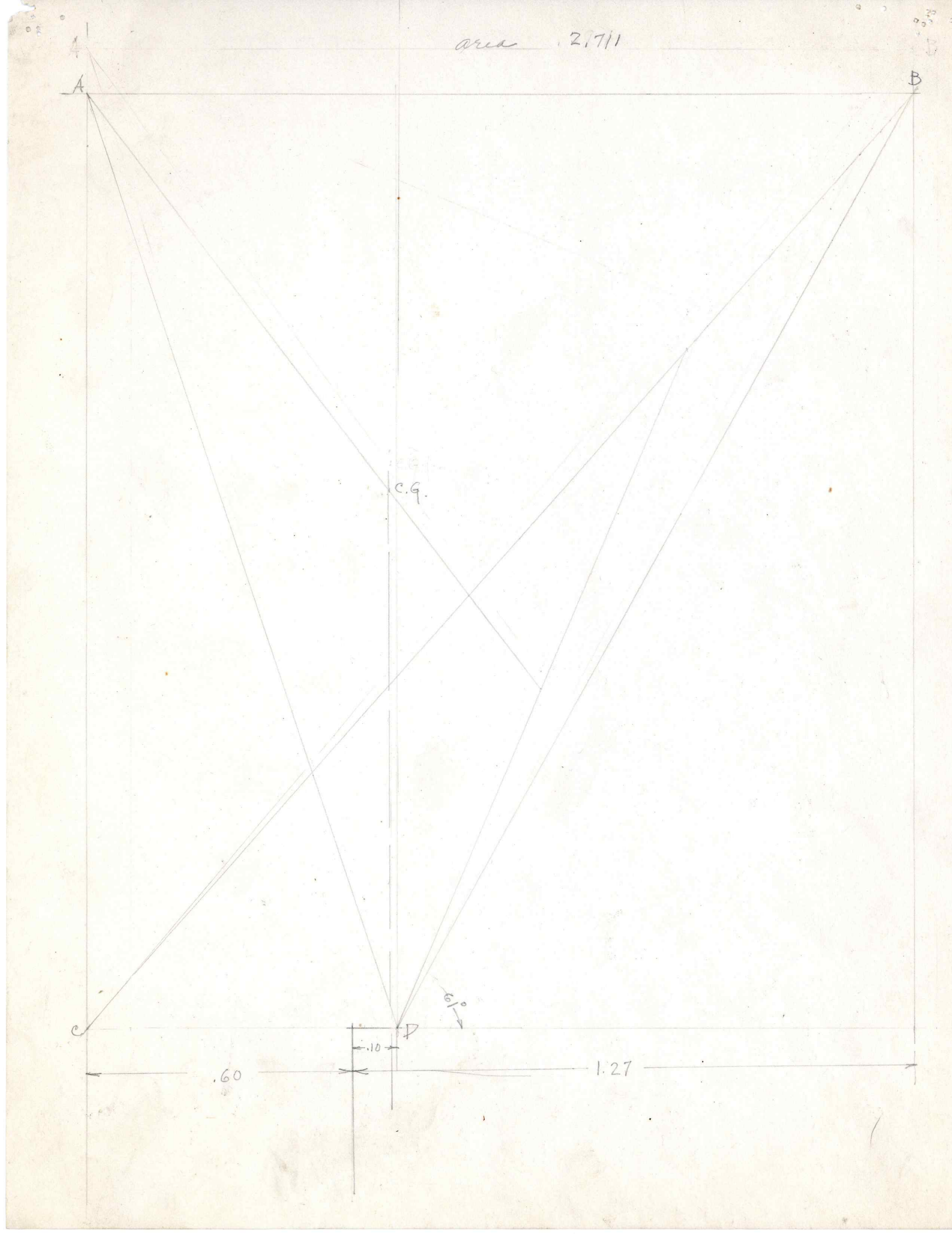
F-3

area 2.552

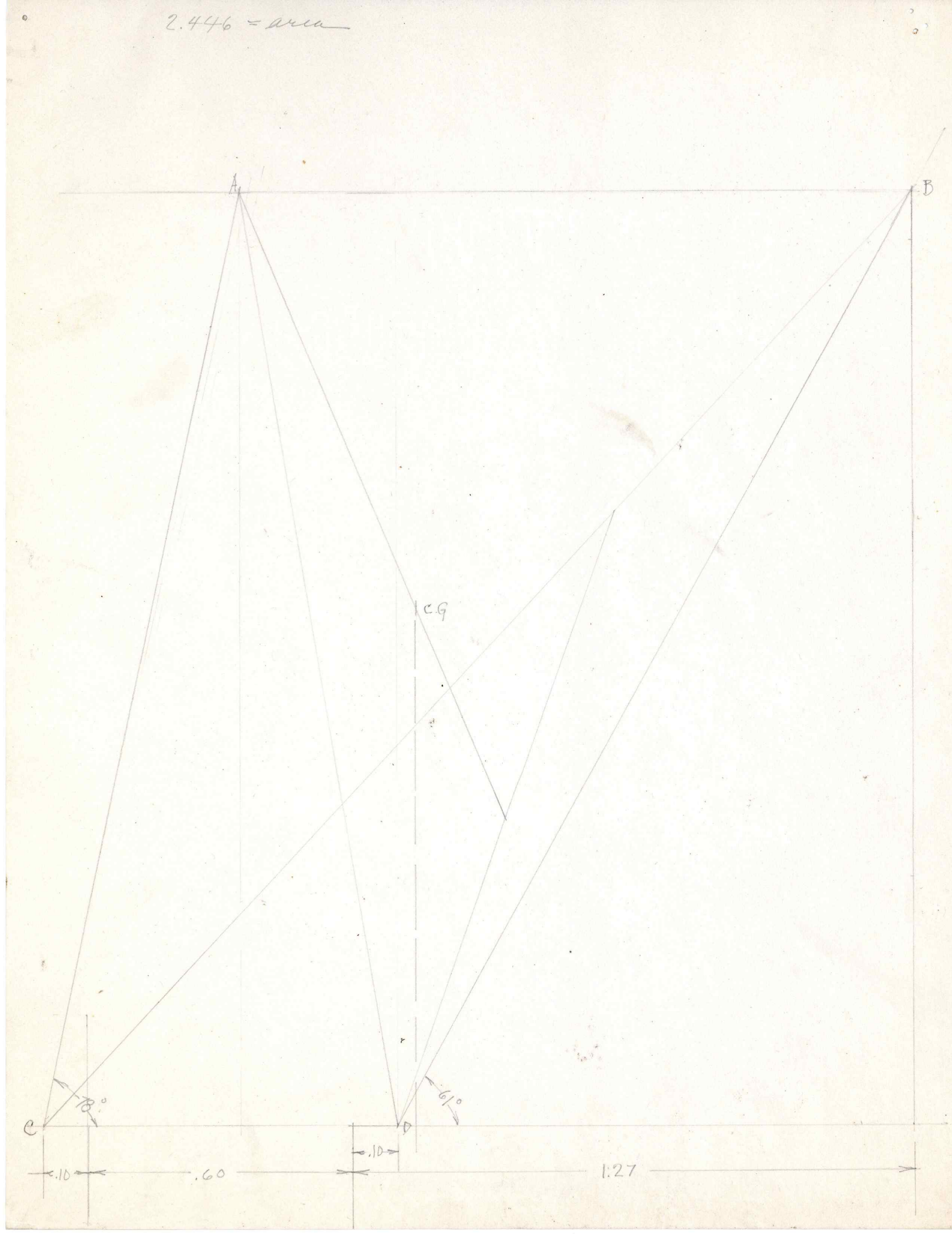


.2429 = area

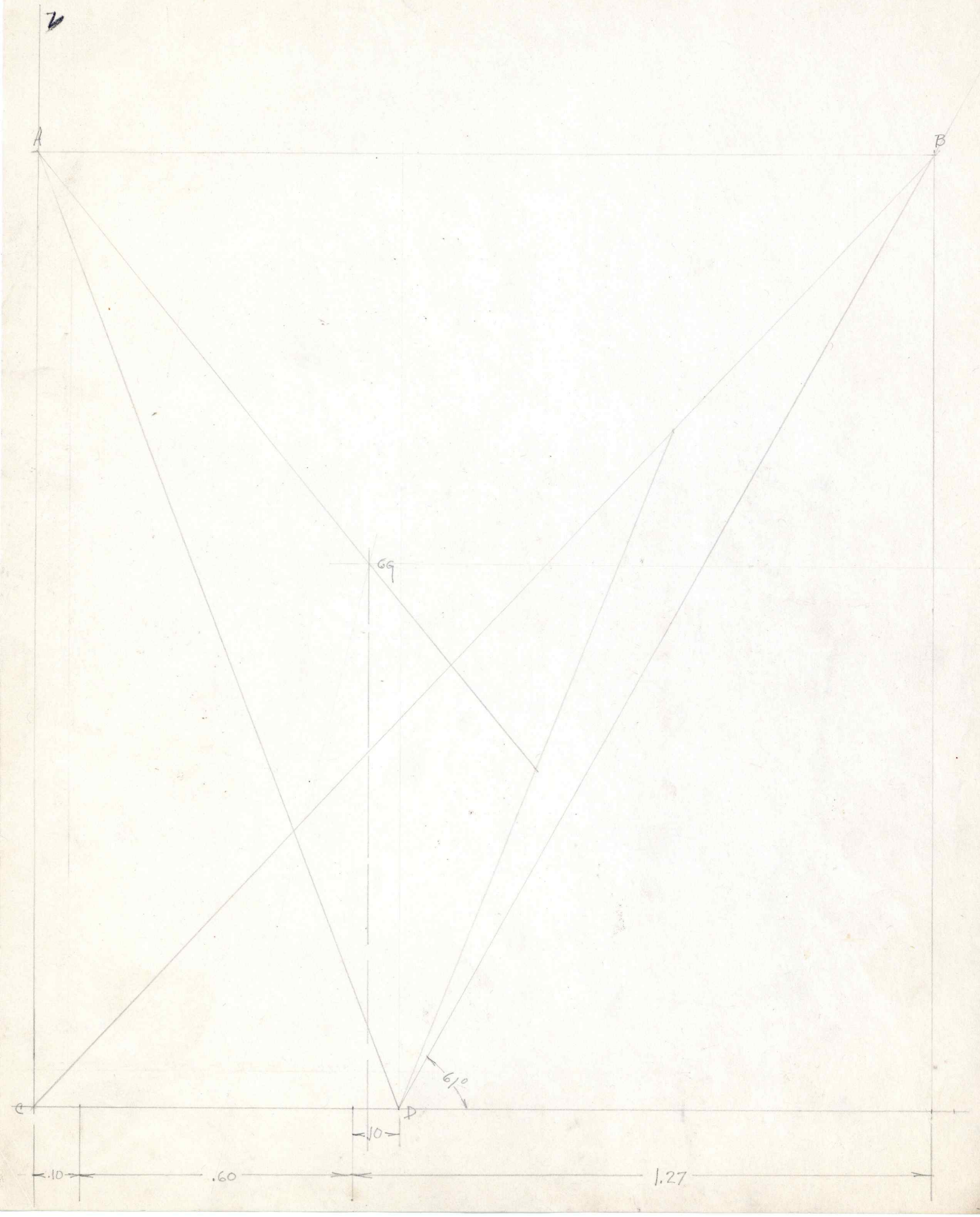


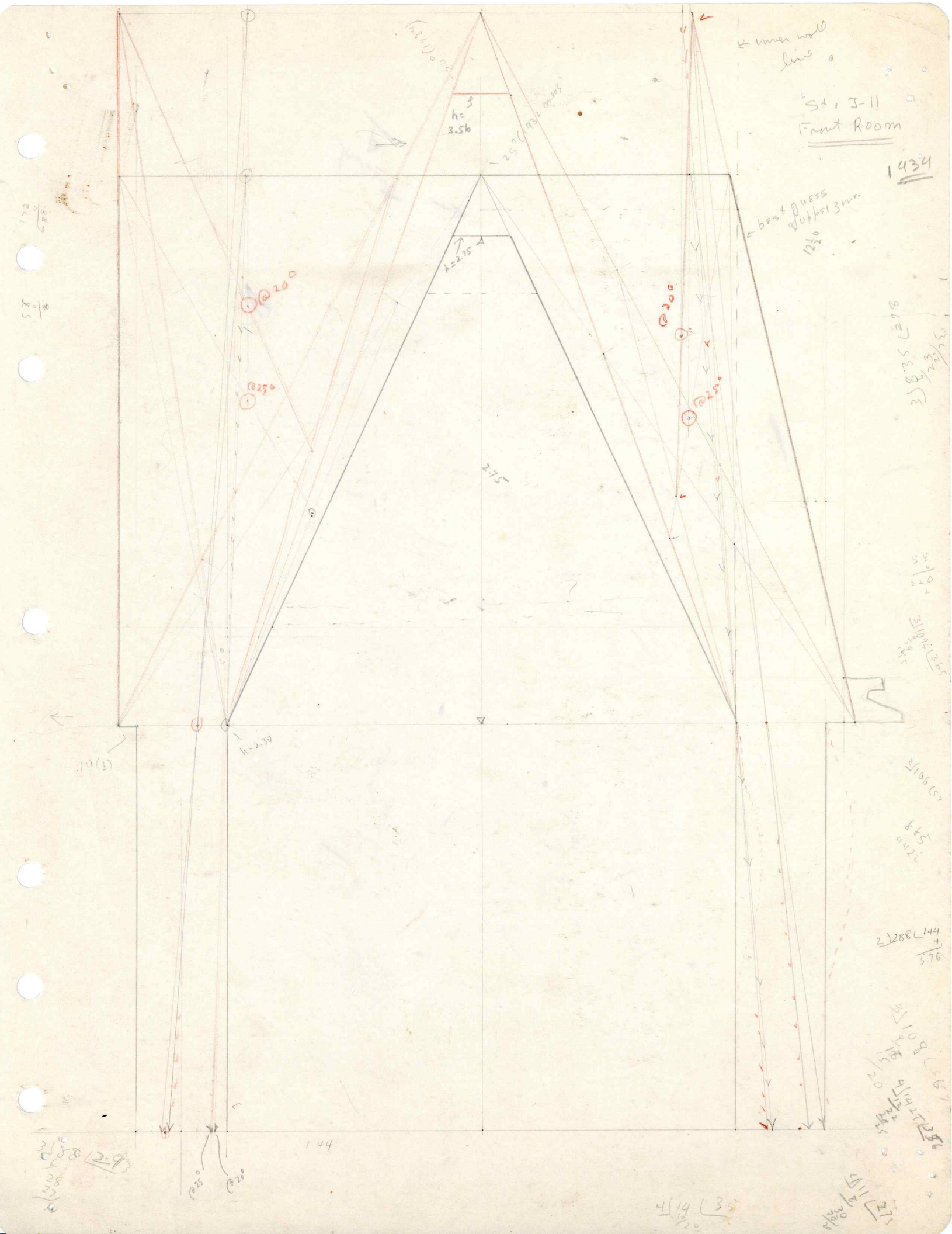

area 2.711
A
B
C.G.
C
D
60°
.10
.60
1.27

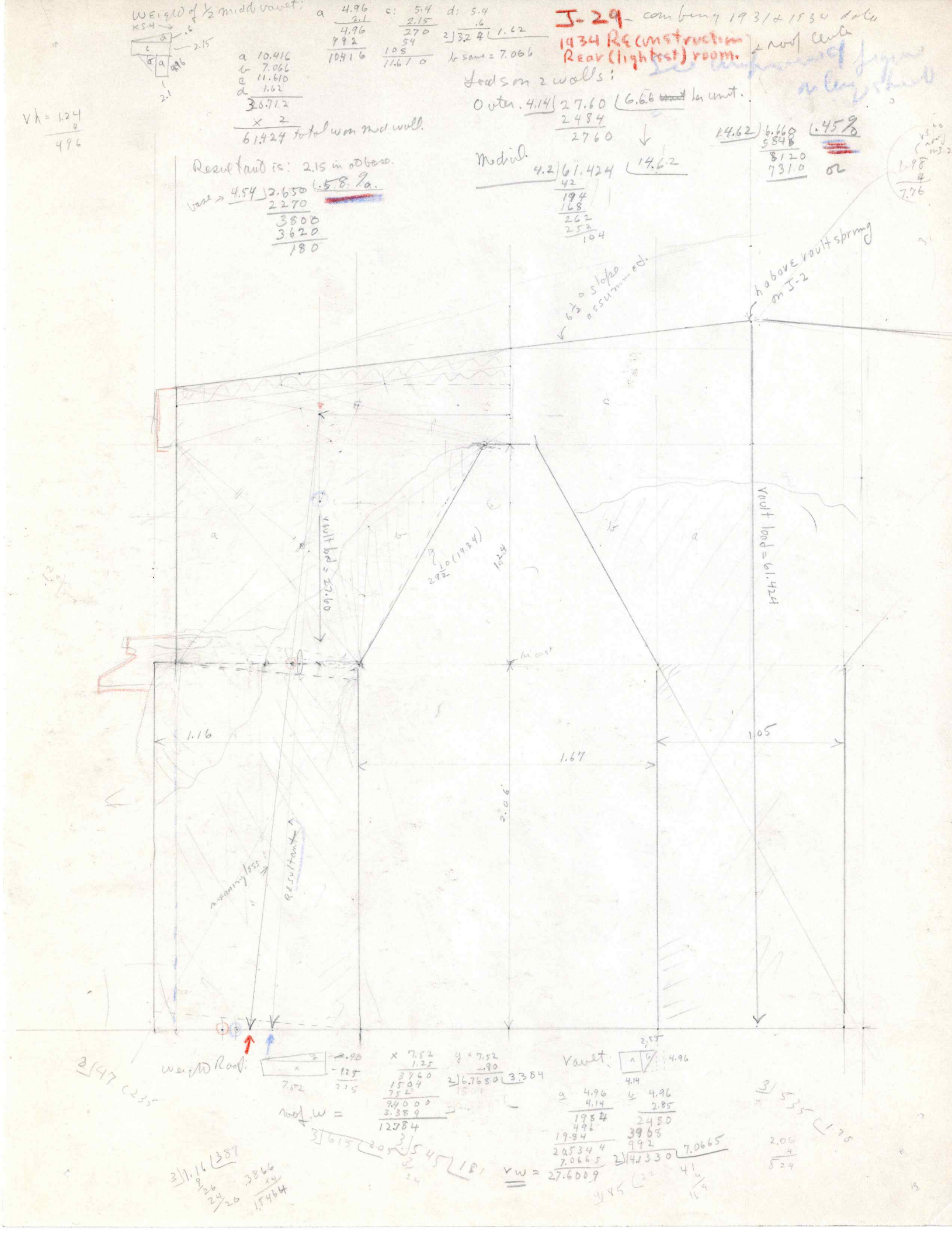
