NCARB

PRACTICE EXAM

ARCHITECT REGISTRATION EXAMINATION® 5.0

Programming and Analysis division

ARE® 5.0

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Question 1

An architect is laying out the interior of a building in the upper Midwest for a new tenant build-out. The tenant wants to locate corridors with nine-foot ceilings on fully glazed exterior walls. On the other side of the wall, the tenant plans to hang an extensive artwork collection.

Based on a solar altitude angle of 24 degrees at the winter solstice, how wide should the south-facing corridor be to avoid direct sunlight on the opposite wall? Round to the nearest foot.

A. 11 feet
B. 20 feet
C. 25 feet

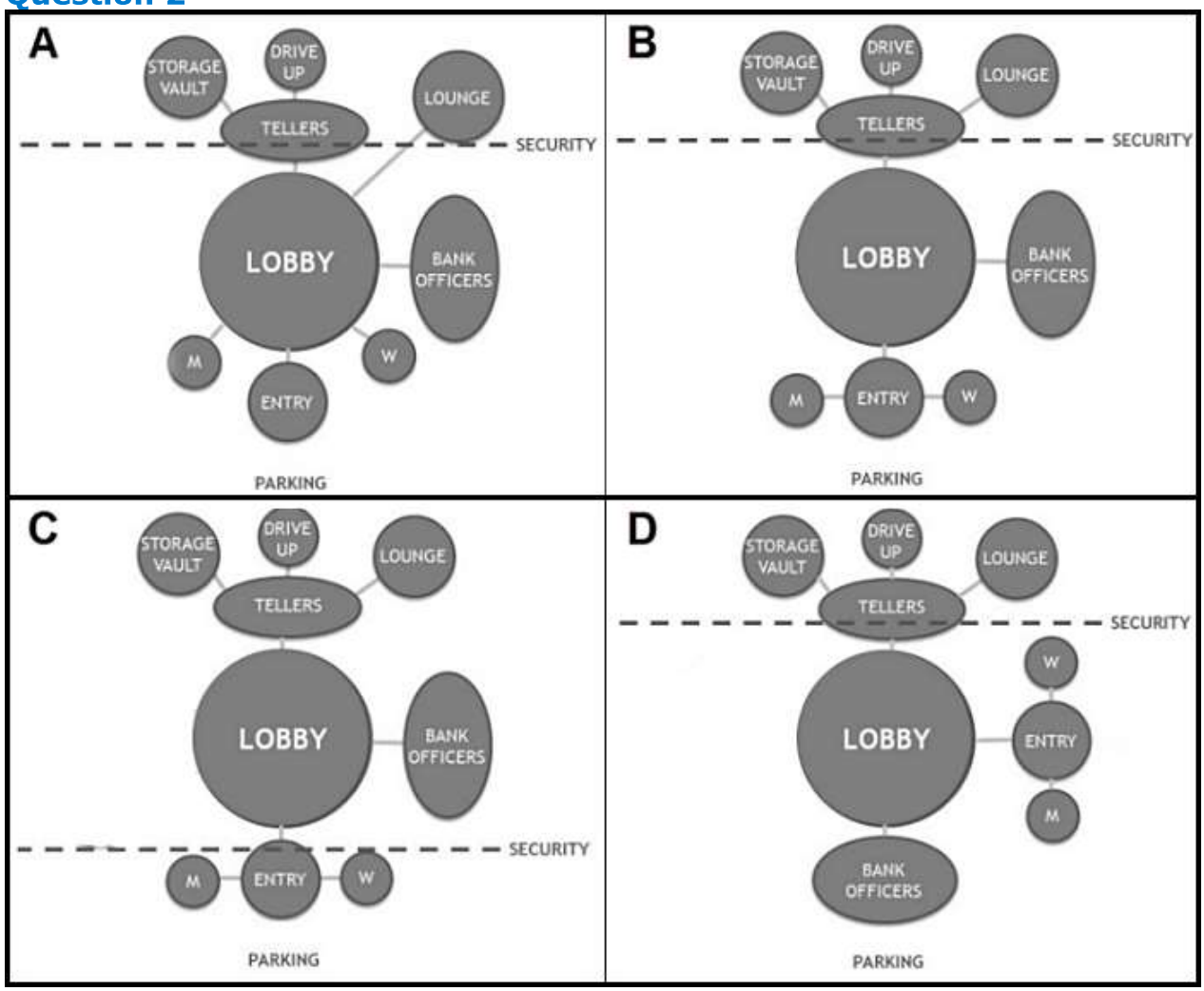
Correct answer: B

CORRECT RESPONSE
20 feet

CALCULATIONS
1. Tan(24) = 9 / x
2. 9 / (tan(24)) = 20.21 (rounded to 20 feet)

Section: Building Analysis & Programming

Question 2



Refer to the exhibit.

The architect of a regional bank is given the following architectural program:

- An Entry with Men's and Women's restrooms must be located next to the Parking lot.
- A Lobby must have immediate connection to the Tellers and Bank Officers.
- The Lounge for employees must be private.
- A Drive-Up window must be accessible to the exterior and to Tellers.
- A Security perimeter must protect Tellers and the Storage Vault and not be accessible by customers.

Which bubble diagram meets the program requirements?

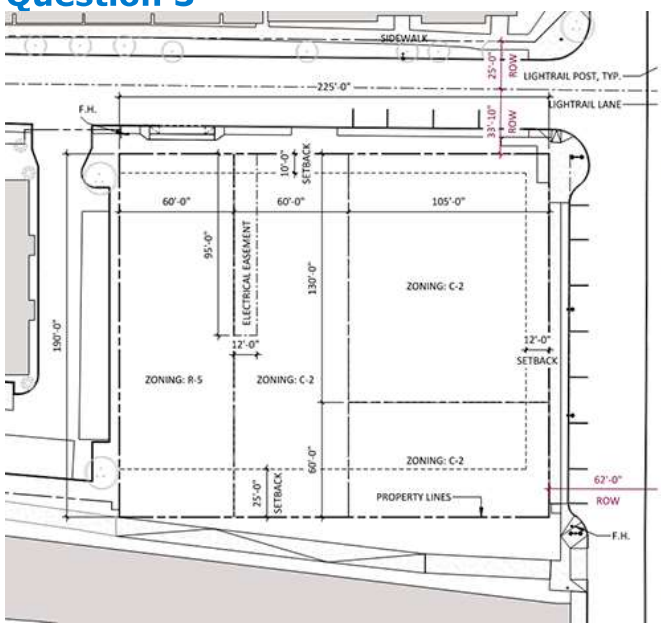
A. A
B. B
C. C
D. D

Correct answer: B

CORRECT RESPONSE
B
This bubble diagram provides a Security perimeter that is not accessible by customers, a Lobby that has an immediate connection to the Tellers and Bank Officers, a Lounge that is private, and an Entry with Men's and Women's restrooms that is located next to the parking lot.

Section: Building Analysis & Programming

Question 3



BUILDING SETBACKS					
Adjacent to Streets					
For structures not exceeding two stories or 30'	Average 25'	Minimum 20' permitted for up to 50% of structure, including projections			
For structures exceeding two stories or 30'	Average 30'	[Same as above]			
Not Adjacent to Streets					
	When Adjacent Zoning is:				
Maximum building height	S-1, S-2, RE-43 to R-3(*)	R-3A, R-4, R-5, R-4A(*)	CP, Ind. Pk., PSC, RSC, MUA, DC, GC, RH, UR	C-1, C-2, C-3 A-1, A-2, CP, Ind. Pk., P-1, P-2	
1 story (or 15')	25'	10'	10'	0'	
2 story (or 30')	50'	15'	10'	0'	
3 story (or 42')	100'	30'	10'	0'	
4 story (or 56')	150'	45'	10'	0'	

Refer to the exhibit.

An owner has purchased four properties and wants to develop them in the following ways:

- Combine the three properties zoned as C-2 into one parcel.
- Construct a two-story commercial building on the combined C-2 parcel.
- Construct a four-story multifamily building on the parcel zoned as R-5.

The city grants a variance to reduce the setbacks along the two streets to 10' and 12'.

What is the maximum allowable square footage for the commercial building?

A. 23,715 square feet
B. 42,780 square feet
C. 47,430 square feet

Correct answer: B

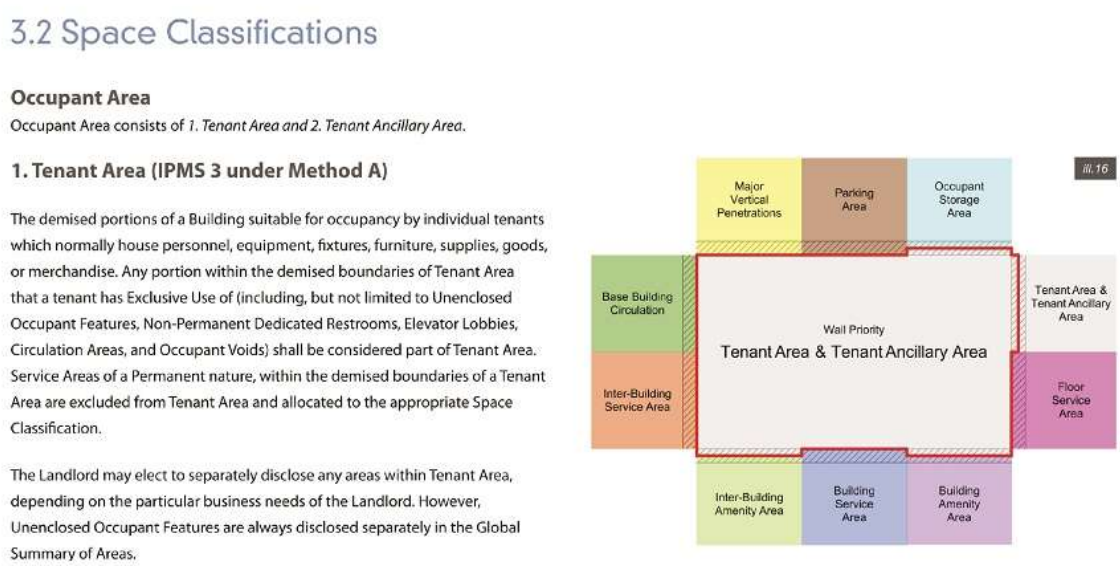
CORRECT RESPONSE
42,780 square feet
This response results from a calculation that multiplies the two sides of the C-2 parcel, which the owner wants to use for the two-story commercial building, and subtracts the setbacks from

those two sides in order to find the buildable area. This calculation also accounts for the table, which indicates that lots adjacent to R-5 lots are separated by a 15' setback. Finally, this calculation accounts for the fact that the commercial building will be two stories, meaning that the buildable area arrived at after multiplying the two sides of the parcel must be doubled.

CALCULATIONS
1. For the width of the combined C-2 properties at the top of the block: 105' + 60' = 165'
2. Subtract the setbacks from this side: 165' - 15' (the setback next to the R-5 parcel, as indicated in the table for properties adjacent to R-5-zoned properties) - 12' (setback on the right side of the block) = 138'
3. For the length of the combined C-2 properties: 130' + 60' = 190'
4. Subtract the setbacks from this side: 190' - 25' (setback at the bottom of the block) - 10' (setback at the top of the block) = 155'
5. For the buildable area: 155' x 138' = 21,390 square feet
6. 21,390 x 2 (stories) = 42,780 square feet

Section: Site Analysis & Programming

Question 4

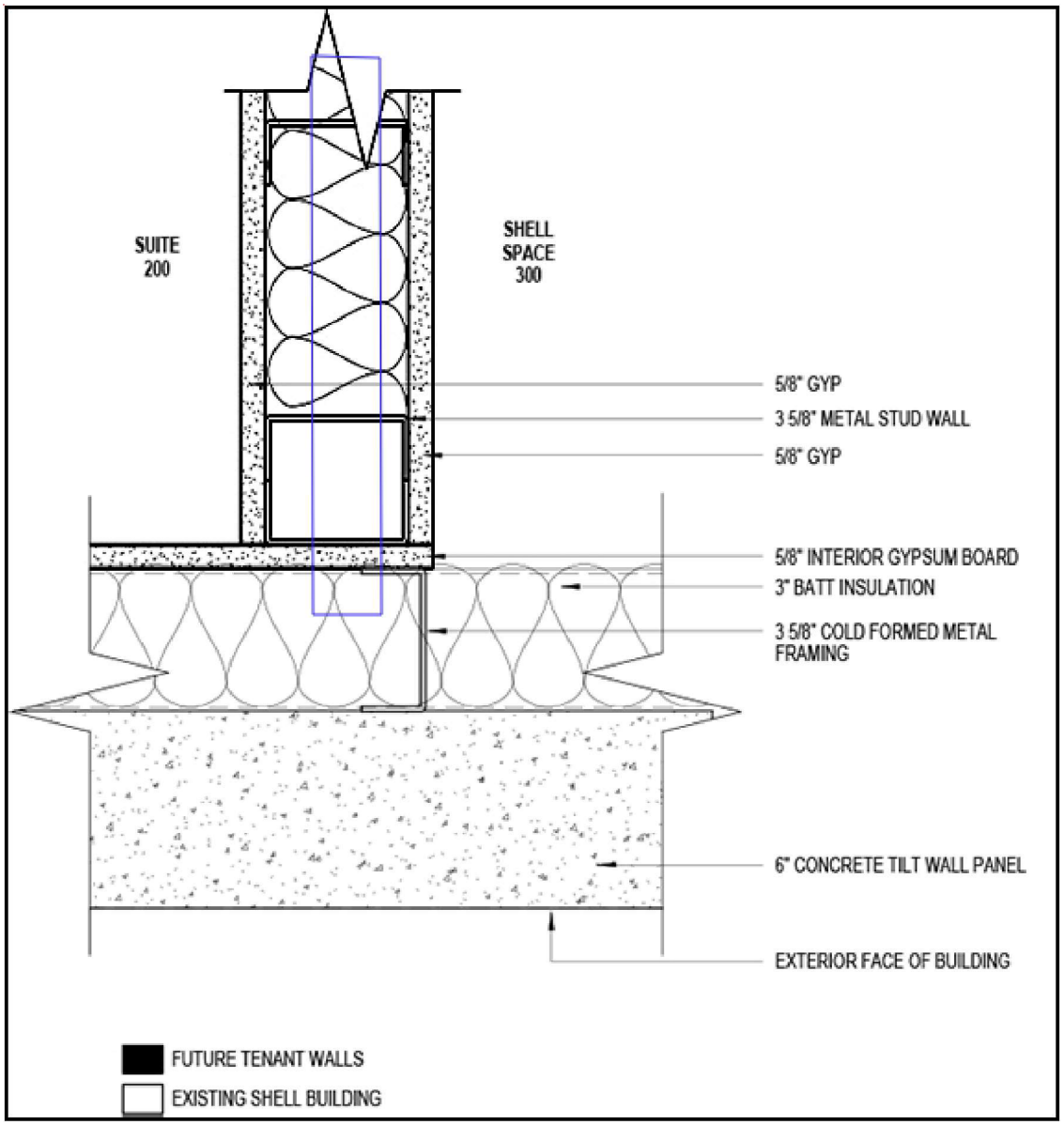


Refer to the exhibit.

