

ARE

EXAM GUIDE

Site Planning & Design

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This document, effective August 2015, supersedes all previous editions of the ARE® 4.0 Exam Guide: Site Planning & Design. Please check NCARB's web site, www.ncarb.org, regularly for updates to the ARE 4.0 Exam Guides and for the most current information regarding the ARE.

SITE PLANNING & DESIGN

OVERVIEW

DIVISION STATEMENT

The application of knowledge and skills of site planning and design including environmental, social, and economic issues, project and practice management.

Content Areas

1. **PRINCIPLES**
(22-30 percent of scored items)
2. **ENVIRONMENTAL ISSUES**
(24-32 percent of scored items)
3. **CODES & REGULATIONS**
(18-26 percent of scored items)
4. **MATERIALS & TECHNOLOGY**
(16-20 percent of scored items)
5. **PROJECT & PRACTICE MANAGEMENT**
(4-8 percent of scored items)

Vignettes

SITE GRADING

Modify a site's topographical characteristics responding to programmatic and regulatory requirements.

SITE DESIGN

Design a site, including building placement, parking, and vehicular and pedestrian circulation, responding to programmatic, functional, environmental, and setback requirements utilizing general site planning principles.

SITE PLANNING & DESIGN

KNOWLEDGE / SKILLS

The division has been broken down into a listing of knowledge and skills directly related to each major content area

1. PRINCIPLES

(22-30 percent of scored items)

- A.** Review and assess sites. Incorporate the implication of human behavior, historic precedent, and design theory in the selection of systems, materials, and methods related to site design and construction.

1. Site Planning

Use physical, contextual, and regulatory characteristics, in combination with programmatic requirements, to evaluate project sites.

2. Site Design and Design Principles

Use site evaluation data and programmatic requirements to develop and evaluate alternative site designs.

3. Implications of Design Decisions

Use architectural, engineering, and construction principles and procedures to evaluate site design.

4. Adaptive Reuse of Buildings and/or Materials

Apply principles for adaptive reuse of facilities and materials to site design.

5. Architectural History and Theory

Analyze and evaluate the project site with respect to its regional, local, and site-specific historical context.

2. ENVIRONMENTAL ISSUES

(24-32 percent of scored items)

- A.** Interpret site and environmental conditions. Assess and apply systems, materials, and construction methods. Incorporate principles of sustainability. Assess design impact on human behavior.

1. Interpreting Existing Site/Environmental Conditions and Data

Assess site layout and proposed materials and systems with respect to environmental context.

2. Design Impact on Human Behavior

Assess site layout and proposed materials and systems with respect to human behavior, safety, and security.

3. Hazardous Conditions and Materials

Assess the site with respect to the presence of hazardous conditions and materials, and identify mitigation options.

4. Sustainable Design

Identify and apply sustainable strategies and technologies to site layout and selection of materials and systems.

5. Alternative Energy Systems and New Material Technologies

Identify and apply alternative energy systems and new material technologies to site layout and selection of materials and systems.

SITE PLANNING & DESIGN

KNOWLEDGE / SKILLS

3. CODES & REGULATIONS

(18-26 percent of scored items)

- A. Incorporate building codes, specialty codes, zoning and other regulatory requirements in site design and construction.

1. Government and Regulatory Requirements and Permit Processes

Identify and apply relevant land use, building codes, and regulations into the site design, and assist in permitting.

2. Accessibility Laws, Codes and Guidelines

Identify and apply relevant specialty codes and regulations into the site design, and assist in permitting.

4. MATERIALS & TECHNOLOGY

(16-20 percent of scored items)

- A. Analyze the implication of design decisions in the selection of systems, materials, and methods incorporated in site design and construction.

1. Construction Details and Constructability

Incorporate appropriate materials into site details, systems, and assemblies.

2. Construction Materials

Evaluate and select appropriate site products, materials, and systems based on programmatic, performance, and sustainability requirements.

3. Fixtures, Furniture, Equipment, and Finishes

Evaluate and select appropriate site fixtures, furniture, equipment, and finishes based on programmatic and performance requirements.

4. Thermal and Moisture Protection

Manage the impact of temperature, water, and climatic conditions on site design.

5. Natural and Artificial Lighting

Apply principles of natural and artificial lighting in site design.

6. Implications of Design Decisions

Use architectural, engineering, and construction principles and procedures to evaluate site materials, assemblies, and systems.

5. PROJECT & PRACTICE MANAGEMENT

(4-8 percent of scored items)

- A. Assess and administer site design, including construction sequencing, scheduling, cost, and risk management.

1. Construction Sequencing

Determine site phasing based upon prioritized programmatic requirements and anticipated construction sequencing.

2. Cost Estimating, Value Engineering, and Life-cycle Costing

Analyze site development costs relative to programmatic and budgetary requirements.

SITE PLANNING & DESIGN

SAMPLE MULTIPLE-CHOICE QUESTIONS

Go to page 11 for answers.

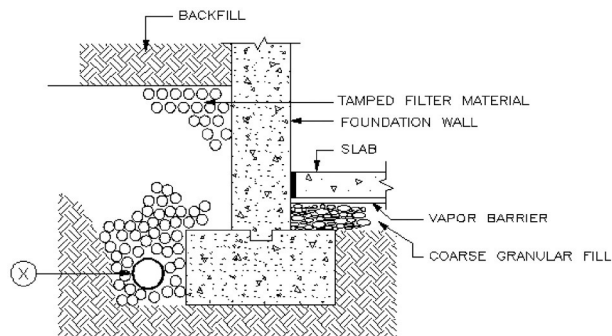
1. Which of the following pieces of information are typically included in a subsurface investigation report?

Check the four that apply.

