Structural Vignette Study Guide

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10/7/2010
Welcome to NCARBland.

*Ignore your professional experience!*

*And whatever you do...*

*Don't try to use Architecture!*

---

The ARE always looks like something you've seen before.

It isn't.

It isn't a building.

It isn't a roof.

It isn't a stair.

Those are not trees.

There are no occupants to get caught in a fire.

Because there are no fires.

It is a test, and only a test.

It is not a building.

---

1. from — The Tao te ARE
Structural Vignette Introduction:

This vignette is used to determine if you are minimally competent to practice architecture.

NCARBland’s structural vignette is quite limited in scope, but makes up for it with byzantine complexity.

What you need to prepare for the Structural Layout Vignette:

1. This Study Guide
2. NCARB ARE STUDY GUIDE: PROGRAMMING, PRACTICE, & PLANNING
3. NCARB’s practice software.

There is no extra credit for not killing trees,
For aligning windows and toilet rooms,
For adding room for flashing,
Or installing an extra door.
Your solution will be scored by a machine and that’s it.
No one will ever see your test solution and comment on your brilliance.
You will not have a chance to explain why what you did is better or how your interpretation is reasonable.
You will not have a chance to explain your design.
Design doesn’t enter into it.
The computer will just score what is there in the way it was programmed.

from – The Toa te ARE
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ABOUT THE STUDY GUIDE

The process of completing the Structural Layout vignette is intended to be moderately complex.

Use this guide as a starting point for your preparation.

The written material in this guide is intended to assist you in understanding what the Structural Layout vignette is really all about.

The practice activities are intended to assist you in learning the mechanics required to complete each task.

Think about the exercises as providing opportunities for drill rather than simulations of the entire vignette.
PART 1: BEFORE YOU BEGIN
Alligators, Logs, and Red Herrings

There's an old saying, "When you're up to your ass in alligators, it's hard to remember that you came to drain the swamp." That's the way the Structural Vignette is designed.

Candidates need to remember their objective and recognize the requirements which are relevant to solving the vignette, and those which are not. To help you do so, here is a brief field guide to swamp critters.

Alligators

An alligator will bite you. Hard. Alligators are the core of the test - the items which are actually measured and scored. Getting bit by an alligator can affect your score. A few Baby Gator bites won't matter. But a Bull Gator will grab hold and pull you underwater until you drown. It's the sort of mistake that can wreck your solution to the point where you fail.

It is critical to recognize the Alligators on the exam and deal with them. Be aware that rubbing an alligators belly puts it to sleep.

Logs

Logs don't bite. But, when you are in a panicked rush to get across the swamp, a log can be mistaken for an alligator. Wasting time going dealing with a log just puts you further behind schedule.

On the test logs are just dead wood. They fill out the written material often for the sake of "let's pretend, it's not NCARBland." Sometimes, just to tell you that you don't have to do something which can't be done using the software, anyway.

Red Herrings

Red Herrings look like something helpful, but they throw you off track. Following them wastes time, and anything that wastes time makes passing more difficult. A red herring sends you off in the wrong direction, and the Structural Vignette has so many of them that it is hard to believe that they're not there on purpose.
The Software Tutorials

Begin your preparation process as if you have never taken an ARE section before. Start where NCARB expects you to start, with the Tutorials rather than the practice vignette.

Review Common Tools Tutorials

4. Common Tools Draw Tutorial:
5. Review the Symbol Tool and do the stupid practice exercise because Columns are a symbol tool.
6. Review Line Tool and do the stupid practice exercise because "beam or lintel" and "bearing wall with bond beam" behave are line tools.
7. Review the Two Point Rectangle Tool because joists and decking are two point rectangle tools.
8. Common Tools Move Adjust Tutorial:
10. Review Lines for "beam or lintel" and "bearing wall with bond beam" and practice it.
11. Review Rectangle for joists and decking and practice it.

Review Structural Systems Tools Tutorial

12. Structural Systems Tools
13. Review the Layers Tool Tutorial and practice it

Yes I know it seems really dumb to spend time reviewing the idiotic software.

But it's not dumb.

EVERYTHING IN THE TUTORIALS IS FAIR GAME FOR THE TEST.

Figure 1: Start with the Common Tools Tutorial
Try the practice Vignette

NCARB’s practice vignettes can be very useful or entirely counter-productive depending on how you use them.

Don't start the practice vignette yet
I want to talk theory First.

What not to do.

It is common for candidates who focus on getting the right answer, to mislead themselves into believing that they have mastered the vignette. They will sit down and work through it and post their answer online at areforum.org. When told of their mistakes they will make corrections and repost.

They may have come up with the right answer, but the process by which they arrived at it cannot be used at the test center because the ARE doesn't include the "call a friend" lifeline.

If you cannot identify and correct every error you make during the test all by yourself, you are likely to fail Structural Layout.
**Processes, Methods, Recipes, and Algorithms.**

When you practice the vignette I recommend that you focus on the way in which you solve the vignette not the fact that you arrived at a passing solution.

**In other words:**

*During preparation focus on the process method recipe or algorithm you are using. It’s like math class. What is important is that you show your work.*

You will not become an architect just because you can solve the practice vignette in twenty minutes. They don’t award licenses based on your ability to solve the same problem ten times.

Instead, you will get one shot at a new problem. This will measure your technique for solving the vignette. Improving your technique is all that matters.

Your process must be repeatable, consistent, and produce correct results...like counting on your fingers.

---

*Al, tell them what they've won!*
A Word from Al Gore about his Invention

This Study Guide is my tribute to Al Gore. The study guide develops an algorithm for solving the structural layout vignette. And even though it seems endless at times, there really are a finite number of steps for solving the problem.

There's also a lot of commentary on the algorithm because I believe it is important for candidates to really understand the test in order to maximize their chances for success.

An algorithm is a way of solving a particular type of problem "by the numbers." It does first things first, and last things last. Unsurprisingly, middle things come in between.

It is possible to pass the ARE without a method, just as it is possible to build a building without a program and budget up front. There’s nothing inherently wrong with "working it out during construction," so long as you achieve your goal. Sure it may take longer, but there are no liquidated damages associated with the six-month delay which a failed test entails.