A prospective tenant is considering leasing Suite 200 in an existing office building. The prospective tenant hires an architect to review the existing building's drawings and provide the usable area for Suite 200.

Click on the location on the demising wall between Suite 200 and Shell Space 300 in the plan detail to indicate the boundary from where the usable area should be calculated.

Correct answer:



CORRECT RESPONSE

Centerline of the demising wall

Building Owners and Managers (BOMA) standards state that usable area should be calculated from the center of the demising wall.

Section: Codes & Regulations

Question 5

An client owns an historic structure located in the northeastern United States. It features a south-facing, front facade with fine brick detailing and a parking area to the rear of the structure that is scheduled to be demolished and redeveloped.

Which one of the following sustainable strategies should the architect recommend?

A. Incorporate an exterior insulated finish system that increases the overall R-value of the facade.

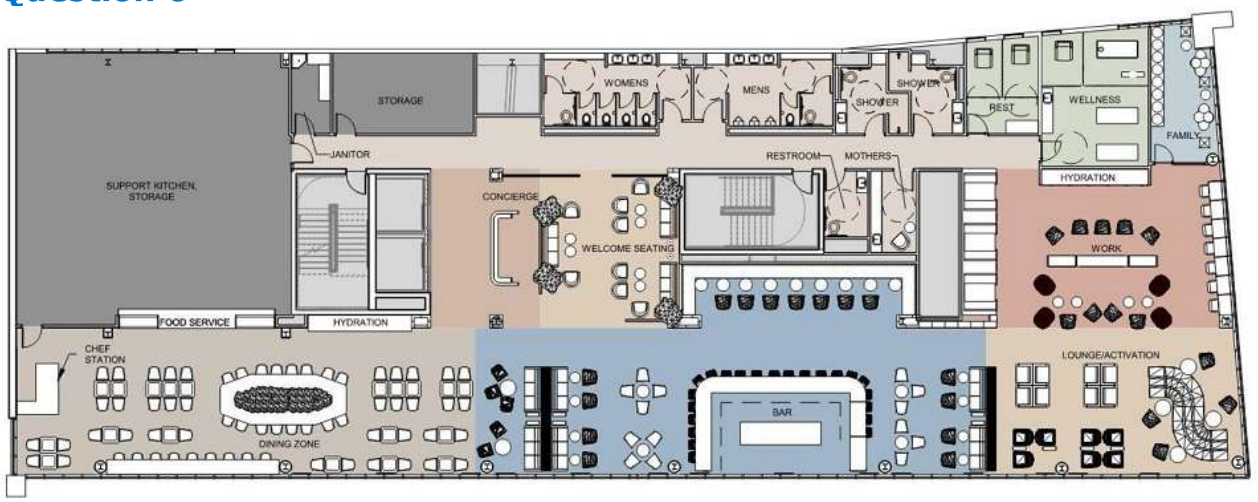
B. Install a geothermal system to increase mechanical system efficiency.
C. Replace the existing roof with a low albedo material.
D. Install a new solar panel array on the front facade.

Correct answer: B

CORRECT RESPONSE
Install a geothermal system to increase mechanical system efficiency.
With the redevelopment of the rear parking area, new geothermal wells can easily be incorporated into the design in order to take advantage of a natural energy source.

Section: Building Analysis & Programming

Question 6



Refer to the exhibit.

An architect is working on an airline club at an airport in the northeast United States. The airport has strict acoustic criteria and wants to pursue LEED Gold certification.

Which consultants should the architect include on the project team? **Check the four that apply.**

A. Public health consultant
B. Sustainability consultant
C. Food service consultant
D. Aviation consultant
E. Acoustic consultant
F. Interior design consultant

Correct answer: BCEF

CORRECT RESPONSES
Sustainability consultant
A sustainability consultant will provide guidance for the project for LEED accreditation.

Food service consultant
A food service consultant will provide guidance on the food-related portion of the project, including for such spaces as Food Service, Kitchen Support, and Chef Station.

Acoustic consultant
An acoustic consultant will provide evaluation and advice on following the strict acoustic criteria demanded by the airport.

Interior design consultant
An interior design consultant will provide FF&E consulting.

Section: Site Analysis & Programming

Question 7

Local Zoning: Nonconforming Use in a Floodplain

1. No modifications or additions to a nonconforming use or structure shall be permitted unless they comply with this ordinance.

2. If a nonconforming use or the use of a nonconforming structure is discontinued for 12 consecutive months, it is no longer permitted and any future use of the property, and any structure or building thereon, shall conform to the applicable requirements of this ordinance;

3. No modification or addition to any nonconforming structure or any structure with a nonconforming use, which over the life of the structure would equal or exceed 50% of its present equalized assessed value, shall be allowed unless the entire structure is permanently changed to a conforming structure.

4. No maintenance to any nonconforming structure or any structure with a nonconforming use, the cost of which would equal or exceed 50% of its present equalized assessed value, shall be allowed unless the entire structure is permanently changed to a conforming structure with a conforming use in compliance with the applicable requirements of this ordinance.

5. If any nonconforming structure or any structure with a nonconforming use is destroyed or is substantially damaged, it cannot be replaced, reconstructed or rebuilt unless the use and the structure meet the current ordinance requirements. A structure is considered substantially damaged if the total cost to restore the structure to its pre-damaged condition equals or exceeds 50% of the structure's present equalized assessed value.

Refer to the exhibit.

A client hired a design team to evaluate a structure that has been unoccupied for about eight months. The structure is located in a floodplain and is known to be nonconforming. A recent storm causes a landslide that damages the structure, and the client asks the design team to recommend the most economical short-term solution.

What should the design team recommend?

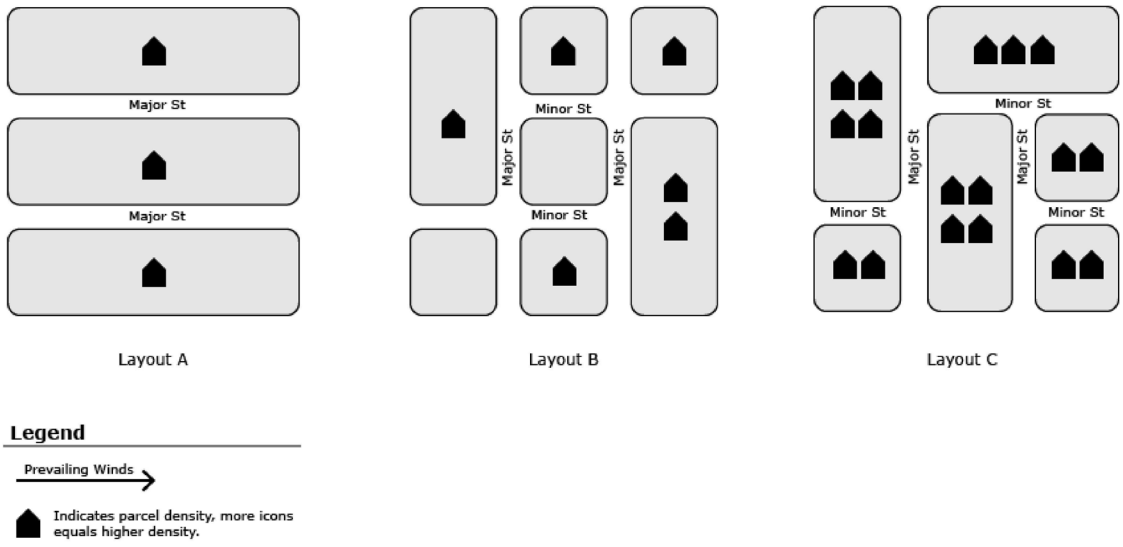
A. Perform a cost estimate to repair the structure to its pre-damaged condition.
B. Establish the exact date of discontinued use for the structure.
C. Rebuild the structure to comply with floodplain ordinance requirements.

Correct answer: A

CORRECT RESPONSE
Perform a cost estimate to repair the structure to its pre-damaged condition.
Performing a cost estimate will establish if the structure was "substantially damaged." If the cost estimate reveals that the cost of repairs exceeds 50% of the present equalized assessed value, then it must be rebuilt to meet ordinance requirements, per item 5 of the zoning description.

Section: Codes & Regulations

Question 8



Refer to the exhibit.

A township wants to develop a masterplan for a new town center that prioritizes pedestrian comfort.

Which site layout is most appropriate for minimizing prevailing winds?

A. Layout A
B. Layout B
C. Layout C

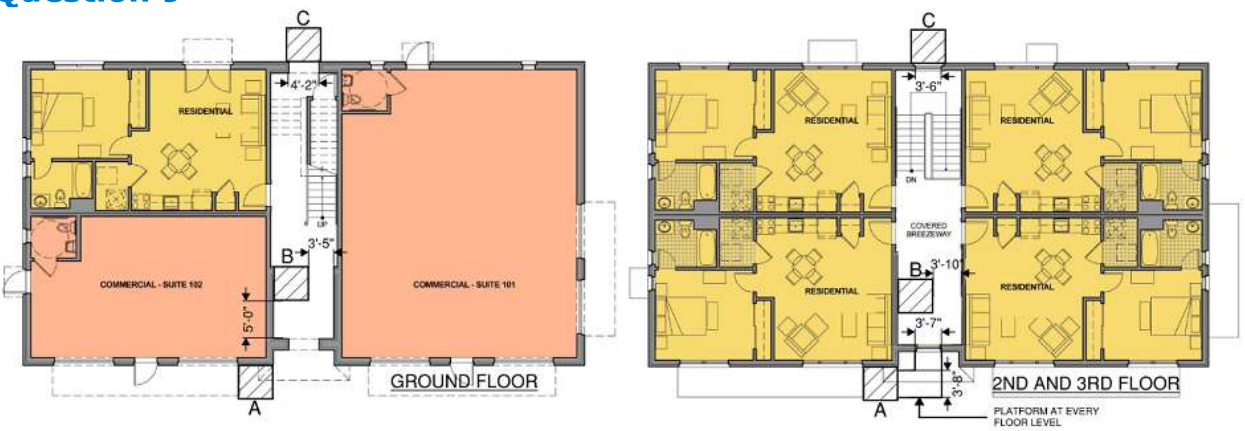
Correct answer: C

CORRECT RESPONSE

Layout C
A discontinuous street organization with higher density and many T-intersections can slow and block wind flow in streets.

Section: Environmental & Contextual Conditions

Question 9



Refer to the exhibit.

An owner wants to install an elevator for resident access in an existing three-story building.

Which location is most appropriate?

A. A
B. B
C. C

Correct answer: B

CORRECT RESPONSE
B
There is sufficient space to place the elevator shaft inside the building and the elevator entry will be visible from the main entrance.

Section: Building Analysis & Programming

Question 10
A developer has hired an architecture firm for the design of a high-density development. The AHJ mandates that the developer provide public, open space within the vicinity of the development that benefits both the new development and the existing community.

Which of the following strategies should the firm recommend for the design of the open space? **Check the three that apply.**

A. Understand the capabilities of future management entities who will maintain the space.

B. Determine and analyze the projected needs of the user population in 10 to 20 years.
C. Assess the existing qualities and characteristics of the potential open space sites.
D. Design only for the target demographics of the new residential development.
E. Minimize the initial economic impact by planning primarily passive spaces.
F. Reduce regular maintenance with minimal open space programming.

Correct answer: ABC

CORRECT RESPONSES
Understand the capabilities of future management entities who will maintain the space.
The proposed open space must be able to be maintained by any future management entity. A poorly maintained facility will drive away potential users of the open space.

Determine and analyze the projected needs of the user population in 10 to 20 years.
Planning the open space should include not only a demand analysis of today's user but a projected demand of that user in 10 or 20 years.

Assess the existing qualities and characteristics of the potential open space sites.
The appropriate open space design can be developed after assessing the existing qualities, characteristics, and capabilities of the site.

Section: Codes & Regulations

Question 11

An owner hires an architect to evaluate the feasibility of constructing a new three-story apartment building above an existing cast-in-place concrete parking garage.

Which consultant should the architect hire first?

A. A geotechnical engineer to evaluate the soil for its capacity to bear additional levels.
B. A fire protection engineer to evaluate the required fire separation from vehicle parking below.
C. A structural engineer to evaluate the existing garage for its capacity to support additional levels.

Correct answer: C

CORRECT RESPONSE
A structural engineer to evaluate the existing garage for its capacity to support additional levels.
A structural engineer will be needed to inspect the structure before proceeding with the project and the hiring of fire separation and geotechnical consultants.

Section: Site Analysis & Programming

Question 12

An owner is developing three retail stores on a fully hardscaped Brownfield site previously used as a dry-cleaning facility and a gas station. An underground gasoline storage tank was removed 20 years before, and soil samples taken during the tank removal confirmed the soil had been contaminated by the underground storage tank.