2.446 = area



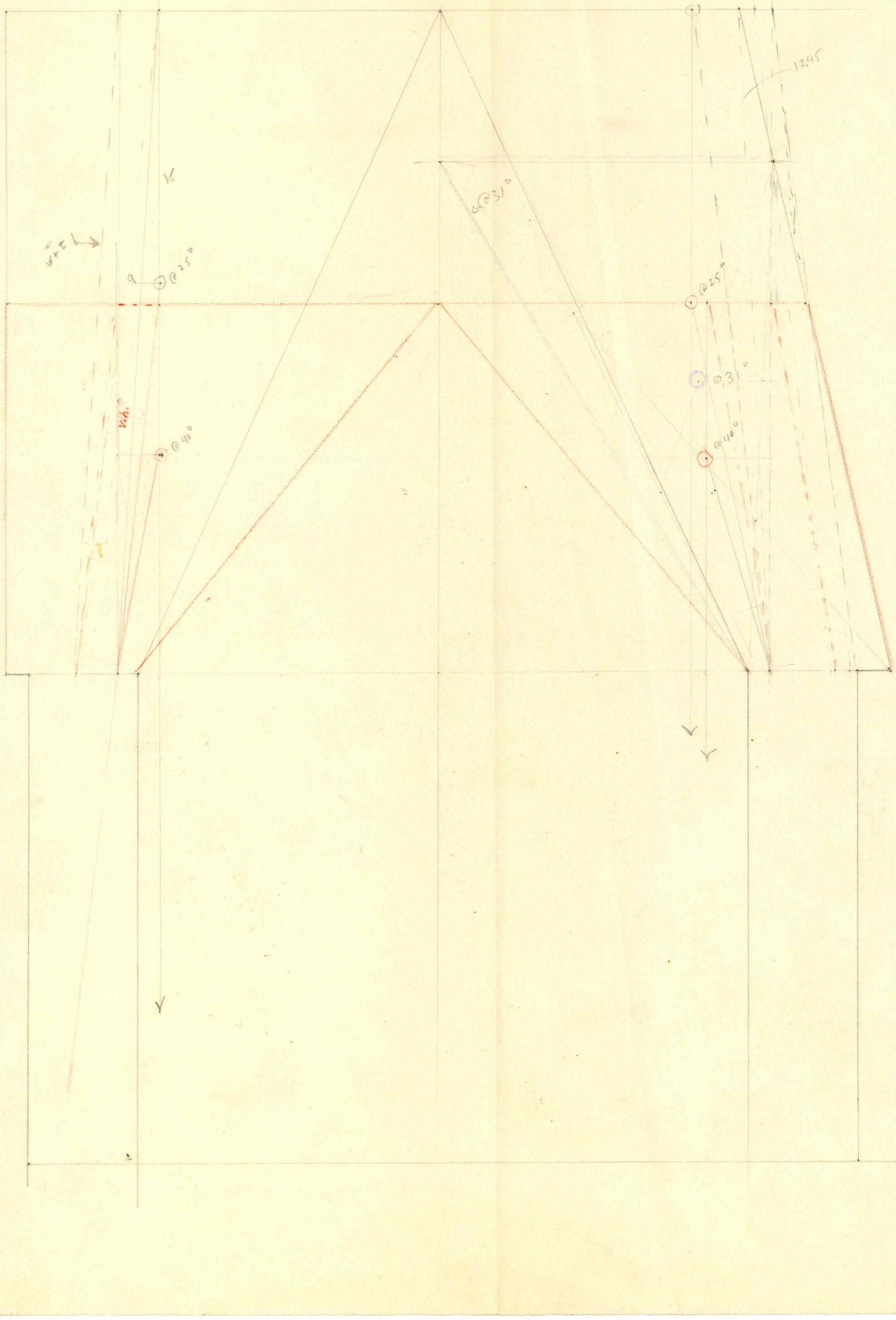
2.922 = area

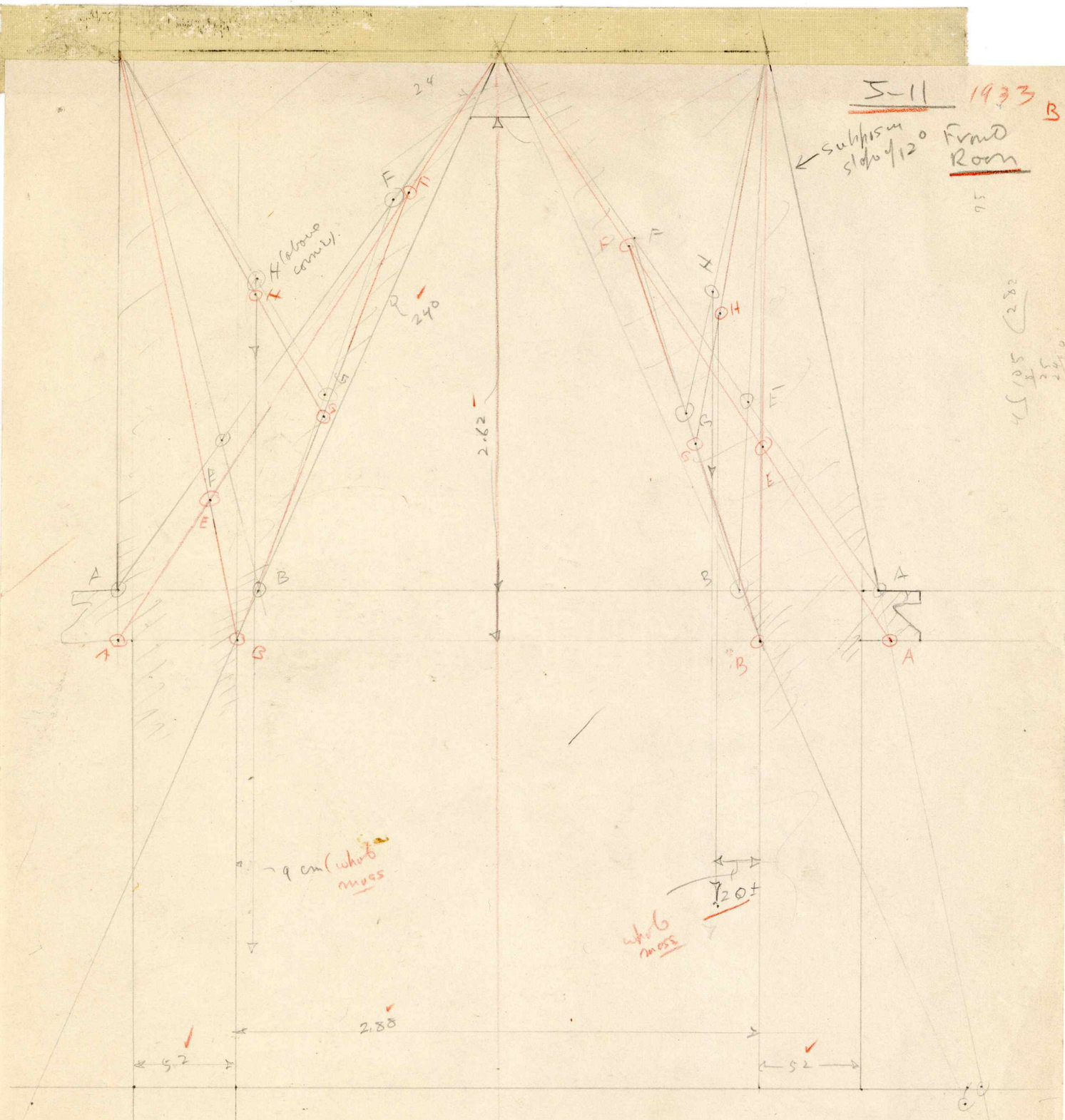


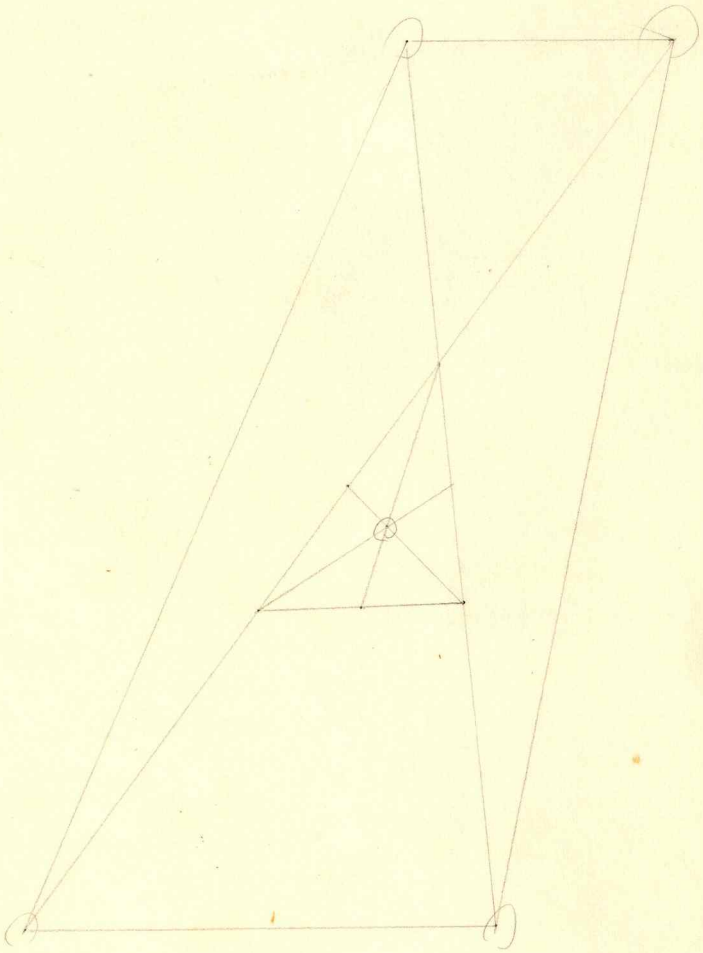

← inner mold line
St. J-11
Front Room
1434
best guess
@20°
@25°
275
h=3.56
h=2.75
h=2.30
1.44

