

BUILDING TECHNOLOGY Info:

Building Section
Structural Layout
Accessibility Ramp
Mech./Elect. Plan
Stair Design
Roof Plan

Building Section

The frost line is at the top of the footing -that ensures you go down at least 10" below the line for the bottom of the footing not allowing those upheaval forces to get under it.

Allowing a few extra inches at the window is generally good design sense anyway since you may need deepened structural members, flashing, soffits etc., as long as they're not giving an overall height restriction I can't see them faulting you for it. Remember that the spot elevations on each roof are taken from the same relative point so when you're thinking of separation for a clerestory you have to account for one of the roof thicknesses.

In the stair question I got I was able to make it work with a simple L shape. It seems that the landings are multiples of 6" apart in elevation so I took that as my given riser and made the tread as short as the code allowed to squeeze the stair into the space. My code said min. 48" between handrails because of area of refuge(unless occupany calcs dictate more). I didn't have code info on the distance between wall and rail so set them off the wall by 1" making for a 54" min. stair width.

Hope that helps a little.

As you work through it again, ask about anything you are not sure on and go in there thinking you are ready to kick its er, patootie, next time!

On the Building section vignette from the NCARB practice program the high ceiling Meeting room has a joist (in elevation) of 28" deep @ 5' oc. Upon picking the 28" joist it draws 24" joist + 4" slab for a total of 28". But if I pick the 32" it draws 28" joist + 4" slab for a total of 32". Which one is the correct answer here? I am confused.

Great question!!! I will have dig deeper into that. I would assume that NCARB has to accept the 24" + 4", as you can't be expected to measure everything you draw, within the time limits.

It seems to work for me...I pick the 28" joist and I get a 2'-4" deep joist with a 4" slab on top. Same follows for the other dimensions in section and elevation.

That sounds more like it.....good!

For the building section vignette, is a 16 x 8 duct 16" wide and 8" deep? If so, am I correct in that the 8" deep duct (or the largest in an area) plus 8" space for lighting sets the ceiling height under the trusses?

NEVER USE A VERTICAL DUCT, AT LEAST ON THE TEST.....SO, YES, 8" IS THE DEPTH, 16" THE WIDTH. LOOK FOR THE DEEPEST DUCT (AT THE RISER ON THE

FLOOR). THAT WILL MORE THAN LIKELY DETERMINE THE MINIMUM HEIGHTS NEEDED.

Also, for the structural layout vignette, are we required to size the trusses? If so, how? What about the spacing?

NO SIZING NECESSARY. SPACING: PER SPAN OF DECKING (SEE PROGRAM).

In the Building Section vignette I realize that we are supposed to look for the largest duct/joist combination for the floor. Do we actually SHOW the largest joist in our section or do we simply allow for this dimension yet still show the (smaller) members that are cut by the section mark?

YOU MUST INDICATE ON YOUR SECTION EXACTLY WHAT THE APPEARS AT THE SECTION LINE, YET ALLOW FOR THE LARGEST DUCT/JOIST COMBINATION.

Also, in your "Solutions" book Building Section problem, the Passing Solution (page T-9) uses 1'-4" for the joist size on the first and second floors. Towards the northwest of each plan it clearly indicates 20" joists....how come this larger joist was not taken into account in setting the height? Perhaps I am missing something....

THAT'S SOMETHING THAT MANY CANDIDATES DO....DO NOT LOOK FOR THE LARGEST DUCT, THEN LARGEST JOIST (SOMEWHERE ELSE ON PLAN) AND ADD THOSE TWO....YOU WILL BE OVERBUILDING. REMEMBER, IT'S THE LARGEST JOIST/DUCT COMBINATION (THEY MUST BE ONE ABOVE THE OTHER) THAT DETERMINES THE INTERSTITIAL SPACE NEEDED.

Question about footings: is the frost line at the bottom or top of the footing?

EITHER, TOP SAFER

In the Ballast Building section vignette: The ceiling height for the lounge is 17'-0, however the 20x10 duct coming from the adjacent 2nd floor corridor feeding the lounge is significantly higher because of its required ceiling height. The vignette implies that the roof structure above the lounge needs to be much higher than the minimum required clearance allowed for the light fixtures and duct below, yet the solution in the back of the book shows the duct and roof structure above the lounge at a level that would require an impossible "downward" bend in the duct unless the duct went outside the building first. Maybe I am thinking too much but all the other guides I have show an interior riser feeding the typical high ceiling space. In Ballast there is no supply riser.

Also, they got a little tricky on the building section. For parapets I'm so used to having them at the roof edges and the change in elevation, but the directions said "2'-8" parapets at changes in adjacent roofs". No mention of roof edges. My take on this was to not have parapets at the edges (overbuilding), and only have it where the two story volume is. Was this a good call??

The other tricky thing was after drawing the slab and the walls on the first floor, I moved to the second floor and it appeared that a non rated wall crossed the section line. I had a hunch that it didn't and sure enough I erased the slab and saw that it stopped about 4" from the section line. Had I not erased the slab, I would have just put the wall in....Tricky

Tricky is right on Section....I would have done the same.

Section Vignette:

Ceilings: Can the ceiling be drawn across partitions OR should one break the ceiling at partitions?

EITHER WAY

Footings: I understand that the grade beam portion should come to the top of the slab (6" above

grade). Does the same apply for the interior footing directly below the slab? Does the slab run continuously over the footing, OR is it broken by a stubby grade beam extending to the top of the slab?

SLAB-ON-GRADE SHOULD STOP ON EITHER SIDE OF BEARING WALL; B/W SHOULD REST ON TOP OF FOOTING.

Just to make sure I understand- The perimeter grade beams should come up to align with the top of the slab.

Correct

The internal footing should look like a simple rectangle (no beam) under the BROKEN slab with the B/Wall coming down through the slab to the footing.

INTERNAL FOOTING SHOULD HAVE A SMALL FOUNDATION ON TOP, ALIGNING WITH TOP OF SLAB, AS ON PERIMETER. B/W RESTS ON THAT, SLABS STOP ON EITHER SIDE OF B/W.

In the Building Section vignette the passing solutions don't seem to allow for a minimum of 8" flashing height between the bottom of the clerestory sill and top of roof deck. In real life I would never detail the sill to be flush with the top of the deck, there would be no way to install through-wall flashing, counterflashing, etc. Do we assume that sufficient flashing height is built in to the clerestory height that is provided?

CORRECT

Should the top of the footing or the bottom of the footing be at the frost line depth? NCARB's study guide implies the top but another guide says the bottom? I always thought it was the top of the footing at the frost line. Please clarify. Thanks. - a confused interior architect

I FEEL EITHER WOULD BE ACCEPTABLE, AS CODES VARY AROUND THE COUNTRY, BUT SAFE TO PUT FROST LINE AT TOP OF FOOTING.

Structural Layout

1. In the plan a beam and joists are indicated through the corridor. I drew in the joists, but how much space should I allow for the beam. There is no indication how deep this beam is?

CHANCES ARE YOUR SECTION LINE DID NOT CUT THROUGH A BEAM, BECAUSE NCARB DOES NOT HAVE A TOOL (YET) FOR DRAWING A BEAM. UNLESS THERE IS A SIZE SHOWN FOR THE BEAM DEPTH, YOU DO NOT HAVE TO WORRY ABOUT IT.

2. How deep should I draw footings? I've been drawing them 3'-0" deep....

TOP OF FOOTING GOES TO "FROST DEPTH" (GIVEN IN PROGRAM).

I located joist along the non-bearing wall very close to the inside face of the wall, not on top of the wall or not even at the outside edge, following the almost "real life application" which would place the joist 6"+- from the inside edge. The point is that the edge of the deck is not supported by the joist only by the wall for about 1 foot, is this falls into the "minor" violation category or a fatal error. I looked at the passing solution from the NCARB Study Guide and they centered the edge joists on the walls.

I prefer placing structure on center line of wall. One foot in seems serious, but should not be fatal. Let's hope.

When drawing the line indicating a B/W, should I break the line at each door opening, or could I

draw a continuous line the entire length of the designated B/W, than placing the lintel line over the opening?

EITHER WAY IS ACCEPTABLE, EXCEPT DRAWING A CONTINUOUS B/W, YOU MAY FORGET TO DRAW A LINTEL.....YOUR CHOICE.

You show a bearing wall on the first floor underneath the columns and clerestory wall in your solution. If you choose to use columns instead, you would have columns in the same spot as above, but would you need to draw a beam over them to catch the clerestory?

ABSOLUTELY

Does the beam over the columns on the second floor just carry the roof deck and joists?

CORRECT

Hard to know just where NCARB is "cutting" the sections on the floor plan, should we assume like 3' A.F.F.? Is there an advantage to placing a bearing wall beneath the columns on the first level instead of using columns?

NONE

Structural Layout:

1. If an all-steel solution is used, would one have to put an additional beam / lintel over openings greater than 6'? On the lower level of your mock exam, I used all steel and have several beams running N / S of the Waiting room and Video arcade. Do I need an additional lintel underneath my beam? Would both the beam and lintel be on the lower level layer? Is the need for lintels only in bearing wall systems?

NO NEED FOR BOTH, LINTELS IN B/W ONLY.

2. Again, using an all-steel solution, if both floors are using a column, do I need to show it on both floors? Sounds obvious but I wanted to double check.

ABSOLUTELY

For whatever reason, I feel best with an all steel solution. I am concerned that this might yield some small spans, however. Is this a potential downgrade? Professor, your Solutions passing solution shows an intermediate column at the east and west sides of the seating area, yet the center beam spans the entire width (less than 40', I think). Why did the east and west spans include extra columns, when the beam could span the entire distance? The southwest beam is far less than 20', is that always ok? The idea of going to a bearing wall for such a small span seems overly fussy. On the same problem, anything wrong with going to all steel on the lower west entrance wall?

IF THE PROGRAM ALLOWS EITHER STEEL OR B/W-STEEL COMBINATION, THEN SURE, USE ALL STEEL. SOMETIMES THAT SYSTEM IS EASIER TO SEE WHAT YOU HAVE DONE. THE ONLY REASON I USE B/W, IS THAT IT JUST IS YEMPTING TO FILL THOSE EXISTING WALLS WITH SOMETHING....NO OTHER REASON. IF YOU GET INTO A SITUATION WHERE COLUMNS ARE FORCED 5' - 10' APART, MAYBE B/W'S WOULD BE MORE APPROPRIATE. I PLACED A COLUMN OR TWO ON EAST/WEST SPANS, IS BECAUSE I COULD, AND WOULD BE MORE ECONOMICAL. 40' SPAN IS A MAX AND ALLOWED, BUT IF POSSIBLE TO BREAK THAT UP, THEN CHEAPER.

You mention issues with joist depths... might we be asked to size joists? Why do they give roof heights in the program?

NO SIZING NECESSARY ON THIS PROBLEM. ELEVATIONS GIVEN JUST TO GIVE AN IDEA OF VOLUME, AND FACT THAT YOU WILL HAVE WALLS (MAYBE B/W'S)

OVER DOORS.

You suggest that they might ask for an all b/w solution...this leaves no possibility for the clerestory to run perpendicular to joists (I think). Doesn't that require the clerestory to span between bearing walls?

NOT POSSIBLE TO HAVE ALL B/W SOLUTION WITH CLERESTORY IN PROBLEM. THEY MIGHT HOWEVER REQUIRE SOME WALLS TO BE B/W'S, ALTHOUGH I DOUBT THAT.

In a bearing wall solution, if a lintel and beam are the same line type. Will a lintel "turn into" a beam if I design a span to long for a lintel? Seems basic, but, if I try to span wider then, say 8', does the lintel become a beam spanning greater than 8'. This might relate to my previous questions about short beams and all b/w solutions.

I WOULD NOT USE A LINTEL OVER 6', SAY WHEN A DOOR IS IN A B/W. LINTEL, OR BEAM, OVER 6' SHOULD NOT SUPPORT B/W.....TOO EXPENSIVE.SUPPORT

1. Structural layout: Maximum beam spans supporting joists? I've heard 40' but some "passing solutions" I see show them a lot more frequently. At what minimum span would I probably start getting downgraded.

DEPENDS ON CONDITIONS, BUT GENERALLY A 20' SPAN IS IDEAL. YOU MAY BE FORCED TO PUT CLOSER.