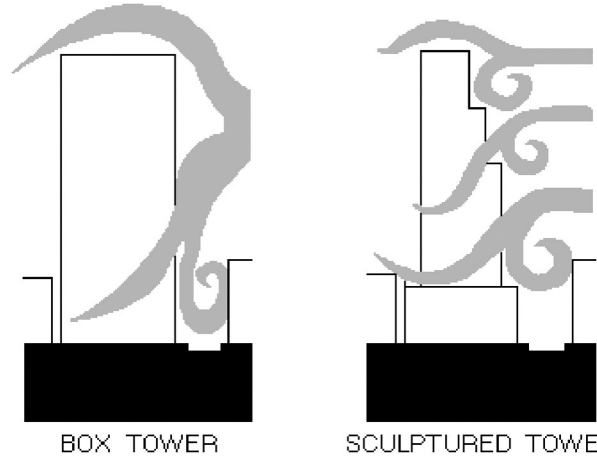
- A. Results of field tests
- B. Results of laboratory tests
- C. Recommended types of foundations
- D. Soil sieve analysis
- E. Boring location plan
- F. Recommended treatment for contaminated soil

2. Which of the following defines the sudden loss of shearing resistance in a cohesionless soil?

- Plasticity
- Liquefaction
- A collapsing soil
- An expansive soil



3. The purpose of the element X in the diagram above is to
- increase hydrostatic pressure on the wall
 - reduce hydrostatic pressure on the wall
 - maintain uniform hydrostatic pressure on the wall
 - decrease vapor pressure in the basement room



4. The diagrams above indicate which of the following about the relationship between wind and the mass of high-rise buildings?
- Wind acts the same on all vertical surfaces regardless of mass and material differentiation.
 - More wind turbulence is created at the street level of wide, smooth-surfaced facades.
 - Wind turbulence is increased at street level by stepped building forms.
 - Wind turbulence is of minimum concern in the relationship between high-rise buildings and the street.

SITE PLANNING & DESIGN

SAMPLE MULTIPLE-CHOICE QUESTIONS

Go to page 11 for answers.

5. Building failure can often be traced to unstable subsoil conditions. Which of the following subsurface conditions is likely to cause differential settlement of building foundations?
- Large beds of clay contained in gravel
 - Small boulders dispersed in gravel
 - Stratified rock
 - A deep layer of dry sand and gravel
6. In a residential development composed of large building lots, on-site sewage disposal for each lot is permitted subject to the suitability of the soil. Which of the following soil investigations should the architect request?
- Percolation test
 - Evaporation test
 - Test for soil alkalinity
 - Test for soil density
7. Which of the following would be the best design-with-climate strategy in the layout of a new town in a cool region such as Winnipeg or Minneapolis?
- The town structure should be densely grouped; larger building units may be grouped close together but spaced to utilize sun-heat effects, and the layout should provide a sheltering effect against winds.
 - The preferred design is an open and free layout of buildings that tend to merge with nature.
 - The town structure should be dense and provide shade, and unit dwellings or groups of buildings should create court-like areas.
 - Buildings should be separated to utilize air movements, and the character of the town fabric should be loose and scattered.
8. Assume a project site of 50,000 square feet of land area and 10,000 square feet of gross building floor area. At a ratio of 3 square feet of parking area to 1 square foot of gross building area, how many parking spaces are required at 400 square feet per car?
- spaces
9. Easements are generally placed on private property to accommodate which of the following?
- Daylight
 - Landscaping
 - Access
 - Setbacks
10. The characteristic of an existing structure that will directly affect the thermal environment of adjacent new construction is its
- mechanical systems
 - texture
 - shadow pattern
 - footprint

SITE PLANNING & DESIGN

SAMPLE MULTIPLE-CHOICE QUESTIONS

Go to page 11 for answers.

11. Costs for cutting and filling earth on site are typically calculated by which of the following?
 - Square yards
 - Cubic yards
 - Acres
 - Tonnage

12. The most important factor for locating a new retail center is
 - accessibility to market area traffic
 - the availability of utilities
 - a well-drained level site
 - its proximity to employment zone areas

13. In cold climates, vapor barriers are desirable below attic insulation because they
 - minimize moisture migration
 - serve as secondary waterproofing
 - support the insulation
 - provide protection from insect infestation

14. The process of stripping existing vegetation from a site can cause
 - pollution
 - disorientation
 - defoliation
 - erosion

15. Local government authorities impose which of the following land use restrictions? **Check the four that apply.**
 - A. Setbacks
 - B. Covenants
 - C. Height and area limitations
 - D. Accessibility Acts
 - E. Parking requirements
 - F. Zoning

16. Foundation design in northern climates can require footings to be as deep as 5 feet below grade for which of the following reasons?
 - Protect against snow drifts
 - Rest on undisturbed soil
 - Be below frost level
 - Resist earthquakes

17. The practice of balancing cut and fill is used in
 - site grading
 - sediment control
 - land reclamation
 - footing excavation

SITE PLANNING & DESIGN

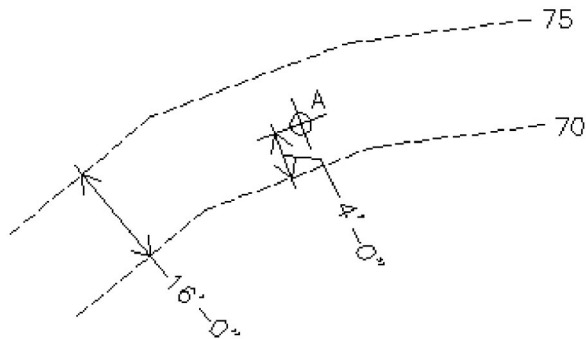
SAMPLE MULTIPLE-CHOICE QUESTIONS

Go to page 11 for answers.

18. A roof overhang on which of the following façades of a building built in the northern hemisphere will provide seasonal adjustment for solar radiation?

- North
- South
- East
- West

19. Assuming a constant slope between the two contour lines shown, what is the elevation of point A?



- 70.25 ft
- 71.25 ft
- 72.50 ft
- 73.25 ft

20. What is the term for the boundaries, property lines, or limits of a parcel of land, as defined by distances and compass bearings?