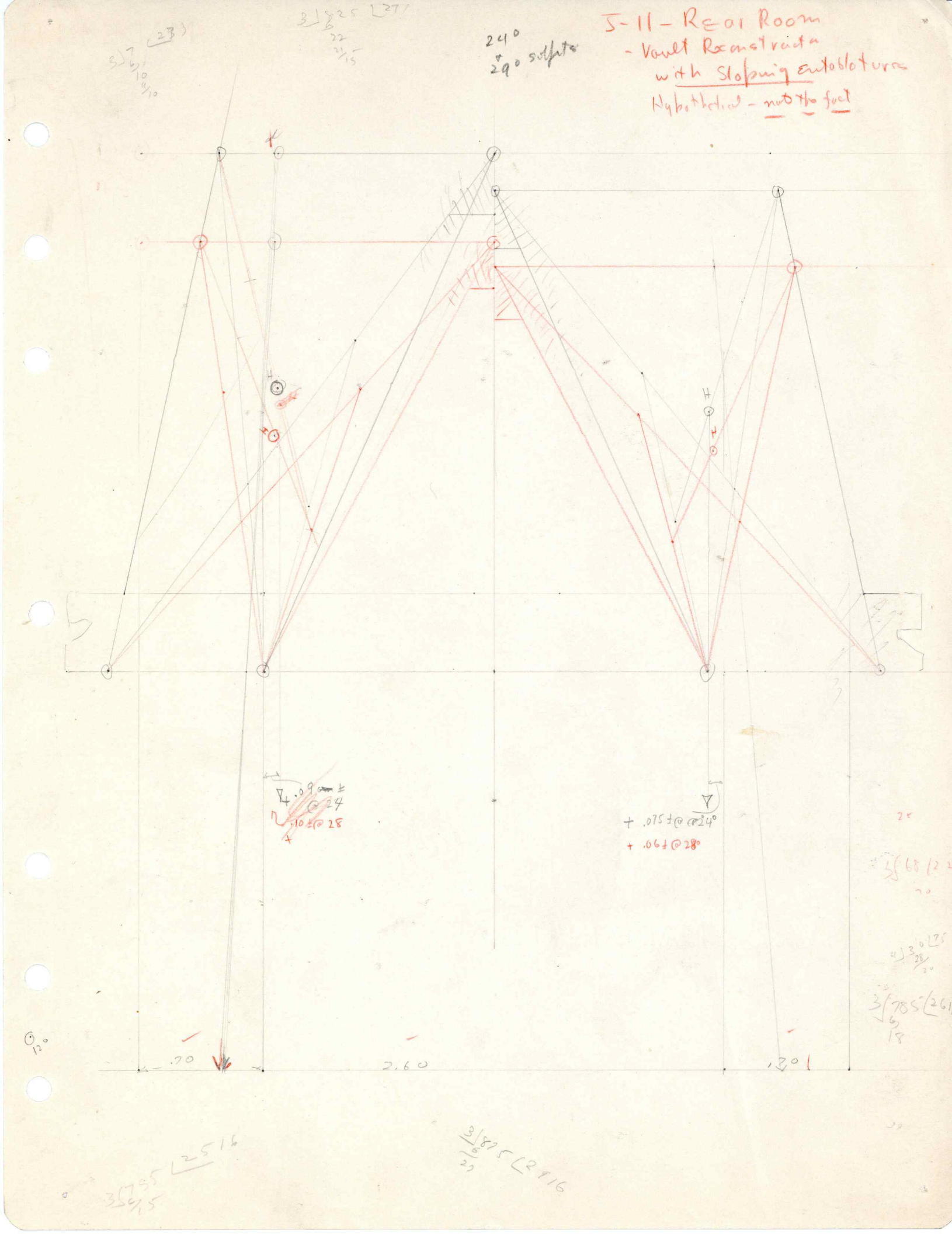

J-29 combining 1931 & 1934 Units
1934 Reconstruction
Rear (lightest) room.
Weight of ½ middle vault:
a 4.96
b 7.066
c 11.610
d 1.62
36.712
× 2
61.424 total wt mid vault.
Vh = 1.24 / 4.96
Loads on 2 walls:
Outer. 4.14 27.60 6.66 lbs/unit.
Middl. 4.2 61.424 14.62
Resultant is: 2.15 in adverse.
.58 %
.45 %
.98 / 4 / 7.76
h above vault spring on J-2
6½° slope assumed.
Vault load = 61.424
1.16
1.67
1.05
Resultant
Weight
Roof:
Vault:
Roof w =
Vw = 27.6009

Moment-1 5-11 Final Room

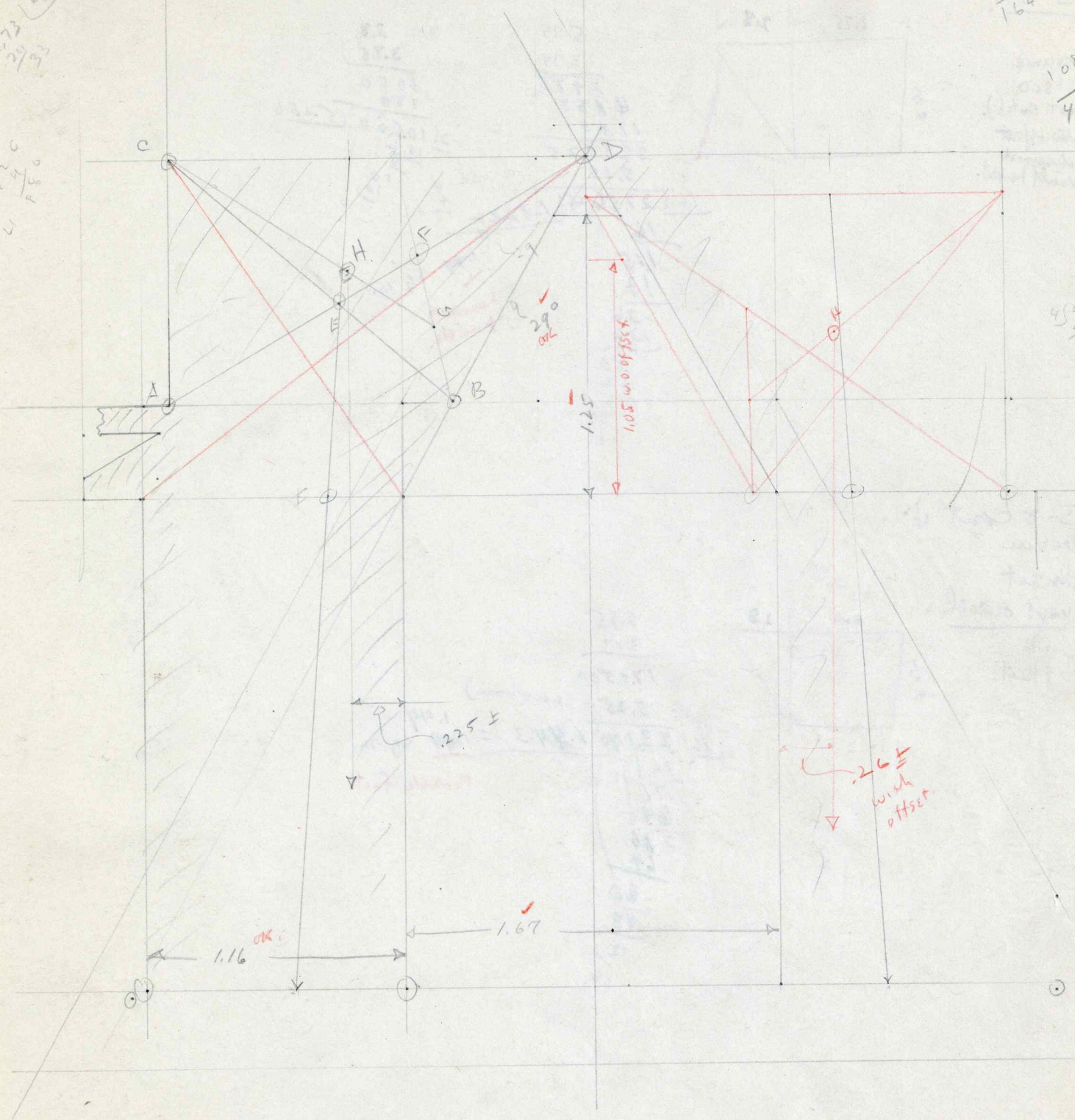



5-11 1933 B
Subphism slope 1/12° Front Room
H (above corner)
F
G
E
A
B
2.62
2.40
2.88
5.2
9 cm (without mass)
7.20 ± (without mass)
Provide rear vault section applied to narrow front wall.
Hypothetic 12° slope applied to front wall.




5-11 - Real Room
- Vault Reconstructa
with Sloping Entablatures
Hypothetical - not the fact
24°
29° soffits
.70
2.60
1.30

J-9.



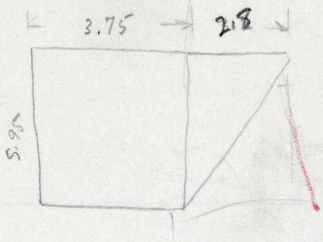
Probable true section of rear room (using slope of 29° from front room). No offset (occurs at other points).

Vault Weights - J-8

6.55
3.75
2.80

J-8

(assume outside vert entab). with offset (observed vault height.



5.95
3.75
2975
4165
1785
22.31.25
5.25

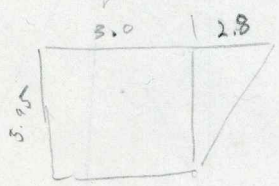
16 | 27.56.25 | 1.7227+

16
115
112
136
132
40
32
8
16

3.2 2.8
3.75
3000
750
2 | 10.5.0 | 5.250
10
10
10
10
4
4
0

1.729 sq. m.
Incorrect possible.