I have been doing my review for the BT division and I have several questions regarding the structural layout vignette. I am having a little trouble with the B/W vs. col. issue. My solution followed yours in the joist spanning and deck direction; however, I did my building all col. and beam construction. I had cols. at the corner connections, at each side of the waiting room opening (as you showed) and I added cols at the midspan of the east cafeteria wall and in line with the clerestory on the south wall. Additionally, my joists spanned the other direction over the servery. I felt the shorter span would reduce costs. I would greatly appreciate your expert opinion on my solution.

CAN'T FOLLOW YOUR SCENARIO....CLERESTORY ON SOUTH WALL ???

I apologize for the poor grammar. I added a col. on the south wall between the delivery/ preparation and servery (in line with the clerestory.)

Additionally, I believe in the real world you would have beams around the entire perimeter of the structure. Joists can not handle the lateral load of the walls at midspan. Therefore, I added these perimeter beams that are parallel to the joists. These beams handle the wall connections, as well as, deck bearing. Is this OK?

BEAMS PARALLEL TO JOISTS ON PERIMETER WALL ARE RARELY NECESSARY, IF ONLY SUPPORTING THE ROOF DECK. UNNECESSARY STRUCTURE WILL BE DOWNGRADED.

Structural layout: I am not sure if I should always support a non-loadbearing exterior wall on the upper level with a beam or bearing wall at the roof level of the lower framing plan. It only seems necessary if a clerestory is on the upper level. Are there any other situations I would need to do this?

GENERALLY NO, BUT MAY DEPEND ON WHERE YOU PLACE YOUR STRUCTURE (MIDDLE OF EXISTING WALLS, OR DEGE)....HARD TO EXPLAIN.

WITH REGARDS TO STRUCTURAL LAYOUT VIGNETTE IN BT EXAM, WHEN DESIGNATING A WALL WITH DOOR OPENINGS, WHICH VARIES FROM 3'-0" TO 6'-0", AS BEARING WALL, SHOULD I DISCONTINUE THE DESIGNATION LINE AND USE LINTELS OVER THESE

OPENING OR SHOULD I USE A SINGLE CONTINUOUS DESIGNATION LINE OVER DOOR OPENINGS?

DORF: NCARB will allow you to draw the B/W continuous, OR stop on either side of the opening. A lintel/beam must be placed over door in either event.

THE PRACTICE SOFTWARE CALLS OUT BEARING WALLS W/ BOND BEAM.

SHALL I ASSUME UP TO CERTAIN SIZE OPENING THAT BEARING WALL DESIGNATIONS HAVE INTEGRAL BOND BEAM?

DORF: If openings larger than 6' I suggest using beam and columns in lieu of B/W.

Accessibility Ramp

I took BT today and it looks like all the vignettes were OK except for the ramps which I had a gap of 1'6" in between my runs. Prof, Will I be downgraded for that?

Gap will be considered an inaccessible space, although I feel not serious enough to worry about, especially if everything else is OK.

HC Ramp: Space was soooo tight that I had to create 3 landings, one of them was the extension of the referenced level (same elev.) In one of your past responses you said "2 landings max", any idea on the verdict?

Accessibility: you should be OK

In your solution edition 2, for ramp, I can see you were using 5'x5' virtual landing half way sitting on public sidewalk, is it OK? I feel like I should solve the problem without invading public sidewalk or anything considered public thing. What do you think?

I FEEL USING PUBLIC WAY WOULD BE OK IN THIS SITUATION.

On the accessibility ramp vignette, the bottom landing of my ramp had a 5x5 virtual clear space, however the edge of ramp was within three feet of the double lobby door to the exterior (ramp is parallel to wall w/ double door). can the 5x5 virtual landing overlap maneuvering clearances at the double door?

I FEEL THEY CAN OVERLAP.

On the Ramp Vignette: is it ok to have a dog leg ramp that is 44in (when req.) wide with a 60in x 60in landing?

ABSOLUTELY

Can the handrail extensions encroach within the 5 ft. circle? Can hand/guardrails encroach within the 5ft landing (circle)?

YES, AS LONG AS THEY DO PROJECT MORE THAN 4".

Can we make each element slightly (1" to 2") to make sure the minimums are met?

NOT NECESSARY

I am confused about the answer...

Can the 1' handrail extensions encroach within the 5 ft. circle? i.e. poke into the circle...

IF 1' EXTENSIONS ARE ON THE WALL, OK. THEY DO NOT ENCROACH ON A CIRCLE, THEY ENCROACH ON A 5' X 5' SQUARE LANDING.

Can hand/guardrails encroach within the 5ft landing (circle)? ...

NO CIRCLES INVOLVED. CAN ENCROACH NO MORE THAN 4", PER CODE

Mech./Elect. Plan

Should I draw the largest duct in the framed area or just the size of duct being cut in section?

DRAW DUCT THAT IS BEING CUT.....ALLOW FOR THE LARGEST DUCT.

Question...In Mech/Elec I was running short on time trying to center lights in one small (8' x 15') room. Ended up using three 2x4 fixtures with proper clearance between each and on two sides. Downside is that one perimeter fixture had 8" to the wall, and another had 4". I layed it out again last night and saw that I could have used 2 fixtures by rotating the grid 90 degrees. How much of a downgrade is thiis? (Overlighting the wall and using one too many fixtures, but having proper distribution in the room)....Fatal??? Major downgrade???

Probably major downgrade on Mech.

Would 4 recessed, incandescent lights on 6' centers be an acceptable solution for the reception/work area room of your Computer Mock Exam for the Mech/Elect Vignette? I realize your solution shows 6 lights centered, but that seems to cause the north/south walls to be washed with light, and I'm wary of over-lighting.

THAT WORKS

Stair Design

I took the BT exam last week and was wondering, do all stair design vignettes have the area of refuge requirement on them? I placed one on both sections of the stair and now don't recall if it was even required in the program. On top of that I made the stair width 48" wide total, not 48" from handrail to handrail. Another thing, I designed an L shaped stair where you can see all the stairs below and placed both areas on each of the layers (with a cutline) even though supposedly its not required and you can do it all on one layer. Will I be seriously downgraded for all of these mistakes?

Problems will have area of refuge(s). Total numbers depend on code requirements, which also cover which floors get them. Providing too many probably bot too serious. Providing a stair which may violate code requirements would be veryu serious.

I thought that if you have more then 200 people using one stair you are required to have two, but I thought that each floor entrance required at least one.

Definitely 1 A/R per 200 people (or fraction), but locations depend on code.

For some reason I thought that the area of refuge is at all stair entrances, that is what I showed on the vignette, do you think I would be downgraded for this?

Also, for the ramp design, I made the stair 6'-0" wide in order to fit in with the ramp design, do you think that this would be treated as excessive?

If an area of refuge was required on the second floor only by code, then having one at the intermediate level would be downgraded.

A wider stair than necessary would also be downgraded. Neither violation would be fatal.

When designing the stair I had misread the tread depth on the stairs (10.44). I was in a hurry and thought it stated 11.44. Everything else in the vignette I know is correct. The risers are still within the tolerances allowed. I caught this at the end of the exam with only minutes to spare and not enough time to fix them properly. Will this miscue on my part be fatal enough to fail me alone?

You might be OK, since it is a minor error ("giggle factor"). I would hope that a small discrepancy would not be taken TOO seriously, assumming all else OK.

For the stair vignette - should the stairs always loopover one another and never do a stiar that doesn't do this?

NOT NECESSARILY, USUALLY CAN BE SOLVED WITHOUT "LOOPOVER"

If I had a two run stair (L-shape) going from the first to second floor, did I have to use the same riser height and tread depth for both segments or does the code just require that all heights and depths in each portion are the same? Thanks!

RISERS MUST BE THE SAME WITHIN A "FLIGHT" OF STAIRS, WHICH IS DEFINED IN THEIR CODE AS A STAIR BETWEEN 2 LEVELS (2nd FLOOR TO INTERMEDIATE LEVEL, FOR INSTANCE.)

1. If you can see all of the stair from the upper floor do you draw all of it, or cut it off?
2. From my understanding, if you can see all of it on the 2nd floor, you draw it all just on that floor.

DORF: TRUE, AS LONG AS YOU CAN SEE THE WHOLE STAIR, INCLUDING ALL PARTS OF LANDINGS, ETC., THEN IT CAN BE SHOWN ON THE UPPER LEVEL ONLY, NO NEED TO DRAW ANYTHING ON THE LOWER LEVEL.

I was under the impression that you drew everything you could see (in my case the whole stair and all landings were visible) looking down from the 2nd "layer", and then on the first "layer" you drew a cut stair going up...would it be a failing error to draw it this way?

DORF: NO, YOU JUST SPENT MORE TIME REPEATING INFORMATION THE COMPUTER ALREADY HAD.

Should I only draw cut stairs on the lower level going up to the upper level on the stair vignette. Sometimes a stair going down ducks underneath a landing above that you wouldn't see all of in plan. Should I cut those too?

CORRECT

Railing extensions on stairs/ramps: Can the 12" railing extension bend to give the 5' landing clearance? For example, can a railing continue 4" past the end of a ramp, bend 90 degrees away from the ramp and continue another 8", and that counts for the total of 12" extension?

THEORETICALLY YES. USE THIS METHOD ONLY IN EMERGENCY.

In your Solution edition 2, for stair, you used 6" high riser for grade to lower level and 7" high riser for lower to upper level. I understand we may use different height risers for each level but 1" difference seems too big to me. If I have similar problem in actual exam, is it OK to use just like that or is it better to find other way? (for example for this particular problem I may use 6" risers throughout whole stair since floor to floor height between lower to upper level is 14'-0", in that case I have very tight passage from storage room door to exit to grade door just 3').

USING 6" RISERS OK ALL THE WAY, BUT MAKES STAIR THAT MUCH LONGER.

Also, on the stair vignette, can you show the railing flush with the outer edge of the landing or stair, as if it were built upon the top of the stringer as is typically done on steel stairs, (not on the "wall" side obviously) or should we always show it 2" inside the landing or stair? (Which often requires the landing or stair to be wider to meet clearance requirements)

I WOULD TAKE THE WIDER STAIR APPROACH, BUT YOU ARE CORRECT, AND MAYBE NCARB HAS ALLOWED FOR YOUR APPROACH.

1.) When the code calls for the stair width to be 48" between handrails (because of AR) You taught in your seminar that the stair width should be 4" + 4" + 48" = 4'-8". I cannot remember if I exactly drew 4'-8", but I did make sure that 48" was clear at all areas between the handrails. Is this acceptable?

I THINK YOU WILL BE FINE

2.) How many points are taken off for excessive landings?

SOME, DEPENDING ON HOW MUCH OVERSIZING INVOLVED

In the stair vignette can the area of refuge clearances overlap door clearances at the landing?

NO

On your computer mock exam in BT for the stair, you are only showing one AR on the second floor landing (elev. 14'-6"). The way I had calculated it: 2nd fl occupant load = 360/200 = 1.8 ~ 2 AR's. Is it portion thereof, meaning 201 occupants would still mean 2 AR's? Is this right or am I missing something?

2nd Floor: 360/3 = 120 people using stair = 1 A/R.

Roof Plan

Question about roofs: leave extra space between roofs where clerestory window is? If for example we need 30" should we design the roof for 36". Is this ok or will it be points lost?

POINTS LOST....USE 30"(INCLUDES SILL ETC..)

Could I use only "shed" type roof for all lower roof slopes, this would create a line of ridges coming up to the wall of a higher roof. One would see a vertical triangular piece of wall intersecting with the other roof's higher wall. This may not be a good design in the real life, but for the exam would this be a passing solution?

Shed roofs, of course, may be used. I am not picturing the triangular piece you describe.

When finish the roof exams is recommended to placing flashing at skylight and vents after the roof meet vertical wall and chimney?

skylights and vents are self-flashed, and therefore do not need additional flashing. Vertical walls and chimney definitely need flashing.

On your Roof Design Vignette in the NCARB solution, the slope of the upper roof runs to the left - can't it just as easily run to the right, and have less height? There is easily 30 inches of room for the clerestory and the structure on the east wall, and it seems like it would be a more economical building, not so tall, mine is 25' feet tall, not 29' feet... or is that just splitting hairs as far as the program is concerned?

ACTUALLY, I LIKE YOUR SOLUTION BETTER, BUT IN TERMS OF SCORING, EITHER WOULD ACCEPTABLE.

Most was as expected, but I had one tricky issue with the building section.