What type of contaminants are most likely to be found? **Check the three that apply.**

A. Lead
B. Ozone
C. Fertilizer
D. Pesticide
E. Petroleum
F. Volatile organic compounds

Correct answer: AEF

CORRECT RESPONSES

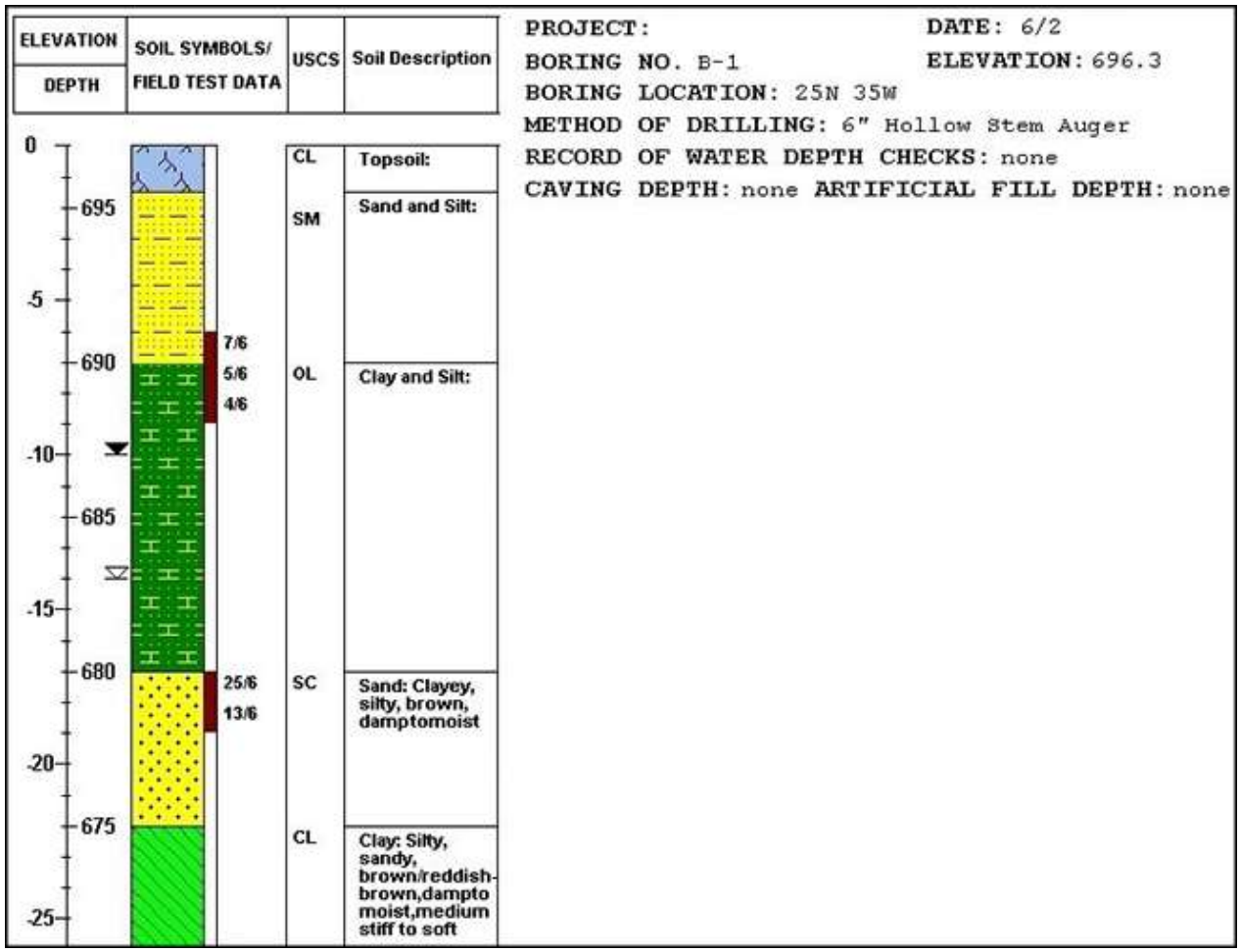
Lead
Lead is often found at Brownfield sites, especially if past uses include the storage or handling of fuel.

Petroleum
Petroleum, oil, and hydrocarbon compounds are often found at Brownfield sites, especially if past uses include the storage or handling of fuel.

Volatile organic compounds
Volatile organic compounds, or man-made chemicals, are often found at Brownfield sites, especially if past uses involve industrial or commercial solvents, degreasers, or dry cleaning products.

Section: Environmental & Contextual Conditions

Question 13



Refer to the exhibit.

An architect is designing a commercial building with a one-story underground parking garage. The parking structure has a floor-to-floor height of 10.5 feet. A geotechnical engineer has provided a borehole log, which the architect will use to determine the most appropriate, cost-effective foundation type.

Which foundation type should the architect choose for the building?

A. Mat foundation
B. Pier foundation
C. Pile foundation
D. Slab-on-grade foundation

Correct answer: A

CORRECT RESPONSE

Mat foundation

A mat foundation is a continuous slab resting on the soil that extends over the entire footprint of the building. This foundation type supports the building by transferring its weight to the ground and is commonly used when the soil is weak. Based on the borehole log, this foundation will be the most appropriate for the project. Also, a mat foundation is a shallow foundation, and shallow foundations are less expensive than deep foundations.

Section: Building Analysis & Programming

Question 14

A city acquires a six-acre property through eminent domain and hires an architect to design a new 20,000-square-foot aquatic center on the site. The site has the following characteristics:

- Previously used as a vehicle salvage yard.
- Easy access to a nearby interstate.
- Across the street from a city park and fire station.

Which of the following should the architect prioritize before beginning the design of the aquatic center?

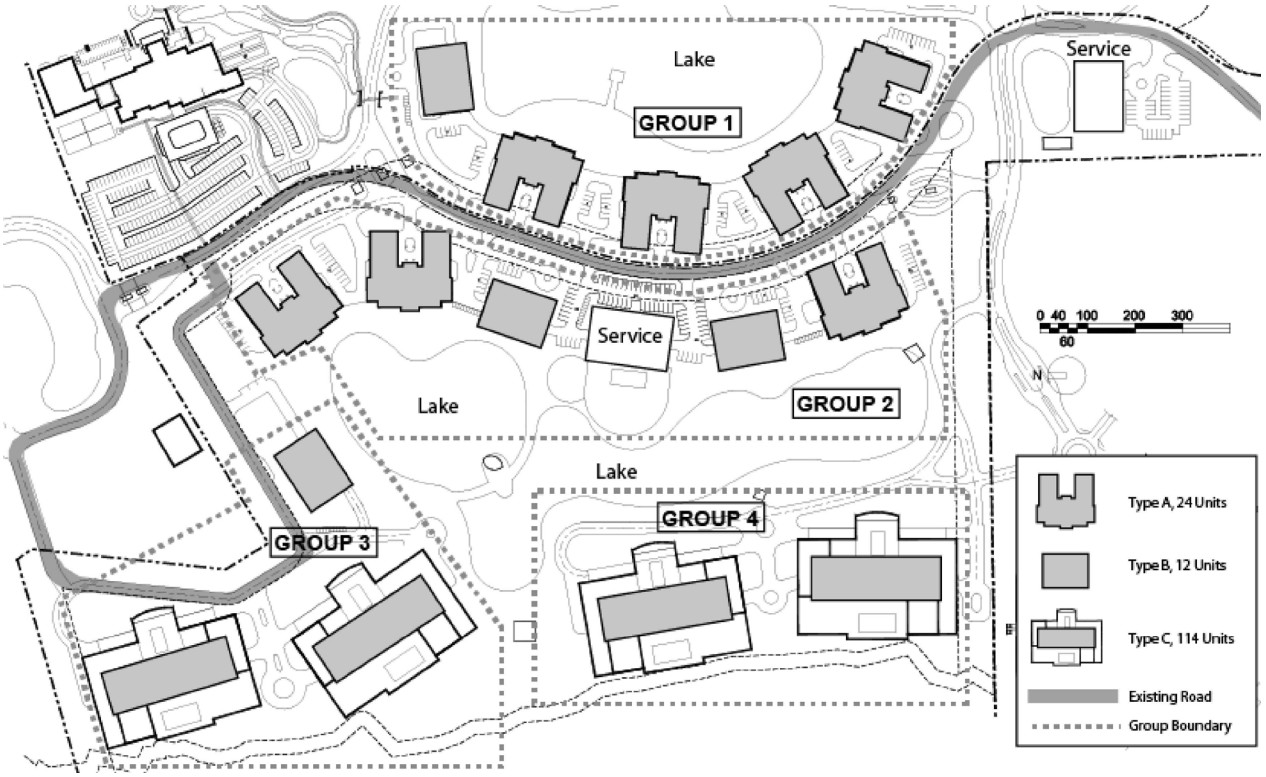
A. Monitoring the progress of the legal action filed by the previous owner over the seizure of the property.
B. Performing environmental testing on the site to determine if groundwater or soil is contaminated.
C. Planning the public drive access away from the existing fire station to avoid cross traffic with emergency vehicles.

Correct answer: B

CORRECT RESPONSE
Performing environmental testing on the site to determine if groundwater or soil is contaminated.
Vehicle salvage yards are often contaminated by waste oil, gas, and other vehicle fluids that have leaked into the soil over time. Environmental testing should be performed to determine the impact of the salvage yard's tenure at the site. Different types of mitigation are possible depending on the proposed use and will affect how the site needs to be designed.

Section: Environmental & Contextual Conditions

Question 15



Refer to the exhibit.

An architect is designing a new retirement community campus with multiple buildings. To allow for a phased build-out, the buildings are clustered into four groups. Phase 1 of the build-out has the following requirements:

- Minimum of 100 units.
- Locate all residential buildings on the existing road.
- All residential buildings are to be adjacent to a lake.

Which group is most appropriate for the Phase 1 build-out?

A. Group 1
B. Group 2
C. Group 3
D. Group 4

Correct answer: A

CORRECT RESPONSE
Group 1
Group 1 has 108 units; all Group 1 residential buildings are located on the existing road; and all Group 1 buildings are adjacent to a lake.

CALCULATIONS
1. Four Type A Buildings at 24 units per building: 4 x 24 = 96
2. One Type B Building at 12 units per building: 1 x 12 = 12
3. Total number of units: 96 + 12 = 108 units

Section: Building Analysis & Programming

Question 16

Which of the following is the most restrictive when determining a building's maximum allowable floor-to-area ratio?

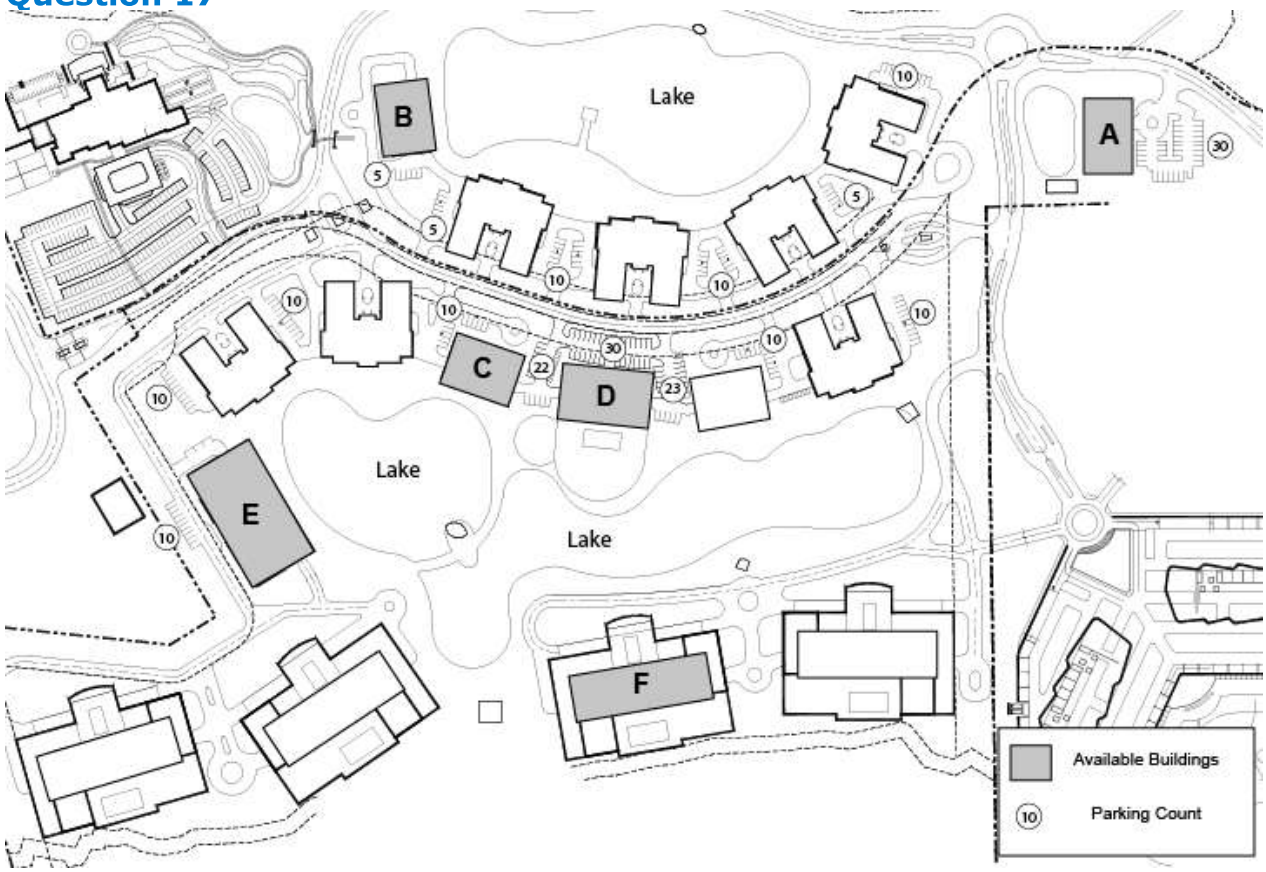
A. Construction type
B. Occupancy group
C. Zoning ordinances

Correct answer: C

CORRECT RESPONSE
Zoning ordinances
Zoning regulations limit the setbacks, building height, and allowable floor-to-area ratio.

Section: Codes & Regulations

Question 17



Refer to the exhibit.

A local hospital wants to open a rehabilitation center in a new, multi-building retirement community. The following is required for the rehabilitation center:

- Must be able to view a lake.
- Must have a minimum of 10 adjacent off-street parking spaces.

Which buildings are appropriate to host the rehabilitation center? **Check the three that apply.**

A. Building A
B. Building B
C. Building C
D. Building D
E. Building E
F. Building F

Correct answer: CDE

CORRECT RESPONSES
Building C
Building C has a view of a lake and has enough (32) parking spaces.

Building D
Building D has a view of a lake and has enough (75) parking spaces.

Building E
Building E has a view of a lake and has enough (10) parking spaces.

Section: Building Analysis & Programming

Question 18

County Demographic Report

Households Estimate	**108,000**
Average Household Size	**2.18**
Average Family Size	**2.99**

Household Size		
1-Person	40,872	39%
2-Person	34,483	33%
3-Person	13,037	12%
4-Person	11,438	11%
5+ Persons	4,886	5%
Total	**104,716**	**100%**

Household Type		
Family-Households	48,455	46%
Non-Family Households	56,261	54%
Total	**104,716**	**100%**

Population Estimate	**228,400**
Daytime Population Estimate	**311,800**

Age Distribution		
Under 5	13,740	6.0%
5-19	30,790	13.5%
20-24	15,590	6.8%
25-34	54,960	24.1%
35-44	38,020	16.6%
45-54	28,590	12.5%
55-64	22,470	9.8%
65-84	21,280	9.3%
85 and over	2,960	1.3%
Median Age	**34.5 years**	

Refer to the exhibit.