J-8 cont'd
assume
inset
vert entabl.
with
offset

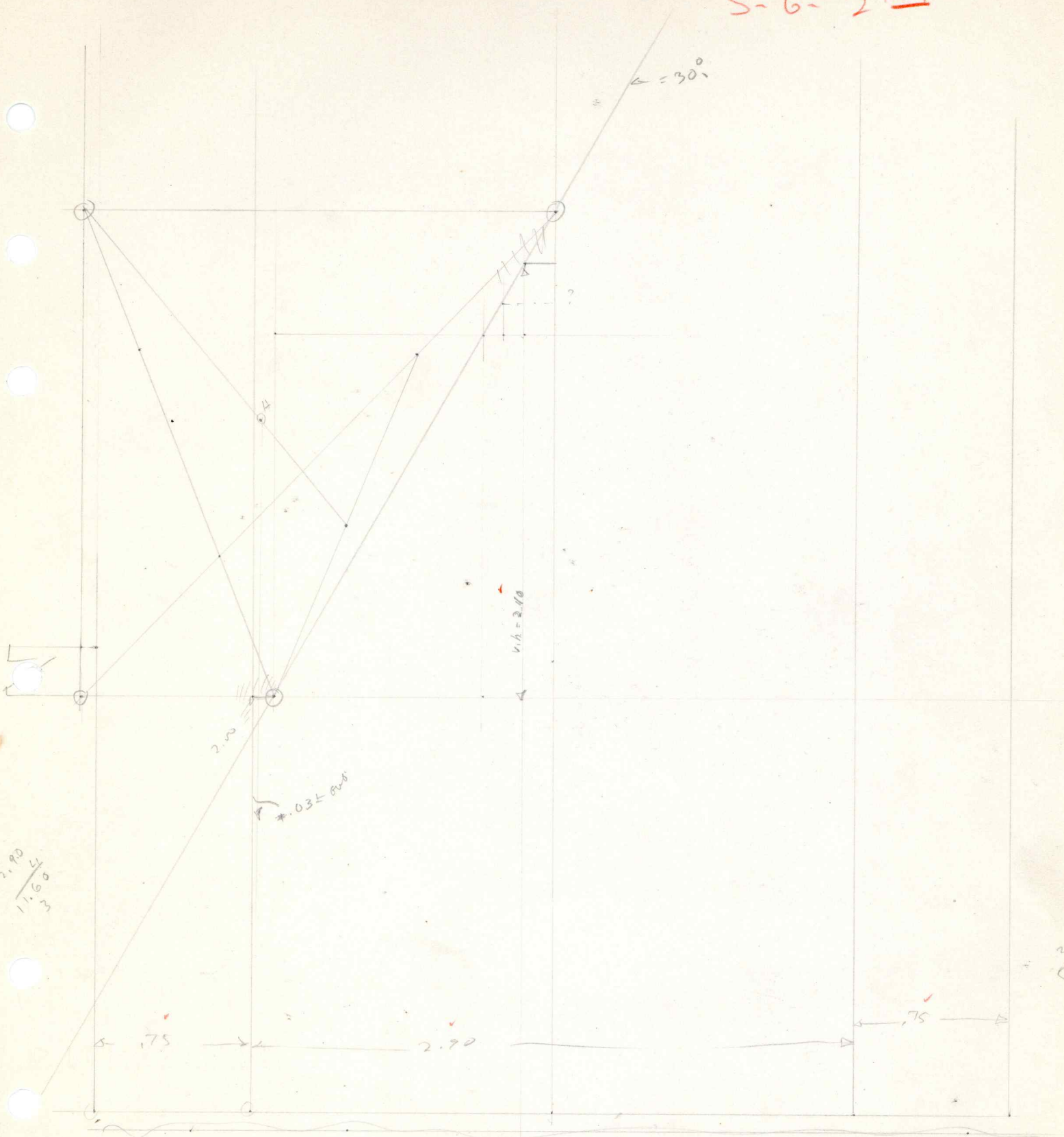


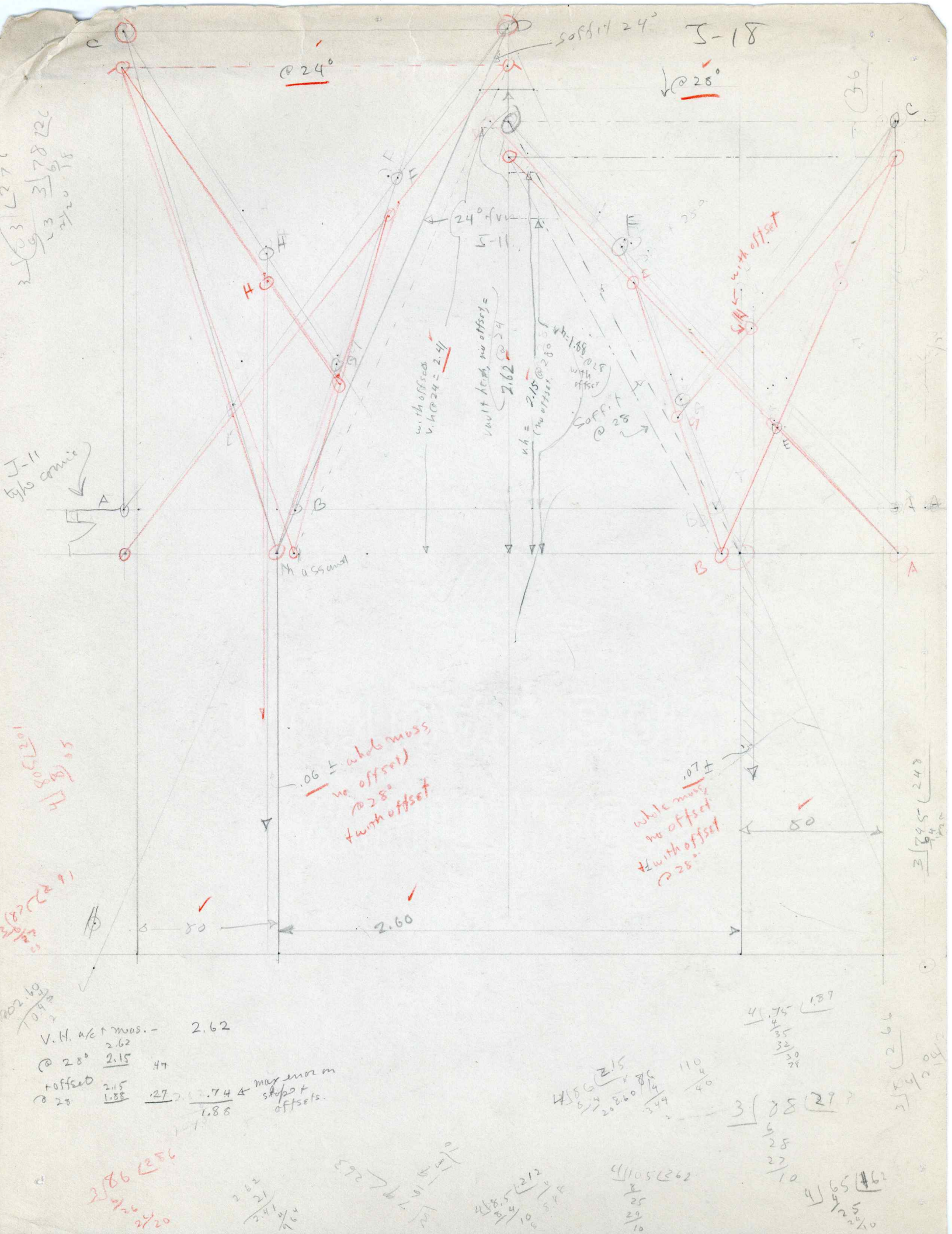
5.95
3.00
17.8500
5.25 (see below)

1.44
16 | 23.100 | 1.443 = 1.727 sq. m.
Probable fact.

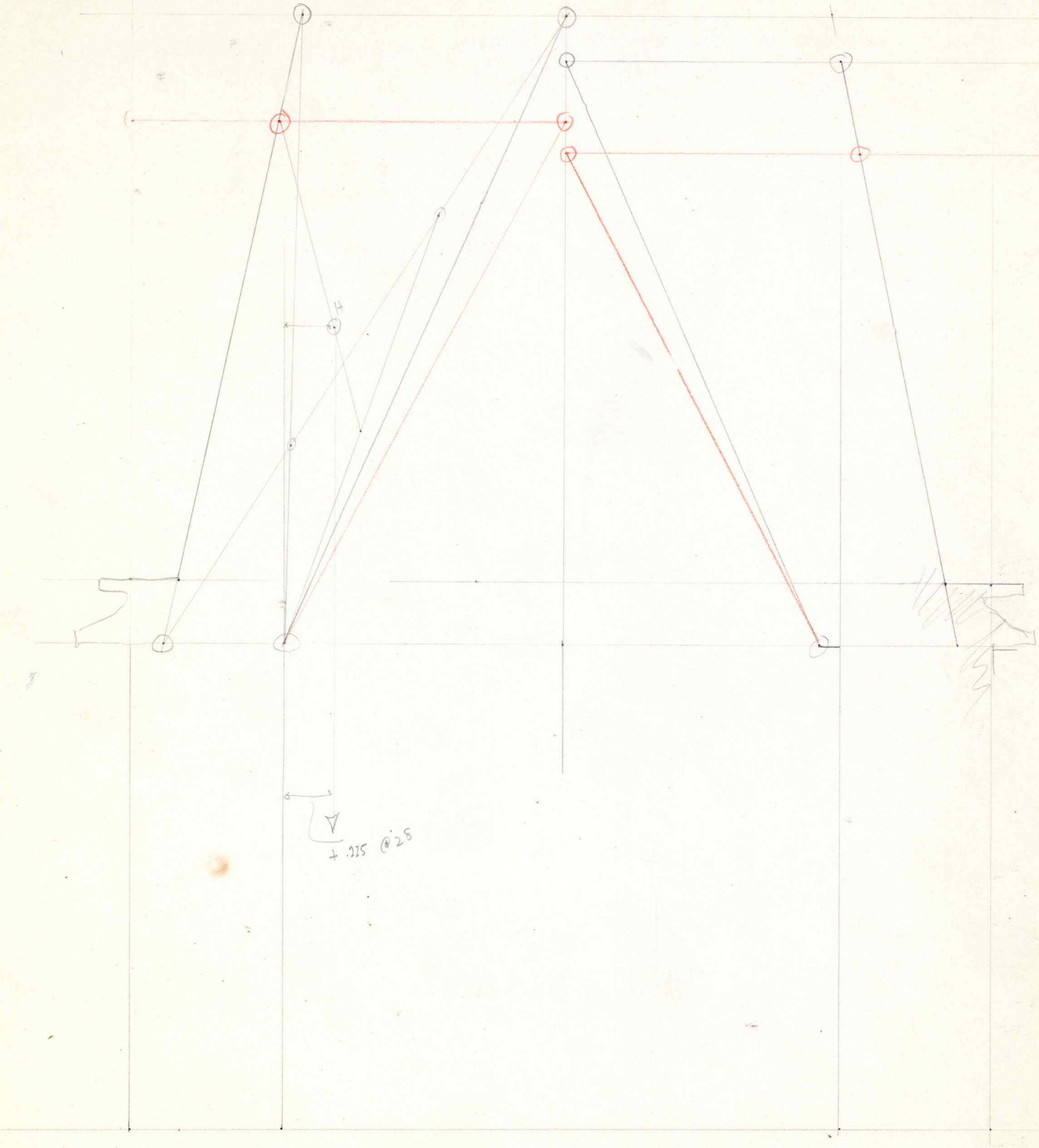
16
71
64
70
64
60
48
12
16

5-6-21




J-18
@ 24°
@ 28°
soffit 24°
24° rvu
J-11
w/o cornice
J-11
with offset
w. h offset
v.h @ 24 = 2.41
vault horiz. no offset =
2.62
v.h. = 2.15 @ 28°
(no offset)
v.h. 1.88 @ 28°
with offset
soffit @ 28°
h assumed
.06 ± whole mass, no offset @ 28° + with offset
.07 ±
whole mass, no offset @ 28° + with offset
2.60
80
80
V.H. a/c + mass. — 2.62
@ 28° 2.15
+offset 2.15
@ 28 1.88
.27
.74 ± max error in skipping offsets.
1.88

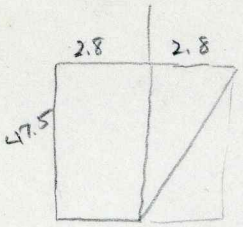
Hypothetical
Vault Reconst. of J-11
using J-2 upper jaws.



5.6
2.8
2.8

Room 6 of J-2

Offset 0,
height observed.
Soffit 31°.
(outside vert.
other zone - close
to stress point).

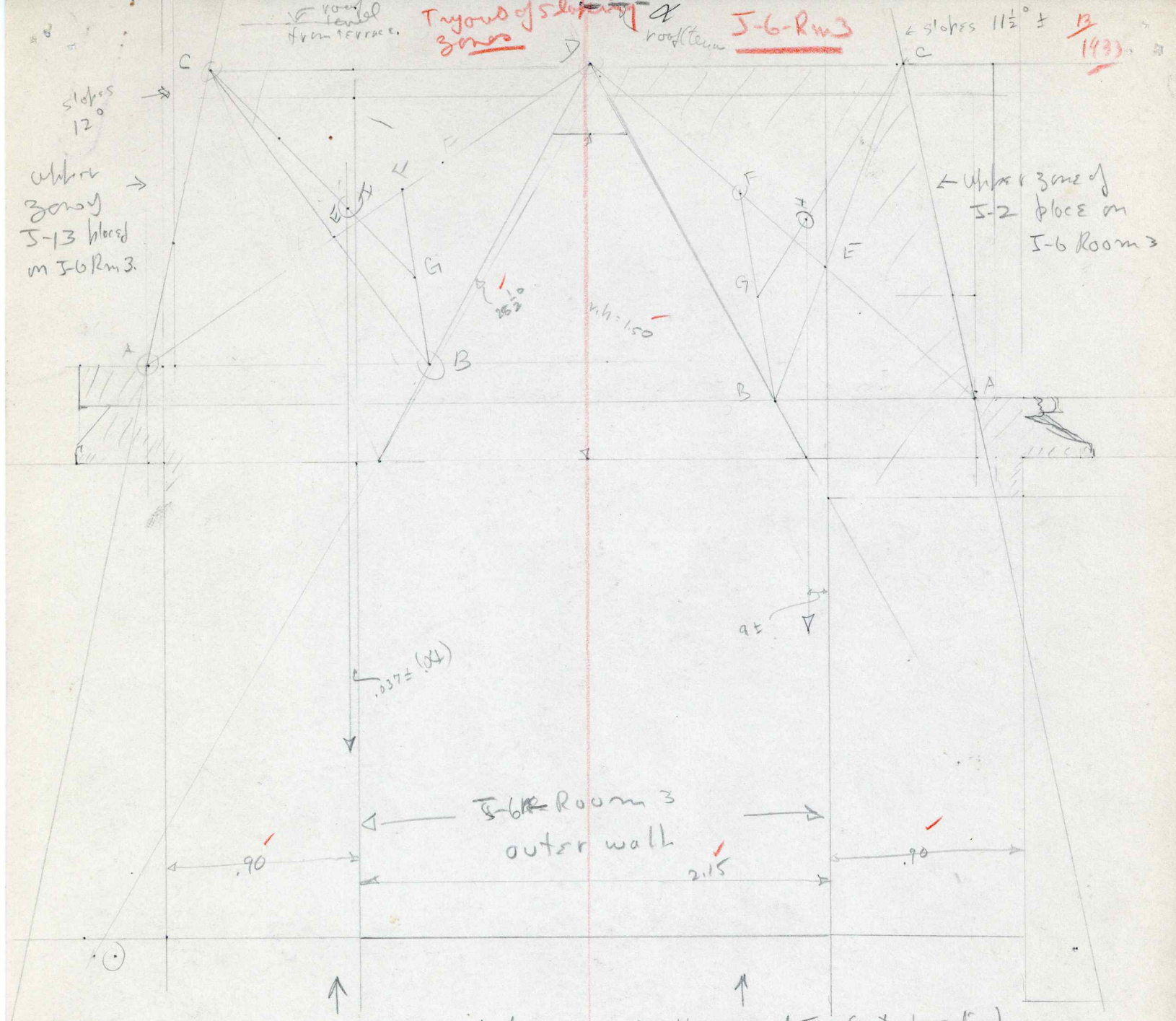


2.8
4.75
3800
950
13.300
6.650
16 | 19.950 | 1.246
16
39
32
75
64
110
96
14
16

2.8
4.75
2 | 13.30 | 6.65
12
13
12
10

= 1.25 sq. meters.