Hi, my name is Al Gore and I invented the algorithm.

According to Wikipedia (which is on the internet (which I also invented):

an algorithm is an effective method for solving a problem using a finite sequence of instructions.

Figure 2: It's a fact: Al Gore does not endorse this book
**Tips and Tricks**

I'll be blunt.

I hate the very idea of "tips and tricks."

The mindset is grossly counter-productive to passing the ARE because it encourages taking the exam lightly.

Knowledge, skills and techniques are what is needed to assure success.

You want a tip: take the vignette more seriously than everyone on the internet and in your office and at the local AIA meeting tells you to.

Sure you might pass without doing so, but "might pass" isn't good enough for an architect.

Suppose someone said, "Here's a tip to meet life safety requirements." What could it be other than analyze the building and study the code?

Approach the exam with the same seriousness you approach professional practice. The worst mistake anyone can make is to think they can game the exam. You can't game the multiple choice without cheating, and it is pretty much impossible to game the vignette.

The study guide can show you how to solve the structural layout vignettes, but it will take the hard work and time which learning requires.

The trick to passing the vignette is thorough preparation. You need to be able to recognize your own errors and correct them within the time allotted. You need to learn to avoid most errors before you step into the testing room.

Tip: A few extra weeks of preparation can save you six months.
PART 2: BREAKING DOWN THE VIGNETTE TEXT SCREENS
**Introduction to the Five text screens**

The ARE is designed to test your reading comprehension.

Don't believe me?

The Structural Layout Vignette has six screens.

Five of them contain text, only one contains graphics.

You may be a "visually oriented person" but you are going to be tested on your reading ability.

The good news is that you can prepare for the actual test vignette by practicing reading the screens of the practice program and taking notes on them.

The bad news is that you can not really afford to skip reading them in the testing room.

However, the more familiar you are with the practice vignette text screens, the more readily you will understand the written portions of the test vignette...and most importantly, the more easily you will recognize any differences between the practice vignette requirements and the test itself.
The Index

The index is for navigating the five text screens.

There are four linked pages and the index button which will return you to the index screen.
The Vignette Directions

The Vignette Directions for the practice vignette are probably identical or nearly identical to the directions you will encounter on the test.

By practicing reading them during your preparation you will be able to read and understand them more quickly in the testing room.

More importantly by striving to read and understand them before you get into the test room, you will be able to incorporate their requirements in your solution without worries.

The Program for your test vignette will obviously be different from that given in the practice program.

However, much of the practice program contents (and by extension the test program) tells you what you are not supposed to do (negative requirements) in order to simplify the solution and standardize the tasks.

Because the test vignettes need to be standardized, you should expect the test program to contain similar or identical negative requirements (e.g. "the site has no seismic activity.")
Program

The vignette program contains the specific requirements for your solution.

This is the only text screen where you are likely to encounter a difference between the practice problem and the actual test.

Let me repeat that: This is the only text screen where you are likely to encounter a difference between the practice problem and the actual test.

However, the only way to know if there is a difference is to be highly familiar with the practice vignette program.

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The entire floor plan for an urban multi unit building has been completed and approved, and you are now required to develop a roof framing layout for the building or portion of the building shown on the work screen. The layout must accommodate the conditions and requirements given below.

**SITE FOUNDATION**

- The site top is uniform, activity and wind pressures are negligible.
- The soil and foundation system should be assumed adequate for all standard and extreme loads.
- The distribution of concentrated or special loads need not be considered.

**CONSTRUCTION MATERIALS**

- Structural steel is used with construction to be chosen for the roof structure type.
- Steel beam sections are to be rolled or built up.
- The roof deck is capable of carrying the design loads on spans up to and including 4 ft.
- Joists are sized to carry roof loads only.

**GENERAL REQUIREMENTS**

- All portions of the roof framing are flat.
- Dead loads are to be considered.
- Structural members must not extend beyond the building envelope, except to frame a designated covered entry.
- Openings may be located within walls, including the window wall and the clerestory window wall.
- Walls shown on the background floor plan may be designated as bearing walls. Additional bearing walls are not allowed.
- Ladders are required to be shown in bearing walls only. Other details shall not be included.
- The opening located between the common area and the sleeping area must be constructed and column free.
- The common area is designed to be column-free.
- The window wall and the clerestory window wall to the underside of the structure above. All corner openings have a head height of 7 ft above finish floor level.
- The roof over the high-ceiling space must be higher than the roof over the low-ceiling spaces.
  - The common area requires a high ceiling with a top of structure height of 10 ft.
  - The remaining spaces require a low ceiling with a top of structure height of 12 ft.
- The structure must accommodate a clerestory window to be located along the full length of the north wall of the common area.
Tips

It is beneficial to examine the tips screen during your preparation. Some items on it would be better suited for the Vignette Directions, since they are critical.
The General Test Directions

The General Test Directions are buried on the index screen. They provide a lot of insight into the ARE graphic vignettes, but you will not have time to read and fully analyze them in the test room and still complete the test.

That’s why I will do it for you.
Transcription of Vignette Directions

The vignette directions are probably generic and identical for all Structural Layout Vignettes within ARE 4.0.

This section provides a transcription of the Vignette Directions for reference and an Analysis of each of the directions.

The Vignette Directions should be understood in the context of the General Test Directions.

(numbers added for clarity)

1. Use the drawing tools provided to create a two-level roof framing solution over the program areas shown.

2. The layout you design should be structurally sound, efficient, and responsive to program requirements.

3. Your design is to be expressed by superimposing the necessary structural members on the background floor plan provided.

4. Draw the structural elements for the lower roof framing on the lower level (Lower Roof Framing Plan).

5. Switch layers using the layers icon and draw all additional structural elements required for the roof framing on the upper level (Upper Roof Framing Plan).

6. Return to the lower level and make sure that all upper level elements are fully supported from below.

7. For scoring, your solution must be drawn on these two separate layers.

8. Your layout should show the location of columns and/or loadbearing walls, the placement of beams, and the placement and spacing of roof joists.

9. You may not add walls.

10. All walls are assumed to be non-load-bearing unless you designate them otherwise.

11. If your layout includes load-bearing walls, you must use the drawing tool provided to designate existing walls as load-bearing walls.