A developer purchases a hotel and hires an architect to redevelop the building to match the current demographic needs of the community. The existing hotel has the following spaces:

- 100-square-foot Gift Shop on the first floor.
- 300-square-foot to 1,200-square-foot Hotel Rooms.

- 3,000-square-foot rooftop Game Room.

Which design strategy should the architect suggest to the developer?

A. Convert the first-floor Gift Shop into an after-school classroom for 30 students.
B. Convert the Hotel Rooms into one- and two-bedroom rental apartments.
C. Convert the Hotel Rooms into three-bedroom senior living rental units.

Correct answer: B

CORRECT RESPONSE
Convert the Hotel Rooms into one- and two-bedroom rental apartments.
One- and two-bedroom units are appropriate because 72% of the county is made up of one- or two-person households. Also, the design of the hotel features 300- to 1,200-square-foot rooms, a size that enables conversion into one or two-bedroom apartments.

Section: Site Analysis & Programming

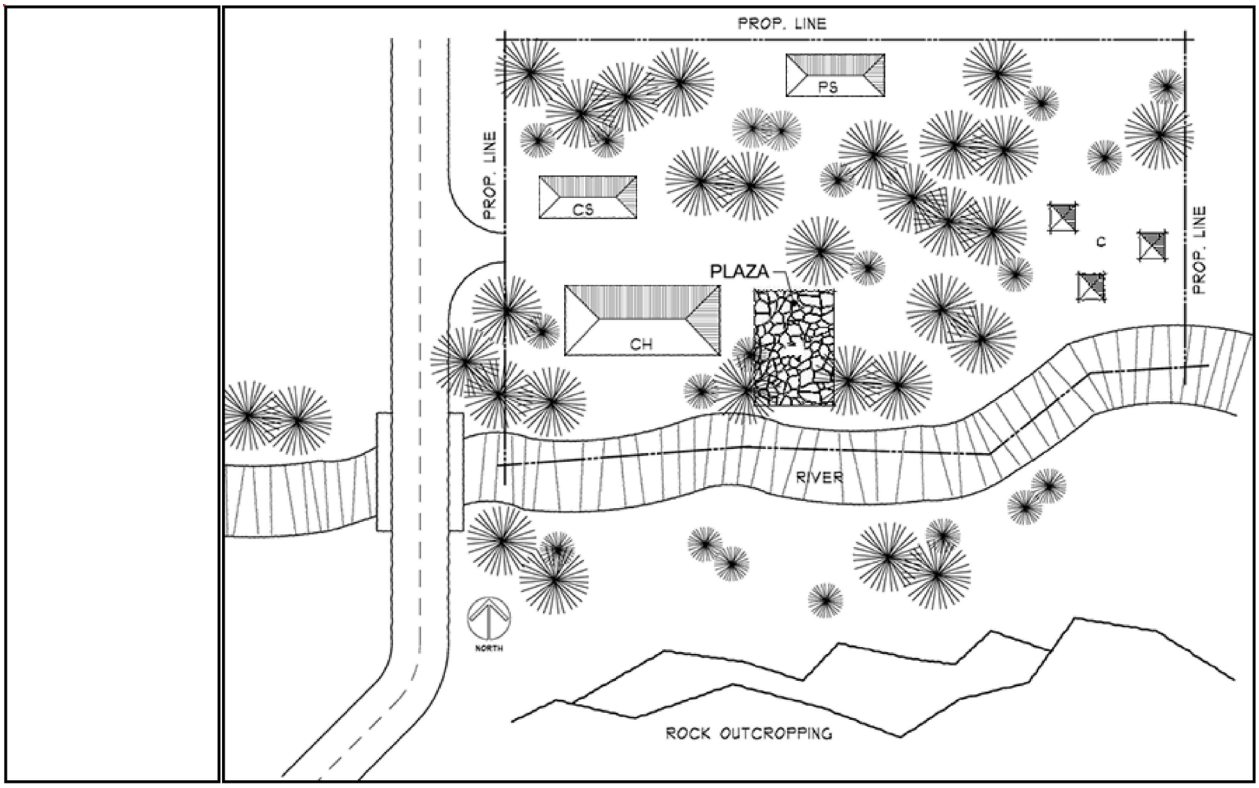
Question 19

A group of artists is planning a retreat community and asks an architect to provide a site study that evaluates functional building placement according to the following program requirements:

- A Community Hall will house the living, kitchen, and dining functions. It should have views of the river and rock outcropping and be near the Outdoor Plaza. This is the busiest and noisiest of all the buildings and will require easy access to the road for visitors.
- A Painting Studio should have unrestricted north light.
- A Clay Studio should have direct access for vehicles.
- Three Writer's Cabins should be secluded and have a view of the river and rock outcropping.
- No trees should be disturbed.

Drag the buildings onto the locations on the site plan to meet the program requirements.

Correct answer:



CORRECT RESPONSES

Community Hall

This building should be placed to the west of the Outdoor Plaza, as it requires access to the road, views of the river and the rock outcropping, and it should be near the Plaza.

Clay Studio

This building should be placed north of the Community Hall by the road. The Clay Studio requires direct access to the road, and because the Community Hall must be placed on the southern half of the area that has road access, the Clay Studio must be placed in the northern half of this area.

Paint Studio

The Paint Studio needs unobstructed north light, and there are two locations that can satisfy this requirement. One of those locations, though, the one in the northeast corner of the site, is near the area where the Three Writer's Cabins must be placed, and these cabins are required to be secluded. The only other available placement then for the Paint Studio is the location just south of the northern Property Line in the area between the line and the cluster of trees.

Three Writer's Cabins

These buildings should be placed just west of the eastern Property Line between the line and the cluster of trees. The Writer's Cabins need to have a view of the river and the rock outcropping, and they also need to be secluded. This location is the only one that satisfies the seclusion requirement.

Section: Site Analysis & Programming

Question 20

A client asks an architect to perform a review of existing site conditions to determine if a ground source heat exchange system is possible at the site.

Which one of the following should the architect review?

A. Geotechnical reports
B. Seasonal sun diagrams
C. Stormwater runoff records

Correct answer: A

CORRECT RESPONSE
Geotechnical reports
Geotechnical reports for water table conditions are used to determine if geothermal opportunities, which a ground source heat exchange system would take advantage of, are present at the site.

Section: Environmental & Contextual Conditions

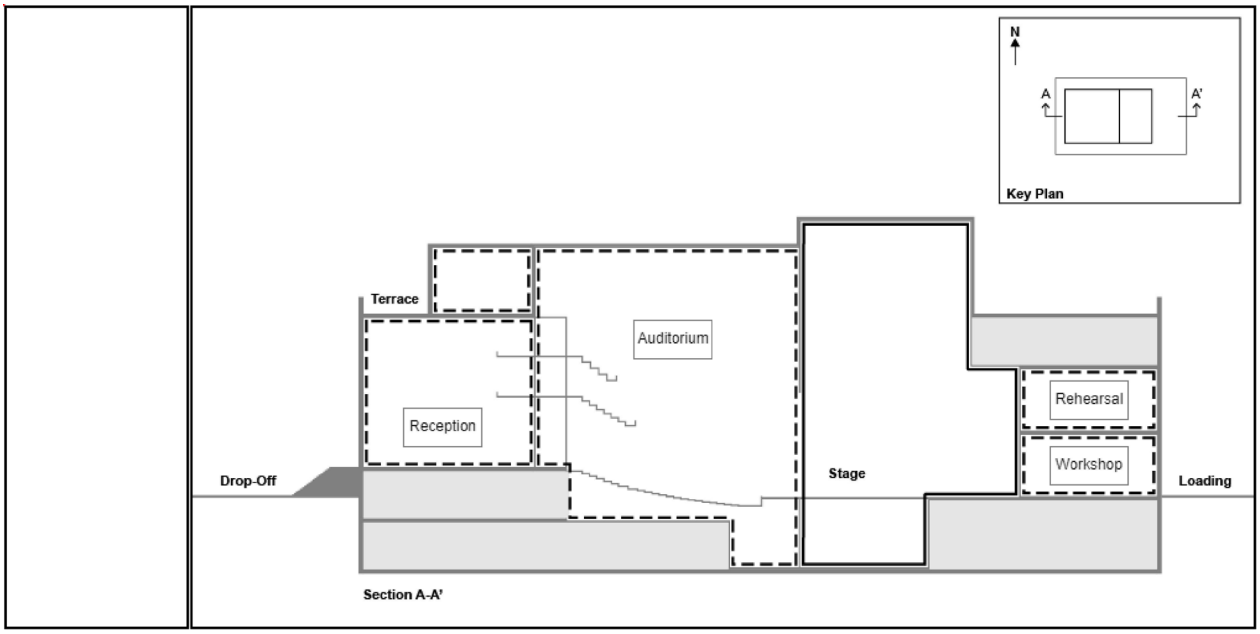
Question 21

An architect is designing a new performing arts center in the northeastern United States. The owner has provided the following requirements for room adjacencies:

- The Reception hall must be adjacent to the Drop-Off and directly connected to the Auditorium.
- The Auditorium must accommodate three levels of raked seating.
- The Rehearsal room needs to receive direct sun for morning rehearsals.
- The Workshop for stage sets must allow for ease of movement between the Loading area and the Stage.

Drag the room labels into the dashed spaces in the section drawing to meet the owner's requirements.

Correct answer:



CORRECT RESPONSES
Reception

The Reception hall is to be adjacent to the Drop-Off entry and connected to the Auditorium.

Auditorium
The Auditorium is to be located in the area indicated by the raked seating.

Rehearsal
The Rehearsal room is to be located on the east side of the building, as indicated by the key plan, for exposure to morning daylight in the northeastern United States.

Workshop
The Workshop is to be located on the same level as, and have direct access to, the Loading area and the Stage for ease of movement.

Section: Building Analysis & Programming

Question 22

An architect is designing an energy-efficient home in the Southwest. The client has asked the architect to provide recommendations for passive cooling of the new home.

Which of the following passive cooling strategies should the architect use? **Check the three that apply.**

A. Roof ponds
B. Trombe wall
C. Evaporative mechanical cooling
D. Courtyards with fountains
E. Materials with high thermal mass
F. Large windows to the east and west

Correct answer: ADE

CORRECT RESPONSES
Roof ponds
Roof ponds can provide thermal mass to the roof structure, which is a passive strategy to aid the cooling of the home.

Courtyards with fountains
Courtyard fountains provide evaporation and keep the air cool within the spaces of a home.

Materials with high thermal mass
Materials with high thermal mass help delay heat transmission and help with heat flushing during the night, making the building cooler during nighttime.

Section: Environmental & Contextual Conditions

Question 23

503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506.

Exceptions:

1. The occupancy located on an occupied roof shall not be limited to the occupancies allowed on the *story* immediately below the roof where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Section 907.5 is provided in the area of the occupied roof.
2. Assembly occupancies shall be permitted on roofs of open parking garages of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

503.1.4.1 Enclosures over occupied roof areas. Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

Exception: Penthouses constructed in accordance with Section 1510.2 and towers, domes, spires and cupolas constructed in accordance with Section 1510.5.

Refer to the exhibit.

The owner of an apartment building wants to add a rooftop patio. The building has four stories, a wood frame, and an automatic fire sprinkler system. The proposed patio would cover half of the roof and include a small penthouse with stair and elevator access. A structural engineer determines that the existing roof structure can support the new patio.

How should the architect bring the rooftop patio into code compliance?

A. Add audible fire alarms to the rooftop patio.
B. There is no code requirement for the rooftop patio.
C. Limit rooftop patio occupancy to 20% of the floor below.

Correct answer: A

CORRECT RESPONSE
Add audible fire alarms to the rooftop patio.
There is an exception to this limitation if the building is fully sprinklered and there is an occupant notification system throughout the building and on the roof (503.1.4 Exception 1).

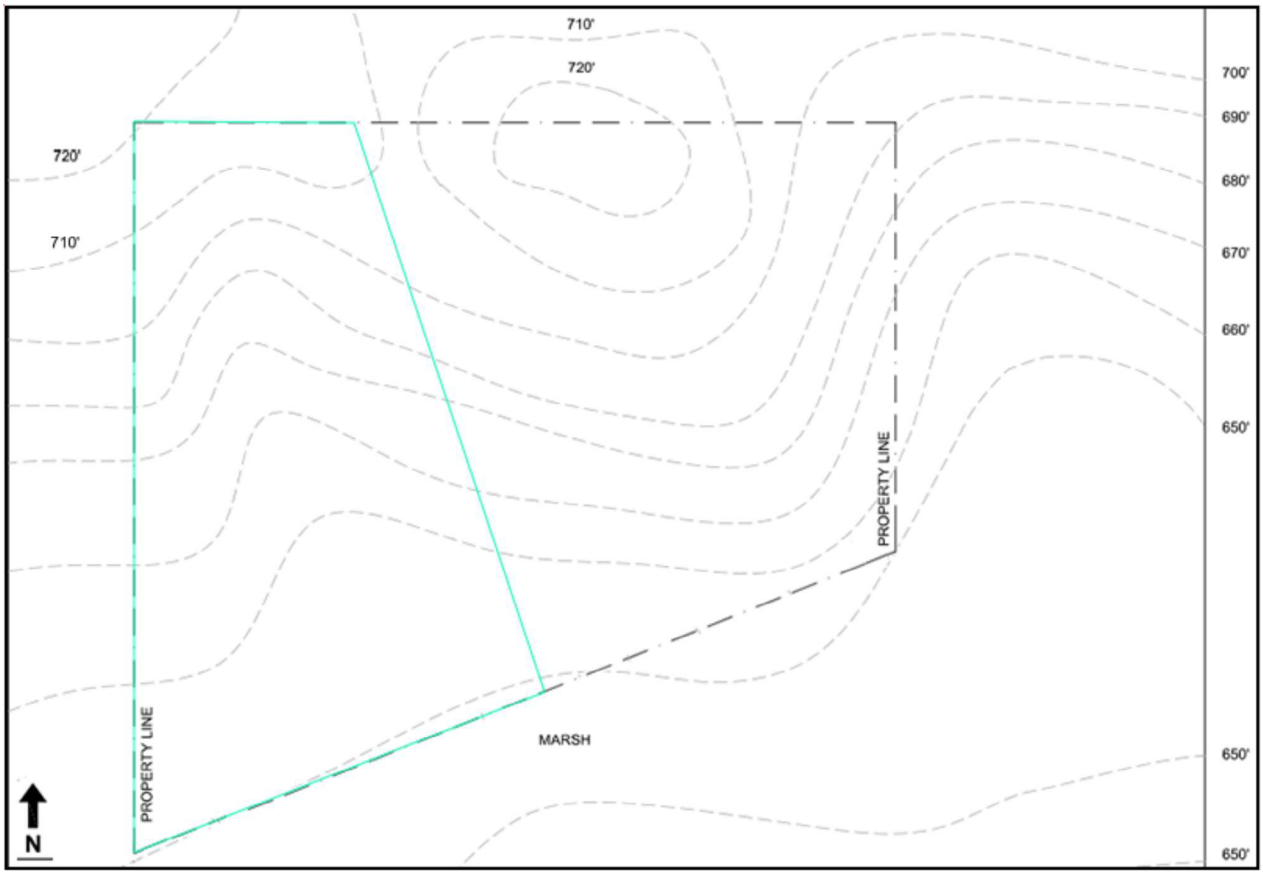
Section: Building Analysis & Programming

Question 24

An architect needs to preserve the naturally occurring runoff of a new development as a critical project requirement.

