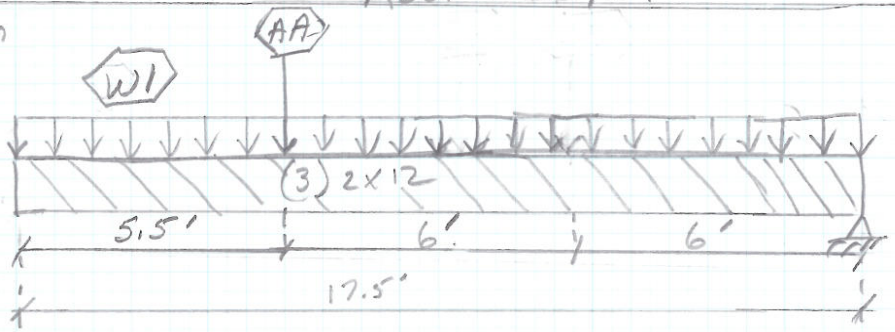
Residential House — OAK LANE
Bill Stavis

Given: Two wide flange beams have been replaced with Triple 2X12 #2 Southern Pine wood beams.
① W8x24 - 17.5 ft long & ② W8x24 - 13.5 Ft long.
③ The 2nd floor, floor joist changed direction, normal to the indicated direction. Length of floor joist span was 19' now 17.5'

Assume: Dead Loads
#2 Southern Pine Modulus of Elasticity =
Roof pitch = 8/12
Roofing materials = 2.8 PSF
#2 Southern pine = 37.3 PCF
2x4 Wood Stud, gypsum board 2sides = 8 PSF
Decking = ½" = 1.2 PSF ; ¾" = 2.5 psf
Allowed Deflection = L/360

Live Loads
Rooms = 40 psf
Roof = 20 psf

BEAM ①



W1 = distributed load weight of vertical wall panel above & 2nd floor bedroom ceilings & insulation
AA = point load from vertical support to Roof & point load from floor joist (3) 1 3/4" x 9 1/4" G.L.

Continued:

W1 DEAD = [8' x 8 psf (wall)] + [15' x (2.9 + 2.2 + 2.4 + 2.1) psf (2nd FLR ceiling)] + [4.1 #/LF x 3 (beam weight)]

= (64 + 144 + 12.3 #/LF) = **220 #/LF Dead Load**

W1 LIVE = 15' x 15 psf (2nd FLR ceiling) = **225 #/LF Live Load**

AA DEAD = [(19' x 26') (1.7 + 2.8 + 1.1) psf (Roof)] / 2

+ [[(6' + 3') (8') (3.3 + 2.5) psf (floor)] + [8' x 8' x 8 psf (wall)]]

= [494 s.f. (5.6 psf)] + [[72 s.f.) (5.8 psf)] + [512 #]

= 1,383.2 # + 929.6 # = **2,312.8 # DEAD LOAD**

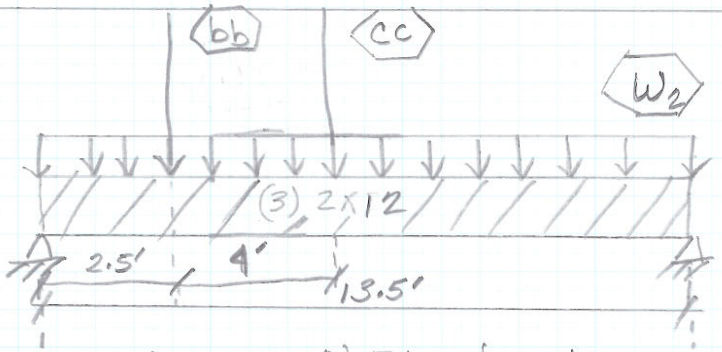
AA LIVE = [(19' x 26') (20 psf)] + [(9' x 8') (30 psf)]

= 2470 # (ROOF LIVE) + 2880 # [FLOOR LIVE] = **5,350 # Live Load**

AA WIND = [(sin 33.7°) (40 psf) (19' x 26')]

= (22.2 psf) (494 sf) = **10,967 # Wind Load**

BEAM (2)