12. For scoring, only walls so designated will be counted as load-bearing walls.

13. To designate decking, you should draw the rectangular boundary of each area of the roof that is to receive decking and orient the direction arrow to indicate its span direction.

14. Before beginning your solution, you should review the program information that can be accessed through the Vignette Index screen and familiarize yourself with the floor plan on the work screen.
Analysis of Vignette Directions

[Item 1] Use the drawing tools provided to create a two-level roof framing solution over the program areas shown.

You are to provide roof framing.

The word "Program" is a red herring. It does not refer to the vignette document labeled "program." It is only used to make the candidate imagine this is a real building. DON'T DO THAT. You're in NCARBLand. Don't forget it.

[Item 2] The layout you design should be structurally sound, efficient, and responsive to program requirements.

"Structurally sound" means:

- all the roof decks are supported by joists running perpendicular to the span direction
- each end of each joist is supported by a beam or a bearing wall or a lintel
- all the beams and lintels are supported by a column or bearing wall
- each upper level column is supported by either a lower level column or a lower level bearing wall.

"Efficient" means:

- Each member should support something.
- DO NOT DRAW a beam/lintel or bearing wall on which nothing bears. If nothing bears on it, leave it out.
- DO NOT DRAW exceptionally long beams, instead put a column in the middle – but check for openings required by the structural program.
- Frame joists in the short direction

"Responsive to Program Requirements" means:

- Respond to Structural Program. These are the items listed on the "Program" screen.
- DO NOT: try to respond to the red herring of the "architectural program"

[Item 3] Your design is to be expressed by superimposing the necessary structural members on the background floor plan provided.

You are going to draw over the top of the floor plan provided. (This is probably a round-about way of testing that the structurally relevant word "superimposing" doesn’t freak you out). Generally, this is a throw away item since it is impossible to use the vignette tools in a way that does not superimpose your work over the background. O.K. it's not impossible since you could draw everything to next to the floor plan, and I have to agree with NCARB. If you do that you deserve to fail.
[Item 4] Draw the structural elements for the lower roof framing on the lower level (Lower Roof Framing Plan).

You must draw the lower level roof decks, lower level joists, lower level beams/lintels, and lower level columns on the "Lower Level Framing Plan."

[Item 5] Switch layers using the layers icon and draw all additional structural elements required for the roof framing on the upper level (Upper Roof Framing Plan).

You must draw the lower level roof decks, lower level joists, lower level beams/lintels, and lower level columns on the "Lower Level Framing Plan."

[Item 6] Return to the lower level and make sure that all upper level elements are fully supported from below.

The authors of the Vignette provide really lousy advice on the TIPS screen [see the TIPS analysis below] because they suggest starting your design on the first floor. The fact that this appears in the DIRECTIONS suggests that doing so is required. Ignore it. Start with the upper level because load paths go from top to bottom.

[Item 7] For scoring, your solution must be drawn on these two separate layers.

This is critical and of course it is buried.

[Item 8] Your layout should show the location of columns and/or loadbearing walls, the placement of beams, and the placement and spacing of roof joists.

It should also show the deck.

[Item 9] You may not add walls.

You can use the "loadbearing wall tool" to designate walls shown on the background plan as load bearing.

DO NOT add new additional walls for structural support.

[Item 10] All walls are assumed to be non-load-bearing unless you designate them otherwise.

All the walls shown on the background plan are non-loadbearing unless you draw over the top of them with the "loadbearing wall tool."

[Item 11] If your layout includes load-bearing walls, you must use the drawing tool provided to designate existing walls as load-bearing walls.

This is critical...so it's listed third.

[Item 12] For scoring, only walls so designated will be counted as load-bearing walls.

You cannot use the background walls as loadbearing walls unless you draw over them with the "loadbearing wall tool."
[Item 13] To designate decking, you should draw the rectangular boundary of each area of the roof that is to receive decking and orient the direction arrow to indicate its span direction.

It does not tell you to use the tool! It literally tells you to draw a rectangular boundary...and the only rectangle is the one for sketch.

[Item 14] Before beginning your solution, you should review the program information that can be accessed through the Vignette Index screen and familiarize yourself with the floor plan on the work screen.

This is "should" be a tip and not a direction ...BTW, to get to the directions screen you have already been to the Index.
**Transcription of Program**

The preliminary floor plan for an urban mini-mall has been completed and approved, and you are now required to develop a roof framing layout for the building or portion of the building shown on the work screen. The layout must accommodate the conditions and requirements given below.

**Site/Foundation**

1. The site has no seismic activity and wind pressures are negligible.

2. The soils and foundation system should be assumed adequate for all standard and normal loads.

3. The distribution of concentrated or special loads need not be considered.

**Construction/Materials**

1. Structural steel/open web steel joist construction has been chosen for the roof structure type.

2. Steel beam sections are to be rolled or built-up.

3. The metal roof deck is capable of carrying the design loads on spans up to and including 4 ft.

4. Joists are sized to carry roof loads only.

**General Requirements**

1. All portions of the roof framing are flat.

2. Cantilevers are prohibited.

3. Structural members must not extend beyond the building envelope, except to frame a designated covered entry.

4. Columns may be located within walls, including the window wall and the clerestory window wall.

5. Walls shown on the background floor plan may be designated as bearing walls. Additional bearing walls are not allowed.

6. Lintels are required to be shown in bearing walls only.

Other lintels shall not be indicated.

7. The opening located between the common area and the seating area must be unobstructed and column-free.

8. The common area must be column-free.

9. The window wall and the clerestory window extend to the underside of the structure above. All other openings have a head height of 7 ft above finish floor.

10. The roof over the high ceiling space must be higher than the roof over the low ceiling spaces.

   - The common area requires a high ceiling with a top of structure height of 18 ft.

   - The remaining spaces require a low ceiling with a top of structure height of 12 ft.

11. The structure must accommodate a clerestory window to be located along the full length of the north wall of the common area.
Analysis of Program

(Introduction)

The preliminary floor plan for an urban mini-mall has been completed and approved, and you are now required to develop a roof framing layout for the building or portion of the building shown on the work screen.

You are better off ignoring the role playing part. It does not matter that it's a mini-mall and it doesn't matter that the floor plan is preliminary, completed, or approved. Don't role play. It's a test.