Click on the area of the survey where the site should remain undeveloped.

Correct answer:



CORRECT RESPONSE

This area represents a swale, which is to be protected from development.

Section: Environmental & Contextual Conditions

Question 25

Excerpts from 2010 ADA Standards for Accessible Design

604.8 Toilet Compartments. Wheelchair *accessible* toilet compartments shall meet the requirements of 604.8.1 and 604.8.3. Compartments containing more than one plumbing fixture shall comply with 603. Ambulatory *accessible* compartments shall comply with 604.8.2 and 604.8.3.

604.8.1 Wheelchair Accessible Compartments. Wheelchair *accessible* compartments shall comply with 604.8.1.

604.8.1.1 Size. Wheelchair *accessible* compartments shall be 60 inches (1525 mm) wide minimum measured perpendicular to the side wall, and 56 inches (1420 mm) deep minimum for wall hung water closets and 59 inches (1500 mm) deep minimum for floor mounted water closets measured perpendicular to the rear wall. Wheelchair *accessible* compartments for *children's use* shall be 60 inches (1525 mm) wide minimum measured perpendicular to the side wall, and 59 inches (1500 mm) deep minimum for wall hung and floor mounted water closets measured perpendicular to the rear wall.

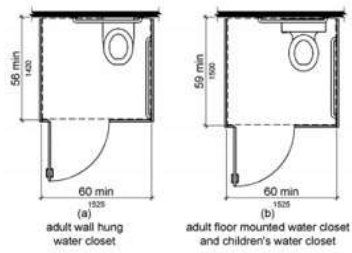


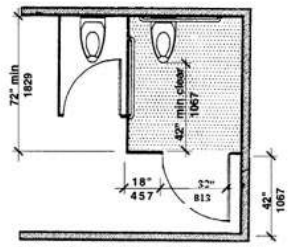
Figure 604.8.1.1
Size of Wheelchair Accessible Toilet Compartment

Excerpts from 521 CMR - Architectural Access Board (Authority Having Jurisdiction)

30.6 TOILET STALLS

If toilet stalls are provided, then at least one shall be a standard *accessible* toilet stall. Where six or more stalls are provided in a toilet room, at least one alternate *accessible* toilet stall (*See* **Fig. 30c**) shall be provided in addition to the standard *accessible* toilet stall. *Accessible* toilet stalls shall be on an *accessible route*.

30.6.1 Standard *Accessible* Toilet Stall: Standard *accessible* toilet stalls shall be at least 60 inches (60" = 1524mm) wide and 72 inches (72" = 1829mm) deep. *See* **Fig. 30a and 30b**. Arrangements shown for standard *accessible* toilet stalls may be reversed to allow either a left- or right-hand approach. Water closets in *accessible* stalls shall be located on the 60 inch (60" = 1524mm) wall and shall comply with **521 CMR 30.7, Water closets**.



Accessible Toilet Stall (Left Approach)
Figure 30a

Refer to the exhibit.

An architect is working on a project located in the northeastern United States. Part of the project involves renovating the existing public restrooms to have four toilet stalls with wall hung water closets. At least one of the provided toilet stalls will be a standard accessible toilet stall.

What is the minimum size of a standard accessible toilet stall for this project?

A. At least 60 inches wide and 72 inches deep.
B. At least 60 inches wide and 59 inches deep.
C. At least 60 inches wide and 56 inches deep.

Correct answer: A

CORRECT RESPONSE
At least 60 inches wide and 72 inches deep.
The AHJ has its own Architectural Access Board regulations that are more stringent than the 2010 ADA Standards for Accessible Design regarding wheelchair accessible toilets stalls. The most stringent regulations need to be followed.

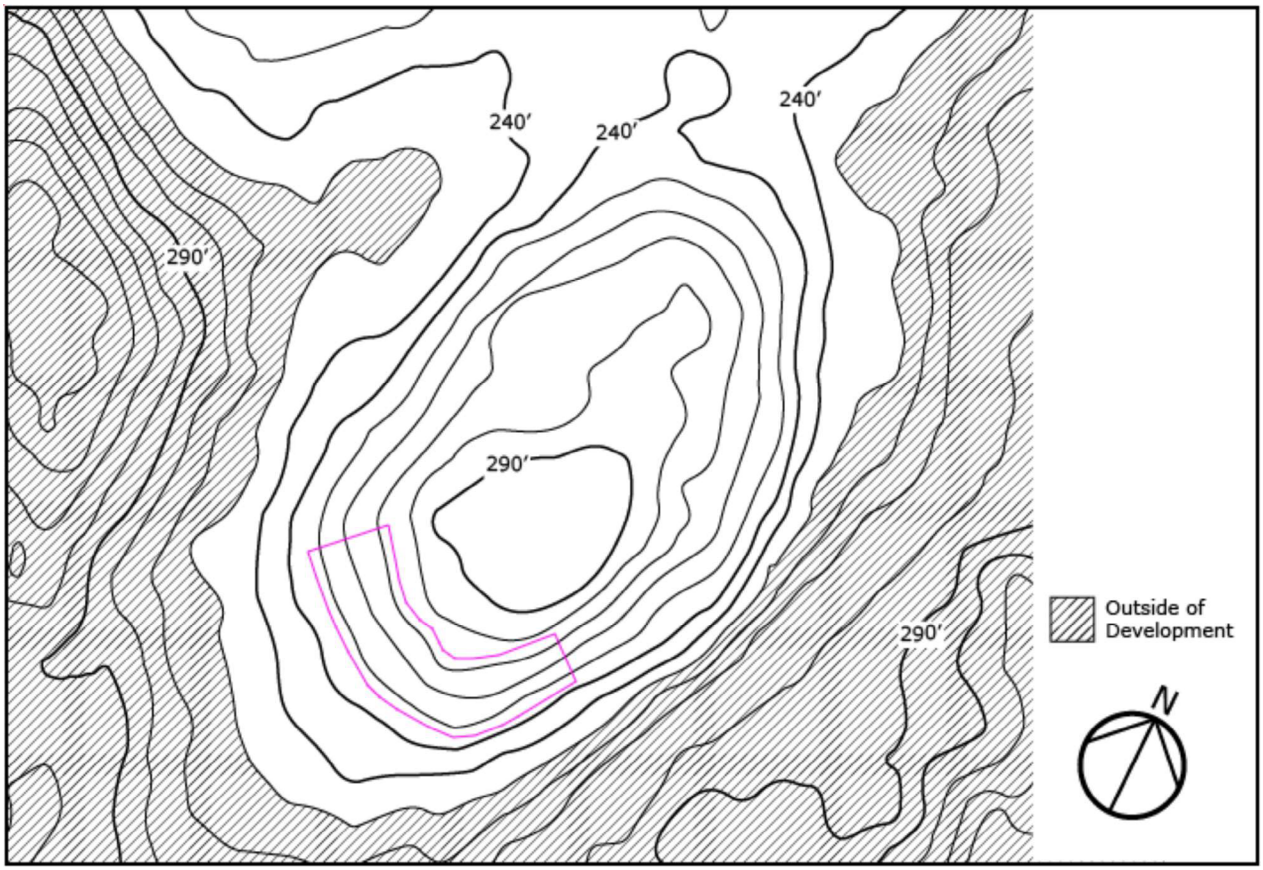
Section: Codes & Regulations

Question 26

An architecture firm is designing a new two-story residence on a hilly site in a cold climate. Winter winds predominantly come from the north. The owner directs the firm to site the residence in a microclimate that takes advantage of solar radiation and wind protection and avoids cold air collection.

Click on the area of the site plan to indicate where the finished first floor elevation of the house should be located.

Correct answer:



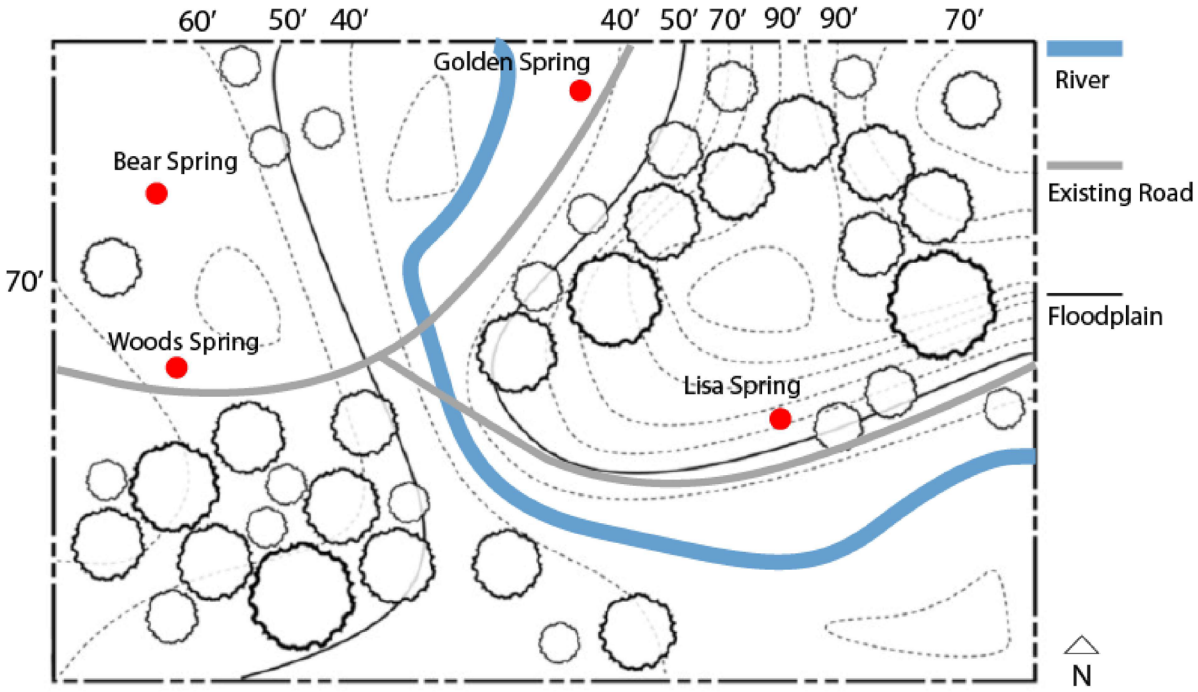
CORRECT RESPONSE

Elevation between 250 feet and 270 feet

The most favorable microclimate in a cold region with hilly terrain is low on a south-facing slope in order to take advantage of greater solar radiation. At this site, the first floor elevation of the residence needs to be placed at a point on the south-facing slope that is low enough to take advantage of the protection that the hill will afford from northerly winds, but it also needs to be placed high enough to avoid cold air collection at the bottom of the valley.

Section: Environmental & Contextual Conditions

Question 27



Refer to the exhibit.

A developer purchases a piece of land with several natural hot springs and plans to build a resort that takes advantage of local geothermal resources. The client has requested that the development of the site be cost-effective. The resort has four major program requirements:

- Low-Rise Hotel Program: Minimize construction and land disruption.
- Entertainment Program: Locate close to the resort and to an existing spring.
- Parking: Connect with an existing road.
- MEP and Support Program: Cannot be located in the floodplain.

Which spring should the architect recommend developing?

A. Lisa Spring
B. Golden Spring
C. Bear Spring
D. Woods Spring

Correct answer: D

CORRECT RESPONSE
Woods Spring
Woods Spring is connected with an existing road, is not in a floodplain, and is on flat land, which means that construction needed to develop the site will be less expensive.

Section: Environmental & Contextual Conditions

Question 28

A new development located near an active canal is in the assessment phase. The architect receives a soils report that indicates possible hydrostatic water problems where the foundation for a new building is to be placed. The developer asks the architect to suggest water mitigation strategies.

Which of the following should the architect suggest? **Check the three that apply.**

A. Sump pumps near the areas where the footings will be constructed.
B. Dampproofing membranes around elements in the ground.
C. Aggregate base course or gravel fill below the slabs.
D. Vapor barriers around the building perimeter.
E. Pervious paving at all hardscape locations.
F. Drainage boards around the building.

Correct answer: ACF

CORRECT RESPONSES

Sump pumps near the areas where the footings will be constructed.
The use of sump pumps, while not the most cost-effective way of mitigating hydrostatic pressure, can be a solution to remove water that impacts the building structure.

Aggregate base course or gravel fill below the slabs.
Gravel fill mitigates hydrostatic pressure by providing an air void near the foundations or slabs.

Drainage boards around the building.
The use of drainage boards around the building alleviates hydrostatic pressure by creating a void or path through which water can be directed.