- Chaining
- Datum
- Benchmarks
- Metes and bounds

21. Since contamination in soil typically leads to groundwater contamination, which of the following cleanup technologies can be used to remediate the unsaturated zone?

- Vapor extraction
- Biodegradation
- In situ incineration
- Photolysis

22. Which of the following technologies is most commonly used in groundwater remediation projects?

- Extraction/treatment
- In situ aeration
- Biological barriers/filters
- Gas chromatography

23. Which of the following site conditions affects the development potential of a parcel of land?

Check the four that apply.

- A. Economic climate
- B. Wetlands
- C. Endangered species
- D. Acid rain
- E. Hazardous waste
- F. Existing infrastructure

SITE PLANNING & DESIGN

SAMPLE MULTIPLE-CHOICE QUESTIONS

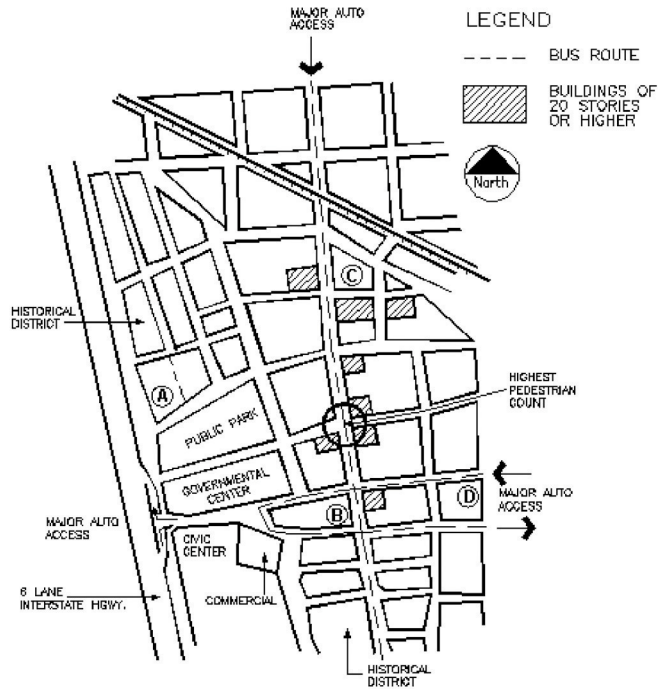
Go to page 11 for answers.

24. Zoning ordinances promote social vitality within a city when they include
- strict zoning by land-use category
 - high-rise buildings in a park-like setting
 - mixed use and overlay zoning
 - flexible car-parking ratios
25. Which of the following site orientation factors is critical for residential units?
- Bedrooms should face away from harsh winds.
 - As many units as possible should be entirely masked from breezes.
 - West facing units are at a premium.
 - Each unit should receive sun for at least part of a winter day.
26. Restrictive covenants are typically developed on behalf of
- property owners
 - city officials
 - design professionals
 - civil engineers
27. The term "right-of-way" is used to describe
- the right to have first opportunity to purchase real estate when it becomes available
 - the right of taking of land by entering on it in a peaceable manner
 - a right belonging to a party to pass over land of another
 - a right to cross a picket line during a strike
28. A nonconforming but legal structure that existed prior to the enactment of a land use ordinance is said to be
- an easement
 - dedicated
 - aggrieved
 - grandfathered
29. Which of the following principles should guide residential zoning adjacent to a central business district?
- It should be prohibited because land costs are too high.
 - It should be maintained as a viable community asset.
 - All substandard existing units should be converted to commercial use.
 - Future units should be available to low-income and elderly families only.
30. Topography is the most critical criterion when routing which of the following utility lines?
- Water
 - Electrical
 - Natural gas
 - Storm sewer

SITE PLANNING & DESIGN

SAMPLE MULTIPLE-CHOICE QUESTIONS

Go to page 11 for answers.



31. On which of the proposed sites would the use of solar energy be most limited?
- Site A
 - Site B
 - Site C
 - Site D
32. Water-detention areas are used primarily for which of the following?
- To create swimming and recreation areas
 - To provide aesthetically pleasing vistas
 - To control surface water runoff
 - To act as reservoirs in periods of drought

33. Which of the following environmental impacts should be considered in a site analysis? **Check the four that apply.**
- A. Reflections
 - B. Air movement
 - C. Archeological finds
 - D. Pedestrian access
 - E. Sun and shadow patterns
 - F. Topography
34. Increased moisture content in bearing soils can have which of the following effects? **Check the three that apply.**
- A. Change in volume
 - B. Reduction in bearing capacity
 - C. Increased cohesion
 - D. Excess surface runoff
 - E. Decreased compatibility
 - F. Sewer backups
35. Methods to reduce potential vertical movement to a proposed building due to expansive clay soil conditions would include the following? **Check the four that apply.**
- A. Over-excavate below footing grade and fill with compacted gravel.
 - B. Waterproof the foundation to reduce filtration
 - C. Extend footings and foundations to a depth of consistent ground moisture
 - D. Drain surface water away from building foundation
 - E. Plant trees near the building to stabilize the ground
 - F. Control roof water runoff