You need to provide a roof framing plan.

The layout must accommodate the conditions and requirements given below.

Critical: There are positive requirements (things you must do) and negative requirements (things you must not do) listed in the structural program.

---

Site/Foundation

These are all negative requirements or things you should not do if you want to pass. The whole reason that they need to provide these is because of the role playing nonsense in the Introduction. If you take the role playing seriously, then you need to be told all of this stuff to bring you back to NCARBland from the real world. On the other hand, if you just take the vignette as nothing but a test, then you won't worry about foundations and lateral loads because the vignette doesn't ask you for them.

1. The site has no seismic activity and wind pressures are negligible.

   **Negative Requirement:** means DO NOT design for lateral loads.

2. The soils and foundation system should be assumed adequate for all standard and normal loads.

   **Negative Requirement:** means DO NOT worry about the foundation system. Don't waste time looking for a foundation or footing tool, there isn't one. Don't waste time thinking about adjusting your structure to make the foundation efficient.

3. The distribution of concentrated or special loads need not be considered.

   **Negative Requirement:** means don't try to imagine special loads such as roof mounted equipment.

---

Don't remember Items 1 and 2 of the General Test Directions?

**REREAD the Site/Foundation requirements.**

They have RADICALLY limited the meaning of "structurally sound" in the Vignette Directions.

This shouldn't surprise you because of Items One and Two in the General Test Directions.
**Construction/Materials**

1. Structural steel/open web steel joist construction has been chosen for the roof structure type.

   ![This just is more role playing pretend talk. It doesn't actually matter what material was chosen for the joists. The "Draw Tool" only has a generic option labeled "joist." That's what you need to know.](image)

2. Steel beam sections are to be rolled or built-up.

   ![This is another role playing pretend item. The "Draw Tool" only offers an option labeled "Beam or Lintel." Were the framing wood, you would have exactly the same menu item.](image)

3. The metal roof deck is capable of carrying the design loads on spans up to and including 4 ft.

   ![This item is actually important. Metal decking...unlike plywood or several other materials...actually has to span in a certain direction. This requirement is used to make sure you understand structural efficiency. Use the maximum allowable span for setting the joists.](image)

4. Joists are sized to carry roof loads only.

   ![Don't imagine any additional loads such as rooftop equipment. Even if you do imagine such equipment, don't change the joist spacing from the maximum allowed to make up for it. This is meant to double check your understanding that structural efficiency requires the maximum joist spacing.](image)

**General Requirements**

1. All portions of the roof framing are flat.

   ![The roof framing is not sloped. This is meant to help you from getting bogged down in designing a roof (that's a different vignette). However, the proper term for what they mean is "dead-level."](image)

2. Cantilevers are prohibited.

   ![Everything needs to be supported at both ends.](image)

   If you find yourself wishing you could use a cantilever, STOP. Solve the vignette, DO NOT design.

3. Structural members must not extend beyond the building envelope, except to frame a designated covered entry

   ![Just follow the line labeled "Edge of Roof." That's a lot easier to do and remember.](image)

4. Columns may be located within walls, including the window wall and the clerestory window wall.

   !["Window Wall" and "Clerestory Window Wall" Unless you read the program slowly and carefully, this can easily confuse you.](image)

   There's a window wall shown on the plan, but using horrible vocabulary in order to add to the confusion this also mentions a "clerestory window wall."
The "window wall" and the "clerestory window wall" are two different elements of the vignette.

It's not just that columns "may be located" in walls. Columns must be located in walls. See Item 8. Given the other requirements and the vignette geometry, any column not in a wall is wrong.

5. Walls shown on the background floor plan may be designated as bearing walls. Additional bearing walls are not allowed.

Just like columns, you cannot have freestanding bearing walls. Any bearing wall you designate must be over the top of a background wall.

6. Lintels are required to be shown in bearing walls only. Other lintels shall not be indicated.

This is important. Only draw a "Beam or Lintel" where it is directly supporting a load. Adding an extra "Beam or Lintel" will affect scoring because it is inefficient.

7. The opening located between the common area and the seating area must be unobstructed and column-free.

Critical programmatic requirement.

It means that you cannot use a bearing wall. Therefore you must use a "Beam or Lintel" across the opening.
8. The common area must be column-free.

This is an important programmatic requirement. But it's not quite enough. For the sake of structural efficiency and compatibility with the background walls, all spaces must remain column-free.

9. The window wall and the clerestory window extend to the underside of the structure above. All other openings have a head height of 7 ft above finish floor.

This is mainly to check if you are reading all the requirements carefully. Notice how they changed the clerestory to "clerestory window" even though they called it "clerestory window wall" earlier.

10. The roof over the high ceiling space must be higher than the roof over the low ceiling spaces.

• The common area requires a high ceiling with a top of structure height of 18 ft.

• The remaining spaces require a low ceiling with a top of structure height of 12 ft.

For this vignette, the actual dimensions are Red Herrings.

11. The structure must accommodate a clerestory window to be located along the full length of the north wall of the common area.

This is the most significant single element of the program...and it is buried here at the end. You must not confuse the "clerestory window" with the "window wall" no matter how hard NCARB tries to get you to.

The "clerestory window" location is not indicated on the background plan.

For this vignette, all you need to know is that the high roof is higher and the low roof is lower. On other sections of the ARE this information might be very much relevant.
Transcription of Tips

Procedural tips for Structural Layout

• When solving this vignette, first draw the structural elements for the lower roof framing on the lower level. Then switch layers using the layers tool, and draw all additional structural elements required for the upper roof framing on the upper level. For Scoring your solution must be drawn on these two separate layers.

• When elements overlap, you may have trouble selecting a particular element. If this happens, keep clicking (without moving the mouse) until the desired element highlights.

Warnings

• The joist tool works like a 2-point rectangle. Choose the draw tool, select joist, direction and spacing from the menu and draw a rectangle covering the entire area desired. Do not draw individual joists.

• The decking tool also works like a 2-point rectangle. Choose the draw tool, select decking and direction from the menu and draw a rectangle covering the entire area desired. The shaded 2-point rectangles you draw describe the areas covered by decking.