Section: Site Analysis & Programming

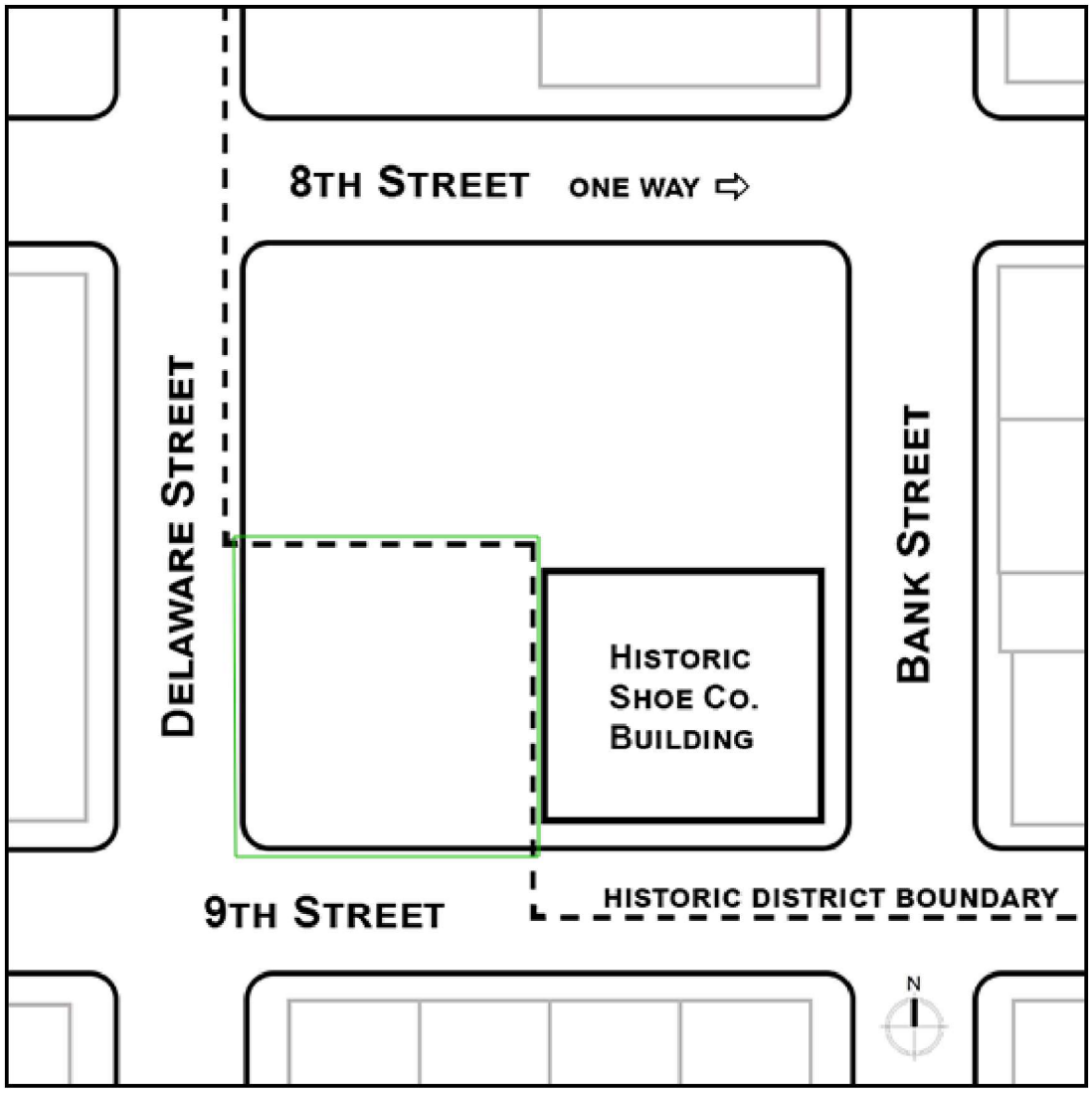
Question 29

A client owns a site that takes up an entire city block. Part of the site has an existing historic building and includes an historic district designation. Any proposed work within the historic district would need to be reviewed by the Historic Resource Commission for approval. The client wants to develop the site in the following ways:

- Renovate the existing seven-story historic building into new apartments.
- Construct an addition to the historic building.
- Construct a new, free-standing, four-story office building.
- Build a new 200-space surface parking lot that would serve both buildings.

Click on the area of the site map to indicate where the new office building should be located.

Correct answer:



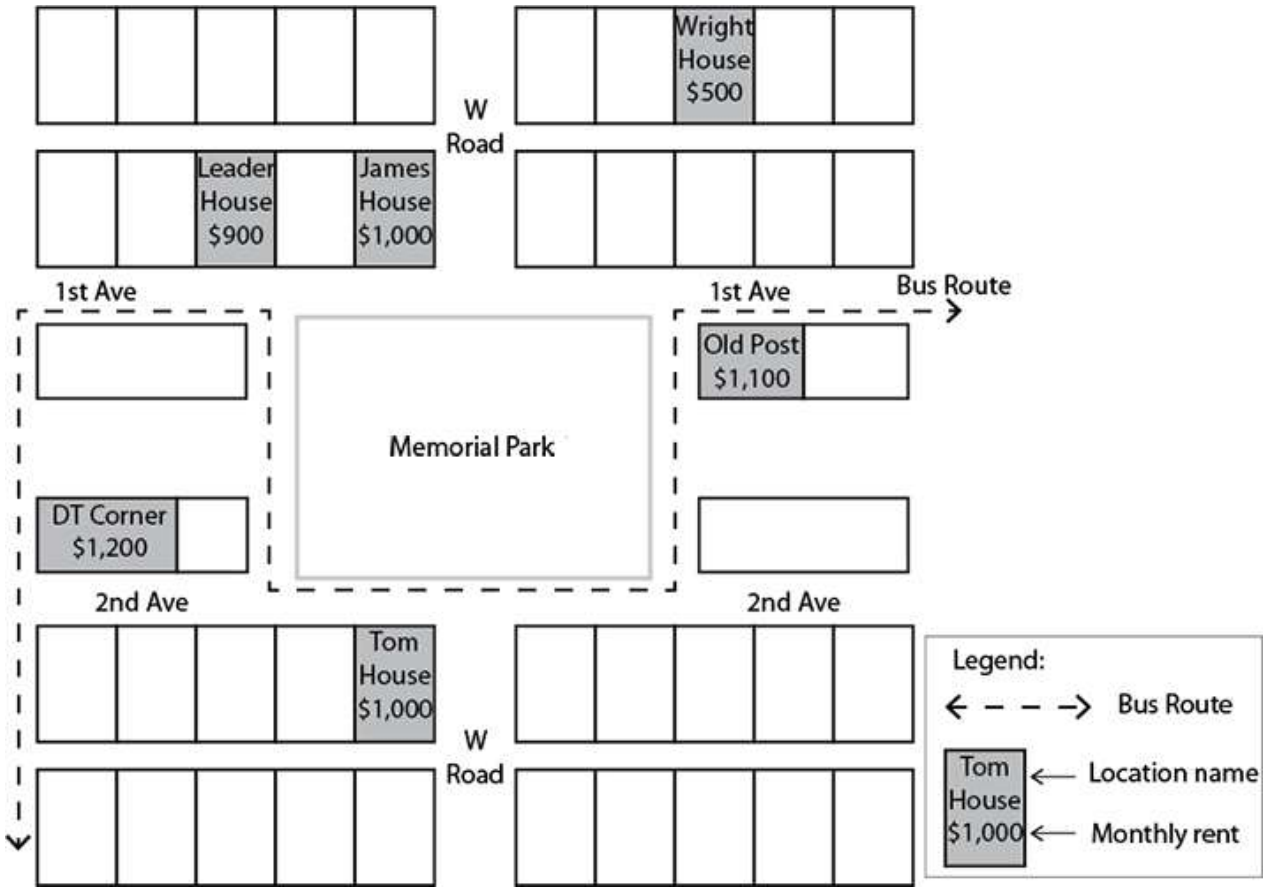
CORRECT RESPONSE

Southwest corner of the block, just outside of the Historic District

This is the most appropriate location for the new office building as it lies outside of the historic district and would not require review or approval by the Historic Resource Commission. Also, two-way traffic on both 9th and Delaware streets makes this the most accessible location for the office.

Section: Site Analysis & Programming

Question 30



Refer to the exhibit.

A restaurant owner wants to open a new neighborhood restaurant. Their budget is $17,000, which includes the first year of rent and a minimum of $5,000 for renovations. They have the following requirements for the site:

- On a bus route
- On 1st Ave or 2nd Ave
- View of Memorial Park

Which locations for the restaurant meet the owner's requirements? **Check the two that apply.**

A. Wright House
B. Leader House
C. James House
D. Old Post
E. DT Corner
F. Tom House

Correct answer: BF

CORRECT RESPONSES
Leader House

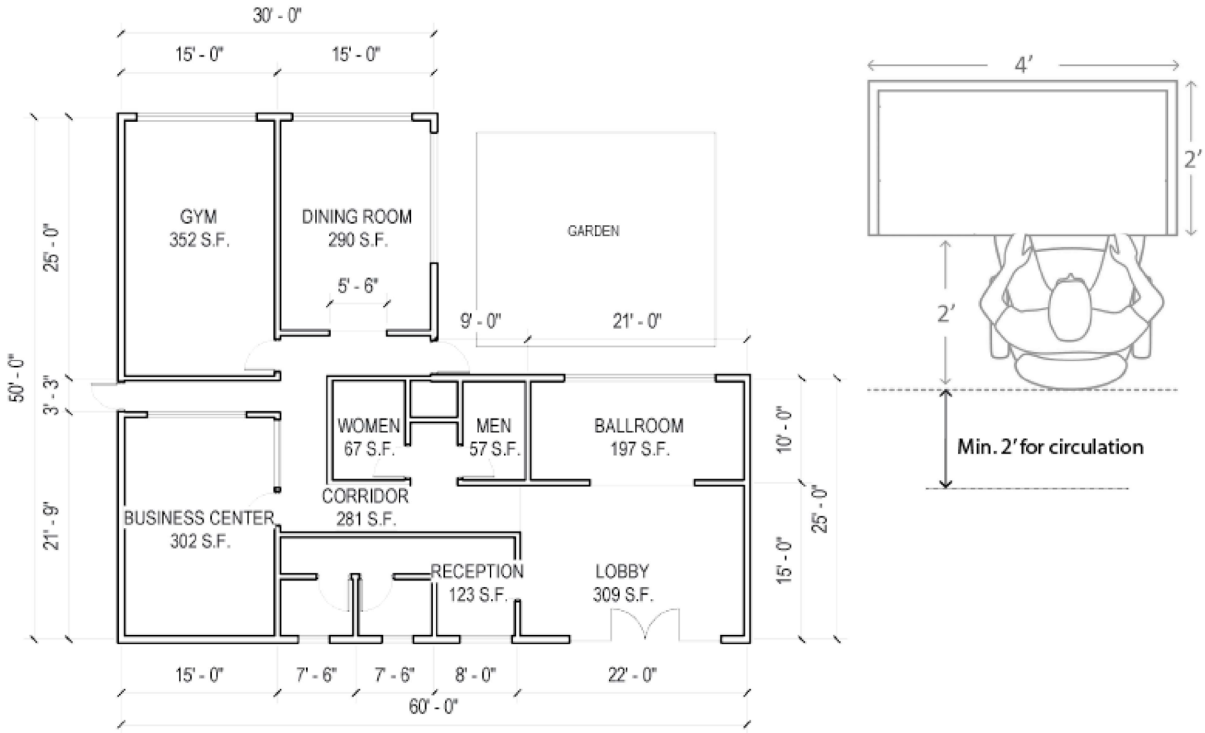
The cost for rent at this location is acceptable ($900 < $1,000). The location is on a bus route, has a view of the park, and is adjacent to 1st Ave.

Tom House
The cost for rent at this location is acceptable ($1,000 = $1,000). The location is on a bus route, has a view of the park, and is adjacent to 2nd Ave.

CALCULATIONS
1. One year's rent: $17,000 (budget) - $5,000 (remodel cost) = $12,000
2. Monthly rent: $12,000 / 12 = $1,000

Section: Environmental & Contextual Conditions

Question 31



Refer to the exhibit.

A homeowners association (HOA) decides to upgrade their clubhouse by renovating one existing room into a new after-school classroom. Workstations cost $2,000 each and the cost of the classroom renovation is $20 per square foot. The total budget for the renovation is $26,000. The HOA has the following requirements for the classroom:

- Accommodate 10 workstations.
- Contain an exterior window.
- All workstations must be adjacent to a wall or window.

Which room should the HOA renovate?

A. Dining Room
B. Business Center
C. Gym

D. Ballroom

Correct answer: A

CORRECT RESPONSE
Dining Room
The Dining Room has natural light, a view of the garden, 290 square feet, and roughly 55 feet of wall length to accommodate the 10 workstations.

CALCULATION
1. The budget for the whole project is $26,000.
2. Workstation cost: 10 x 2,000 = $20,000
3. Room renovation cost: $26,000 - $20,000 = $6,000
4. Maximum Renovation Area: $6,000 / $20 = 300 sf

Section: Building Analysis & Programming

Question 32

SECTION 411
SPECIAL AMUSEMENT BUILDINGS

411.1 General. *Special amusement buildings* having an *occupant load* of 50 or more shall comply with the requirements for the appropriate Group A occupancy and Sections 411.1 through 411.7. *Special amusement buildings* having an *occupant load* of less than 50 shall comply with the requirements for a Group B occupancy and Sections 411.1 through 411.7.

Exception: *Special amusement buildings* or portions thereof that are without walls or a roof and constructed to prevent the accumulation of smoke need not comply with this section.

For flammable *decorative materials*, see the *International Fire Code*.

[F] 411.2 Automatic fire detection. *Special amusement buildings* shall be equipped with an automatic fire detection system in accordance with Section 907.

[F] 411.3 Automatic sprinkler system. *Special amusement buildings* shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Where the *special amusement building* is temporary, the sprinkler water supply shall be of an *approved* temporary means.

Exception: Automatic sprinklers are not required where the total floor area of a temporary *special amusement building* is less than 1,000 square feet (93 m^2) and the exit access travel distance from any point to an exit is less than 50 feet (15 240 mm).

[F] 411.4 Alarm. Actuation of a single *smoke detector*, the *automatic sprinkler system* or other automatic fire detection device shall immediately sound an alarm at the building at a *constantly attended location* from which emergency action can be initiated including the capability of manual initiation of requirements in Section 907.2.11.

[F] 411.5 Emergency voice/alarm communications system. An *emergency voice/alarm communications system* shall be provided in accordance with Sections 907.2.11 and 907.5.2.2, is permitted to serve as a public address system and shall be audible throughout the entire *special amusement building*.

411.6 Exit marking. Exit signs shall be installed at the required *exit* or *exit access doorways* of amusement buildings in accordance with this section and Section 1013. *Approved* directional exit markings shall be provided. Where mirrors, mazes or other designs are utilized that disguise the path of egress travel such that they are not apparent, *approved* and *listed* low-level exit signs that comply with Section 1013.5, and directional path markings *listed* in accordance with UL 1994, shall be provided and located not more than 8 inches (203 mm) above the walking surface and on or near the path of egress travel. Such markings shall become visible in an emergency. The directional exit marking shall be activated by the automatic fire detection system and the *automatic sprinkler system* in accordance with Section 907.2.11.

411.6.1 Photoluminescent exit signs. Where *photoluminescent exit* signs are installed, activating light source and viewing distance shall be in accordance with the listing and markings of the signs.

Refer to the exhibit.

To take advantage of a large city's demand for seasonal Halloween amusements, a client hires an architect to design a new, temporary escape room business, which is considered a special amusement building by the IBC. The client has leased a 2,000-square-foot space in an existing commercial center that will feature a design that disguises doors and the path of egress as part of the amusement. The building does not have a sprinkler system, and the cost to add one would exceed the proposed budget for the project.