Like a previous post, I too had strange wording for the parapet issue. It wanted 2'-4" parapets at adjacent roofs or something to that effect - no mention of roof edges etc. I was at such a loss at how to proceed, I ended up with one parapet in the center - most strange. Of course I am now second guessing myself. I can almost accept not passing for something I have done, but because they decided to rephrase the program in a confusing manner - I would be upset beyond words!

I just want to confirm that it is ok to show the stair entirely from the second floor if all of it is visible. BTW, The stair question was easier than I expected...

CORRECT

Any problem with moving a downspout 3' or so from the end of a gutter? I had a window at the corner of the intersecting wall (corner).

S'OK, I'M SURE

If the 2 out parapet were supposed to e there - do I fail the vignette? Maybe this is an issue to add to your classes?

WE CAN ONLY GUESS AT WHAT THEY MEAN, DEPENDS SOOOO MUCH ON WORDING. I WOULD HAVE TAKEN THE SAME APPROACH AS YOU.

1. Per the parapet issue. If I incorrectly omitted the two exterior parapets (I drew the center), would that cause a fail for the vignette? I am as confident as I can be that the other elements were drawn correctly and the volume is correct. The wording issue really upsets me. sigh...

IF THEY WANTED PARAPETS, THEN THIS WOULD BE A LIFE-SAFETY ISSUE, AND IMPORTANT. I FRANKLY DOUBT A FATAL ERROR, BUT IMPORTANT.

2. Structural. The structural problem had 2 entrances that were recessed from the perimeter (north and south walls). The program and plan said they were covered and structure could go outside the perimeter at those locations. My solution spanned the recess with joists. I had parallel beams flanking the entry - the entry niche centered within a +/-25' span - and joists running perpendicular to the beams (parallel with entry doors). The edge joist or two actually ran outside the perimeter creating the structure for the covered entry. With the assumption that the walls are independent of the structure, and I was not cutting into the joists or deck, I did not add any additional structure to the entry recesses such as bearing walls, etc ((un)like your class problem)). Does that sound correct?

AS LONG AS YOU DID NOT CANTILEVER THE BEAMS, SOUNDS OK....BUT FRANKLY, A LITTLE HARD TO FOLLOW.

Roof Plan Vignette:

Cricket: Is there a rule of thumb for proper cricket size at chimneys (perp. dim. from face of chimney)?

EQUILATERAL TRIANGLE SEEMS LIKE THE BEST APPROACH.

also - on the roof vignette - there was a room labeled "Cooler" off of the kitchen. program says skylights are not required in hall, storage rooms and closets. i assumed this room can be considered a storage room, and since it is labeled a "cooler" it would not require the need for a skylight which would result in heat gain into the room. did i make a correct assumption?

SOUNDS LIKE YOU MADE THE RIGHT DECISION.

In your computer mock exam for the BT roof vignette, program calls for 1 exhaust fan per pair of toilets. It looks like you are showing 1 per toilet. Is this correct? Also, program calls for skylight to be provided where no windows are shown and no clerestory has been specified. Your solution shows 2 skylights in the waiting area, but technically there are 2 windows in this room on either side of the fireplace. Are the skylights really required here?

1 or 2 exhaust fans OK, although 1 would be better if program requires that. Windows in Waiting Room are not to exterior, so felt this room should get skylight.

Building Section

Structural Layout

Accessibility Ramp

Mech./Elect. Plan

Stair Design

Roof Plan

STILL TO ORGANIZE BELOW!!!!

On your computer mock exam you are showing a beam along the south cafeteria wall that supports the wall above, but you do not show a beam along the east cafeteria wall to support that wall above also. can you please explain why this is?

East wall is a two story/ self supporting wall, and therefore does not need an intermediate beam.

Is it a fatal error if you choose on the building section vignette the ceiling to slab height as a combination of largest joist and the largest duct at a particular floor? (not the largest overall combination)

I think the idea is to maintain the programmed ceiling height in every floor so you should get the

largest duct and joist combination for each floor.

PROBABLY NOT FATAL, BUT YOU WILL BE OVERBUILDING UNNECESSARILY.

Your sample NCARB solution:

1. Is it alright to provide only a 36" single door at the exit corridor?

NOT WITH A PAIR OF DOORS LEADING OUT OF THE LOBBY.

With a pair of exit doors leading OUT of the lobby, we need to provide a matching width or smaller exit at the exit corridor right? ie. either double doors or a single 36" door should be fine. Is that correct?

NO, IF DOUBLE DOORS LEAD OUT OF LOBBY, AND THERE ARE NO OTHER DOORS LEADING INTO LOBBY, THEN A NEW PAIR OF DOORS MUST BE SHOWN AT THE CORRIDOR.

2. Does the 44" min exit route also applies to the size of that new door opening? (i.e. I should provide double doors) Or it's only determined by the size of the existing exit doors?

44" APPLIES TO STAIRS AND RAMPS.....NOT DOORS.

Only the roof planes need to be drawn within the building envelop (dash lines), not the gutter/downspout, right?

CORRECT, GUTTER MAY BE DRAWN JUST OUTSIDE OF ROOF EDGE (DASHED LINES).

1. In your mock solution of the ground floor plan, you show that the clr for the lobby door is 5'min, I don't think it's right. In the program, it stated "when opening, doors shall not reduce the width of landing to less than 1/2 of the required width." So, I think it should be 5'6": 3'door + 30" (1/2 * 60") what do you think?

ACTUALLY THAT LANDING (PASSAGE) ONLY NEEDS TO BE 54" PER OCCUPANCY, CODE OVER-RULES TO 60". Actually.

2. can guardrail project into the area of refuge?

A/R SHOULD BE 30" X 48" CLEAR BETWEEN RAILINGS.

1. So the landing should be sized based on the occupancy, not the over-ruled code?

NO! THE CODE DIAGRAM OVER-RULES THE 54" BY OCCUPANCY.

2. Can I size my landing based on the 60" code over-rule just to be safe?

SEE ANSWER ABOVE.

In your solution, you said all area of high roof should always be higher than low roof. I know it's a good practice, but is that a downgrade or fatal error if that's violated?

YES

1. on the upper level, when a portion of stairs goes under a landing: if I show that run with cut stairs, a portion of that cut stairs will still overlap that landing, is that allowed? Or in that case, I should show up to and include the intermediate landing on the upper level; on the lower level, I DON'T show the interim landing, but show the stair in question in cut stairs and the rest of the stairs.

IF YOU CAN SEE YOUR ENTIRE STAIR FROM UPPER LEVEL, NO CUT STAIR REQUIRED AND NO DRAWING ON LOWER LAYER NECESSARY.

IF STAIR GOES UNDER ANY PORTION OF UPPER LANDING, THEN CUT STAIR SHOULD BE USED ON UPPER LAYER AND ON LOWER LAYER FOR SAME RUN.

IF STAIR CAN BE SEEN FROM UPPER LAYER TO INTERMEDIATE LEVEL, THEN DRAW THE STAIR TO THAT LEVEL. ON LOWER LAYER DRAW INTERMEDIATE LANDING, REST OF STAIR GOING TO GRADE, AND A CUT STAIR ON FLIGHT GOING UP ONLY.

2. When using cut stairs on the lower level, does that mean the same run of stairs should be shown AGAIN in the upper level as either cut stairs or full-drawn stairs??

SEE ANSWER ABOVE

3. I wonder how flexible about what to and what not to show. I am still quite confused with this issue, thanks advance for the advice.

JUST MAKE SURE THE COMPUTER HAS ALL THE INFORMATION, THERE ARE LOTS OF WAYS TO SHOW IT.

Bldg Sect:

In your mock exam solution, the roof elevation between the main bldg and the meeting room has 4 inches difference. I think a parapet should be provided right? Or in that case I could bring up the lower roof for 4 inches to make it flush, so that I could eliminate 1 parapet?

PROVIDE PARAPET

Structural:

1. on the lower level plan, at where the lower roof meet the high wall, can I extend the roof deck to the center of the wall instead of just touching the outside edge? It seems to make sense because you suggest us to extend the joist to the center of the wall.

OK

2. Should both directions of the joists extend into the center of the wall?

YES

What's the max distance between downspouts?

GOOD QUESTION. TOO MANY UNKNOWNNS.....SUGGEST 1 AT EACH END WILL SUFFICE.

In the bathrooms, if we have sinks at the opposite wall of where the toilets are, do we need to provide 2 plumbing vent?

SOUNDS GOOD.

This is regarding what to show and what not to show in both levels, please tell me if this is correct:

If the stairs connecting the intermediate and the lower level cannot be seen entirely from the upper level, I am going to show only up to the intermediate landing. Then on the lower level, I am not showing the interim landing, but show a cut stairs connecting the interim landing and the lower level, and the rest of the stairs.

Is that right?

IF YOU CAN SEE YOUR ENTIRE STAIR FROM UPPER LEVEL, NO CUT STAIR REQUIRED AND NO DRAWING ON LOWER LAYER NECESSARY.

IF STAIR GOES UNDER ANY PORTION OF UPPER LANDING, THEN CUT STAIR

SHOULD BE USED ON UPPER LAYER AND ON LOWER LAYER FOR SAME RUN.

If this case, the cut stairs I am showing on the upper level will partially overlap with the upper landing, is that allowed?

Basically, if the computer has all the information, you can show the stair in any number of ways. If a landing hides a portion, then that portion must be shown on a different layer.

IF STAIR CAN BE SEEN FROM UPPER LAYER TO INTERMEDIATE LEVEL, THEN DRAW THE STAIR TO THAT LEVEL. ON LOWER LAYER DRAW INTERMEDIATE LANDING, REST OF STAIR GOING TO GRADE, AND A CUT STAIR ON FLIGHT GOING UP ONLY.

1. Building Section

When I draw the building section on exam, how should I draw the intersection area such as intersection of ceiling line with partition wall? Just cross each other or should ceiling line stops at partition and resume the other side of partition?

EITHER WAY IS ACCEPTABLE.

The other question I have is that isn't it safer to provide 9" clearance between ceiling line and bottom of duct rather than 8" minimum clearance? Because NCARB software is not accurate so I am afraid I may violate 8" minimum clearance requirement.

ALWAYS PLACE DUCT AT BOTTOM OF JOIST TO AVOID CONFLICT.

2. Structural layout

On your sample solution, the direction of joist at lower right area of plan is same as direction of rest of area, but aren't joists at lower right area supposed to be directed shorter way (parallel to 20')?

EITHER WOULD BE ACCEPTABLE.

I heard for this particular vignette it would be better to use simple bearing wall system rather than column and beam system, is it sound right?

NOT BETTER, JUST AN OPTION. SOME FIND USING ALL STEEL EASIER.

On your sample solution, it seems like bearing wall stops right before lintel (window/door location)and resumes the other side of lintel, but I think bearing wall should be continuous all the way to the end since the plan is cut in high elevation, and lintels are to be overlapped on bearing wall line. Do you think am I right?

PLAN IS ACTUALLY CUT THRU DOOR, BUT CONTINUOUS BEARING WALL, OR STOPPING B/W ON EITHER SIDE OF DOOR, IS ACCEPTABLE.

3. Accessibility-Ramp

This seems like minor thing but I just want to have your advice on that.

When I make inside switchback handrail for switchback ramp, what should I do for little gap between two handrails since code requires "inside handrails on switchback or dogleg ramp or stairs shall be continuous between runs or flight". It is a such small gap so it is hard to draw small handrail with this dumb NCARB software.

"SMALL" GAP WILL NOT BE A PROBLEM, BUT TRY TO OVERLAP A LITTLE.

4. Mechanical & Electrical

If I have for example 152 sf for the room and requirement saying "Acceptable air distribution pattern includes one supply diffuser and one return air-grille for every 144 sq. ft of floor area in each space", how many diffusers and return grilles should I provide for the room?

What if I have 158sf or 162sf, how can I determine number of diffusers and grilles by what criteria?

HOW MUCH " ROUNDING GOWN" NCARB WILL ALLOW IS HARD TO GUESS. TO BE

SAFE, IF OVER 150 SF, PUT TWO AND TWO.

5. Stair Design

What would you recommend for showing stair on 2nd floor plan and Ground floor plan?

I think if I follow conventional way of showing for the stair such as showing cut stair approximately 5' from ground floor and show all the stair treads which are visible from 2nd floor, I am O.K. Do you think is this sound right for this specific vignette?

IF YOU CAN SEE YOUR ENTIRE STAIR FROM UPPER LEVEL, NO CUT STAIR REQUIRED AND NO DRAWING ON LOWER LAYER NECESSARY.