Tools you might find useful

• Full screen cursor to help you line up structural elements.
Analysis of Tips

Procedural tips for Structural Layout

When solving this vignette, first draw the structural elements for the lower roof framing on the lower level. Then switch layers using the layers tool, and draw all additional structural elements required for the upper roof framing on the upper level.

A. **This is bad advice.**
B. Start with the upper level so that you can coordinate the lower level supports with it.
C. If the background plan was drawn on two layers (as is the case with other vignettes) then this might make a little bit of sense.
D. The whole vignette about carrying gravity loads to ground...that's why you want to start at the top.
E. You will still wind up switching layers back and forth as you check your work, but reduce the chance for error by starting at the top.

For scoring your solution must be drawn on these two separate layers.

**This is not a tip, it's a requirement.**

Burying it here is inexcusable conduct by NCARB.

When elements overlap, you may have trouble selecting a particular element. If this happens, keep clicking (without moving the mouse) until the desired element highlights.

This is the in test advice. If you still need it in the test room, you're in trouble.

My advice: Practice selecting overlapping objects prior to testing. Then practice some more. Practice until you are an expert.

**Warnings**

The joist tool works like a 2-point rectangle. Choose the draw tool, select joist, direction and spacing from the menu and draw a rectangle covering the entire area desired. Do not draw individual joists.

A. You should have learned how to use the 2 point rectangle tool in the really lame tutorials I advised you to do.
B. You better know how joists work before you get to the testing room.
C. The area covered by the rectangle and the particular spacing you have chosen is what gets scored.
D. Don't worry about the graphic alignment of the individual joists within the rectangle. The computer just draws something, and you cannot change the graphic representation.
E. Remember it's not CAD. The vignette was designed to replace hand sketches.

The decking tool also works like a 2-point rectangle. Choose the draw tool, select decking and direction from the menu and draw a rectangle covering...
the entire area desired. The shaded 2-point rectangles you draw describe the areas covered by decking.

A. Span direction is critical.
B. The arrow must be perpendicular to the joists.

**Tools you might find useful**

Full screen cursor to help you line up structural elements.

A. Full screen cursor is recommended. It is also important that grid is not recommended.
B. This means that dimensions aren't a part of this vignette. Remember it's not CAD. The vignette was designed to replace hand sketches. General Test Directions Annotated
Analysis of the General Test Directions

Item 1. - In order to ensure precision and accuracy of measurement, each vignette type is intended to assess a limited set of design skills, knowledges, and abilities.

It is important to understand that the vignettes are constructed in accordance with testing and measurement practices of the Education Industry. In industry terms each vignette including the scoring mechanism, the delivery methods, and the actual contents is an instrument.

Each vignette is designed to be precise - identical inputs (solutions) must produce identical outputs (scores). The quest for precision is almost certainly one of the reasons that the test was moved from human scoring to computer scoring.

Each vignette is designed to be accurate – it strives to measure exactly what it proposes to measure. For example if a vignette seeks to measure the candidate’s ability to lay out parking spaces, then it needs to be constructed so that laying out the parking spaces does not depend on determining occupancy and then calculating the spaces.

As item 1 states, each vignette is constructed to remove such dependencies by limiting its scope.

Item 2. – As you solve the problems posed by the vignettes, therefore, you will be asked to focus on specific design issues rather than to confront all of the design issues that a particular problem might represent.

The vignettes are not designed to measure how much you know. Instead, they are designed to determine if you can perform the specific tasks specified in the vignette.

In the real world a good design is subtle and layered. The issues it seeks to address are practically infinite.

On the ARE there are only a few dozen issues within each vignette, and the required solution is unimaginative and purely literal.

For example in the real world, a parking layout might seek circulation which consists of right turns rather than left turns. On the ARE striving to implement such best practices is counter-productive. A right hand layout will not compensate for an error elsewhere in your solution any more than a left hand or mixed layout will. Furthermore developing a right hand layout is likely to take more time. Anything that takes more time than an acceptable alternative reduces your chance of passing.

Item 3. - You should read the directions given for each vignette carefully in order to familiarize yourself with the scope of the vignette and the nature of the problem that it presents.

The only way to learn what you are being asked to do is by reading the directions carefully (equally important is learning what you are not being asked to do).

However, "familiarizing yourself" is not enough. You need to know what is and isn't required to maximize your chance of success.

The most consistent way to gain that knowledge is to read and take comprehensive notes.

The time to start reading and taking the notes on the material is before the test using NCARB's practice vignettes. This will:
Improve your reading and note taking skills.

Improve your knowledge of the general vignette requirements.

Help you understand the specific requirements of the test vignette.

Help you identify important differences between the requirements of the test vignette and NCARB’s practice vignettes.

Your test results will reflect your level of preparation. Start preparing early.

Item 4. - In order to give yourself the best opportunity to demonstrate your ability, you should plan your work on a vignette so that it can be completed within the time available.

The time to plan your work is during preparation. Develop a consistent and repeatable process for solving the vignette.

The process should have these phases:

- Identifying all the specific and general vignette requirements.
- Collecting information on each requirement.
- Analyzing each requirement.
- Checking your identification, collection, and analysis.
- Drawing the solution.
- Checking the solution against your analysis.

During preparation, you should develop a time table for completing each of these phases. You can use NCARB’s practice vignette to rehearse the mechanics of the process. You can use alternative practice vignettes to check your timetable against the allotted time for the vignette.

Item 5. - In addition to the vignette directions, other task information is provided, such as program and code requirements, that is needed for solving the problem posed by the vignette.

There is no reason to mentally distinguish between the program, code and directions for the vignette. All are equally important. Together they make up all the requirements for the vignette. You must know and meet all of them.

The most consistent way to do this is taking comprehensive notes (as discussed Item 3).

Unlike a multiple choice question, you are creating a solution not recalling an answer.

Everything needed to create the answer is provided to you, criteria, workspace, and tools. All you need to do is execute.

Item 6. - The requirements established by these materials are to be observed since they will be used in scoring the vignette. You should not consider outside information that conflicts with the requirements presented in the vignette, such as knowledge of code requirements in a particular jurisdiction.