Which of the following design choices should the architect make in order to comply with code? **Check the three that apply.**

A. Escape room spaces will not exceed 1000 total square feet.
B. Escape rooms will be equipped with automatic fire detection.
C. Escape rooms will be equipped with a class C fire extinguisher.
D. Escape rooms will have photoluminescent exit signage.
E. Construction will be 3-hour fire-rated and use non-combustible materials.
F. Fire department key access box will be installed at the front entrance.

Correct answer: ABD

CORRECT RESPONSES

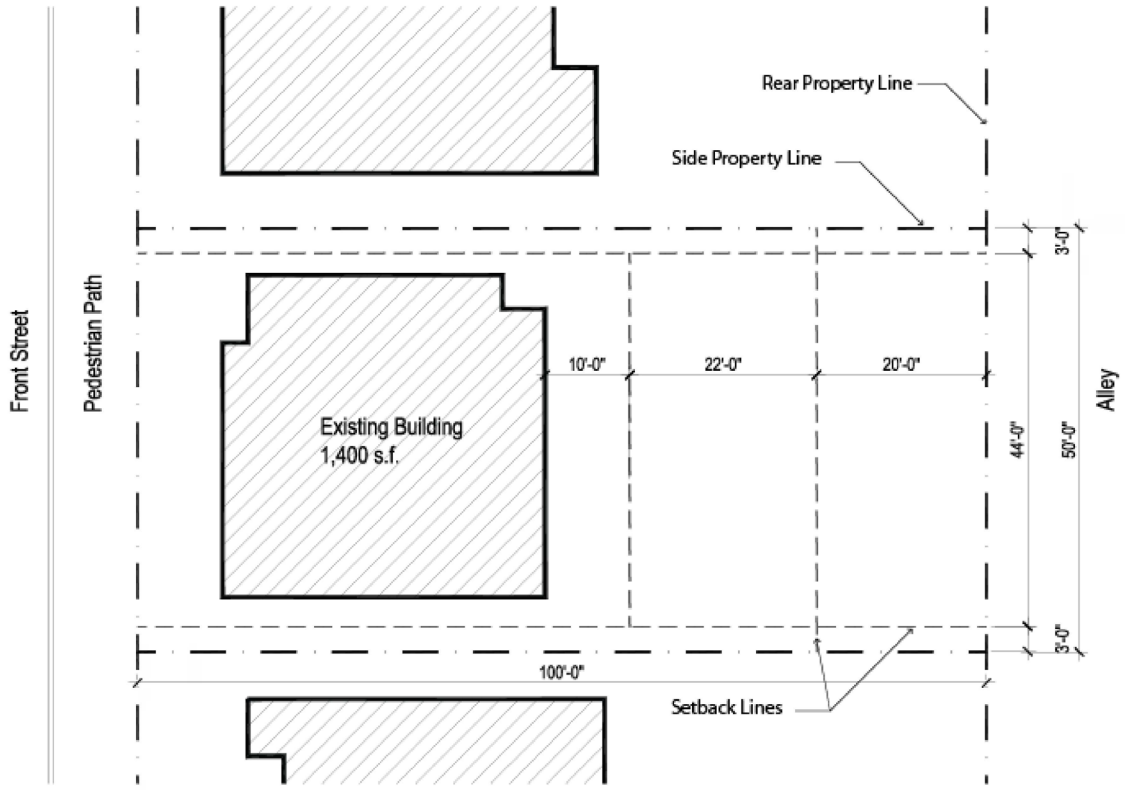
Escape room spaces will not exceed 1000 total square feet.
The owner informs the architect that the budget does not allow for the addition of a sprinkler system to the building. The IBC allows for this in special amusement buildings, but IBC 413.3 describes how the absence of a sprinkler system is only allowed if the temporary amusement space is less than 1000 square feet. Thus, the spaces in the building must be kept under 1000 total square feet.

Escape rooms will be equipped with automatic fire detection.
All special amusement rooms in the building must be equipped with automatic fire detection. IBC 411.2 states that special amusement buildings must be equipped with an automatic fire detection system.

Escape rooms will have photoluminescent exit signage.
Escape rooms use doors and path of egress travel that may not be evident as part of their design. IBC 411.6 requires low-level exit signs and directional path markings must be provided and will become visible, or photoluminescent, in an emergency.

Section: Codes & Regulations

Question 33



Refer to the exhibit.

A homeowner wants to add a 162-square-foot parking space and a shed in their backyard. The homeowner wants the shed to be as large as possible. The zoning authority has the following requirements for lot improvements:

- The shed must be a minimum of 20' away from the rear property line.
- The shed must be a minimum of 10' away from the main house.
- The maximum area of all buildings on a parcel cannot exceed 40%.
- The maximum impervious surface ratio is 42%.

Which one of the following shed sizes should the architect recommend?

A. 300 square feet
B. 480 square feet
C. 550 square feet
D. 800 square feet

Correct answer: B

CORRECT RESPONSE
480 square feet
The owner wants the largest shed possible, and in order to find the shed size that the architect should recommend to the owner, it is necessary to calculate both the maximum shed size *and* the maximum impervious surface area. The architect cannot simply recommend the maximum shed size but must recommend the largest shed that can be accommodated on the lot *along with* the parking space (and the existing building area).

CALCULATIONS

1. Lot size: 50' x 100' = 5,000 sf
2. Maximum area of all buildings: 5,000 sf (lot size) x 40% (maximum building area, per the zoning authority) = 2,000 sf
3. Maximum shed size: 2,000 sf - 1,400 sf (existing building area) = 600 sf
4. Maximum impervious surface area on site: 5,000 sf x .42 (maximum impervious surface ratio, per the zoning authority) = 2,100 sf
5. Allowable impervious surface area on site: 2,100 sf - 1,400 sf = 700 sf
6. Impervious surface area for response option B, the 480-square-foot shed: 480 sf (shed area) + 162 sf (parking space area) = 642 sf
7. The 480-square-foot studio shed does not exceed the maximum shed size (480 sf < 600 sf) and the combined area of the shed and parking space does not exceed the allowable impervious surface ratio (642 sf < 700 sf) requirement.

Section: Building Analysis & Programming

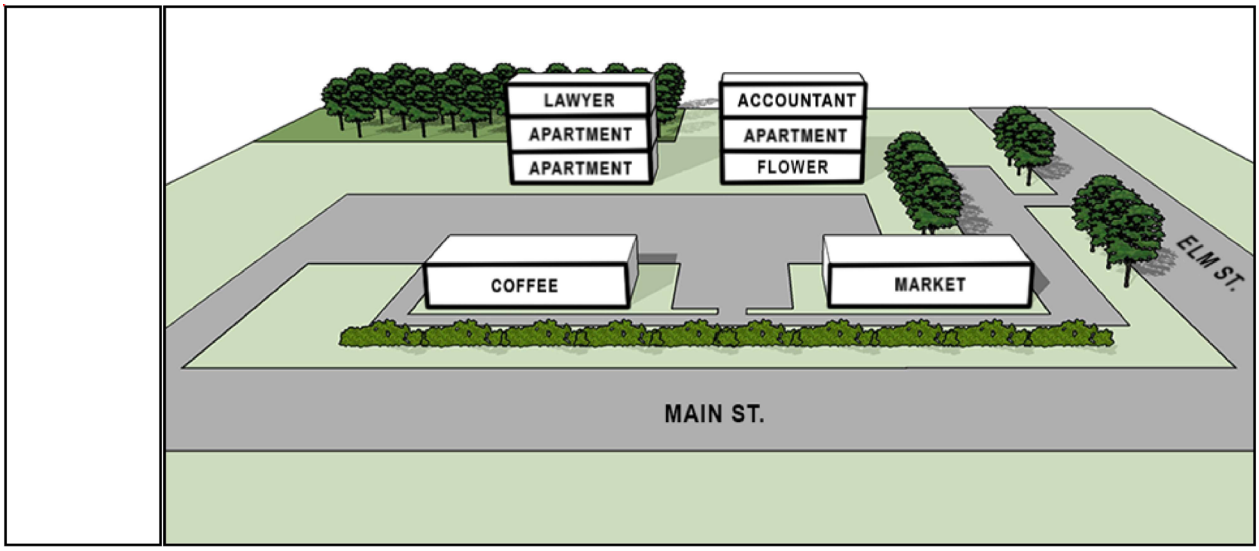
Question 34

An architect is designing a new mixed-use development. The site is adjacent to a park, has a main parking area, and has a smaller parking lot with a service drive off of Elm Street. The investors make the following requests:

- Three floors of Apartments should be located close to the wooded park behind the property.
- One level of Apartments should be on the ground floor.
- A Coffee shop should be located where a drive-through can be provided.
- A Market should be located with direct access to the service drive.
- A Flower shop should be close to the service drive.
- Offices for a Lawyer and an Accountant must be located on the highest floor.
- The Lawyer's office should not be next to Elm Street of Main Street.
- All retail should be located on the ground floor.

Drag each defined function from the left onto its location on the massing diagram to indicate the most appropriate use of each floor in each building.

Correct answer:



CORRECT RESPONSES

Apartments
Because of the requirements of the other functions, and because the Apartments are required to be near the wooded area, they are to be placed in the remaining available floors in the three-story buildings by the wooded area, those floors being the bottom two floors of the three-story building on the left and the second floor of the three-story building on the right.

Lawyer
This function, along with the Accountant, must go on one of the highest floors. Because the Lawyer's office should not be next to the two roads, it cannot be placed in the three-story building on the right because it is next to Elm Street. The only floor left for the Lawyer's office then is the third floor of the three-story building on the left.

Accountant
The Accountant must be placed on the highest floor of a building, and because the Lawyer's office must be placed on the highest floor of the three-story building on the left, the third floor of the three-story building on the right is the only acceptable remaining floor for the Accountant.

Flower
The Flower shop must be close to the service drive, and because all retail must go on the ground floor, the only floor that satisfies those requirements is the first floor of the three-story building on the right.

Market
The Market requires direct access to the service drive off of Elm Street. The only floor in the development that satisfies this requirement is the one-story building on the right.

Coffee
The floors in both of the one-story buildings allow for a drive-through, but because the Market must be placed in the one-story building on the right, the one-story building on the left is where the Coffee shop must be placed.

Section: Building Analysis & Programming

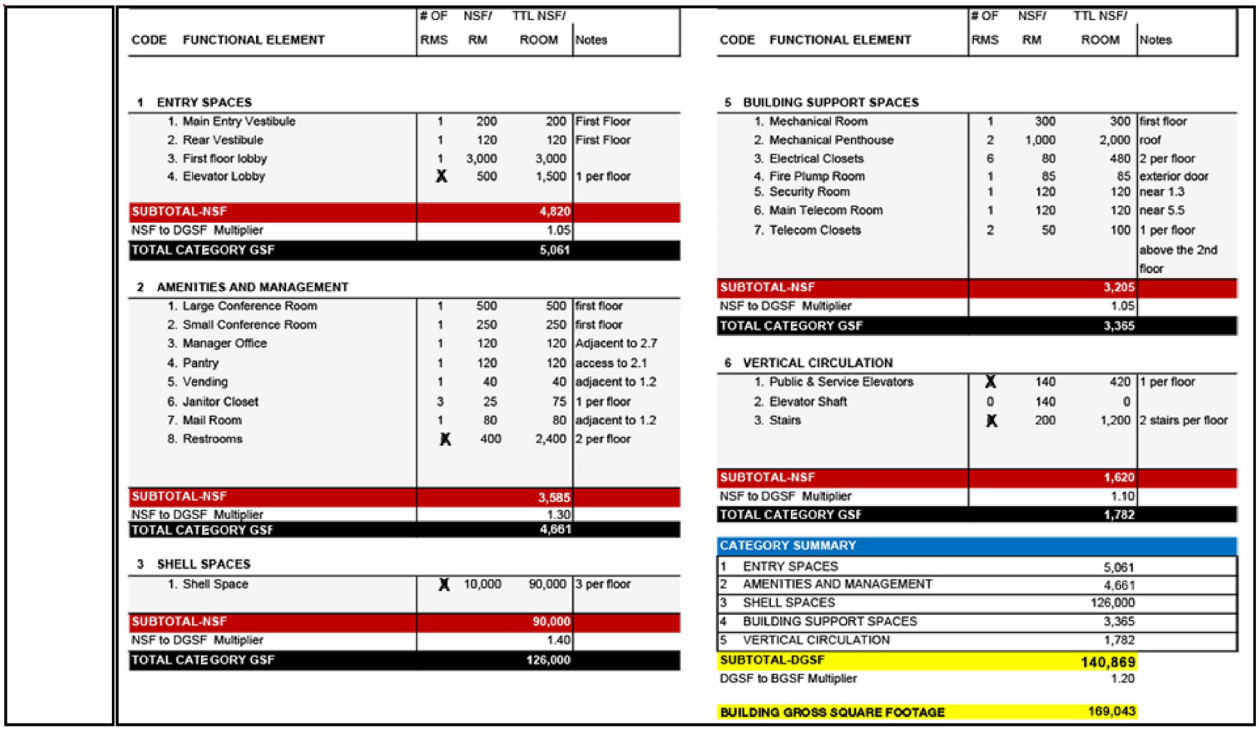
Question 35

While an architect is preparing a building program for a three-story, multi-tenant office building, the owner requests a fourth, additional floor. In accommodating this change, the architect makes the following assumptions:

- The second and third floor programs match, and the fourth floor will also match their programs.
- All public, accessible vertical circulation elements will be extended to the fourth floor.
- All mechanical and building support spaces are adequate to serve the fourth floor.
- A Janitor's Closet is not required on the fourth floor.
- The first floor of the building is the only floor with doors that exit to the exterior.

Drag the "X" symbols onto the room quantities in the "# OF RMS" column on the program to indicate the room quantities that will change because of the additional floor.