2.8
4



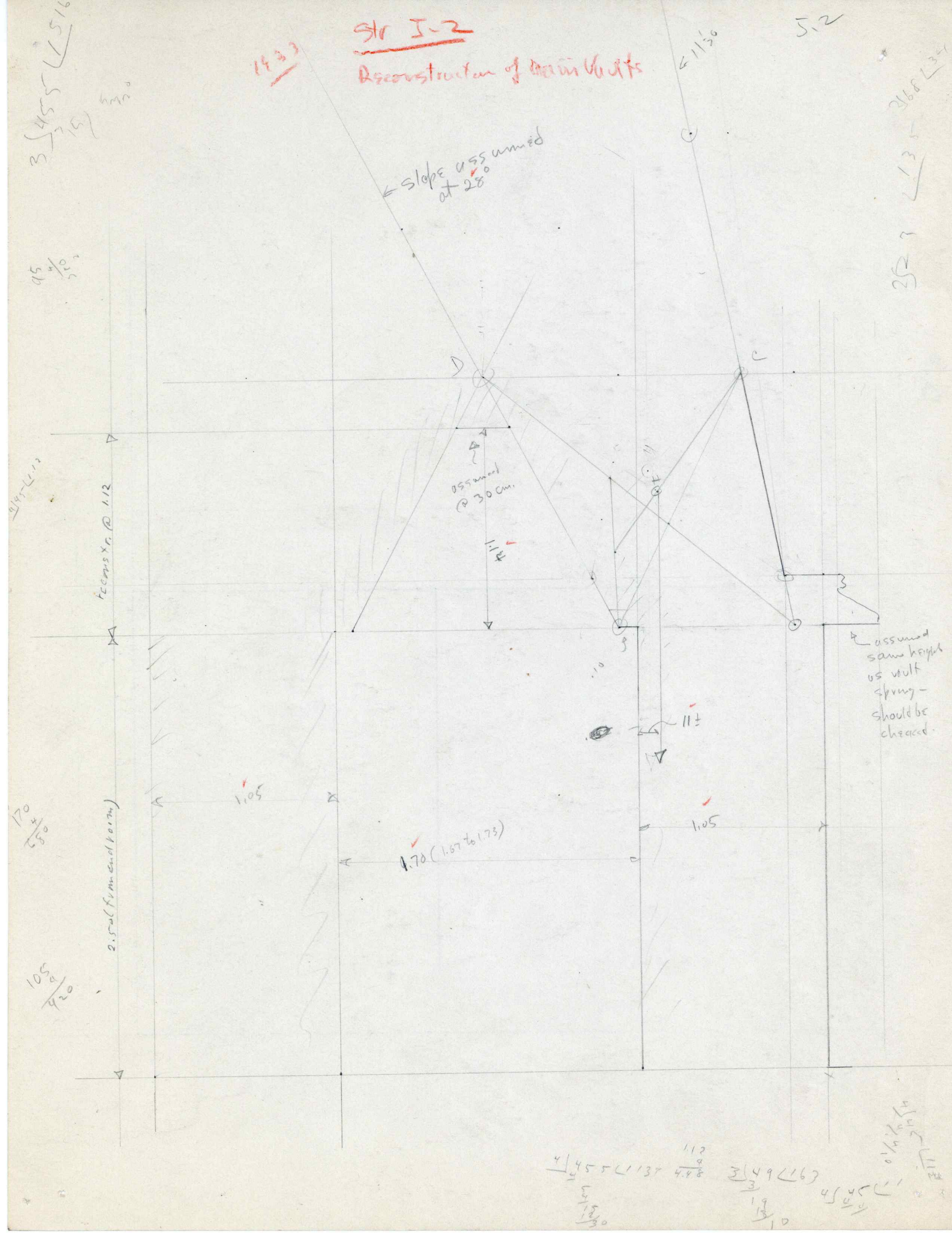
The upper zone section (outside) of J-13 could have been applied to J-6-Rm 3 without net thrust on the walls

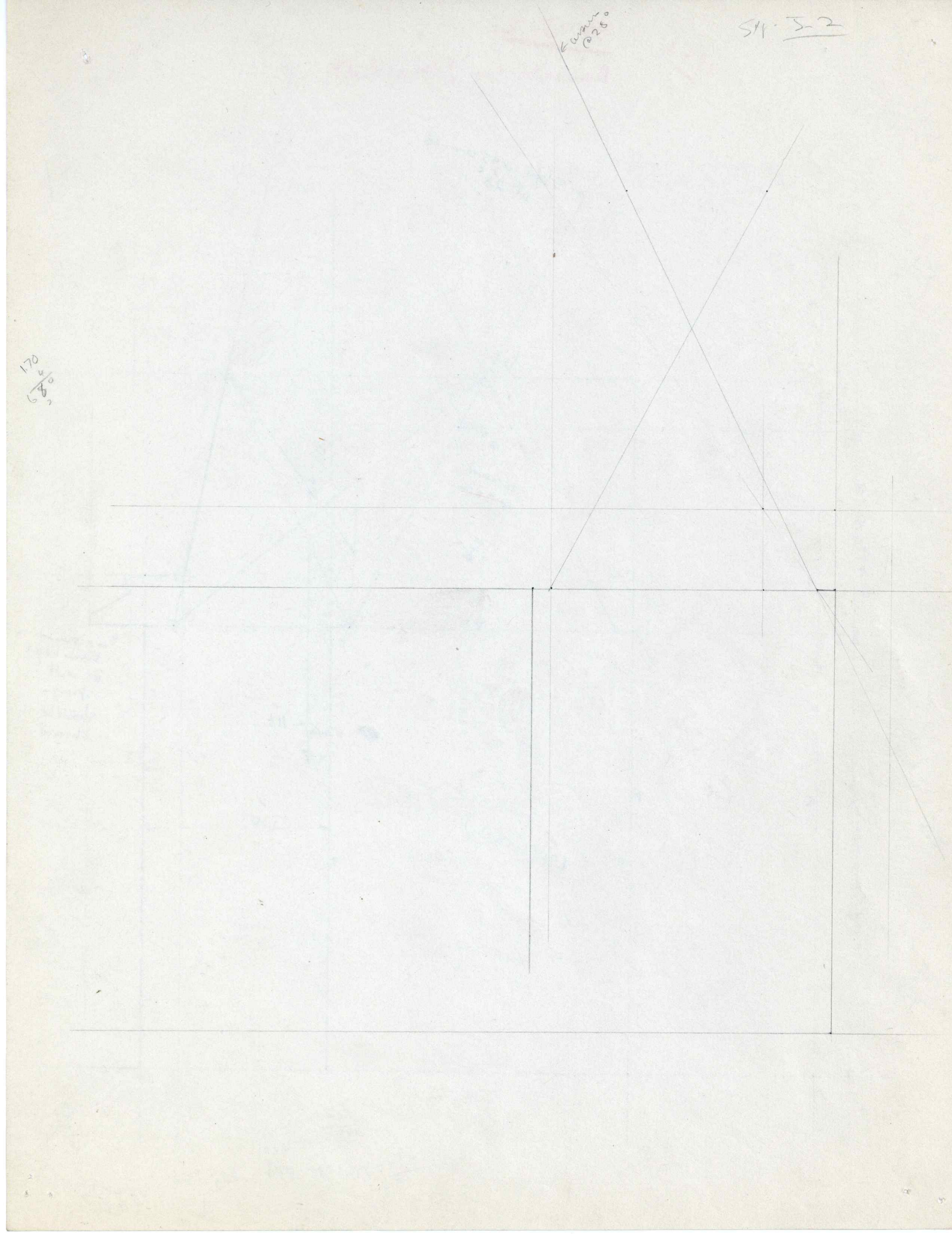
the upper zone of J-2 (outside section) could have been applied to J-6-Rm 3 with very slight thrust on outer walls.

Req'd h = 2.16
+ .12
+ 2.00
4.28
× 4
17.12

Str I-2

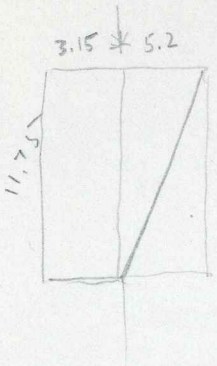
Reconstruction of Main Vaults




Equinox @ 28°
S/I - S-2
170
68

Vault weights - J-11
Heat Room.

J-11 -
maximum, as measured (24°, no offset).



3.15 × 5.2 × 11.75 × 30.55 = 61.100 lbs

3.15 × 5.2 = 16.38

16.38 × 11.75 = 192.465

192.465 × 30.55 = 5879.25 cu ft

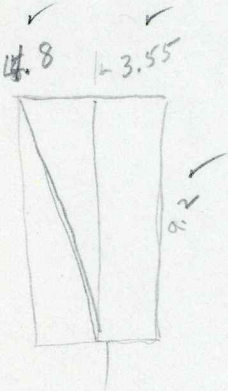
5879.25 / 16 = 367.45 cu yds

367.45 / 61.100 = 6.01

6.01 × 5.1 = 30.55

66.5625 / 16 = 4.1601 meters - max + acc to measurements.

J-11 -
minimum



4.8 × 3.55 × 11.75 × 30.55 = 44.116 lbs

4.8 × 3.55 = 17.04

17.04 × 11.75 = 200.22

200.22 × 30.55 = 6117.771 cu ft

6117.771 / 16 = 382.36 cu yds

382.36 / 44.116 = 8.66

8.66 × 5.1 = 44.166

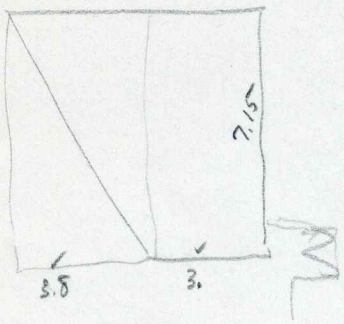
54.24 / 16 = 3.39 m.

Minimum, w/ offset, @ 28°

54.74 / 16 = 3.42

J-6 - Room 1.

Inset



7.15 × 3. = 21.450

7.15 × 3.8 = 5720 + 2145 = 27.170

13.585 × 2 = 27.170

35.035 ÷ 16 = 2.189 = 2.19

32 / 30 / 16 / 143 / 128 / 155 / 144

add offset.

7.15 × .7 = 5.005

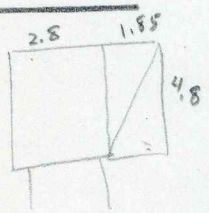
35.035 + 5.005 = 40.040

40.040 ÷ 16 = 2.502 = 2.50

32 / 80 / 80 / 48 / 32 / 16

J-2 - Room 6

a Outset



4.8 × 2.8 = 384 + 96 = 13.44

4.8 × 1.85 = 240 + 384 + 48 = 8.880

8.880 × 2 = 17.880

17.880 ÷ 16 = 1.117 = 1.12 sq meters. (outset)

16 / 18 / 16 / 28 / 16 / 120 / 112

± Inset - subset

4.8 × .7 = 3.36

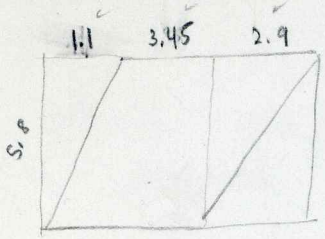
17.880 − 3.36 = 14.520

14.520 ÷ 16 = .907 = .91

144 / 120 / 112 / 8 / 16

1.12 − .91 = .21 sq meters

5-13



5.8
1.1
58
58
63.8 | 3.19
2.9
5.8
232
145
2 | 16.8 2 | 8.41

3.85
5.8
3080
1925
22330
8.41

3.45
158
2760
1725
20.010
3.19
8.41

16 | 31.51 0 | 1.969 = 1.97 sq ft.
16
155
144
111
96
150
144
6
16

.0455

.7
3.85
2.9
745

4.45
3.34

3.85
4
3.45
1.1
455

1.1
3.45
2.9
9.45

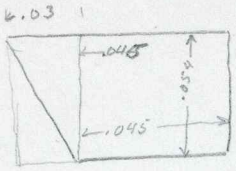
Vaults - Weight Calculations.

Excluding Mouldings - assuming offset.

J-9 (two Entots.)

(inset).

cms

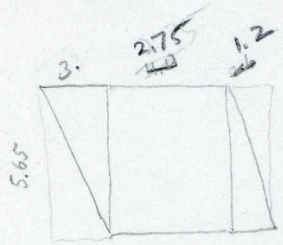


.045
.054
180
225
24.30 cms.

3.0
5.4
120
150
2 | 16.20 | 8.1

8.1
16 | 32.4 | 2.025 sq. meter.
32
40
32
80
80

J-2.