SITE PLANNING & DESIGN

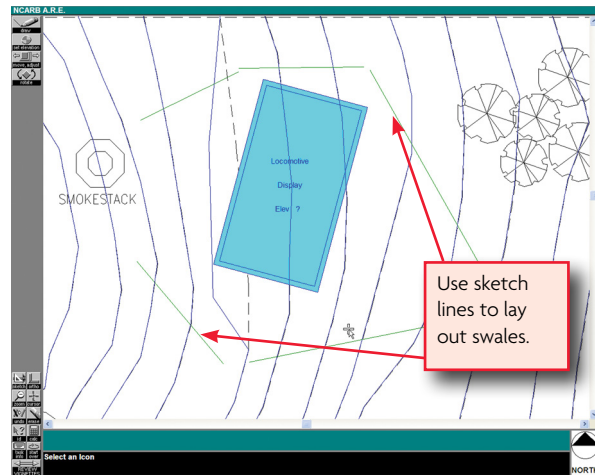
SAMPLE MULTIPLE-CHOICE ANSWERS

1. A, B, C, E
2. Liquefaction
3. reduce hydrostatic pressure on the wall
4. More wind turbulence is created at the street level of wide, smooth-surfaced facades.
5. Large beds of clay contained in gravel
6. Percolation test
7. The town structure should be densely grouped; larger building units may be grouped close together but spaced to utilize sun-heat effects, and the layout should provide a sheltering effect against winds.
8. 75
9. Access
10. shadow pattern
11. Cubic yards
12. accessibility to market area traffic
13. minimize moisture migration
14. erosion
15. A, C, E, F
16. Be below frost level
17. site grading
18. South
19. 71.25 ft
20. Metes and bounds
21. Vapor extraction
22. Extraction/treatment
23. B, C, E, F
24. mixed use and overlay zoning
25. Each unit should receive sun for at least part of a winter day
26. property owners
27. a right belonging to a party to pass over land of another
28. grandfathered
29. It should be maintained as a viable community asset.
30. Storm sewer
31. Site C
32. To control surface water runoff
33. A, B, E, F
34. A, B, D
35. A, C, D, F

SITE PLANNING & DESIGN

SITE GRADING VIGNETTE

General Tips for Taking Site Grading



Directions

On the work screen you will see a topographic representation of an existing site that is to have a built object placed on it and the site regraded. The tools available will allow you to place the built object and manipulate and identify contour lines. Your completed work should show the placed built object and should show the site plan with contours that will successfully allow water to flow from the site in accordance with the program and site conditions.

Before beginning your solution, you should review the program that can be accessed through the Vignette Index screen and familiarize yourself with the site plan on the work screen.

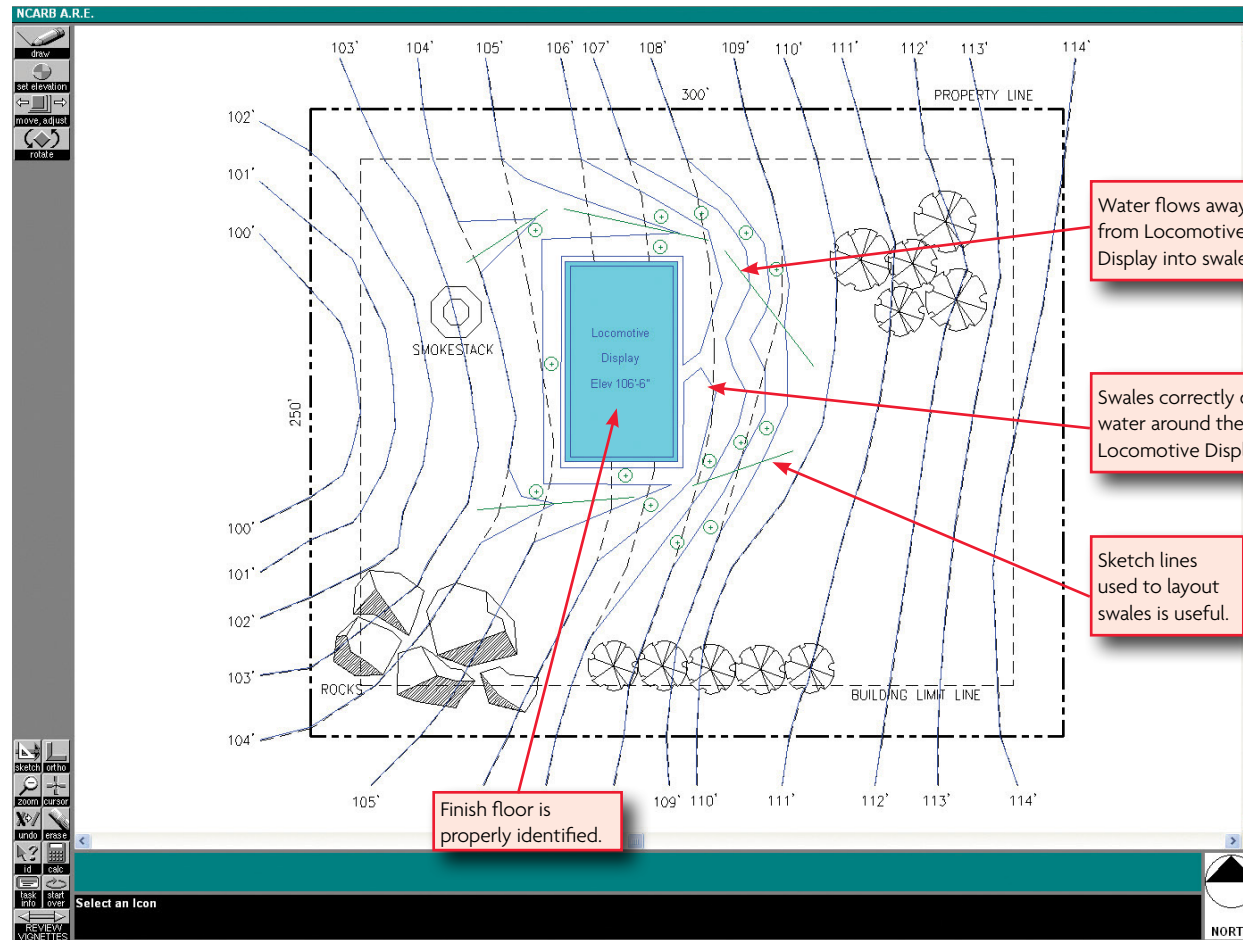
Program

A steam engine Locomotive Display is to be located within a fenced area in a city park. The park is surrounded by private properties on all sides.