Notice how they lumped all that stuff together as "requirements." Like I said, that's the way to think about it. "Directions," "Program," and "Code" are just convenient handles for organizing your notes.

For Example, even though IBC is a reference for the ARE do not apply it to the vignette. Remember the vignette has limited requirements (see Item 1).

Now look Item 6 again. It tells you that the program, code, and directions are what is used for scoring the vignette.
Item 7. - The problems presented by the vignettes are intended to be straightforward and solvable using the information provided. You should not assume that any unstated unusual conditions exist.

The required answers are more or less trivial compared to real world problems. That's why you are expected to solve them in a short period of time.

Looking at an ARE question or Vignette, coming up with an obvious answer, and then thinking, "Yes, but..." is the kiss of death on the test.

Let this be a reminder the ARE is different from actual architectural practice and requires an entirely different mindset from that which makes for a great architect.

The best part of this item is that once you understand it, you need not be paranoid. The solution is exactly what is asked for (In this case, the cigar is just a cigar).

Item 8. - Differences in preferred work styles and degrees of comfort with using a computer as a design tool may dictate different strategies for different candidates in working out and recording solutions to vignettes.

This points out a key concept that should guide your preparation: the computer software is primarily designed for recording your solution.

That's why it's not like AutoCAD. While it may be frustrating until you become familiar with the tools the software provides, it means that if a certain level of accuracy isn't readily achievable with the software, then that level of accuracy is not relevant to scoring the vignette.

This is important. If you are spending time trying to get a detail of your solution "correct" and finding it difficult due to the limitations of the tools, it is probably not an issue with the software. It is an issue with where you are focusing your energy. (Handrails on the ramp vignette are famous for this).

The software tools for each vignette are designed to accurately record what is being scored. What cannot be accurately recorded by the software is almost certainly not scored.

Item 9. - Some may wish to work out and refine solutions on the screen using the tools provided, while others may wish to develop solutions on scratch paper and then use the tools to reproduce the solutions on the screen for recording and scoring.

For most people, drawing out your solutions on paper means that you are trying to design rather than solve the problem.

Before you enter the testing room, you should have a method for solving the problem efficiently.

Before you enter the testing room, you should have practiced to the point where you can solve the problem "by the numbers" using a repeatable method.

You should be comfortable enough with the software that it is more efficient to draw your solution directly with the tools than to draw and translate.

Item 10. - You may not use reference materials other than those provided in the vignette directions, texts, or other documents during the examination.

Maybe, this was added by the lawyers.
Technically you've been given fair warning against using crib notes...not that they would really do any good on a vignette with requirements you haven't seen.

On the other hand, barring candidates from bringing in legitimate reference materials is actually doing them a favor. If having a handbook would actually improve your efficiency in solving the vignette then you are ill prepared.

If you think that having a handbook would help your chances of passing then you don't have the right mindset.

As they pointed out, everything you need is there in the requirements (directions, program, and code).

Don't get sidetracked. See Item 7.

**Item 11.** You may use the scratch paper that has been provided, but you must turn it in at the end of the examination.

An absolutely useless instruction...since there is almost zero chance of you reading it during the test.

**Item 12.** YOU ARE NOT TO USE ANY OTHER PAPER.

As I mentioned at the beginning, the directions are an asinine element of the ARE. The most useless instruction from the candidate's standpoint is the one that is given prominence. The candidate didn't bring any extra paper into the exam room to use.

It is either a huge editorial error which has survived for nearly twenty years or a deliberate red-herring.

**Item 13.** Your solution to each problem will be scored, as appropriate, on the basis of responsiveness to code and program requirements, technical soundness, and adherence to principles of sound design logic.

These are the three major categories of scoring criteria.

This is my take on each of the three:

**Responsiveness to code and program requirements:**

Does the drawing show all the required elements?

Does it provide the required relationships?

Does it avoid prohibited relationships?

**Technical Soundness:**

Are the elements drawn accurately within the limitations of the software and the limits of a tolerance factor?

Are the required relationships drawn accurately within the limitations of the software and the limits of a tolerance factor?

Are the prohibited relationships drawn accurately within the limitations of the software and the limits of a tolerance factor?

**Sound design logic:**

Does the solution have attributes which the test software assumes all passing solutions to have?
PART 3: BREAKING DOWN THE VIGNETTE GRAPHIC SCREEN
SYMBOL KEY

A1 – Critical Room Name

A2 – Critical Room Name

A3 – Critical condition for roof

RH1 – Don’t confuse window wall with clerestory window

L1 – Dimension Doesn’t matter.

L2 – Room Name doesn't matter.

abw- these alligators come into play if you use bearing walls. That’s why I don’t recommend them.
The practice vignette is a three structural bay problem.

Correctly identifying the structural bays is critical to solving the vignette, because any solution which does not utilize the bays will be grossly inefficient and failing.
PART 4: PREPARING FOR THE EXAM
Key Concept: Structural Bays

The structural bay is the basic building block of the framing layout. Therefore, recognizing, understanding, and responding to structural bays is the key to solving the vignette.

Shape of structural bays

Square
You are unlikely to see square bays on the vignette because they have no wrong answer. Therefore they do not fully test the candidate's understanding of framing.

Rectangular
Rectangular bays have a preferred direction for framing. This allows them to be used in order to test the candidate's understanding of structural framing basics. I suspect that candidates will always encounter rectangular bays in the vignette.

Quantity of Structural Bays

One Structural Bay
Two Structural Bays
Three Structural Bays
Components for framing Structural Bays.

---

**Joists in the Middle**

The direction in which the Joists are oriented determines the direction of the Decking and Beams.

---

**Decking on top of Joists.**

Decking always spans perpendicular to the joists.

---

**Beams (or bearing walls) under Joists**

Beams always span perpendicular to Joists.

---

**Columns support Beams**

---

Algorithm for Framing Structural Bays with Steel

1. **Frame the joists across the short dimension of the bay.**
   
   Judgment call, sometimes it is o.k. to frame joists across the long direction, because the length of span a must be used elsewhere and the supports already exist. If you can get all the joists framing the same direction, then all your decking will go in one direction. This simplifies drawing your solution.