4.
5.65
2.60
8.47
1.695
16 | 32.765
32
76
64
125
112
13

3.
5.65
2 | 16.95 | 8.475

0.6
5.65
2 | 3.390 | 1.695

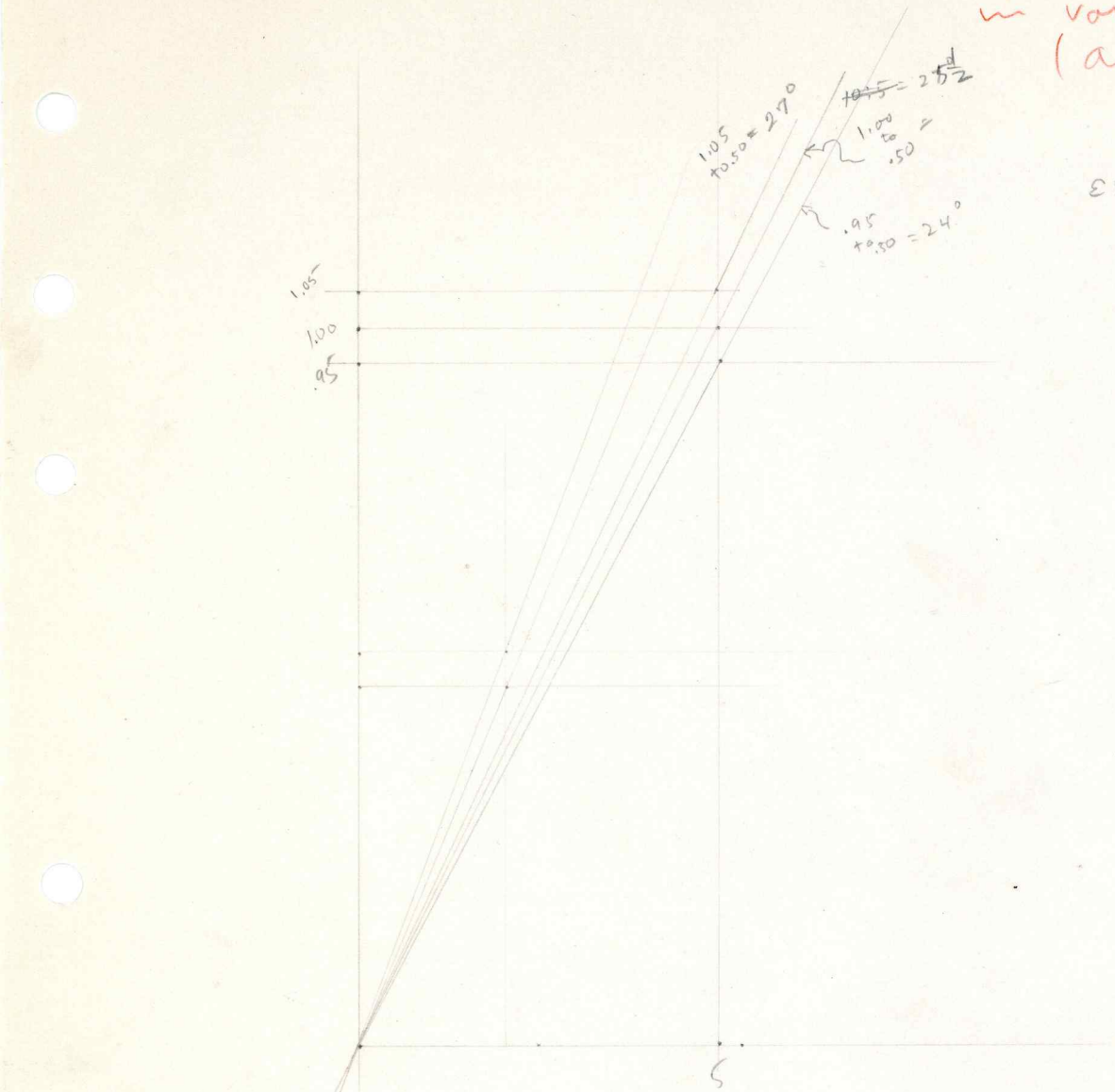
7
5
14
2.047 = 2.048

5.65
3.
2 | 16.95 | 8.475

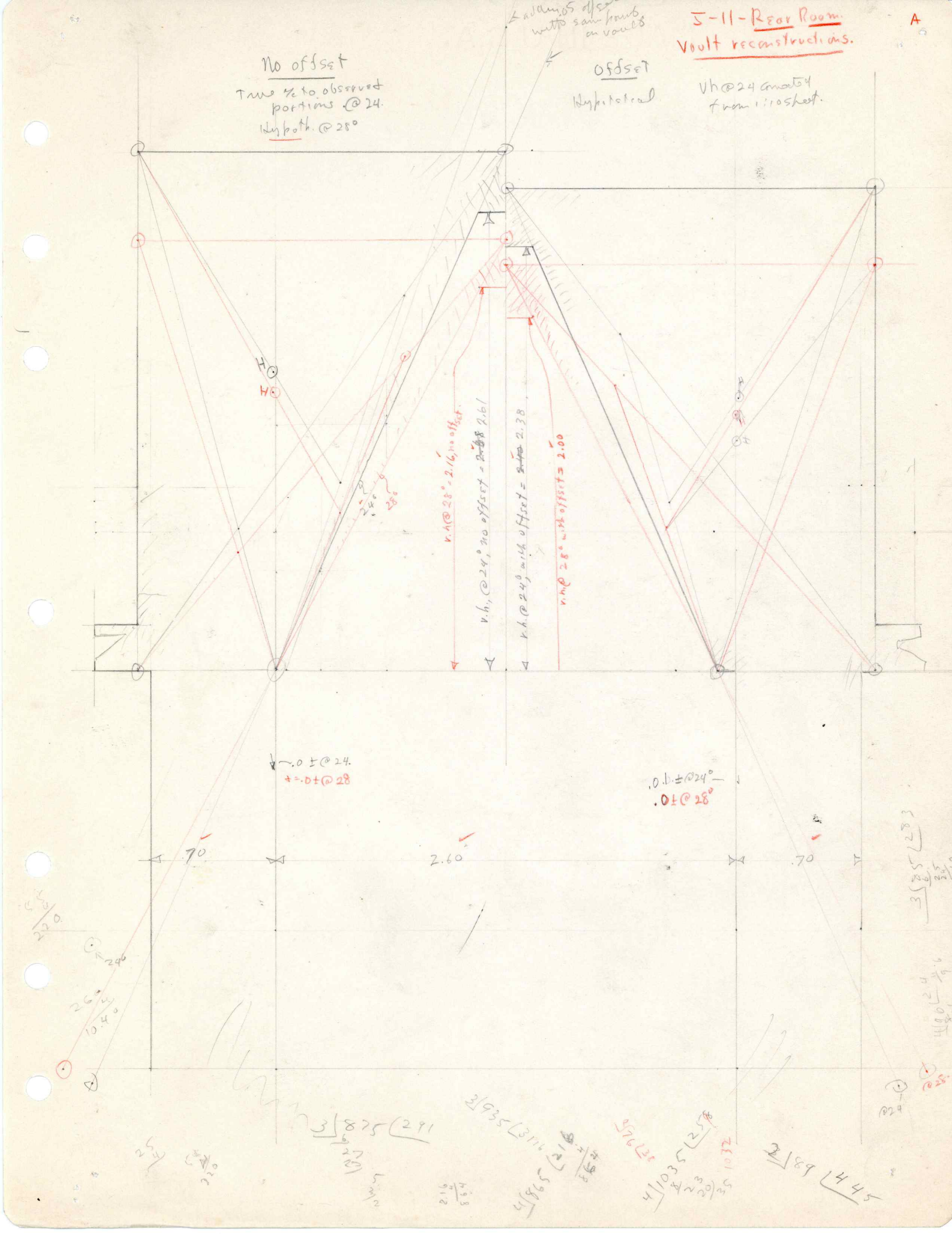
5.65
2.75
2825
3955
1130
15.5375
8.475
3.39
16 | 27.4025 | 1.737 = 1.74 sq. meters.
16
114
112
60
48
122
112
105

5.65
1.2
1.130
565
2 | 6.780 | 3.39

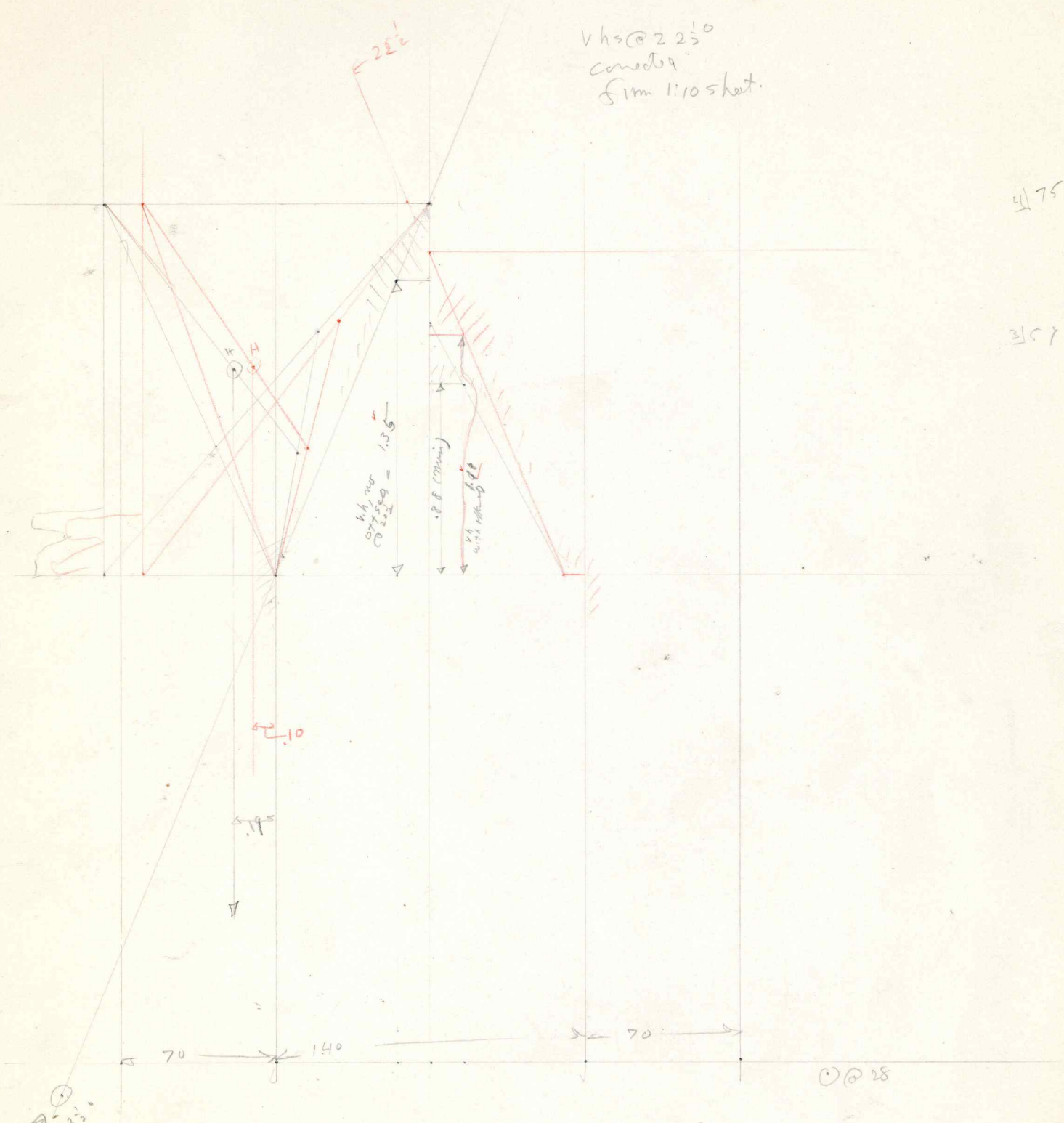
Test for Error in vault measur. (angles).



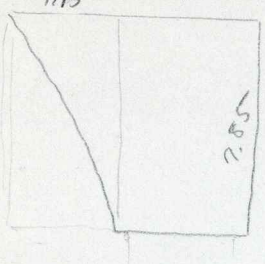
Error of .05 in radial distance = about 1½°


No offset
Two ½ to obstruct portions @ 24.
Hypoth. @ 28°
adding 05 offset with saw-tooth on vaults
Offset
Hypotheteal
I-11-Rear Room.
Vault reconstructions.
A
Vh @ 24 connects from 1:10 sheet.
H
H
v.h. @ 28° = 2.16, no offset.
v.h. @ 24°, no offset = 2.61
v.h. @ 24°, with offset = 2.38
v.h. @ 28° with offset = 2.00
.0 ± @ 24.
± .0 ± @ 28
.01 ± @ 24°
.01 @ 28°
.70
2.60
.70
24
26
10.4°
@ 28°
@ 24

5.23



I-22



3.5 × 7.85 = 27.475

4.15 × 7.85 = 32.577 5

16.23 2

43707

16 | 43.70 | 2.73

32

11.7

11.2

50

48

2

about min. for no thrust.

2 | 32.577 5 | 16.28+ = 16.23

2

12

12

5

4

17

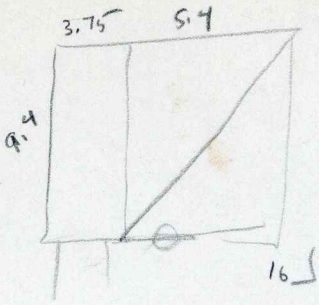
16

17

with offset, outboard vert Ent edl.

5-6-2nd

(CuO≤0, insoluble).