1. Place the Locomotive Display on the site within the building limit lines.
 - ▶ Regrade the site to create a level area for the Locomotive Display.
 - ▶ Indicate the finish floor elevation of the Locomotive Display. The finish floor elevation must be 6" above the nearest contour line.
2. Regrade the site so that water will flow around and away from the Locomotive Display.
 - ▶ The slope of the regraded portions of the site shall be at least 2 percent and no more than 20 percent.
 - ▶ Contour lines between property lines and building limit lines may be manipulated.
3. The existing smokestack, rocks, and trees shall not be disturbed.
4. Changes in site topography not required for proper drainage should be avoided.

SITE PLANNING & DESIGN

SITE GRADING VIGNETTE - Sample Passing Solution



Procedural Tips

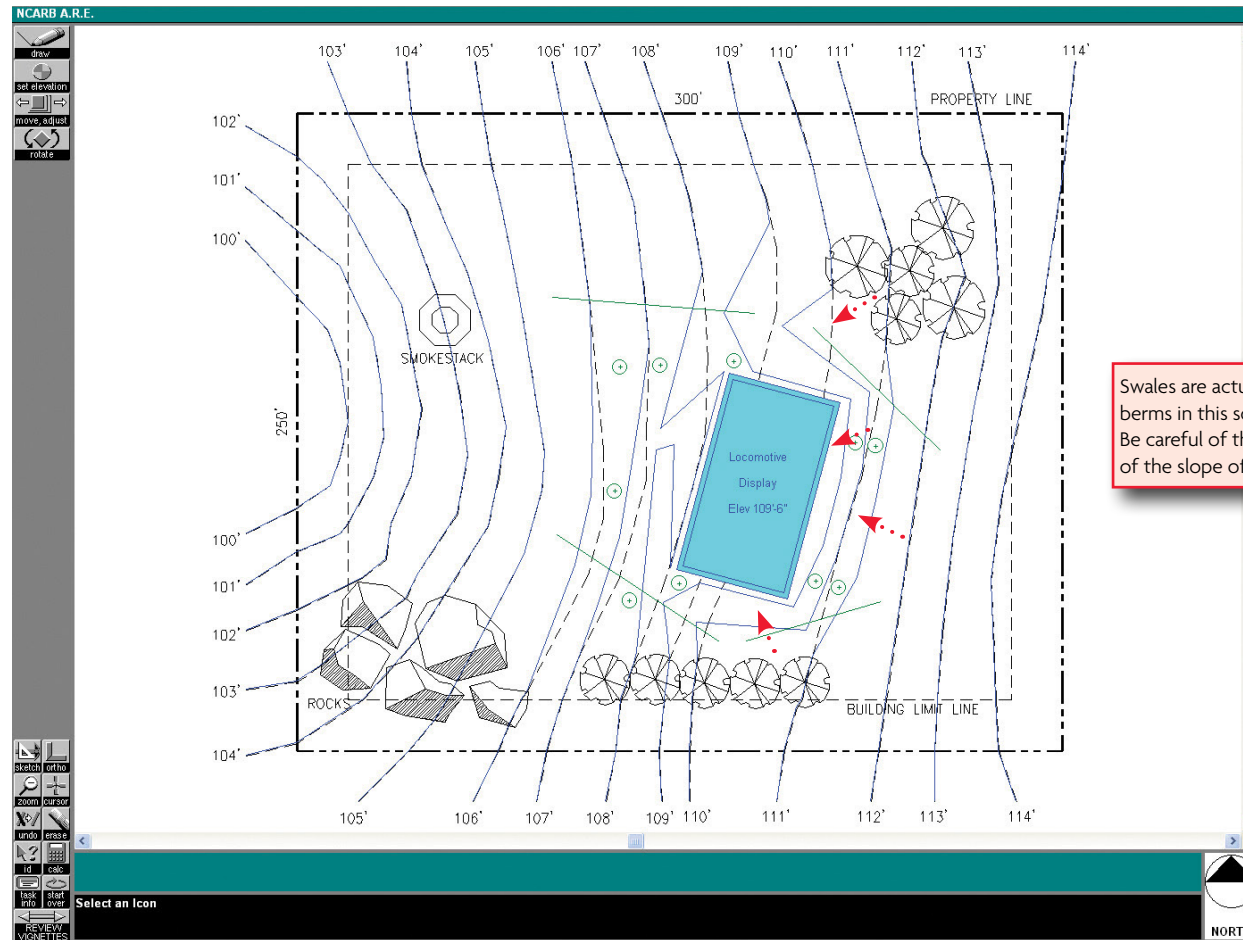
- ▶ **Erase** affects all changes that have been made to a contour. **Undo** affects the last action only.
- ▶ When elements overlap, you may have trouble selecting a particular element. If this happens, keep clicking (without moving the mouse) until the desired element highlights.

This solution shows a clean, simple answer to the problem presented. The program requires that water be directed around and away from the Locomotive Display, while leaving the smokestack and trees undisturbed. The candidate has created a level pad for the Locomotive Display and properly set the finish floor elevation. The sketch tool was used here to lay out the

swales (not required, but a good method for locating swales). Using the sketch lines as a guide, the existing contours were altered to provide a level pad for the Locomotive Display and swales to divert the water running downhill from the east side of the site.