IF STAIR GOES UNDER ANY PORTION OF UPPER LANDING, THEN CUT STAIR SHOULD BE USED ON UPPER LAYER AND ON LOWER LAYER FOR SAME RUN.

IF STAIR CAN BE SEEN FROM UPPER LAYER TO INTERMEDIATE LEVEL, THEN DRAW THE STAIR TO THAT LEVEL. ON LOWER LAYER DRAW INTERMEDIATE LANDING, REST OF STAIR GOING TO GRADE, AND A CUT STAIR ON FLIGHT GOING UP ONLY.

Do the diffusers/returns from DIFFERENT rooms need to meet the 4' distance requirements? Or it only applies to d/r in the same room?

SAME ROOM ONLY

When we are using cut stairs, does the 2 elevations represents the 2 landings? or can I draw a partial cut stairs so that 1 elevation is the landing and the other one is just that particular step?

NEVER SHOW ELEVATIONS OF TREADS. ELEVATIONS ARE ALWAYS OF LANDINGS

1. I know you suggest us to show the cut stairs on the lower level, but in some cases, I always feel it looks better and makes sense to show it on both levels, if I do that, would it be a downgrade?

NO PROBLEM, SHOW TWICE IF YOU WANT.

2. If I could see the entire stair on one level, does it matter if I show it on the upper or lower level?

SHOW ON UPPER LAYER ONLY

1. You overlap the 5'x5' clear on the top of the ramp with the 8'x8' clear for the stairs. Isn't that not allowed??

I DON'T THINK SO.

2. Is the mid-rail of the stairs allowed to protrude into that 8'x8' clear for the stairs?

YES

3. Can the door maneuvering clear overlap with other clearances? (i.e. the 5'x5' or the 8'x8')?

I FEEL YES

1. So the conclusion is all clearances in the ramp vignette can overlap, right?

I HOPE SO

2. For both stairs and ramp vignettes, can I increase the sizes of landings, ramps and/or stairs to simplify the solutions or should I always try to use the least size possible?

DO NOT INCREASE UNNECESSARILY, ALTHOUGH TO SIMPLIFY DESIGN CAN BE JUSTIFIED.

Also, if the access to the bottom of the stairs is kind of far away from the access to the ramp, would that be a fatal error?

NOT FATAL, BUT UNDESIRABLE DESIGN LOGIC

On the BT - Structural Layout Vignette, what is the best way to space the joists? Is it better to intuitively space them at varying distances based on their span (not going over the max span), or simply space them at the maximum allowed regardless of span?

Use the max. allowed spacing in all spans.

In this vignette you will have 3 landings

- 1) the second floor
- 2) the one between two flights of stairs
- 3) and the one at the intermediate level

Obviously you draw the 1) on the second floor only then you draw 3) on the first floor only but do you draw 2) on both floor plans?

I'm pretty sure the answer to this is yes, but the illustration in my practice book only shows the second floor solution (why!) so I want to be clear.

No need to draw 2) twice.....use the 'cut stair' tool on the lower level plan.

* This Question is for someone familiar with the computer program. When you use the stair cut it puts an elevation tag at both ends. My question is in regards to the elevation tag on the cut stair side not the shown landing side. Does that elevation tag represent the stair at the next landing (not shown due to the stair cut)?

* This is my understanding. I use the cut stair and indicate the landing levels on both sides. My only question is showing the rails when using this. I stop them at the cut lines, no different 'real life'.

Professor Dorf mentioned in an earlier post about showing the full stair on either plan upper or lower. This too would show the railings to broken. I'm thinking either way is correct.

* I would agree with Steven to stop the railing at the cut line.

* DORF: Absolutely

* I just want to clarify the issue with cut stair. If I place a cut stair on the upper level, with the handrails, extending to the cut lines, do I then place the opposite cut stair at the lower level with the handrails extending to those cut lines?

* DORF: YES

Structural: is it important to span the roof decks to the same direction for both the upper and lower roof?

ABSOLUTELY NOT

Roof: is the size/angle of the crickets critical?

NOT A MAJOR ISSUE.

And does it matter for the ex. fan to be shown wall mounted or ceiling mounted?

DEPENDS IF FOR PAIR OF TOILETS OR SINGLE.

BT-Roof Comp mock: I have a similar solution to yours, except my high roof ridge aligned with the the clerestory, your ridge is 1-2' to the south of clerestory. I keep the high roof slope 6:12 on both

sides. This makes both north and south elevations of the lowest point of the high roof not the same, is that ok?

No problem

In building technology stair design vignette, does anyone have a clear understanding how you determine the width of the stairs required?

The code in my practice book says min. 44" but the occupant load has something to do with this. i.e. occupant load at second floor = 360 with two exits required therefore a single exit would be a 180 load. They then give a factor of .3 for your stair width. This would equal 54" but the solution in my "old" NCARB study book looks as if its drawn at 60". They don't have an explanation of this in the illustrated solution.

If someone out there understands this, please let me know. I'm lost here.

There's three ways to determine the exit width.

1. occupant load
2. min. exit width
3. min. width as dictated by the area of refuge.

—

In your example, 54" is correct since the occupant load requires more than the min. Areas of refuge have nothing to do with stair width as they only occur at door landings. Stair width and landing width are independent.

Dorf: THIS IS NOT CORRECT!!!! READ RESPONSE FROM VIN IN CANADA.

How is this incorrect? I may have overstated the independences of landings in that they must equal stair width, however, they typically do not have to exceed a specified minimum. As far as areas of refuge are concerned, your own sample solution online shows how they have no relationship to the stair width as long as they (the AOR's) are properly configured.

Dorf: THE WAY I AM INTERPRETING THE AOR CODE, CLEAR DISTANCE BETWEEN RAILINGS MUST BE 48", THEREFORE OVERALL STAIR WIDTH = 48" + 4" + 4" = 56".

One of us is missing something. Assuming that the configuration is accommodating, the AOR size (which is a constant per area required) has nothing to do with the stair (tread) width -- as your online solution so clearly exemplifies.

Dorf: PROGRAM IS NOT INCLUDED ON ONLINE SOLUTION.

Based on the information you've given, 54" is correct based solely on occupant load. However, double check the AOR requirements. For example, the NCARB practice vignette requires 48" clear between rails when an AOR is required. This would make the min width 56". Unless you're omitting another requirement in your example, the difference between 56" and the 60" solution could be a matter of not being able to determine the exact dimension in the study guide or the designer simply making the stair width match a 60" landing. Which leads me to a question for P.D. ... Would you consider 4" in extra width to match a landing a downgrade? Unless there is a requirement that SCR hasn't mentioned, could this be an indication from NCARB that minor over-building is OK?

**

PROGRAM IS NOT INCLUDED ON ONLINE SOLUTION.

True, just as SCR failed to mention this requirement (if it was in the example) so I did not assume it.

My only point was that stair width is independent of AOR SIZE (at the landing) I never meant that one should ignore other AOR requirements.

Glad we're now on the same page.

Dorf: 4" is not serious over-building, just makes the problem a bit tighter to solve. I still contend that the 56" is the correct overall requirement for the stair in question. This does not mean that you should avoid checking the width based on occupancy, which may over-rule.

[I still contend that the 56" is the correct overall requirement for the stair in question.]

Just so I have it straight. You are assuming the 48" clear stair width requirement when an AOR is required, right? I wasn't making that assumption since one of the tenets of the exam is to use their printed code requirements ONLY. We've seen and heard of variations in the exam code sections and while it's certainly wise to be cognizant of that typical requirement, we should not invoke it if it's not present in the exam. Don't you agree?

As they say in every set of instructions, "These are the ONLY code-related criteria you are required to use."

Dorf: CORRECT, FOLLOW THEIR CODE ONLY.

If you don't mind me butting in here on this one:

The program (according to NCARB practice vignette) states: "When areas of refuge are required, the STAIRWAY WIDTH shall have a minimum clear width of 48" between handrails". Perhaps to accommodate two people having to carry a person in a wheelchair down the stairs...

Since the stairwell cannot decrease in width in the egress travel it stands to reason that the entire length of stairwell (assuming an AOR is needed on the uppermost level) needs 48" clear between handrails. Hence, Prof. Dorf's interpretation of 48" + 4" (one handrail at 2" in width at 2" away from the wall) + 4" (the other side) for a total of 56".

Am I interpreting this correctly? Does it make some sort of sense?

Well, everyone, the following statement is not in my NCARB practice book. "When areas of refuge are required, the STAIRWAY WIDTH shall have a minimum clear width of 48" between handrails" Hence, confusion on this matter. My book is about 5 years old.

But from what I've gathered from this lively debate is that you have to follow the code they give you precisely and read and understand it very carefully. Perhaps the code is different in each different scenario of tests they give. The code they give you on the test isn't always the same on every test, is it?

I just wish the practice book solution example had more explanation on why the "passing solution" passes. They show these sketch circles which are suppose to be the minimum clearances but you have no idea what size they actually are.

As for the AOR, you just have to have an area that is 30x48 on the second floor landing for the wheelchair to park but not obstruct your minimum clear path.

I'm going to go over this several more times before I take the test

[The code they give you on the test isn't always the same on every test, is it?]

Right. We've seen and heard of variations.

[I just wish the practice book solution example had more explanation on why the "passing solution" passes.]

That's why Dorf's stuff is the best.

[As for the AOR, you just have to have an area that is 30x48 on the second floor landing for the

wheelchair to park but not obstruct your minimum clear path.]

If that's what the test's code requirement says about the size. As for obstruction, never obstruct the exit path, even if it's not stated. This is a basic life safety thing. Since the AOR is an extension of the landing, also beware of encroaching into the min clear space for the door.

So what's the verdict on this?

If there's an area of refuge for a particular floor the stair is going to need to be 48"w btw rails (if the code states this). UNLESS there is a situation where the stair & AOR are not adjacent. Is there such a situation?

DORF: I CAN'T THINK OF ONE

Well, everyone, the following statement is not in my NCARB practice book. "When areas of refuge are required, the STAIRWAY WIDTH shall have a minimum clear width of 48" between handrails" Hence, confusion on this matter. My book is about 5 years old.

(NOT DORF): NCARB HAS MADE SOME "ADJUSTMENTS" TO THE CODES PROVIDED WITH THE PROBLEM. MY SUGGESTION IS TO DOWNLOAD THEIR LATEST FROM THEIR WEBSITE, WHICH DOES HAVE THE AOR REVISION. YOU MAY, OR MAY NOT, GET THAT CODE WITH YOUR TEST PROBLEM, BUT AT LEAST YOU WILL BE AWARE OF IT, AND LOOK FOR IT.

Well, now I'm more confused. What I want to know is how to determine the required WIDTH of the stairs, forget the refuge area, based on the occupant load they give you in the test. The code in my study material indicates the handrails may project into this stair width.

Obviously this issue is one of the more difficult parts of this test and perhaps why so many people are having trouble with the stair design. If someone has the NCARB study book and can go over this practice exam they could let me know how they think this should be solved. THANKS!!!

For the structural layout vignette, does the decking and joist extend to the inside perimeter of the walls if it's not bearing on a beam or bearing wall?

PROBABLY OK, BUT I LIKE TO EXTEND EVERYTHING TO CENTER OF WALL TO BE SAFE.

Also the ncarb vignette for the structural layout can I span the joist the short direction(20'-0") for the video arcade, delivery/preparation and servery using the beam and column method?

YES

Professor, in your comp mock solution:

1. In the waiting area, how come there are 3 returns shown? And one is right next to a diffuser; it has to be 4' away from each other, right?

THAT LOOKS LIKE A MISTAKE.....THANK YOU! (GOOD EYE)

2. Reception: I showed 4 rec. lights instead, is that ok?

LIGHTS WILL PROBABLY BE TOO FROM WALL.....4' MAX.

Actually w/ 4 lights its not greater than 4' from the center of the light to the wall. Well, maybe by an inch on 1 wall, the rest are 3'8". Close enough, or you'd recommend over lighting w/6 lights?

6 MAY BE BETTER.

3. Does the flex. duct connect to the CENTER of the diffusers or the edge of it is ok? Because there's a 1' difference in length.

EITHER

I was going thru stair vignette in your published book. In program its called out landing to be at (headroom 80"). The correct solution shows 78" landing ht...Is it correct or I am missing something in program.