3.75 × 9.40 = 35.2500

5.4 × 9.4 = 50.76

25.38

16 | 60.630 | 3.589

48

126

112

143

128

150

144

2 | 50.76 | 25.38

3.589 = 3.59 sig mol

8.5 × 9

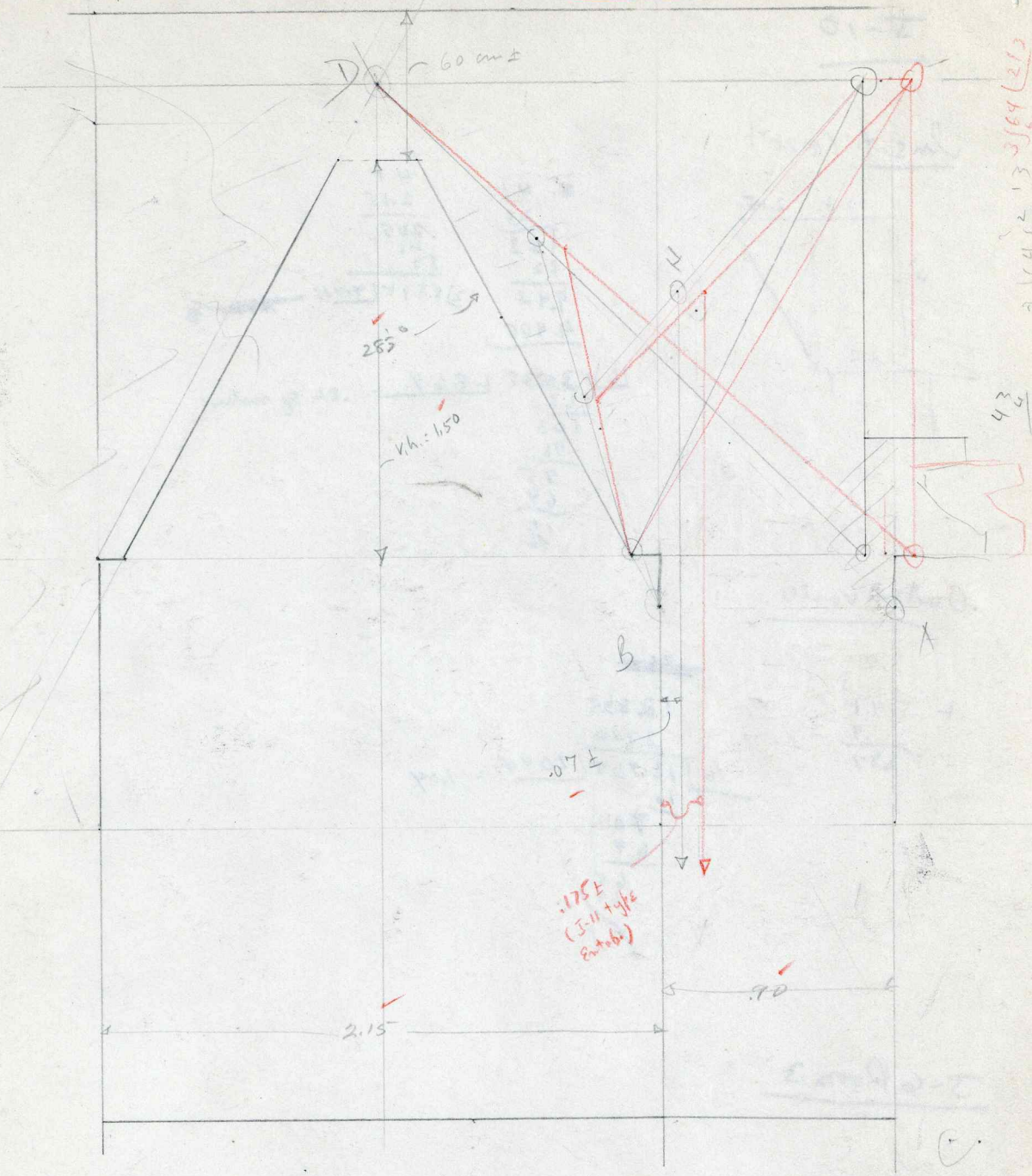
8.5 × 3.75 = 1225

3.75 × 5.4 = 9.15

Vert Zone

J-6 - Rm 3

A



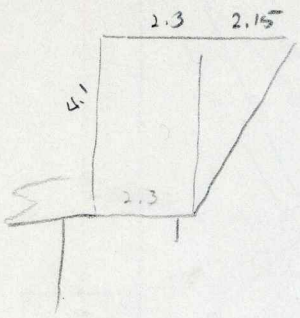
J-6 Room 3

Reconstructed vault

H = center of gravity with J-9 & entablature

J-10

Insol (@28°)