SITE PLANNING & DESIGN

SITE GRADING VIGNETTE - Sample Failing Solution



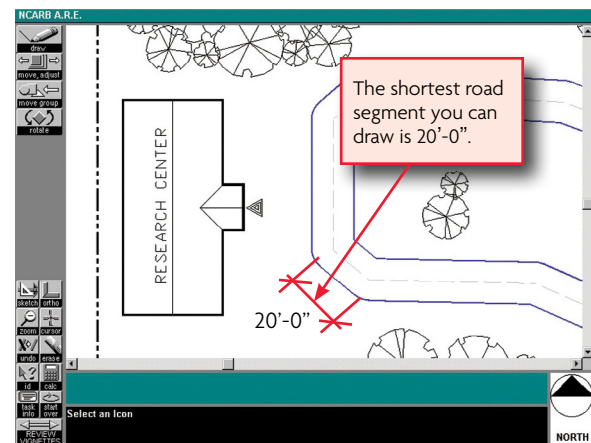
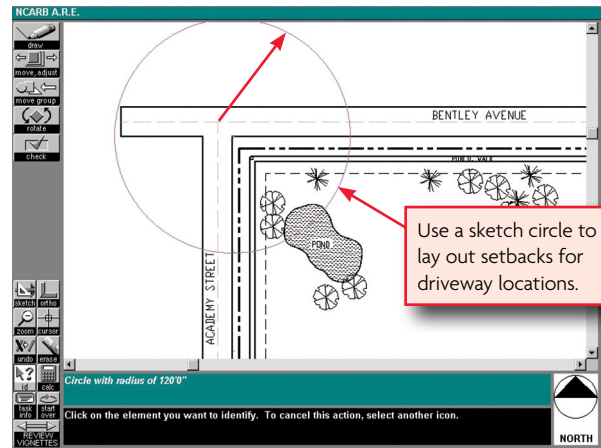
This solution is laid out similarly to the passing solution, except that the swales are drawn as berms. While berms may prevent some surface water from reaching the Locomotive Display,

they also direct water that falls between the berms toward the Locomotive Display. Additionally, the candidate has not created a level pad for the Locomotive Display.

SITE PLANNING & DESIGN

SITE DESIGN VIGNETTE

General Tips for Taking Site Design



Directions

You have been assigned the task of developing a schematic site plan based on a program that includes legal requirements and other site influences.

The plan on the screen presents a site on which to place buildings, related site elements, and vegetation in relation to orientation and environmental conditions. You are to use the tools provided to develop your solution. On the plan you are required to draw and locate:

- ▶ Two buildings
- ▶ An outdoor space
- ▶ Vehicular access and service drives
- ▶ Required parking spaces
 - Only spaces drawn with the "Handicap Spaces" tool will be counted as universally accessible spaces.
- ▶ Pedestrian walkways
- ▶ Vegetation

Before beginning your solution, you should review the program that can be accessed through the Vignette Index screen and familiarize yourself with the site plan on the work screen.

SITE PLANNING & DESIGN

SITE DESIGN VIGNETTE

Program

Design an environmentally responsive site plan that meets all of the client's requirements given below.

A developer plans to build a 5-story, 60 ft high Office Tower; a 1-story, 20 ft high Restaurant; a Pedestrian Plaza; and parking to serve the new buildings.

1. The Office Tower and the Pond shall be no more than 125 ft apart.
 - ▶ The main entrance shall be visible from Bentley Avenue.
2. The Restaurant and the Office Tower shall be at least 210 ft apart.
3. The Pedestrian Plaza is to be 8,000 ft².
 - ▶ Locate the Pedestrian Plaza within the building limit lines so that the main entrance to the Office Tower opens directly onto the Pedestrian Plaza.
4. The view of the service entrance on the Restaurant shall be blocked from the Pedestrian Plaza.
 - ▶ The view of the service entrance shall be blocked by buildings and/or trees, as appropriate.
5. The Restaurant shall have a view of the Pond.
6. The Pedestrian Plaza shall receive the noonday summer sun.
 - ▶ Assume a 45° solar altitude angle.
7. The Pedestrian Plaza shall be blocked from the prevailing winter winds.
 - ▶ The wind shall be blocked by buildings and/or trees, as appropriate.
8. Draw a total of 33 parking spaces.
 - ▶ 30 standard (9 ft x 18 ft) parking spaces are required.
 - ▶ 3 universally accessible (12 ft x 18 ft) parking spaces are required.
 - ▶ Locate the universally accessible parking spaces within 100 ft of the main entrance of the Office Tower.
 - ▶ All parking spaces shall be perpendicular to the traffic aisles.
 - ▶ No parallel parking is permitted.
9. Draw all traffic aisles and drives required to connect parking to the street.
 - ▶ Drive-through circulation is required.
 - ▶ Dead-end parking is prohibited.
 - ▶ Parking along the service drive is prohibited.
 - ▶ All drives and traffic aisles are automatically drawn at a width of 24 ft.
 - ▶ The intersection of the access drive with the street must be perpendicular to the street for at least the first 20 ft of the drive.
10. Provide only one 24 ft wide curb cut located no closer than 120 ft from the intersection of the centerlines of the two existing public streets.
11. Draw vehicular circulation to access the parking and service entrance.
 - ▶ A service drive shall attach to the service entrance of the Restaurant.
 - ▶ A turnaround or drive-through circulation is not required for the service drive.

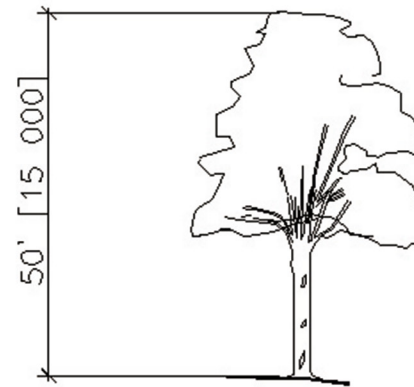
SITE PLANNING & DESIGN

SITE DESIGN VIGNETTE

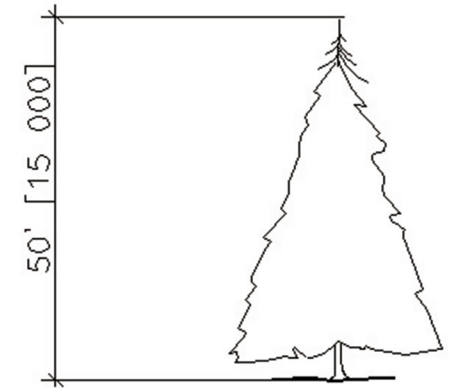
12. Connect the Pedestrian Plaza, the universally accessible parking spaces, and the main entrances of the two buildings to each other and to the existing public walk with a continuous walkway system.
 - ▶ The Pedestrian Plaza may be considered part of the walkway system.