THE CODE REQUIRES 80" CLEAR UNDER LANDINGS. THE ONLY LANDING IN QUESTION INDICATES 106" BELOW IT CLEAR. I THINK YOU ARE MISSING SOMETHING. EMAIL ME DIRECTLY IF STILL CONCERNED.

Mechanical/ Lighting vignette - I could not get good spacing in a large room w/ only 2x2 or 2x4 lights, so I used a combination in only 1 room to achieve good spacing. I know you don't recommend doing this, but program does not prohibit. Is this OK, or is it going to be downgraded or even fatal. Rest of vignette was great - efficient rigid duct run, etc.

I would guess that a combination of lights is OK if it makes sense but I hope you didn't change the grid size as well.

As The Professor says, don't worry about design per se, satisfy the program.

In the future (hopefully you don't have to repeat), I would recommend using a symmetrical lighting layout (with fixtures the same size as the grid) and worry less about maintaining the same spacing throughout the room.

I know they don't like a combination of lights, but if only used in one room, this would not be a serious downgrade.

Professor, what's the significance of knowing the occupant load of the ground floor. How does it affect our stair design?

OCCUPANT LOAD ON GROUND FLOOR WILL NOY AFFECT STAIR WIDTH, BUT WILL DETERMINE THE CLEAR PATH NECESSARY TO GET TO THE EXIT DOOR.

I just came back from the exam and I thought I did ok until I remembered a mistake. On the roof design vignette where the lower roof meets the clerestory I had 14'-1" then I added 24" for the clerestory then I added the roof. But, I forgot to account for the 18" roof construction, so I left it at 16'-1". Is this an instant vignette failure or a downgrade? And if it's a vignette failure...would it be an exam failure??

I would guess a fatal error, although if everything else went well,, you should be OK.

In your computer mock solution, if I put a beam over the 3 columns showing on the lower level east cafeteria wall, would that be a fatal error or downgrade?

I show three also.....no problem

You showed the 3 columns, but you didn't put any beam over it (on the lower level) My question was: is it ok if I put a beam on it?

There is no need for a beam because there are no lateral forces to be concerned about, and the wall is self-supporting. Since it is not necessary to have it, its inclusion would be a down-grade.

In the Building Technology section vignette NCARB mock exam, on the 1st floor the section line cuts through the duct sized 32x16 and then the duct is 32x24 after the cut line. In your NCARB

solution you used the duct 32x24....was this a mistake on your part or am I missing something here?? Should I use the larger duct for some reason??

Unless you want a dropped ceiling below the larger duct, you must allow for this duct size. A dropped ceiling is not permitted, because the ceiling heights are given by the program. Your efforts on this section must be to determine the maximum vertical dimension for the interstitial space so as to AVOID any dropped ceiling.

I can't find this particular situation, but on your Computer Mock-Exam Building Section, the solution calls out for the first floor plenum to consist of 8" lights, 28" joist, 12" duct= 48" deep. The room in the SW corner of the building has 28" joists and 24" duct. Shouldn't the section be increased to 56" to accommodate the larger duct even though it is not in this particular cut?

Dorf: You are correct, if that is the case. I will review NCARB's base drawings.....but check again.

I am looking at the comp mock bldg section solution. Professor did call out 8"light + 28" joist + 24" duct on the first floor. Unless you have an older version of the copy? I bought mine in March.

You are correct, I was looking at an old copy. I see that the newer one has the revised duct size.

1. Is it ok to align all the top of the ducts, regardless of their sizes, at the underside of the joists?

Yes

2. I usually break the slab on grade when it hits the interior bearing wall and start a new slab on the other side, is that ok?

Perfect

3. is it alright for the ceiling to protrude a bit into the wall or I should make sure it just touches the wall and no protruding?

Either

For the intermediate stair landing, does it need to be supported by a wall?

There is no way to support your stair. Just assume everything is being hung from the roof with invisible cables.

So you are saying it's OK to show the landing floating in the air?

Yes, as long as stairs are attached to it, of course.

A "flight" is between 2 landings or between 2 floors?

between 2 FLOORS.

Am I allowed to combine 2 rectangular landings to create an L-shape landing?

Absolutely, but make sure they have the same elevation.

In building section, when the ceiling hit a fire-rated partition, do I have to break it at the wall and draw a new ceiling on the other side?

Good question....I think they should allow ceiling to go through wall....just a guess.

Just to be on the safe side I provided a ceiling on each side of fire rated partition. Just my approach.

I've checked with NCARB since I wrote the last post. Apparently it is OK to bring ceiling through partition, or as you did it.

In the general requirements, it states that "no portion of the ramp or stairs may encroach on the existing upper level." Does that mean that we MUST provide a new landing for the new ramp and stairs to attach to?

Really means that you cannot bring in a jack-hammer to cut into edge of existing upper level.

So could a new ramp or stairs directly attach to the edge of the existing level?

That's the way I see it.

I have a different lighting pattern comparing to your sample NCARB answers, are the following acceptable?

1. Waiting room-I use vertical grid and have only 2 rows of incandescent lights
2. Reception- same grid as yours, but with (4)2x4's
3. Lower right exam room- same grid as yours, again with (4)2x4's

Sounds good.

In your sample NCARB solution for structural layout, on the south caf. wall on the lower level, you noted "beam (or bearing wall) to support decking and wall above" Why? The lower level decks are supported by the east and west bearing walls and joists span between. Can I take out this beam and designate it as self-supporting just like the north caf. wall?

You must have structure at that wall to support the last bay of decking, which spans N-S. Placing just inside of wall you could argue the wall is self-supporting which = joist. Putting in middle of wall = beam, as it supports the wall above also.

In the NCARB CAD program for the structural part, do I draw the line for bearing wall at the center of the wall or at the furthest part of the outside wall? When I tried the practice vignette for the first time I got everything right, but I was drawing the bearing wall line down the center of the wall to indicate that it was bearing. Is this correct??

Another question is where to I end the decking??? at the line of the exterior wall or at the line of the bearing wall indication?? Thanks in advance.

My own rule of thumb is to draw all new structural elements on the center line of the existing walls, including joists, B/W's, and beams. Decking, therefore should be stretched to the centerline also, so it is properly supported. I'm sure the NCARB scoring will allow variations on this, however.

Access./Ramp = Do we need to draw and set an elevation at the bottom of a ramp (i.e. 0'-0"?)

No need to show the 0'-0" elevation.

Mech./Elec. = Is it better to err on more lighting or less lighting based on the programmed footcandles?

Lights must be spaced apart properly, per chart. Lights should be no closer than 1'-5" nor farther than 3'-5" from walls.

Stairs = Can handrails encroach in to the Area of Refuge or does the 30x48 need to be free of all obstructions, including handrails/guardrails?

Allow 30"x48" between railings.

BT Computer Mock Exam - Mech/Elec

The larger exam room, 13.66 x 10.66= 145.6 Shouldn't this require 2 Returns and 2 Supply diffusers? Is this okay? It's right on the edge, but with a computer testing me, I don't feel like I have much choice but be numerically tedious?

I feel 2 and 2 would be fine, although I would have been tempted to round things off a little.

On BT Roof Plan, if you get all of vignette except screw up and put clerestory on west instead of east, is this fatal?

Probably not, because the vignette is really about drainage, but hard for me to be sure.

In your "Solutions" book, the passing solution of Accessibility/Ramp use a pair of 3' doors to match existing door width in order to satisfy the code "not reducing the width in the direction of egress travel". However, the solution uses a 5' (or less than 5') ramp width and the stair is divided in half which mean the stair width between handrail will be around 4'. Does this "reduce the width in the direction of egress travel" ? Or you think it is OK to use minimum requirement per program such as 36" ramp width and 44" stair width? Please confirm.

Stair, ramp and door code requirements are quite independent from corridor codes. Use minimums required if possible.

1. How do I determine the vertical dimension required in a cricket?

As long as you provide a positive slope then you're ok. I don't think you need to calculate that in the exam.

2. How do I determine the number of plumbing vent stacks per fixture?

Usually only one vent stack in a circuit. the program in the exam usually dictate how many to provide.

3. When is it correct to locate an exhaust fan in a wall versus in the ceiling of a room?

If it is shared then I think putting it a wall is better.

4. As I understand the rule on number of exhaust fans, one is required per pair of toilets within a single room (not per pair anywhere). Is this correct?

You can provide 1 exhaust fan for 2 toilets on two different rooms as long as they are back to back.

1. Roof: does the location of the spot elevation mark matter? There is only one spot elevation per roof plane. So if you have only 3 planes, you only get to indicate the plane edge height three places. Are there any rules for this?, like one at the very top, the very bottom and where the low and high roofs meet? Or could it be anywhere?

It could be anywhere, it just helps you figure out the low point of the higher roof.

2. Ramp: in the NCARB practice exam (total height=24"), if I have 19'-4" ramp as my first run, what number should I put with "Set Elevation" for the intermediate landing? 4.8" (because my second run has to be 4'-8" long)? It has an increment of 0.05", like 4.2", 4.25", 4.3" so on. What does 4.35" mean? Or 4.8"???

I think your landing should be 1.6 feet or 19".

1. Just had the BT yesterday, one question I have on the stair vignette, the first landing was 2'-0".

Therefore I could not use a 7" riser combination to get there. Yet I needed the 7" riser for the

other stairs do to the tight space restrictions (actually ended up being 6.5".

I know it stated a flight could not have different rises, these were each separate flights, am I ok?

The code states that a stair is made up of one or more flights, and a flight is defined as a stair run between two flights. Therefore you are correct that the riser MAY change on that lower flight of stairs.

2. One other question, on the ramp, I cannot remember for the life of me whether I put my new door the right direction (I think I did, but am not sure) If I didn't is that vignette automatically failed, (fatal error) or only seriously downgraded. I am just not sure.

An egress door swinging in the wrong direction would be fatal, in my opinion.

1. On the framing vignette, why do I need that beam at the south end of the two-story space.

Isn't the joist up above being carried by the bearing walls and columns?

The joist below should be supported by the bearing walls at either end, shouldn't it?

My thinking: since I place all my structural elements in the MIDDLE of existing walls, then the beam below is carrying the lower roof decking + the existing wall above. Joists will only support decking.....no more

2. On the bldg. section vignette, is it proper to show the foundation wall coming up to meet the bearing walls at the finish floor line, or as you have shown only going up to the grade line. I am referring to the upper start point of the foundation wall, I understand about the depth.

Would I be marked off if I showed the foundation wall starting from the finish floor elevation?

Don't think this is an issue here, but I recommend bringing foundation wall up to top of slab on grade.

The diagram for maneuvering at doors for ramp/stairs show 2'-0" clearance on the pull side of the door - I was under the assumption that this should be a clear space. On the solutions from Prof. Dorf, he shows handrails in this zone on the second floor of the stair problem. Would I fail if I left that 2'-0" area clear? Doing that would increase the size of the landing by a foot....or am I safe to have handrails in that area?

The code allows railings on the walls to be placed in required widths.

1. Is placing the handrail only one inch from wall leaving a clear dimension of 50" instead of the minimum required 48" going to fail that portion or downgrade?

No, sounds good!!

2. The stair handrail extension of 12" along the wall protruded 4" into the maneuvering clearance on the push side of the door leading into a storage room. Is this acceptable or is it fatal?

Acceptable.

On the stair vignette of your book, would a 4'-0" stair be allowed as opposed to 4'-8" from the second floor since the code allows for handrails to project?

No because the code requires 48" clear BETWEEN the railings.

Is there any one preferred method for locating the HVAC diffusers/grilles? Do they need to be in line with light fixtures? Does the placement affect the score?

Don't be a designer.... just get decent air circulation from one side of room the other.

page T-9 of solutions: Can anyone explain to me the reason for the 3'-0" duct depth shown in the

floor to floor calculation on the passing example of the building section (page T-9)? I don't see a 36" deep duct on the plan anywhere. I see 36x24 on both floors. I am reading the plans wrong?

There is a 54"x36" duct just north of the stairs.

One quick question, from the second level, if you can technically see the entire stair to the ground floor will it be necessary to draw that entire stair on the second floor layer? If not, how much would be acceptable?

BASIC RULES: (my understanding of difficult situation)

IF YOU CAN SEE YOUR ENTIRE STAIR FROM UPPER LEVEL, NO CUT STAIR REQUIRED AND NO DRAWING ON LOWER LAYER NECESSARY.

IF STAIR GOES UNDER ANY PORTION OF UPPER LANDING, THEN CUT STAIR SHOULD BE USED ON UPPER LAYER AND ON LOWER LAYER FOR SAME RUN.