4.45
2.3
2.15

4.1
2.3
123
82
9.43
4.405

4.1
2.15
205
41
82
3|8.8 15|4.405

16|13.835|.864 = .86 sq meters
128
103
96
75
64
11
16

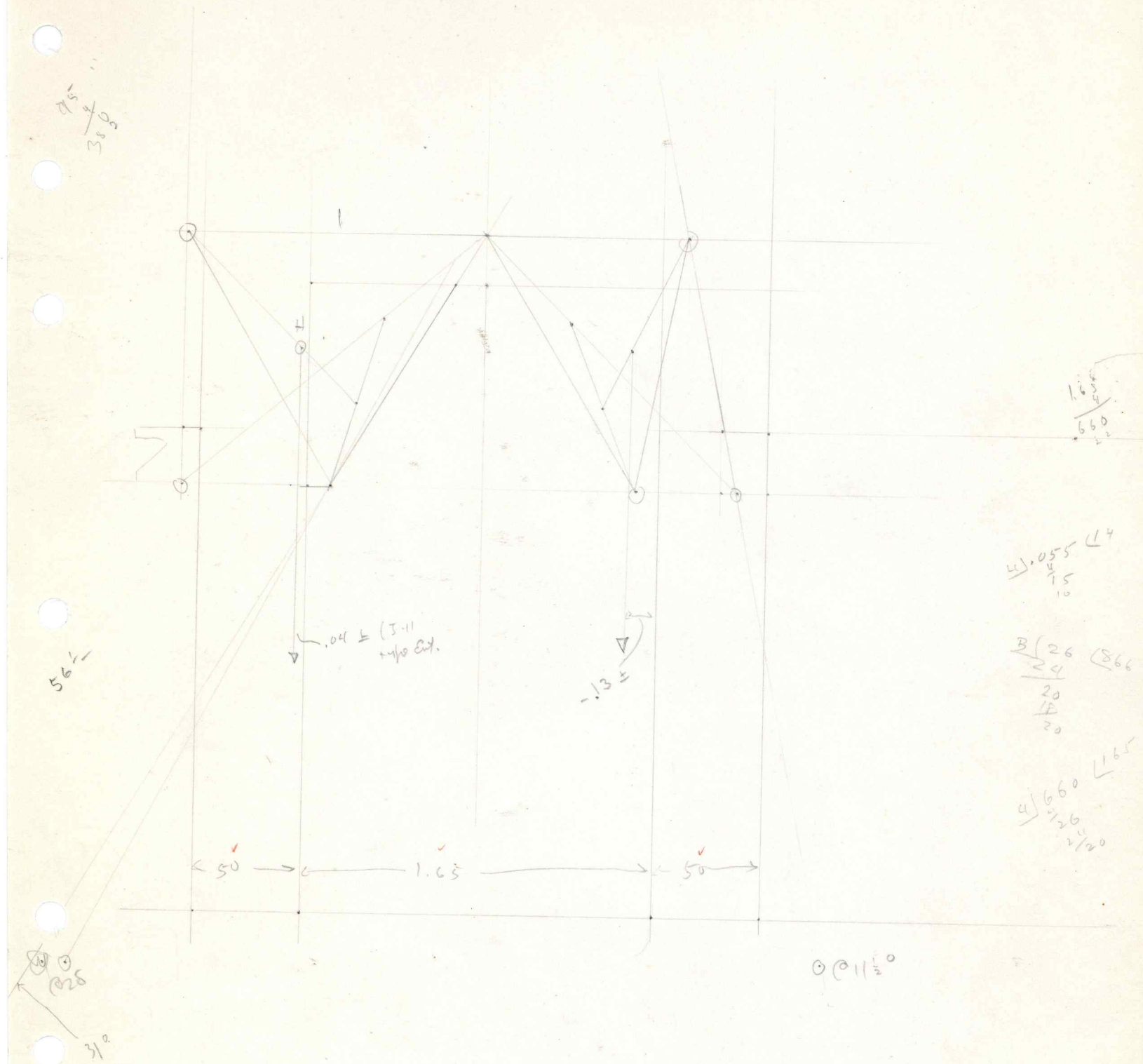
Outsd vol

+ 4.1
.7
2.87

13.835
2.870
16|16.705|1.044 = 1.04
16
70
64
65
64
1

J-6 Room 3

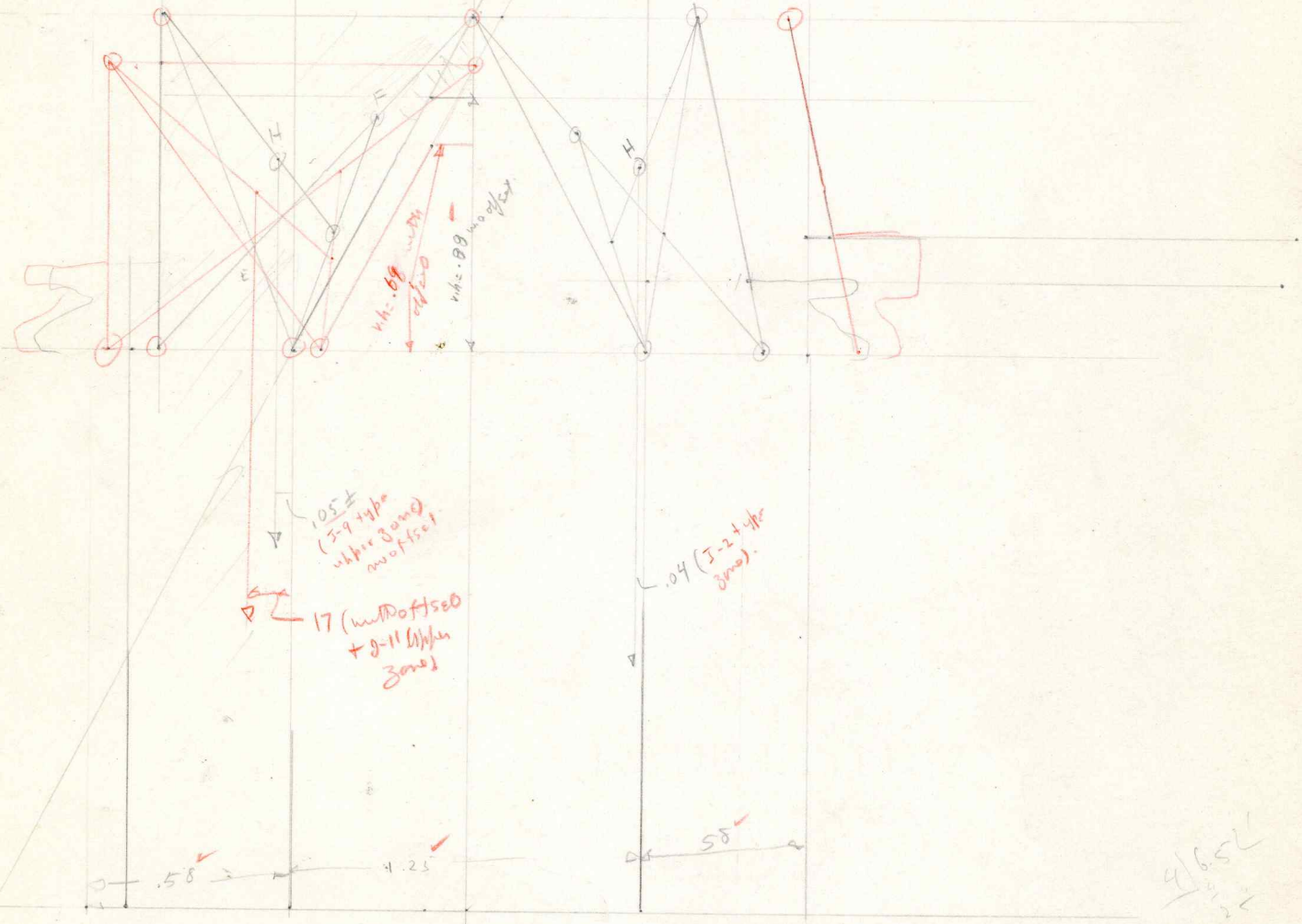
Room 6 of 5-2



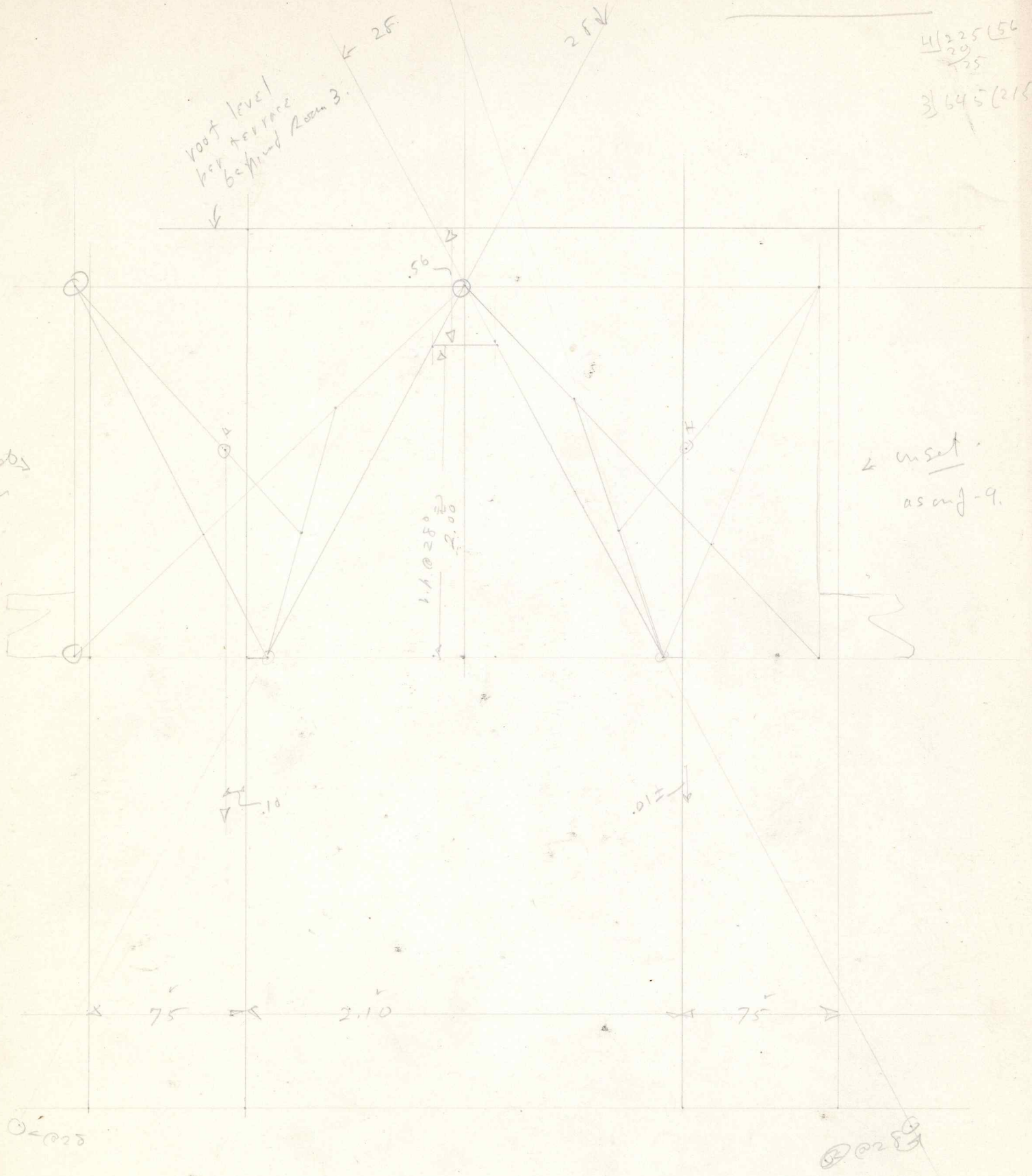
J-10

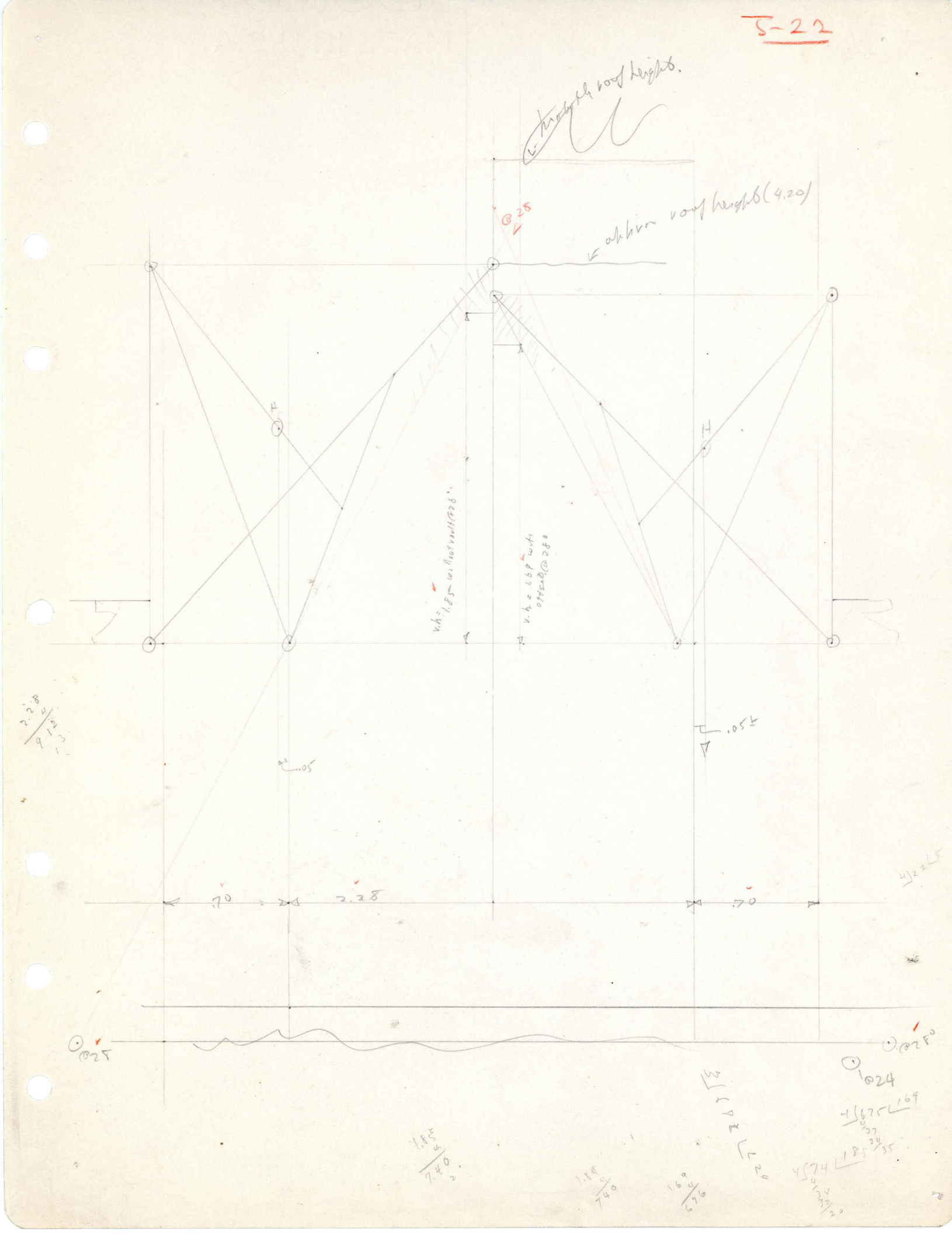
@ 28° (assumed)

W. vault heights corrected from 1:10 scale sheet.



J-6-Room 1


roof level
for terrace
behind Room 3.
.56
outsets
as on
J-11
unset
as on J-9.
.10
.01
7.5
2.10
7.5


Straight roof height.
@28
Arbitrary roof height (4.20)
.70
2.38
.70
.05
.05
@25
@24

Sym. I-13

1933

Reconstructed vault section
- no thrust at 28° soffit,
or greater.

slope
= 12°

True outer section

.17 min. v.h. of true offset

.06 adj for slope

@ 28°

I-2 outer section

C

D

H

H

A

B

assumed @ .30

assumed @ 28°

.05 ±

assumed

assumed offset + height to moulding

.87

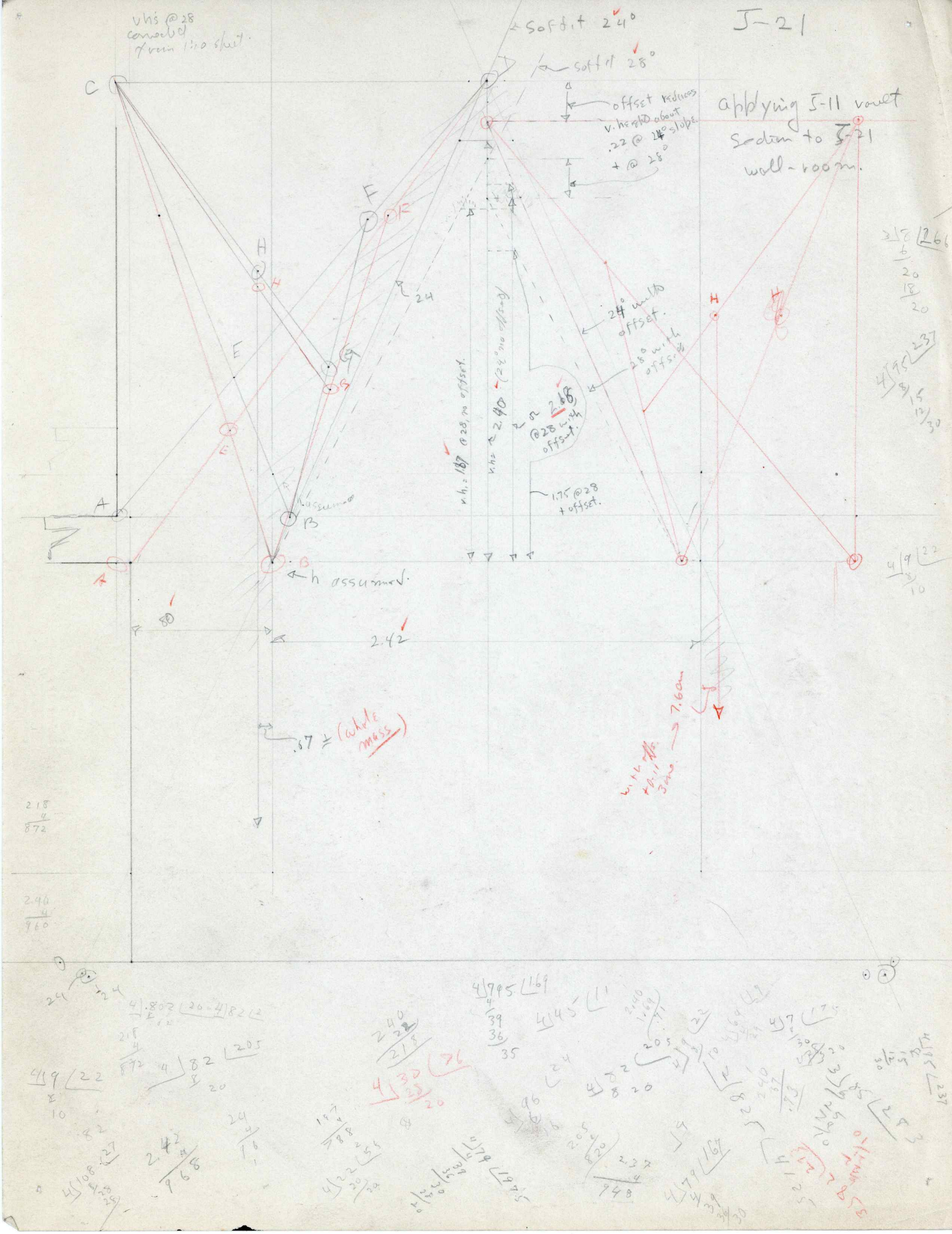
.35 ±

1.62

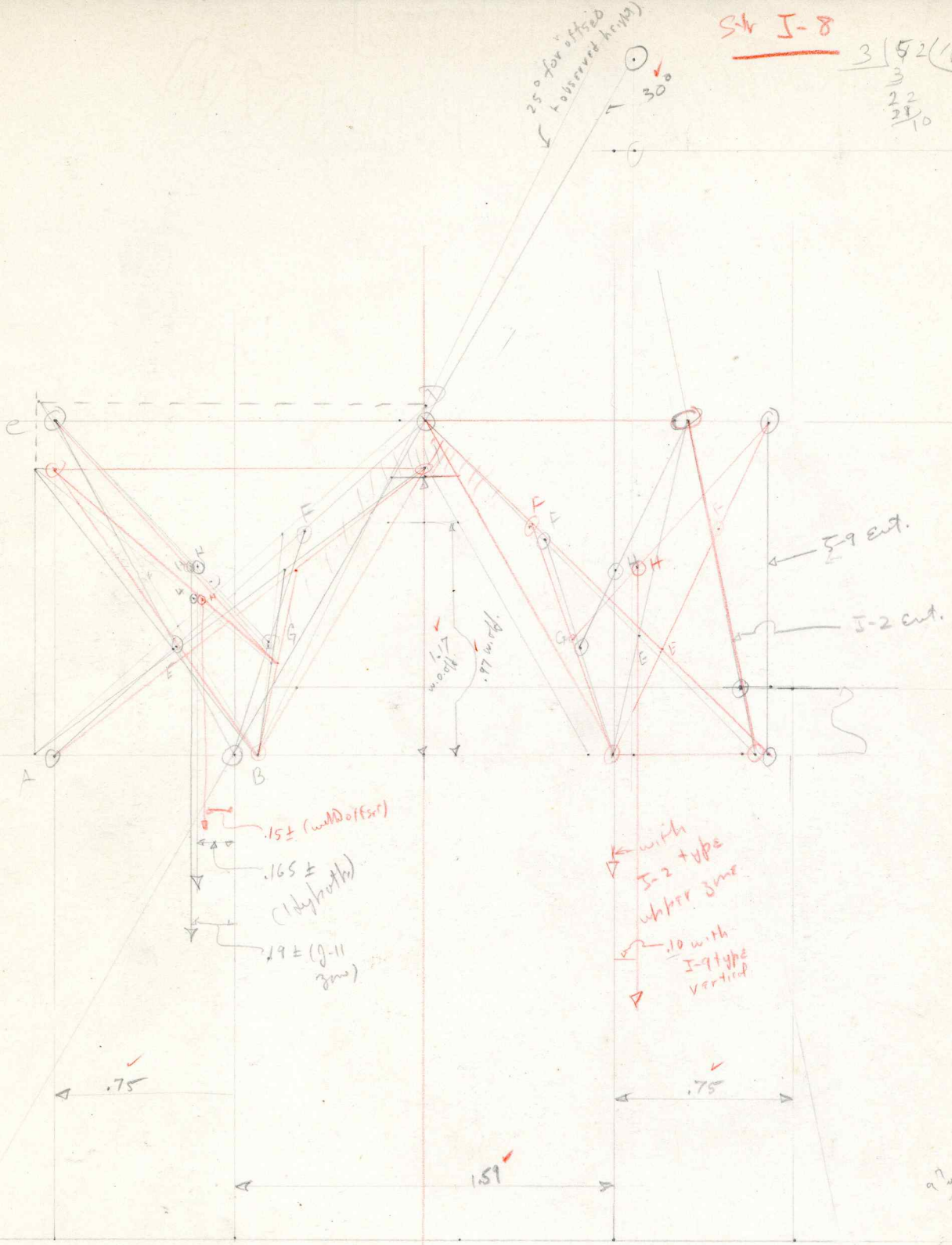
.19 ±

.05 ±

11½°


J-21
vhs @ 28 connects @ crown 1:10 slant.
soffit 24°
soffit 28°
offset redress v. held about .22 @ 24° slope + @ 28°
applying J-11 vault section to J-21 wall-room.
24° with offset.
28° with offset.
v.h. = 1.87 @ 28, no offset.
v.h. = 2.40 (22° no offset)
or 2.68 @ 28 with offset.
1.75 @ 28 + offset.
h assumed.
.80
2.42
.87 ± (white mass)
7.60 am
with flr. 3 more.
A
B
C
E
F
H
S

S-4 I-8


25° for offset
(observer height)
30°
I-9 ext.
I-2 ext.
1.17 w.odp.
.97 w.rdp.
A
B
.15 ± (wall offset)
.165 ± (hydraulic)
.19 ± (I-11 jaw)
with I-2 type adapter jaw
.10 with I-9 type vertical
.75
.75
1.59