2. **Decking always spans perpendicular to the joists**
   
   [decking spans the long dimension of the bay]

3. **Beams (or bearing walls) always span perpendicular to the joists**
   
   [beams run down the long sides of the bay]

4. **Columns Support Beams**
   
   Place a column at each end of each beam. If beam span looks long, add a column or two. Do not place columns in openings.

Keep in mind that the efficiency of steel structures is determined by the total weight of steel not the quantity of columns and beams.

Often times lots of small columns and beams is more efficient than a few large ones...that's why late gauge metal framing is cost competitive.

Because the vignette does not contain sufficient information to determine structural efficiency, so long as your solution is not grossly inefficient it will be adequate.
Vocabulary

Floor plan  The floor plan determines the configuration of your structural bays. The new elements which you draw must align with the floor plan elements to which they are responding.

roof framing layout  You will draw two framing layouts – one for the upper level, then one for the lower level. The new elements which you draw must align with the floor plan elements to which they are responding.

seismic activity  Also known as earthquakes. They create lateral loads. The program instructs you not to design for them. So don't.

wind pressure  creates lateral and uplift loads. program instructs you not to design for them. So don't.

negligible means unimportant.

standard and normal loads  These are gravity loads. They must be since everything else has been eliminated by the program.

Distribution  How things are spread out.

concentrated and special loads  These would be special loads and you don't have to account for them.

steel/open web steel joist  A joist supports a horizontal surface. The fact that it's "steel/open web" doesn't matter. The vignette tests general knowledge of structural layout. Specific facts about steel construction are tested in the multiple choice section.

beam sections  The cross section of a beam. The part about "rolled or built up" is just a red herring. It wouldn't make any difference to the design if they were wood.

metal roof deck  The fact that it is a metal deck matters. Metal decks are corrugated and only span in one direction (perpendicular to the supporting joists).

design loads  For the vignette, their scale and magnitude don't matter. Only the direction. Because the only thing you have to worry about is gravity, the direction is down.

Span  The distance between supports.

roof loads  For the vignette these are gravity loads and act downward. Their magnitude is irrelevant for solving the vignette.

Cantilevers  have only one supported end. Overhangs are also unsupported on the end and are not allowed either.

Prohibited  not allowed.
**Structural members** For this vignette, joists, decking, beams, columns (or bearing walls).

**building envelope** The skin of a structure. It does not play any role in this vignette.

**Edge of Roof** The edge of roof coincides with the edge of wall most places. Where it doesn't, it is explicitly drawn and determines the edge of your decking.

**Window Wall** Is used as a distractor. If a candidate doesn't read carefully, they will assume that the window wall is the same as the clerestory window. I don't know exactly what a window wall is, but for the test it doesn't matter. So don't waste time speculating. Just know that you cannot stick columns in the middle of it.

**Clerestory Window** A high window above eye level according to Wikipedia.

**bearing walls** Bearing walls support gravity loads from above and transfer them to the foundation. In the vignette, they may be used to support one or more roofs.

**Lintel** A lintel is a short beam spanning a small opening.

**Unobstructed** Clear of items which impede or block free movement or view.

**column-free** Unobstructed by columns.

**head height** The distance from floor to the lowest point overhead. Not a concern in the vignette. You can assume head height is always adequate.

**Ceiling** the finished underside of a floor or roof structure. Although in general, it is important to distinguish ceilings from roofs but not in this vignette. Ceilings do not come into play in the vignette.

**Program** The term program is used to create confusion in the vignette. It is used in reference to an imaginary architectural program which the candidate cannot see. It is also used formally to describe structural requirements.

**Structurally sound** For the vignette this means decks span perpendicular to the joists. Each joist is supported at each end by a beam or bearing wall. Beams are supported by columns at each end. That's it.

**Efficient** For the vignette this means that each column supports one or more beams, each beam or bearing wall supports joists, all joists support decks and the joists typically run across the short direction of the bays.

**Designate** For the vignette, this means draw over the top of a floor plan wall with the bearing wall tool.

**Layers** The stupid tutorials explain how to use layers. At least open them up and spend five minutes learning how to use them.

**Supported** Has something holding it up. For the vignette all supports must be under what they hold up.

**Loadbearing** Supports one or more structural members above.
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<table>
<thead>
<tr>
<th>CLERESTORY</th>
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<tbody>
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<td>5. -</td>
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<table>
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<th>WALL</th>
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<tbody>
<tr>
<td>6. -</td>
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<table>
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<tr>
<th>7. Clear opening between Common &amp; seating</th>
</tr>
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</table>

| 8. - |

| 9. - |

<table>
<thead>
<tr>
<th>10. Common - High Roof</th>
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<table>
<thead>
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<th>11. Clerestory North Wall</th>
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<table>
<thead>
<tr>
<th>Common</th>
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<table>
<thead>
<tr>
<th>Clerestory</th>
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<table>
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<th>High Roof</th>
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45
**Note Taking Procedure**

**Text Screens**

The purpose of your note taking is:

1. Make sure that you read every single requirement.
2. Make sure that you identify the specific requirements of your particular vignette such as clerestory location, high roof area, and required column free openings.
3. Make sure that there is no deviation in the standard conditions, such as lateral load, overhangs, and foundations.

**Method of Note taking:**

1. **Draw a compass rose first.** Always, it is amazingly easy to confuse east and west under pressure. Don't believe me? We say "East, and West" even though graphically West is to the left of East. I had the distinct pleasure of sorting through directional confusion the first time I attempted the schematic design vignette.
2. **Go to the Directions.** Using your finger on the screen count the number of sentences in Directions. Write numbers from one to the total number of sentences. Count the sentences again to check your work.
3. **Read and acknowledge each sentence** either by making a brief relevant note which will help you check your work, or a dash indicating that it is something that you already know and do based on your having studied the practice vignette.
4. **Go to the Program.** Write each heading and acknowledge each sub-item. Make a note for the items which you need in order to check your work.
5. **Go to the Tips.** Write the headings and acknowledge each item. Make a note if something is actually helpful.
6. **Skip the General Test Directions.** You do not have time to read and unpack them. You should have done that earlier during your preparation.