IF STAIR CAN BE SEEN FROM UPPER LAYER TO INTERMEDIATE LEVEL, THEN DRAW THE STAIR TO THAT LEVEL. ON LOWER LAYER DRAW INTERMEDIATE LANDING, REST OF STAIR GOING TO GRADE, AND A CUT STAIR ON FLIGHT GOING UP ONLY.

Area of Refuge: 1 per about 200-220 occupants per floor. Less than how many occupants we don't need to provide a area of refuge? Like we need one when there are 180 people, we don't need one when there are only 5 people. How about like 20 people? What's the rule?

The program will tell you if an area of refuge is required, and on what floor. It will also tell you how many areas are required per occupant load. I would provide one per their quota, including any fraction thereof. I took Dorf's advice: follow the directions, and only the directions.

Good advice.

1) Structural Layout- On the answers to the NCARB practice program, how is it that on the 1st level roof plan, there is a beam holding up the South Cafeteria wall above and on the North Cafeteria wall, it is considered self-supporting?

South wall could be shown as self-supporting, if joist is shown just inside this wall. However, I show all my structural members in the CENTER of walls, which suggests this wall is no longer self-supporting. Either approach is correct.

2) Mechanical Layout- approximately how close and how far away can "incandescent" light fixtures be from a wall? is this measured from the center of the fixture?

Centerline from wall.....rule of thumb: 1' minimum, 3.5' maximum.

3) Stairs- If an intermediate landing happens to get wider (traveling from upper floors to the exit) than the predetermined egress width, does the new landing dimension now govern the remaining width size of egress path?

I do not feel it should.

I do have a question regarding the stair vignette. I know that both Dr. Dorf (and NCARB) recommends having stairs that have consistent rise/run throughout the entire stair configuration, yet I see solutions that show different rise/runs - one stair at 7/11 and after the proposed landing, another stair at 6/11.

I think it is impractical to work out some solutions that have the intermediate level at 3'-0" and the upper level at 17'-6" to have equal risers. This adds an extra 4-5 risers in comparing 6" versus 7" solutions. Any clarification or comments on this?

Any other comments on any of the other vignettes would be much appreciated.

Good question. All codes that I find define a 'flight' of stairs as between two LEVELS. Therefore according to NCARB code, risers may change, but it depends on how THEY are interpreting a 'flight'. That is why I recommend finding a common riser, but strictly speaking, I feel you should be safe with either solution.

Read the code. Usually you cannot change the riser height in a flight of stairs and the intermediate landing is probably considered part of the flight

I definitely recommend trying to use the maximum riser height and min. tread depth. The vignette I was given was tricky and I had all I could do to get the min. number of treads in. I would stick with the same riser height for all portions of the stair, if possible. If they give you an odd intermediate landing height then that may not be possible. It's been so long since I took it, it's hard to remember specifically what I did. As long as you have a calculator (and know how to use it) I don't see how fractions are a problem.

ROOF DESIGN:

I found a shed roof worked well, using alternating slopes for lower and higher. Put a down spout for every 150 sq. ft. of roof.

If there are windows/doors in a bearing wall, do I have to "break" the bearing wall when hitting the opening, place a lintel, then start another bearing wall after the opening? Also, I know bearing wall can support columns, can columns support bearing wall?

No

Stair vignette: How much of the stair should be drawn on the 2nd level? It seems illogical to draw anything below the intermediate landing. Additionally, it becomes difficult to draw the entire stair on the second level w/out elements overlapping. Is this overlapping of elements O.K.? It also seems illogical to draw anything that has already been drawn on the lower level.

BASIC RULES: (my understanding of difficult situation)

IF YOU CAN SEE YOUR ENTIRE STAIR FROM UPPER LEVEL, NO CUT STAIR REQUIRED AND NO DRAWING ON LOWER LAYER NECESSARY.

IF STAIR GOES UNDER ANY PORTION OF UPPER LANDING, THEN CUT STAIR SHOULD BE USED ON UPPER LAYER AND ON LOWER LAYER FOR SAME RUN.

IF STAIR CAN BE SEEN FROM UPPER LAYER TO INTERMEDIATE LEVEL, THEN DRAW THE STAIR TO THAT LEVEL. ON LOWER LAYER DRAW INTERMEDIATE LANDING, REST OF STAIR GOING TO GRADE, AND A CUT STAIR ON FLIGHT GOING UP ONLY.

Just took tec and I was able to draw the stair all on the 2nd story, luckily because I had a had time getting the stair to work and had no time to draw on separate levels.

Question regarding the stairs, can the stairs have different risers after a landing... also for head clearance an 8'-0" door can the bottom of landing be at 8'-1"? Is that enough for clearance, door trim?

8'-1" sounds OK. Most codes interpret a 'flight' of stairs as between Levels, and risers must be the same WITHIN a flight. Seems to me that riser height could change, therefore, between Intermediate Level and Grade.

When I am practicing thru the NCARB software, in some of the rooms, I have trouble centering

the lights and avoid having small pieces of tiles at the edges at the same time. How can I resolve this problem? If there isn't a solution, I guess centering the lights would be a priority right? Any thoughts??

General rule of thumb is that the lights shouldn't be closer than 1' beside a wall. leave at least 1'-6" between a wall and light. I found that if the light is even 3' from the wall that is ok (if lighting diagrams gives you a 2' perimeter around the fixture).

If I center the lights correctly but end up having small pieces of ceiling panel at the edge, would that would be ok?

The basic thing is...if you center the grid, the lighting layout will work better. Try to avoid small pieces as much as possible though. Most of the time you can rotate the grid so that the small pieces are a little bit larger. Sometimes at the window walls the tile will work perfect in the room but there will be small tiles along the window wall. I didn't get it marked wrong when I had small pieces at the windows.

Some rooms had small pieces no matter what I did. The lights are more important than ceiling tiles. That is really just aesthetic and could possibly add to the construction costs, but would not interfere w/ the function of the building which is really the purpose of the test.

Okay I messed up on the last moment when I changed from a shed to a ridge roof. The top of ridge wasn't clear of the bottom of clerestory. I know this is not good, call me stupid! I was still cruzing on the shed dimensions. So, is this an automatic fail or a downgrade. Also I had a symmetrical floor plan with an entry of the west side then the rec room and an open garden space behind and then a meeting room. My lower roof had to go around on three sides of the garden patio. I had a ridge roof down the center of the space equal slope and heights. But for some reason when it when over the wall of the patio on one side it was 12'-1" and other side it was 12'-2". I measured the roof planes where exactly equal. But I couldn't get it to be the same height in one place. But the ridge and lower heights all matched. Also what about the difference in the roof plane heights. That seemed like a computer glitch to me?

So if I did okay on all the other vignettes could I pass even if I fail this one?

If you did not get the proper roof heights by not allowing the thickness of structure....that is a pretty serious problem. The other situation sounds like a glitch that will not be graded, so don't worry about THAT one. You can still fail one problem and pass the Division.....so cross your fingers.

I took BT today and did the stair vignette last. I was tired and getting frustrated because my stairs wouldn't work out. They just didn't fit.....until I decided to give up on using only 6" risers and 12" treads. Actually a 7" riser worked out perfectly and it all fell together nicely after that. Since the space is tight and time is of the essence, I would suggest going with 7"/11" right off the bat since that takes the least amount of space and you will have more time/options to complete the exercise.

In many cases for mock exams, a 6" riser worked easiest for calculations and for a 3'-0" intermediate landing, it makes sense to do it that way. I try to avoid fractions, but a 7" riser worked great in the exam (3'-6" landing). Definitely a 7" riser and 11" tread is your best bet for a tight fit. Industry standard is not always what this exam is about.

I take the floor to floor dimension and divide by 7 to see approximately how many risers I need. If it is a fraction, I round that number up and then divide that number by the floor to floor dimension, which will give me the riser height. Usually a number between 6 and 7.

I start with the maximum height and minimum tread width to be able to fit in as few steps as possible. It just seems like trying to fit in 6/12 risers and treads is making the stair

design more difficult than it needs to be. Why try to fit more steps into the design if a person doesn't need to.

Perhaps I should not have used 'industry standard' in my response. But, in the same vein 'human comfort and ergonomics' aren't what this part of the exam is testing, either.

And what does the tread/ riser height have to do with the landing size? 3'-0" vs. 3'-6"

I think we all know how to calculate stairs. The 3'-0" and 3'-6" was referring to intermediate landing height. With a 3'-0" landing height, a 6" riser works easily. And if you choose to do the math $36"/7" = 5.14$ so you would round up to 6 anyway. The exam allows anywhere between 4" and 7" for riser height. That means there are options. Using 7" risers in my stair design fit better, but required a tiny bit more thought when calculating top and bottom elevations. And since this exam is about time management as much as anything, an easy and quick method scores points with me.

Took it for second time as well and 6/11 work well but treads would not fit, but 6 2/3s work out and landed on a whole number (six treads). Then it dawned on me you don't even need to know the fraction, because we are only required to show top and bottom elevation, so if you know that it is less than 7"R then it works. I think that a run of stairs is from landing to landing...question for Dorf?

Dorf: Yes, a run is from landing to landing, a 'flight' is from Level to Level.

As far as I know a stair flight is from landing to landing. Runs are used for ramps. Ncarb seems to say the same thing: "A stairway shall consist of one or more flights of stairs and the landings connecting them". Riser height may be different between different flights.

Dorf: Correct

In the solution you provided for the NCARB problem, you showed 2 rigid supply ducts. I put only 1 supply duct at the center instead and have all the flex ducts connect to it within 10'. Or you don't think that's possible? And is there a limit # of flex duct you could connect to a rigid duct?

1 rigid duct is fine, although not necessary. 3 runs of rigid would be a bit much. I used to show 1 rigid on my solution, but that is harder to achieve, and may take too long to complete.

Can we have an L-shape flexible duct?

I used them and it wasn't marked incorrect. just make sure the total length doesnt exceed 10' (or the given maximum length).

Professor: in the code section it says the least dimensions of the stair landing should not be less than the stair width, and the stair is 8' wide. So the 8' on the top landing should be measured from the top edge of the stair to the new wall you added or to the tip of the door when they are opened?

I feel this dimension can be to the wall.

I had a problem where my ramp had three "runs".. The very last run had an elevation difference of 3"....could I eliminate the rails on the last run since it was lower than 6"?

According to code, you can.....but I would advise going all the way with railings on both sides, regardless.

Ramp: railings: am I supposed to draw a several pieces of railings for where it needs to make a turn? Seems hard to join them nicely at the corners, is there a way to do it?

I drew the rails connecting at there center points, you are right they do not "join" completely, you should have a small segment to make the turn so all the rails are continuous.

Structure: Be sure (on the first floor) to support the clerestory window and any 2nd floor walls above, the walls on the interior framing (with beams).

Roof: On the roof, make it easy, symmetry is best. find the center of the building and sketch a line (make this your ridge line for both roofs if the building is symmetrical) Most critical is to calculate the elevations which include; ceiling height, depth of 1st floor roof structure (usually 18")(these two items total your first floor roof elevation)....,then add to this total your slope (2:12) and distance of roof span (this point gives you the base of the clerestory window), clerestory window height, depth of 2nd floor roof structure (usually 18")...all of these items added will give you the elevation of the 2nd floor roof. Also, don't forget downspouts on the high roof, even over the 1st floor roof, downspouts can drain onto the lower roof...

On the structural layout vignette what does "structural members must not extend beyond the building envelop, except to frame a designated covered entry" refer to??? Does this mean that you could frame a roof over the entry door, even if it is not indicated by dashed lines.

No, you must conform to the existing roof line. Structuring an overhang, at entry, for instance, is OK if part of original roof outline.

I just got back from taking the BT test and I had the same statement...it said "No objects are to extend past the building envelope except at a designated entry"....I put a framed roof over the entry...It shouldn't be down graded if they say to do it...right? The problem also stated that "columns could be placed in the window wall"...the only logical reason (in the problem) to place a column in the window wall was to frame a roof over the entry.....(otherwise a column wouldn't be needed in that location, not even close.)

OK, as long as you stay within given roof profile.

1) In structural layout, when there is a window wall or clerestory, do we need to provide a beam at the roof edge, even if there is a joist at the edge too? Also, the mock exam did not specify the max. span for beams and lintels, what is the span limit before our answer got penalized? Is there also a min. span?