W2 = distributed load from 2nd FLR bedroom

W2 DEAD = [2.5' x (3.3 + 2.5 + 4.0) psf] = **24.5 #/LF DEAD Load**

W2 LIVE = 2.5' x 40 psf = **100 #/LF LIVE Load**

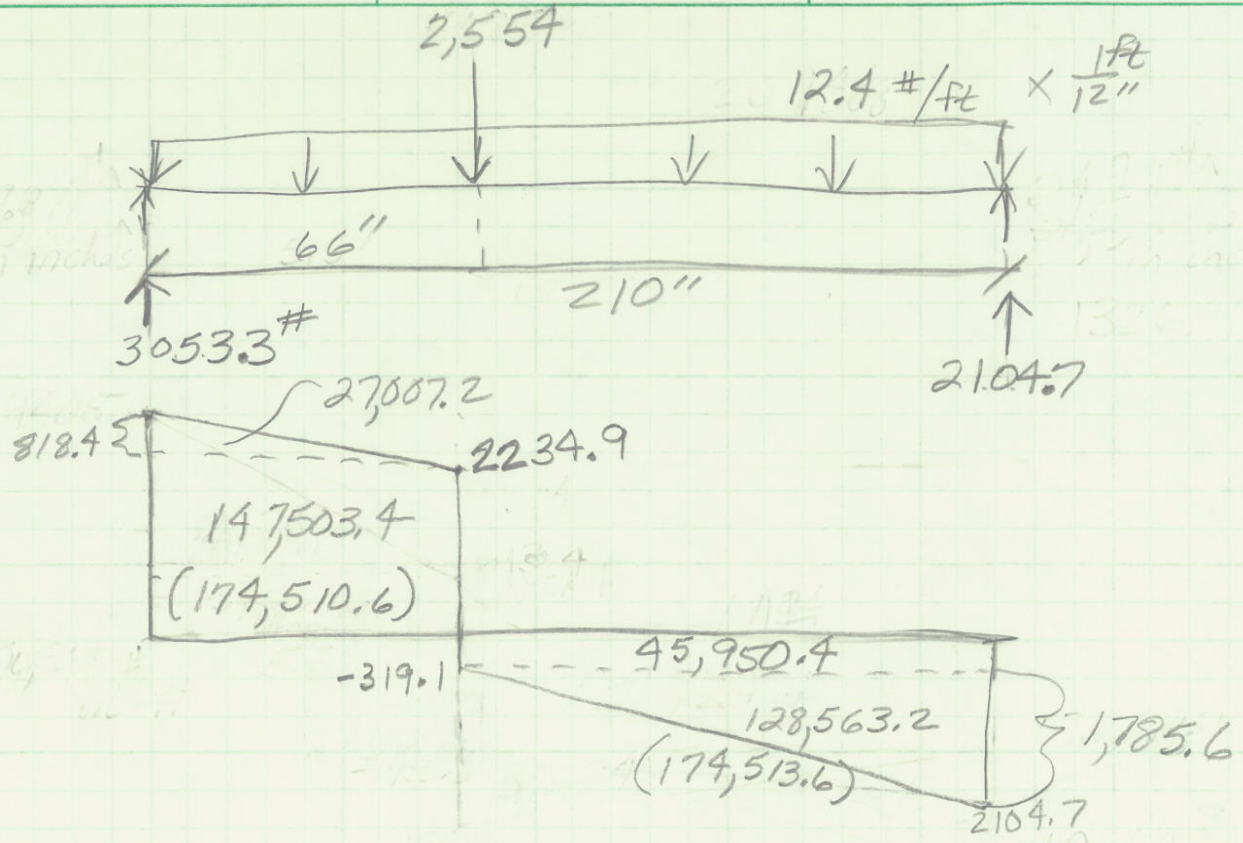
Continued:

Beam (2)

(bb) $_{total}$ = 3,053.3#

(cc) $_{total} = \frac{1}{4}(2{,}554^{\#}) = 638.5^{\#}$

Beam (1)



$$S = \frac{M_{max} \times 12}{F_b} = \frac{174,513.6}{1150} = 151.7$$

$$S = bd^2 \Rightarrow d = \sqrt{\frac{S}{b}} = \sqrt{\frac{151.7}{1.5}} = \boxed{10.1" = d}$$

DAVID

1ST BEAM

YOUR TOTAL WT WAS

$M_{max} = \frac{wL}{8}$ $w = 808 \times 17.5 = 14,140$ lbs

$M = \frac{14,140 \times 17.5}{8} = 30,931$ FT lbs

USING SYP $F_b = 1150$ lbs/in^2

Section required $= \frac{M_{max} \times 12}{F_b} = \frac{30931 \times 12}{1150} =$

$= 322$

CALCULATE BEAM SIZE

$S = b d^2$ b = base d = Height

Let $b = 3 \times 1.5$ (for 3-2X12)

$322 = 4.5 \times d^2$

$d^2 = \sqrt{\frac{322}{4.5}} = 8.4$"

IF YOU ARE USING 3-2X12

THATS GOOD.