**Graphics Screen**

The purpose of your sketch is to roughly translate the requirements onto the plan:

1. Check the North Arrow.
2. Identify the structural bays.
3. Identify the high roof area/upper level.
4. Identify the clerestory location.
Practice

- **Always practice with a timer.** You need to know how long each of your steps takes.
- **Practice taking notes** until you have the process and format down cold. The plus side is that you should be able to get to the point where you can take comprehensive notes for this vignette in 8-10 minutes. I cannot stress the importance of notes enough.
- Focus on improving your process for solving the vignettes not getting the right answer. This will allow you to constructively use the same vignette to improve your performance.
- **Do not get hung up on the details when working with alternate vignettes.** Most alternate vignettes are poorly constructed and worrying about what something means is a complete waste of time. The thing to worry about is did you take good notes and make a reasonable interpretation. That's all that's within your control.
- **Do not get hung up on Drafting precision.** The ARE is not a CAD test. Drawing everything *more or less* to the wall centerline is fine. The important thing about drawing to the centerline is not scoring. The important thing is that it gives you peace of mind while you wait for your PASS letter. Remember, the Computerized vignettes replaced paper and pencil tests, zooming in like it's CD's just wastes time.

- **Focus on improving your process** for solving the vignettes not getting the right answer. This will
PART 5: DRAWING THE SOLUTION
Overview of the Exam Process

Structural Vignette Work Method step by step

1. Take notes.
   1.1. High area
   1.2. Joist spacing
   1.3. Clerestory/special condition
   1.4. Graphics
   1.5. Identify bays
   1.6. Identify clerestory
   1.7. Openings

2. Switch to upper level framing layer
   2.1. Joists in short dimension at required spacing.
   2.2. Deck perpendicular to joists
   2.3. Beams perpendicular to joists
   2.4. Columns
      A. At each end of each beam
      B. Intermediate (typically two per beam)
   2.5. Count the number of columns on the upper level and write it down in your notes

3. Switch to lower level framing plan. Leave upper level visible
   3.1. Place Columns at each location where there is a column on the upper level plan
      A. Verify column count against your notes
   3.2. Draw joists across each bay
   3.3. Draw deck perpendicular to joists
   3.4. Draw beams perpendicular to joists
   3.5. Columns
      A. At each end of each beam
      B. Intermediate (one or two per beam line)
Because the vignette is only requires handling gravity loads, and gravity load paths act from downward from top to bottom, always begin on the upper level framing plan. The Official NCARB Tip to start on the lower level is a really bad idea.

Because you have already identified the bays in your sketch during the note taking phase, you may start by drawing joists. Check your spacing against your notes. Do not start flipping back and forth between screens. It only wastes time and encourages poor note taking. Extend the Joists more or less from wall centerline to wall centerline.
Next draw the decking. Make sure it is spanning perpendicular to the joists. The boundary of the deck should be more or less in the center of each wall.

If your deck arrow runs the length of the upper level bay and crosses the joists, then you have done it right.
Figure 7: Select Draw->Beam or Lintel

We need a beam under each end of each joist. So select the tool and draw a beam more or less in the center of each wall.

Figure 8: Draw Beams supporting Ends of Joists

Beams run the same direction as the arrow for the decking.
Columns will take the load downward. Keep in mind the clear opening listed in the program.

I strongly recommend framing the clear opening with columns. Keep in mind that hyper-efficiency is not required, and that more beams and columns does not necessarily mean higher efficiency because steel is purchased by weight. Framing the opening allows you to remember it should you start tweaking your solution.
Figure 11: Select Layer Tool. Set Current Layer to Lower. Make sure Other layer is visible.

This is the point where you need to count your upper level columns and write it down in your notes.

Figure 12: This grays the upper level framing plan out.

When you have switched layers, the other layer will be gray. If not check the "other level" radio button.
The critical step is to make your load paths from the upper level to the lower level continuous. This means placing a lower level column at the location of each upper level column.

Count the number of columns you just added and check it against the number of upper level columns you wrote down.
Next draw the lower level joists based on your sketch of the structural bays.

Make sure your joists span the short direction of the structural bay.
Draw Joists across the next structural bay. It is ok to run them the long direction because the upper level establishes that the joist span is acceptable. **Doing so makes drawing the deck easier because you only need to use a single orientation for the deck span.**

Complete joists for the lower level.
Figure 19: Select Draw Tool->Decking->Horizontal Span

Pick the span direction which is perpendicular to all your joists.

Figure 20: Draw Deck over joists

If your deck arrow runs the length of the bay and crosses the joists, then you have done it right.
Figure 21: Draw Decks over the remaining lower level joists

Note that two separate rectangular areas of deck were drawn. One for the center bay over the covered entry and another over the two shops in the lower structural bay.

Figure 22: Select Draw Tool->Beam

Each structural bay requires a beam under all the joists.
Beams run the same direction as the arrow for the decking.

The last step is to make sure the lower level beams are fully supported.
Figure 25: Add Columns at each end of each beam.

Make sure you get the ends first. These are most critical because cantilevers are prohibited.

Figure 26: Add intermediate columns to beams without them

Keep in mind that hyper-efficiency is not required, and that more beams and columns does not necessarily mean higher efficiency because steel is purchased by weight, and the vignette does not contain sufficient information to determine what is actually most efficient.
Figure 27: Final thoughts

The Proposed solution is good enough to pass, but the circled columns might cause unnecessary worry while waiting for your score.

The issue with tweaking the solution for fewer columns is that some of the columns require changing both levels. Thus changing it is a judgment call, and must take into consideration the amount of time left. My personal recommendation is to resist the urge to change in this case -- even though it may be contrary to the conventional wisdom of the AREforum.

The reason is that AREforum conventional wisdom is "overcooked" based on the specifics of the official practice vignettes. In other words, because the official vignette has been reviewed so many times, people are able to "improve" the solution at their leisure. Such "improvements" miss the point that there is no improvement on passing.

In addition there are legitimate architectural reasons for column placement such as is shown in this solution (even if those reasons are not relevant to the scoring). For example, structural expression as an organizing scheme is a legitimate architectural purpose – picture the elevation of the clerestory both with and without the circled column in place.

If the scheme penalized the extra column in the clerestory, it would no longer be clearly measuring minimal architectural competence, and the vignette’s validity and legitimacy could clearly be challenged and overturned by a candidate. Even though it is unlikely.