Joist is enough if only supporting the deck. Rule of thumb: Joists max span = 30', beams max 40'. I would avoid putting columns less than say 10' apart, unless absolutely necessary in configuring solution.

2) In the stair and ramp layout, Should we allow 2 to 4 inches more than the required width to be safe?

No

3) In the roof layout, there is no height limitation specified, should we assume that the roof can be as high as we want? Also, when we draw flashing around the clerestory, should we draw two flashing on top of each other, because there are two roof/wall intersections?

Keep building volume to a minimum. Flash only bottom of clerestory.

Ramp Vignette: If you draw a double door in a 6' clear corridor with one leaf at 36" and the other at 30" is this acceptable? I think the solution was one 36" door but I wanted to err on the side of caution since the exterior door was double leaf at 5' clear (another corridor was exiting into the lobby as well).

Ramp: Seems to me if another door was entering Lobby, then a single 3' door at upper level would have sufficed. Adding an unnecessary door at upper level, however, would not be fatal, in my opinion.

Stair Vignette: The code was vague about locations of areas of refuge. If you show an area of refuge where one isn't required (landing at storage room) is that a fatal error? It made the stair a little awkward but it still worked. Again hoping to err on the side of caution.

Stair: If anything, it seems to me if an unnecessary A/R was provided at Intermediate Level (depending on Code requirements), this would probably be a down-grade, but not fatal (for over-building the landing unnecessarily).

Roof Vignette: If the solution calls for both roofs to have the same starting height and a 6:12 slope roof is adjacent to a 2:12 roof, can they share the gutter with downspouts at each end (one at the 6:12 and one at the 2:12) or should I have shown a break in the gutter and downspouts at each end of each roof?

Roof: Good question. Never heard of a roof plan like that. I would guess one gutter would have been enough, but one never knows how NCARB is thinking. (sorry)

I just finished BT this afternoon and was thoroughly disappointed once again with the software inadequacies. During the stair vignette, the elements that I had drawn were not graying out properly when I toggled between the first and second floors. At first I thought that I had been drawing elements on the wrong layers, but I soon came to realize that there was something going on with the software. It became very difficult to read what element was where, let alone select and manipulate each. I finished the vignette and it ended up looking like a muddle mess.

General: Just off the top of my head here are a few things I remember that helped a lot with the vignettes. They might be covered in the book, but I haven't looked at that section since I took the exam so I can't remember.

In the section vignette, draw your grade line FIRST and then put the slab right on top of that. Finding critical dimensions is easy once you find the largest duct size, which more often than not is right where the riser is. Check the joist depth there & compare to other areas around the plan. Usually, that's the deepest, but check just in case. Other than that, it's pretty simple & a case of following directions. Remembering that rated corridor walls need to go to the bottom of structure is important too.

Structural: Pretty much everything he said in the book is what I remember writing down. No real surprises there.

Ramp vignette: I tried to make sure the stairs and ramp started in the same general area. This usually helped the layout & made things easier. The other thing to remember is to make sure the door you have to add is sufficient for exiting. I noticed that usually the door exiting the building will give you the biggest clue. If it's a double door, you'll need to make the door you add a double door too unless there's another door entering into the exit space.

Stair vignette: The thing that saved me a lot of time was the tip Norm gave me that if you can draw the entire stair on the second floor plan (there's no overlap of runs or anything like that) you don't have to redraw it on the first floor. Luckily, on the exam mine did exactly this, so I saved a few minutes by not having to repeat stuff on the first floor. Also, when determining stair width, there are three places to look in their code that are going to affect it, the widest of the three governing. I found that more often than not, if you're required to have an area of refuge, the

dimension they give under that section of the code is going to govern stair width. That's CLEAR width between handrails, also. That's important to note.

RCP vignette: Pretty straightforward. Check dimensions of flex duct runs (I think 10' was max) & make sure that you put fire dampers where they're needed, especially on the return air plenum! If you've spent any time drawing RCPs in your job, this problem will be simple. Make sure you put the right lights in the right rooms & you'll be fine.

Roof plan: Keep your roof plan as simple as possible. Like the section vignette, determining critical vertical dimensions is going to help a lot with this portion. Find the required ceiling height, add depth of structure, and boom...there's the low part of your roof. When you figure out the high side (let the software find it for you), add the clerestory height & structure & there's the low part of the high roof. Pretty easy, really. Remember vents, FLASHING AROUND CHIMNEYS (I say that for Norm's sake) and remember to put gutters and downspouts on the drainage side of all roof slopes. If you put the downspouts at opposite corners of the gutter, chances are they won't be in front of a window & you'll be ok.

I'm sure there's other stuff I'm leaving out, but it's nothing that he doesn't say in his book. I had a slow afternoon here & wanted to post this stuff before I went home. ;)

I still plan on looking at my notes when I get home. Anything I leave out that I think is really important I'll post.

A few more things from my notes:

Section:

-Stretch joists 2" into walls to show they're supported (also, make sure you draw them running the right way!)

Structural:

-Start from the top & work down (obvious)

-Max spacing for joists is 30'. If you need to, break the span up with a beam (max beam span is 40')

-Joist spacing = programmed deck span

Accessibility (ramp):

-Make sure the leftover space is all usable, i.e. don't leave a 2' space next to the ramp or landing because you can't use it for anything. I think Norm said the absolute minimum is 3', but if I was that close to the wall, I'd just run the ramp all the way over & let there be extra landing space at the bottom of the ramp.

Mechanical:

-I mentioned a fire damper for the return duct. Don't forget to actually draw a rigid duct that goes from the riser to the plenum space. Just a stub from the return duct through the firewall that extends a little bit into the room is ok. This also applies if you have a rated room on the plan...it'll need a rigid return duct with a fire damper through the wall to make sure return air is getting out of there and into the plenum.

Hi, in the section, do you show slabs on the outside of the section? It seems like that in Mr. Dorf's book. Or just keep the inside slab below grade line for 0 elevation? Anyone do that & pass?

Slabs should NOT be drawn beyond foundation. That is grade that is outside of the section.

Then how would you achieve an elev. of 0" inside? Bury the inside slab below the grade line?

My example in the book calls for a finished elevation of 1'-6". Generally NCARB asks for a "slab on grade", so you would actually place your slab on top of the grade, despite the fact that there are no steps at entrance. Section measurements would be taken from the finished floor, no matter what elevation it ends up.

I just passed BT and did exactly that. My slab sat on top of the grade, between the walls and all the other measurements were from the top of the slab.

In the BT exam, specifically the Stair Design Vignette, the given code gives the AoR requirements. This requirement states that the AoR is "30" x 48" for each 200 occupants or portion thereof, based upon the stairway occupant load".

My question is this:

"If the stairway occupant load calculations turns out to be 201, are two AoR's required at that floor and any floors underneath that floor?"

2 at that floor only. Other floors are governed by their occupancy.

I just took the Building Technology exam yesterday. A question that I have is regarding the stair design problem. I was in a time crunch and couldn't think of a proper way for the stair to work. I was able to make two separate stairs, one for the 2nd floor to the ground and one for the mid-level to the ground. They all fit with out any problem at all. I can't help but think that I really got it wrong because I thought the whole point of this problem was to have one stair that connected all the levels together. I just didn't have enough time to figure one out (the roof plan problem took some time for me). I figured out how it could've been done when I got home. In your opinion, do you think I got the problem totally wrong? I feel very confident on all the others. It is just this one that has me worried. Do I not get any credit for this problem because it isn't a continuous stair? I don't remember seeing it in the program that it had to be continuous? Will it cause me to fail?

Chris, the program DOES call for ONE continuous stair going to all levels. If you solve this vignette with 2 separate stairs, then you are really solving a DIFFERENT problem. I feel this would definitly fail this vignette. If you feel comfortable with the other 5 vignettes, then you have a very good chance of passing the Division.

-Building section-

a) The footing 'block' is drawn to the proper depth per program but there is a debate about whether the top of the footing 'block' should be drawn to stop at the grade line and then the exterior bearing wall 'block' be drawn or should the footing 'block' be drawn to stop at the top of the slab thickness and then the exterior bearing wall 'block' start? Then in either case the slab 'block' should just touch the exterior assembly and not bear on the footing 'block'?

I feel either would be acceptable at this level of detail, although I prefer to place top of footing at top of slab elevation, as it would be useful to pour slab-on-grade against it. Normal construction would not place slab on foundation wall, but would let it settle naturally, as it will.

-Structural-

a) You have to support the roof at the intersection of a vertical second story wall. If you choose a beam vs. a bearing wall should the beam have a column supporting it at both ends if one end is supported by a two story column (clearstory) and the other end is at the intersection of a bearing wall? Will the bearing wall suffice or is it a good rule of thumb to always have a column supporting the end of a beam even if it is inside the bearing wall?

b) At the ends of an area where joists are to be added to support the roof deck is it better to extend the joists to the centerline of the exterior wall implying that the last joist is supporting the edge of the roof deck or should you use a beam assuming there are no openings in the wall?

B/W's may support beam in this case. Joist(s) should be placed in end wall(s) to support decking. Placing joist in center of wall makes good sense. Using beams to support ONLY decking is really over-kill in this problem.

-Ramp-

a) The code indicates that the handrails are to be continuous along the entire length of the ramp. However, in the practice software there is an existing wall that a new 5' landing ends up being parallel (touching) to as part of a possible solution. Assuming this wall extends some distance up do you need to have a handrail shown along this wall or is the wall itself sufficient and a handrail overkill? (Prof. Dorf your sample solution does not show the handrail)

Rail must extend 12" to meet code. Extending further makes sense, but I feel not necessary, although not a down-grade if you choose to extend around landing.

-Mech,elec.-

a) Are any of the ducts (flexible or rigid) allowed to cross over the top of the light fixtures?
b) The practice software does not allow you to center the grid even in zoom mode. Why? Who knows but only NCARB. Regardless does the actual test allow you to center the grid with some reasonable accuracy? Maybe its just an Illinois curse and everyone in our office got a bad copy of the practice software including their website.

Flex AND rigid may go over light fixtures, as we do not have any vertical dimensions to consider.

The number of pixels on your screen may not allow you to perfectly center grid.....4" discrepancy usually. This inaccuracy is taken into account in scoring. These are not construction documents.....just try to be reasonably accurate.

-Stair Design-

a) It is understood that you do not have to be a Structural Engineer when it comes to this vignette but only to follow the program. However, in your sample solutions to the NCARB practice software and in your book "Solutions" I have noted that you have always kept your solutions with the flights of stairs adjacent to an existing wall. However in trying to keep as tight a solution as possible is there a downgrade if you have a solution with a switchback stair in the middle of the space (not adjacent to a wall) making sure that the landings, width, and lower stair etc. meet the program and are not excessive in length?

b) Do you have to have a space between the flights of stairs or can they be immediately adjacent to each other? Again, in real life we all know there would be a small separation.

Good questions.... It is a bit disconcerting that one cannot support your solution. Assume everything is hung from the ceiling with wires. So to answer your question, stair may float anywhere, and may also have a space between runs if you choose, or touching.....either way.

Structural layout: Your answer says we need to put a beam on the first floor on the south wall of the cafeteria where two doors are shown. I don't understand why you put one here but not one on the wall across. Both of the walls have the same condition.

Both the north and south walls are self-supporting, however the south wall is supporting decking + the wall above, therefore needs beam.

On the building section vignette, do you have to rest the slab halfway into the walls for the computer to register that it's supported or can you just make the slab meet the wall.

I feel either way is OK, but suggest the second floor slab and roof slab penetrate the bearing walls slightly. The slab on grade should NOT penetrate the wall, but instead be drawn up to the wall.

While doing the stair design vignette, I am not sure if I need to do a cut stair going down to the ground floor from the 2nd floor. Not sure about what to do about the railings in this area as well. The handouts from the ARE class I took a few months ago, show cut stairs from the second floor to the first floor and cut stairs from the first floor to the 2nd floor. The view is from the 2nd floor looking down. If this is the case, where do I stop the railings from the 1st and 2nd floors where the

cut stairs are shown? It was my impression that when drawing stair from a 2nd floor to a 1st floor level, one shows the whole stair in plan, not showing any stair cuts. This is my first time posting here and I hope a few of you can answer my questions. Please let me know if I need to explain more about this situation.

BASIC RULES: (my understanding of difficult situation)

IF YOU CAN SEE YOUR ENTIRE STAIR FROM UPPER LEVEL, NO CUT STAIR REQUIRED AND NO DRAWING ON LOWER LAYER NECESSARY.