13. Adhere to the following general conditions:
 - ▶ Paving on the site shall be minimized.
 - ▶ Drives, traffic aisles, and parking spaces shall be no closer than 5 ft to a building.
 - ▶ Buildings must be separated by a minimum of 20 ft.
 - ▶ Provide a 30 ft setback from the Pond for all construction or built improvements.
 - ▶ No more than 6 existing trees may be removed or disturbed.
 - ▶ No construction or built improvements of any kind shall occur over any other existing site feature.
 - ▶ No construction or built improvements of any kind shall occur outside the building limit line except for direct vehicular and pedestrian access.
 - ▶ Buildings shall not overlap the Pedestrian Plaza or parking.

DECIDUOUS TREE



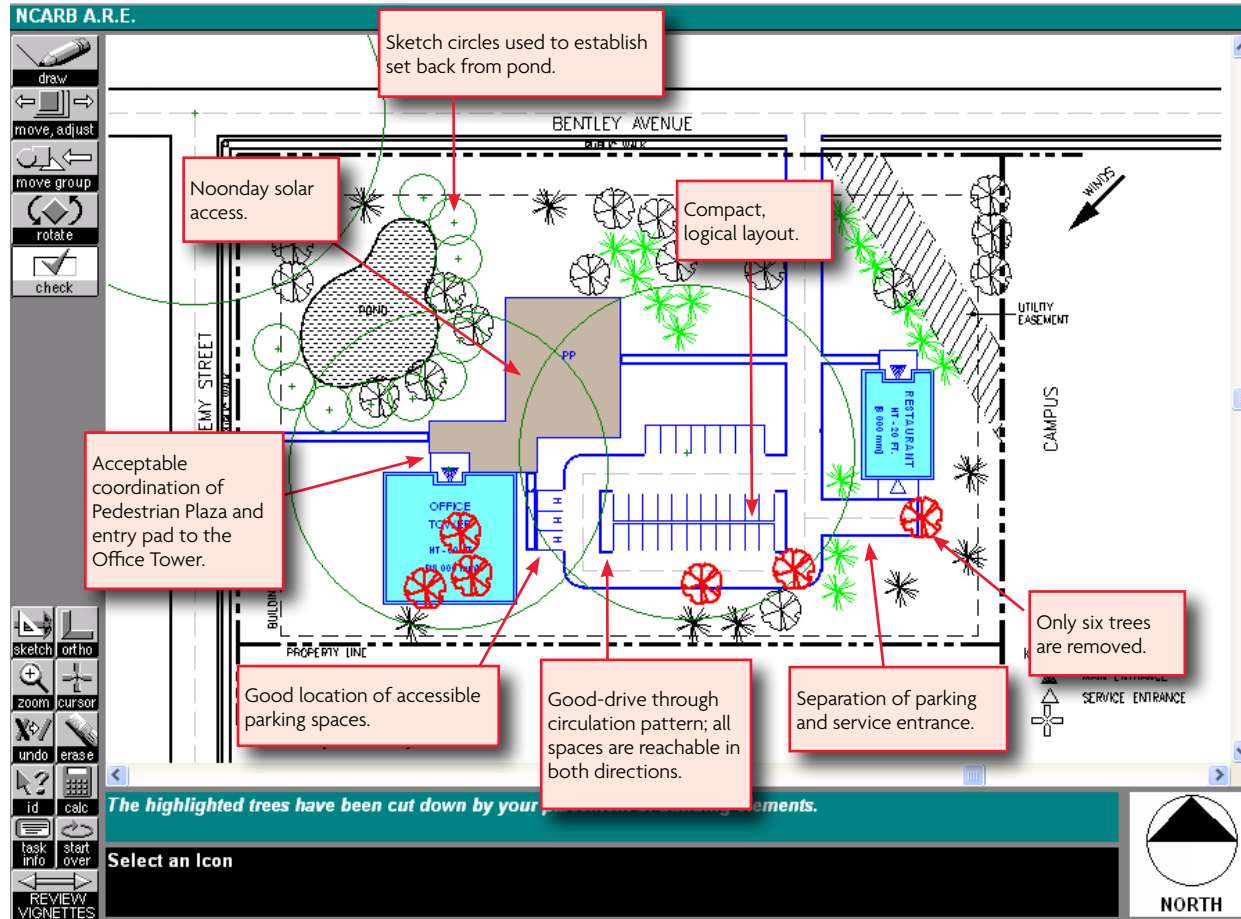
CONIFEROUS TREE



ELEVATION

SITE PLANNING & DESIGN

SITE DESIGN VIGNETTE - Sample Passing Solution



This solution incorporates all of the program requirements into a workable design. The Office Tower is located near the Pond with the main entrance visible from Bentley Avenue. The Restaurant is located an appropriate distance away from the Office Tower and has a view of the Pond. The service entrance of the Restaurant is shielded from the Pedestrian Plaza by the addition of evergreen trees. The Pedestrian Plaza receives full noonday summer sun as required. The Pedestrian Plaza also connects

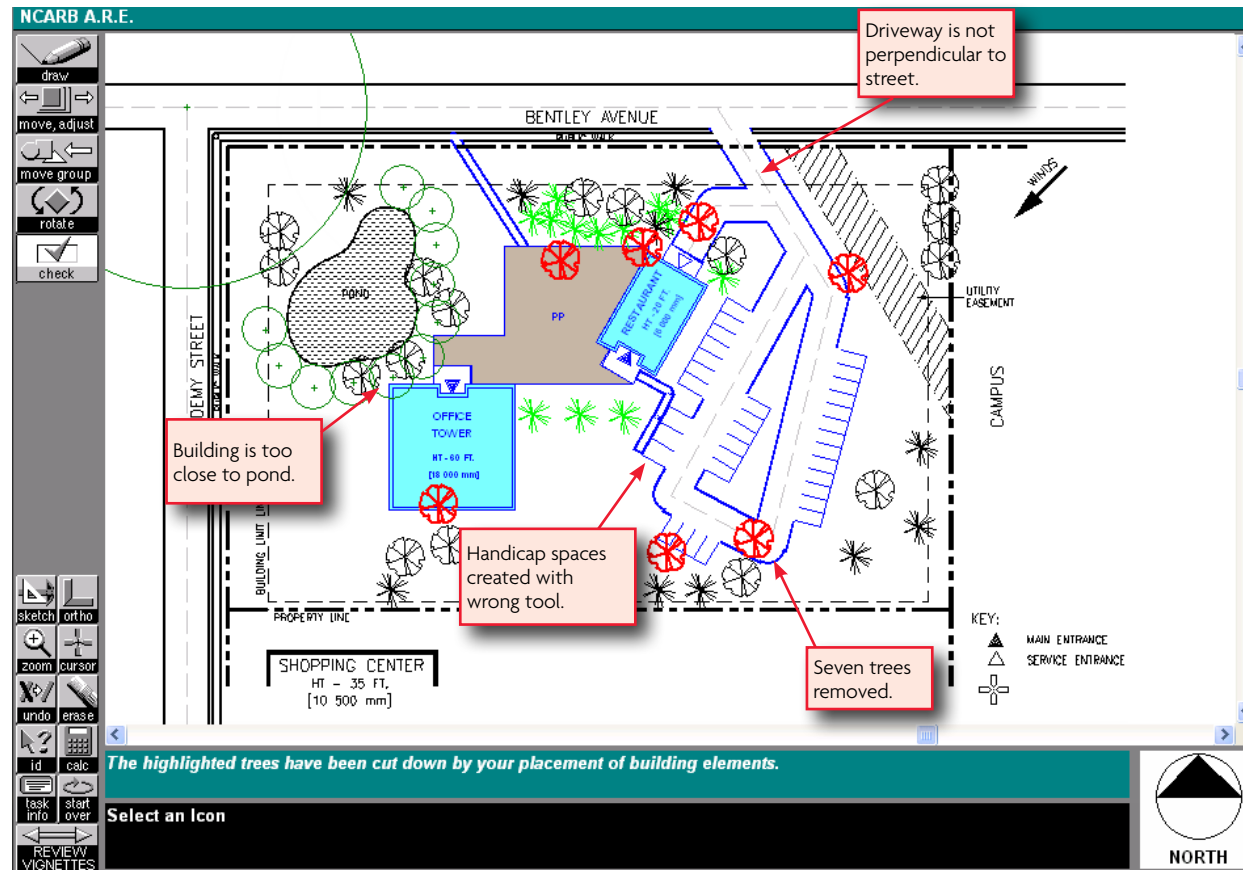
to the main entrance of the Office Tower and connects the Tower, the Restaurant, parking area and other walkways. The curb cut for the driveway is located far enough from the intersection of the roads and the required setback from the Pond is maintained. One of the most important program items in this vignette is the requirement for a drive-through circulation pattern. This solution shows a well-designed, efficient layout that adequately meets that requirement.

Procedural Tips

- ▶ The driveways and walkways are polylines. Use the **move group** tool to move them; use the **move, adjust** tool to adjust them.
- ▶ Check to see how many trees you have cut down while you are drawing, and again before you leave the vignette.
- ▶ 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.
- ▶ To move a bank of parking spaces, we suggest you use the **move group** tool.
- ▶ If you have groups of spaces laid out in relation to each other, but want to move them all to another place on the site, use the **move group** tool.
- ▶ For precise measurements, lay out your parking spaces orthogonally, then rotate if needed.
- ▶ If you have trouble adjusting your road (which is a polyline), you may find it easier to erase the road and begin again than to keep trying to adjust it.

SITE PLANNING & DESIGN

SITE DESIGN VIGNETTE - Sample Failing Solution



Warnings

- ▶ In order to connect your driveway to any other driveway or road, the dashed centerline of your road must connect to the dashed centerline of the other road.
- ▶ Walkways must be attached to elements where a connection is required.
- ▶ Only spaces drawn with the "Handicap Spaces" tool will be counted as universally accessible spaces.

Tools You Might Find Useful

- ▶ Zoom to adjust driveways or walkways
- ▶ Sketch line tool to align and measure spaces and to determine clearances since the length of the line is displayed in the element information area at the bottom of the work screen

This solution generally follows the program requirements, but falls short in a few critical areas. First, the corner of the Office Tower is located within the required 30-foot setback from the Pond. The building locations and paved areas also require the

removal of seven trees, which exceeds the program's general conditions. The accessible parking was not created with the "Handicap Spaces" tool. Another problem is the missing perpendicular segment of the entrance drive.

SITE PLANNING & DESIGN

REFERENCES

The references are presented as a guide in preparing for the examination. It was developed by the committee that prepares the examination. They are not intended to be an exhaustive list of all possible reference materials for the subject area of any given division. NCARB makes no guarantee that the various references are currently in print.

The Architect's Handbook of Professional Practice

Joseph A. Demkin, AIA, Executive Editor
The American Institute of Architects
John Wiley & Sons, latest edition

Architectural Graphic Standards

The American Institute of Architects
John Wiley & Sons, latest edition

Cracking the Codes: An Architect's Guide to Building Regulations

Barry D. Yatt
John Wiley & Sons, 1998

Dictionary of Architecture and Construction

Cyril Harris
McGraw-Hill, latest edition

Landscape Architectural Graphic Standards

Leonard J. Hopper, Editor
John Wiley & Sons, 2007

Mechanical & Electrical Equipment for Buildings

Walter T. Grondzik, Alison G. Kwok, Ben Stein,
and John S. Reynolds, Editors
John Wiley & Sons, latest edition

Site Engineering for Landscape Architects

Steven Strom, Kurt Nathan, and Jake Woland, Editors
John Wiley & Sons, latest edition

Site Planning, Third Edition

Kevin Lynch and Gary Hack
MIT Press, 1984

Site Planning & Design Handbook

Thomas H. Russ
McGraw-Hill, latest edition

Sustainable Construction: Green Building Design and Delivery

Charles J. Kibert
John Wiley & Sons, 2005