IF STAIR GOES UNDER ANY PORTION OF UPPER LANDING, THEN CUT STAIR SHOULD BE USED ON UPPER LAYER AND ON LOWER LAYER FOR SAME RUN.

IF STAIR CAN BE SEEN FROM UPPER LAYER TO INTERMEDIATE LEVEL, THEN DRAW THE STAIR TO THAT LEVEL. ON LOWER LAYER DRAW INTERMEDIATE LANDING, REST OF STAIR GOING TO GRADE, AND A CUT STAIR ON FLIGHT GOING UP ONLY.

RAILINGS MAY STOP AT THE CUT LINE.

In determining the headroom height in the stair design vignette, how much space is needed for the structure supporting the stair run? If I have just over the 80" required space from the top of a tread to the tread above is that acceptable, or is there an assumed stringer thickness to take into account?

The program SHOULD state a stringer depth of 12" measured perpendicular from nosing to underside of stair.

Ramp Vignette: "virtual landing" : In your passing solution (in the Solutions book) the handrail 12" extension goes into the 60"x60" "virtual landing" area. But then one of the stated additional problems with the failing solution is that the extensions go into the "virtual landing" space. Now I am confused as to when the 12" extension is permitted to extend into the "virtual landing"? In both cases the railings seemed to be part of a continuous rail system.

The code indicates that railings may "stick" into required widths by 4". Therefore if railing is on the wall, or in other ways does not violate the required landing widths by more 4", ...no problem.

In your solutions manual, for the Structural layout vignette, you show a beam being required in the south wall of the cafeteria (Between the cafeteria and preparation) because this is a two story space and the wall above cannot be supported on the deck of the first floor roof. The NCARB study guides do not show this beam as being required. Isn't the wall in question self-supporting, just like the north wall of the cafeteria?

I agree with you, that the wall is self supporting. Maybe I'm being too picky, but I place my structite in the center of these walls, so theoretically that member is supporting the upper portion of that wall. I called NCARB on this issue, and they would only say that the program requires lintels in opening in B/W's, almost, but not quite, implying that existing walls are weightless. They defended their solution to this problem, showing a joist rather than a beam. Probably, according to this discourse with them, either would be OK.

Shefali in ON ... Date: Friday, 11/22/2002

Sorry about not having done this earlier as promised. I had a crazy week at work. Some good news too -- I passed my first exam - site planning. Yoohoo!!!
Here is the checklist...

Building Section Vignette

1. Calculate critical dimensions for floor heights. Check this using –
 - Max combined Joist and duct depth

- Clearance for lights as given
- Given finished ceiling heights
- 2. Show all interior partitions
 - Interior fire rated partitions to thru ceiling to structure
 - Show interior partitions 6" above finished ceiling
- 3. show windows and/or doors if being cut by section
- 4. slabs
 - slab on grade to touch exterior walls
 - joists bear 2" on walls
- 5. parapets needed for height changes in roofs
- 6. foundations
 - frost line = top of footing
 - interior wall – right below slab
- 7. ducts – draw right below joists, touching it
- 8. Check plan for any exterior ramps, stairs etc – that relation must be shown on the section as well
- 9. note where the section needs to align with eg. Exterior face of wall

Structural Layout Vignette

10. check span given for roof decking. This is equal to the joist spacing to be used
11. joists to line up with center of wall
12. decking to be centered on wall
13. if columns are too close (20-40') use bearing walls
14. large openings = bearing walls
15. supporting members
 - beams – columns, bearing walls
 - joists – beams, bearing walls
 - columns – bearing walls, columns (on lower floor)
 - clerestory – bearing wall, beam
 - decking – all edges to be supported by joists/beams/bearing walls
16. span joists in short direction
17. no bearing wall over large openings (over 6'-0")
18. doors and windows in bearing walls must have lintels
19. decking has to be perpendicular to joist span
20. spans
 - beams – 20-40'
 - joists – under 30'

Mechanical and Electrical Plan Vignette

1. show return rigid duct stub from return riser into ceiling (if ceiling is plenum)
2. do the same for any fire rated partitions
3. check where rigid ducts may run perpendicular to joists
4. all lights – 1-3' from wall (never more than 4'). Lights should not abut wall
5. flexible ducts must serve only one diffuser
6. return grilles should be 4'-0" from supply diffusers
7. center ceiling grid. Half tiles at the most at edges
8. space diffusers and returns in the room for good air circulation
9. if a range of foot candles are give, use the average. Eg. 65-75 fc, then use 70fc

Accessibility/Ramp Vignette

1. any space left over should be accessible (min 3'-0")
2. stair and ramp to start in the same area
3. exit door to be same as existing exiting doors (same no. of doors)
4. more than 2 landings for the ramp will be downgraded
5. handrails on both sides of the ramp and stair
6. 5'x5' space at top and bottom for wheelchair turning. This should not include 12" extension of railings. Railings may be included if they are continuous
7. remember door clearances
8. landing width to be 60" at direction change in ramps

Stair Design Vignette

1. Stair width determined using one of the following:
 - Occupant load (different for different floors)
 - Min width supplied by Code
 - Area of refuge might determine width
2. Check height of doors for headroom clearances – check section, if provided
3. area of refuge usually 1 per 200 occupants. If 201, 2 areas of refuge will be needed
4. unused spaces should be logical and have good proportions. Should be accessible
5. railings on only open sides of landings
6. stairs should have logical relationships to exit doors
7. different flights may have different risers
8. check door clearances for accessibility on all floors
9. check which levels need area of refuge
10. $2R + T = 24$ or 25

Roof Plan Vignette

1. simple plan
2. flashing – around chimney and between high and low roofs
3. downspouts – not in front of windows and 3'-0" away from skylights
4. HVAC on roof over non-occupied areas like hall, storage etc
5. crickets on high side of chimney

You might to copy this into a word document and format it for easy reading. Or I have the word file and can email it to anyone who wants it.

Hope this helps someone.

This is my impression of this test:

The key is to be familiar with the program and know it well enough to know how it works, what it can do and what it can not do (which is a lot). The type of problems seem to be standard, in that they are always looking for a number of elements to be solved in each vignette and once you know what they are it simplifies the process. Still, I can not emphasize enough the importance of being familiar with the program. After taking all 3 I feel certain that you need to be familiar with all the tools before you take any of the exams, in other words don't just practice for one section and leave the rest for later. Learn all the tools, for all the sections, and for each vignette, that way you get a feel for what this program is capable of doing and most important what it is not capable of. You then learn to work around it and make it do what you want it to do. Dorf has great tips and tricks, i.e. circles for setbacks and distances.

I was so bored with it at the end that I did not practice for BT like I did for the two (I do not have the results for any of them yet) and as a consequence I did not feel as comfortable during this one. I panicked at one point because I did not know how to deal with the vignette's solution. During the roof plan one - I had a building with an open garden in the middle and my first impression was "I can't make this program do a hole in the roof". But as it turned out I broke it down into sections that were manageable and did it.

These are time management tests, so the more familiar you are with the givens the better you can solve for the variables they give you. What I have found with these 3 exams is that if you read all the information you have available (NCARB & Prof. Dorf's materials) there are no surprises on these tests. You pretty much know what they are going to ask you to do. They will change the building type, the numbers, and the restrictions, etc. but at the end the questions are the same.

Prof. Dorf is very good at giving you the same vignette as NCARB with a twist, and he makes you think about the problem in a different way. I took his seminar, I bought his book and did his mock exams - both the pen and pencil and the computer ones, his problems are always harder than the test, but he prepares you for anything you may encounter. Going through his material made me feel comfortable with the way the test is given. Do a search on this forum for Building Technology and for anything Prof. Dorf has posted, it will be priceless.

Carmen

Just finished the BT exam. I got tied up with stair design (went over time and was left with 30 min. for roof design.) Roof design was simple, but could not get arrows to rotate to properly adjust for slopes. With about a minute and a half left (and breathing very hard) I was able to get slopes to rotate. However was unable to adjust for heights. This is the only portion of exam (out of all the vignettes) that I had problems with. I can't imagine rewriting because of this. I am now waiting for the bad news. Can anyone shed light on criteria for grading. Are the vignettes weighted?? If you do poorly on a vignette does it affect overall exam?? Any insight to relieve my anxiety would be appreciated. Not only a six month wait but a new format!!!

Best advice I can give is do the vignettes that you most confident with. I ran into a problem with time on last vignette (stair design and roof design) both were fairly easy. However of course I made it a design problem. (wanted it to be just right) and ran over with stair design. Found myself hurrying to finish roof portion. Familiarize yourself with all aspects of software ie. - able to change roof slope (rotate) for some reason I ran into not being able to rotate them. Finally figured it out with 1.5 minutes left. Lots of anxiety. Other than that the exam was not difficult. Don't forget your lunch, it is a welcomed break.

1. In Structural layout, is it OK to show b/w on 1st floor and 2nd floor plans for 2-story high ceiling space? I placed a full-length clearstory window sitting on top of b/w in 2 story high ceiling space so I had to show b/w on both plans. Obviously that clearstory window doesn't need to support roof joist or roof deck, it just need to be there by program requirement.

I HOPE YOU DID NOT PUT A B/W IN CLERESTORY LOCATION.

2. In Building section, it was really confused what size structural joist is running right above biggest duct. Structure was not clearly shown on plan that what size (either 28" or 32") joist is covering right above biggest duct.(it was really ambiguous) So to be a safer side, I calculated with 32" joist to get a minimum ceiling to slab height since using 28" joist would be fatal error if 32" joist is really running on plan. But if that was 28" joist, is it going to be downgraded or even fatal?

YOU DID THE RIGHT THING, I FEEL.

3. In stair design, intermediate landing, I used 5'-0" wide landing in direction of travel instead of 4'-8" required width. Is it going to be a fatal error or downgrade? I hope only 4" difference would end up being downgraded.

PROBABLY NEEDED 5' FOR DOOR CLEARANCE ANYWAY.....NO PROBLEM.

Unfortunately, I did put B/W on clearstory window location in 2nd floor plan. Actually, I was not sure that I could put a beam right above the clearstory window, which is running parallel to roof joist and deck. So I ended up putting a clearstory window on top of B/W and in that way, I don't need to worry about putting a beam above the clearstory window. (Again, from this clearstory window location I don't need to support roof joist and deck above since clearstory runs parallel to roof joist.) I hope this explains my worry.

EVEN IF JOISTS RUN PARALLEL TO CLERESTORY, YOU STILL NEED TO PUT SOMETHING (JOIST) OVER THE CLERESTORY TO SUPPORT THE DECKING.

For the stair landing width, actually door opens storage room side so I don't need to provide 5' maneuvering space per code. I only need to provide 4'-8". Providing 5' was my mistake. I hope this doesn't downgrade much.

SHOULD NOT BE A PROBLEM.

So Prof. if I put B/W on the location of clerestory window in 2nd floor, is it fatal?

THAT WOULD BE MY FEELING.

As someone mentioned, roof joist which runs parallel to clerestory window automatically drawn on centerline of B/W on 2nd floor. I know if I used a beam, I don't need to worry about all this thing but I drew a B/W. Plus do you think is it OK to joist spanning 33'? Actually I tried to avoid 33' joist span in north-south direction so I ended up joist span 27' in the other direction since I was not sure NCARB is accepting 33' joist span.

33' IS A STRETCH, BUT OK.

Here is my worry. Let me say if I fail a structural layout vignette, and passed other 5 vignette with 3 points since getting 4 points is little tough, should I be passed? In order to pass entire BT, how many point should I get? I know maximum points I can get for this exam is 24 (4x6)points, then what about passing threshold? Is it minimum 17 (3x5+2)points?

I have never heard of a point system for the NCARB scoring, except in the past, when we graded by hand. The scoring now is a lot more involved....but basically you can fail one problem and still pass the division, as long as you did reasonably well (not perfect) on the other 5.

In the above problem, as long as an edge of the joist "shape" is coincident with the center of the wall where the clerestory is located, wouldn't the joist automatically drawn be sufficient over the clerestory. This is likely what you meant by your reply. I just want to confirm as I'm testing soon.

CORRECT

With regard to the parapet above - did you just have one 2'-8 parapet at the interface between the low and high roof? Were the other 2 - far left/right parapets flat?

I had one parapet between the two roofs (high and low) in the middle of the section. On the roof edges (far left and right) I put the joists/deck into the bearing wall a few inches with the bearing wall extending just a few inches up.