Correct answer:



CODE	FUNCTIONAL ELEMENT	# OF RMS	NSF/ RM	TTL NSF/ ROOM	Notes
1	ENTRY SPACES				
	1. Main Entry Vestibule	1	200	200	First Floor
	2. Rear Vestibule	1	120	120	First Floor
	3. First floor lobby	1	3,000	3,000	
	4. Elevator Lobby	X	500	1,500	1 per floor
	SUBTOTAL-NSF			4,820	
	NSF to DGSF Multiplier			1.05	
	TOTAL CATEGORY GSF			5,061	
2	AMENITIES AND MANAGEMENT				
	1. Large Conference Room	1	500	500	first floor
	2. Small Conference Room	1	250	250	first floor
	3. Manager Office	1	120	120	Adjacent to 2.7
	4. Pantry	1	120	120	access to 2.1
	5. Vending	1	40	40	adjacent to 1.2
	6. Janitor Closet	3	25	75	1 per floor
	7. Mail Room	1	80	80	adjacent to 1.2
	8. Restrooms	X	400	2,400	2 per floor
	SUBTOTAL-NSF			3,585	
	NSF to DGSF Multiplier			1.30	
	TOTAL CATEGORY GSF			4,661	
3	SHELL SPACES				
	1. Shell Space	X	10,000	90,000	3 per floor
	SUBTOTAL-NSF			90,000	
	NSF to DGSF Multiplier			1.40	
	TOTAL CATEGORY GSF			126,000	

CODE	FUNCTIONAL ELEMENT	# OF RMS	NSF/ RM	TTL NSF/ ROOM	Notes
5	BUILDING SUPPORT SPACES				
	1. Mechanical Room	1	300	300	first floor
	2. Mechanical Penthouse	2	1,000	2,000	roof
	3. Electrical Closets	6	80	480	2 per floor
	4. Fire Plump Room	1	85	85	exterior door
	5. Security Room	1	120	120	near 1.3
	6. Main Telecom Room	1	120	120	near 5.5
	7. Telecom Closets	2	50	100	1 per floor above the 2nd floor
	SUBTOTAL-NSF			3,205	
	NSF to DGSF Multiplier			1.05	
	TOTAL CATEGORY GSF			3,365	
6	VERTICAL CIRCULATION				
	1. Public & Service Elevators	X	140	420	1 per floor
	2. Elevator Shaft	0	140	0	
	3. Stairs	X	200	1,200	2 stairs per floor
	SUBTOTAL-NSF			1,620	
	NSF to DGSF Multiplier			1.10	
	TOTAL CATEGORY GSF			1,782	

CATEGORY SUMMARY		
1	ENTRY SPACES	5,061
2	AMENITIES AND MANAGEMENT	4,661
3	SHELL SPACES	126,000
4	BUILDING SUPPORT SPACES	3,365
5	VERTICAL CIRCULATION	1,782
	SUBTOTAL-DGSF	140,869
	DGSF to BGSF Multiplier	1.20
	BUILDING GROSS SQUARE FOOTAGE	169,043

CORRECT RESPONSES

Entry Spaces - 4. Elevator Lobby
An additional elevator lobby will be needed in order to match the program of the Third Floor.

Amenities and Management - 8. Restrooms
Restrooms will increase by two in order to match the program of the Third Floor.

Shell Spaces - 1. Shell Space
Shell Space will increase by three in order to match the program of the Third Floor.

Vertical Circulation - 1. Public & Service Elevators
The elevators for the public and service (the non-public shaft) will increase by one as vertical circulation elements extend to the Fourth Floor.

Vertical Circulation - 3. Stairs
Stairs will increase by two as vertical circulation elements extend to the Fourth Floor.

Section: Building Analysis & Programming

Question 36

A hospital located on a dense urban site with no vacant land has hired an architect to develop a new pharmacy through either renovation or relocation. The existing pharmacy must remain operational throughout the renovation or relocation, and construction cost and duration must be minimized. There is a vacant former medical records space down the hall from the existing pharmacy.

Which phasing option should the architect recommend?

A. Relocate the pharmacy to a temporary trailer and renovate the existing pharmacy.
B. Renovate the existing pharmacy in multiple phases so that part of the

pharmacy can always remain operational.

C. Build a temporary pharmacy in another location to be used only while the existing pharmacy is under renovation.

D. Build the new pharmacy in the existing medical records space and abandon the existing pharmacy at completion of construction.

Correct answer: D

CORRECT RESPONSE
Build the new pharmacy in the existing medical records space and abandon the existing pharmacy at completion of construction.
The architect should recommend building the pharmacy elsewhere because it will minimize construction phases and maximize available resources.

Section: Building Analysis & Programming

Question 37

County Demographic Report

Households Estimate	**108,000**
Average Household Size	**2.18**
Average Family Size	**2.99**

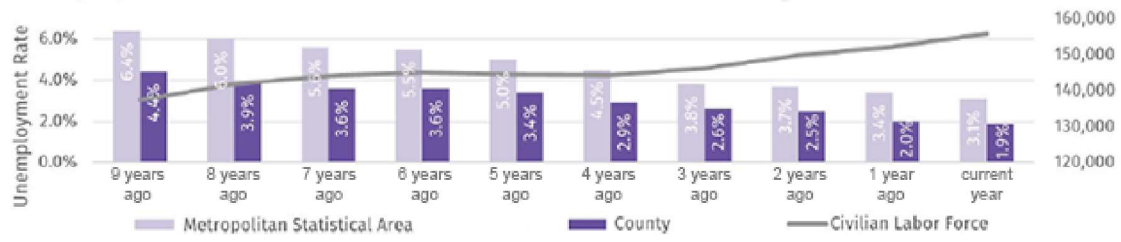
Household Size		
1-Person	40,872	39%
2-Person	34,483	33%
3-Person	13,037	12%
4-Person	11,438	11%
5+ Persons	4,886	5%
Total	**104,716**	**100%**

Household Type		
Family-Households	48,455	46%
Non-Family Households	56,261	54%
Total	**104,716**	**100%**

Population Estimate	**228,400**
Daytime Population Estimate	**311,800**

Age Distribution		
Under 5	13,740	6.0%
5-19	30,790	13.5%
20-24	15,590	6.8%
25-34	54,960	24.1%
35-44	38,020	16.6%
45-54	28,590	12.5%
55-64	22,470	9.8%
65-84	21,280	9.3%
85 and over	2,960	1.3%
Median Age		**34.5 years**

Unemployment Rate and Civilian Labor Force



Refer to the exhibit.

A developer wants to renovate a warehouse into a mixed-use building with public space on the first floor and residential units above.

Which program is most appropriate for the building?

A. Two-bedroom condo units with an unemployment assistance center below.

B. One-bedroom senior living community with a nursing home below.
C. Four-bedroom luxury condo units with a private club below.
D. One-bedroom apartments with a commercial gym below.

Correct answer: D

CORRECT RESPONSE
One-bedroom apartments with a commercial gym below.
According to the demographic report, 1- to 2-person households comprise over 70% of the community and the median resident age is 34.5, which makes one-bedroom units with a commercial gym the most appropriate use for the building.

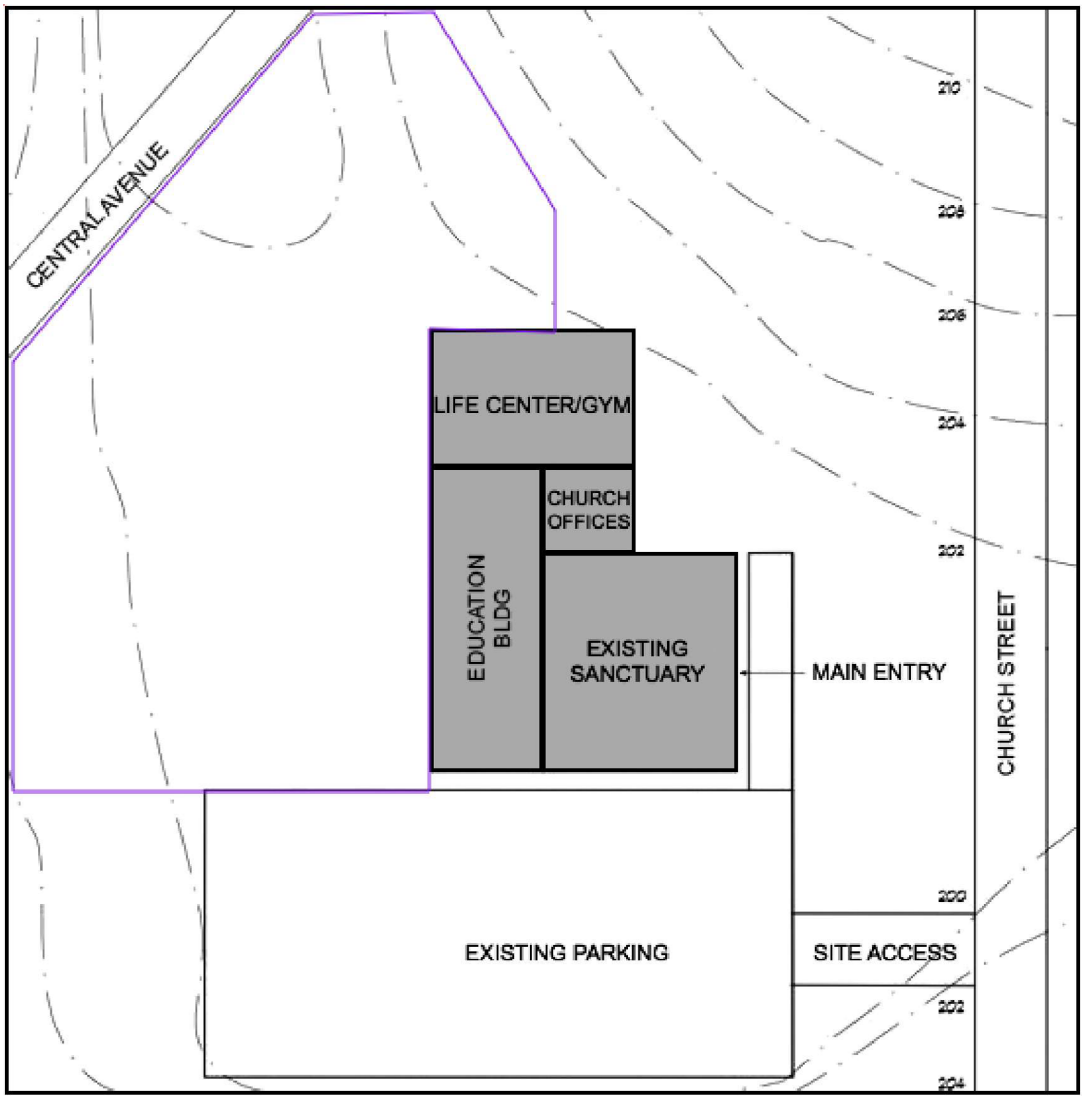
Section: Building Analysis & Programming

Question 38

An existing church wants to add parking, but they do not want to add the parking in front of the Main Entry. The church also wants the most cost-effective location for the additional parking.

Click on the area of the site plan that provides the most economical location for an additional 50% more parking.

Correct answer:



CORRECT RESPONSE

The area bounded by the church, Central Ave., the edge of the property, and the Existing Parking

This is a level area, which won't require the high cost of regrading, that is not located in front of the Main Entry of the Existing Sanctuary.

Section: Site Analysis & Programming

Question 39

An owner has a small property that has a ten-foot-wide side yard, which includes a four-foot-wide utility easement that runs along one side of the yard. The owner has hired an architect to assist in locating a new 7' x 7' shed in the side yard.

How should the owner proceed with the construction of the shed?

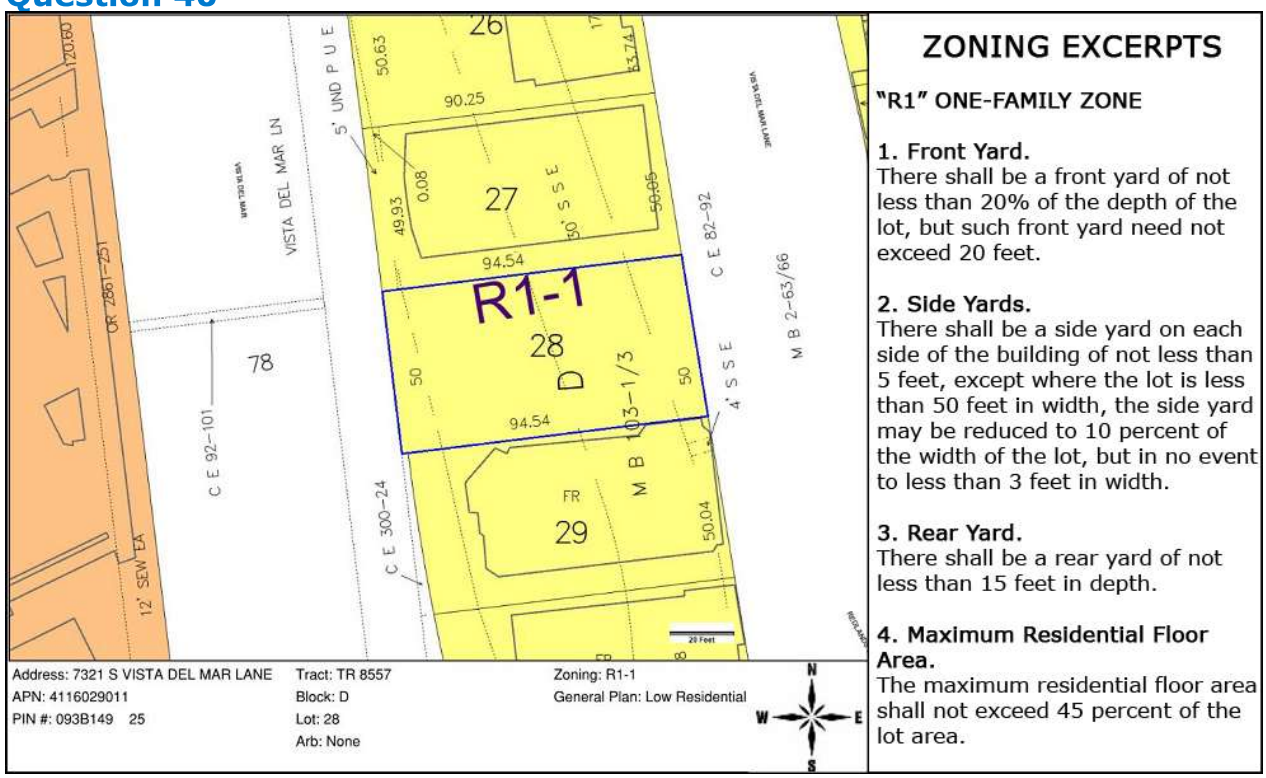
A. Construct the shed because they own the entire parcel.
B. Request permission from the utility company before constructing the shed.
C. Do not construct the shed because no structure can be placed in the easement.

Correct answer: B

CORRECT RESPONSE
Request permission from the utility company before constructing the shed.
The property owner must receive permission from the utility company before building on land designated as a utility easement.

Section: Codes & Regulations

Question 40



Refer to the exhibit.

An architect is designing a building for Lot 28.

What is the maximum buildable area? Round the answer to the nearest whole number.

A. 2,127 square feet
B. 2,328 square feet
C. 2,425 square feet

Correct answer: A

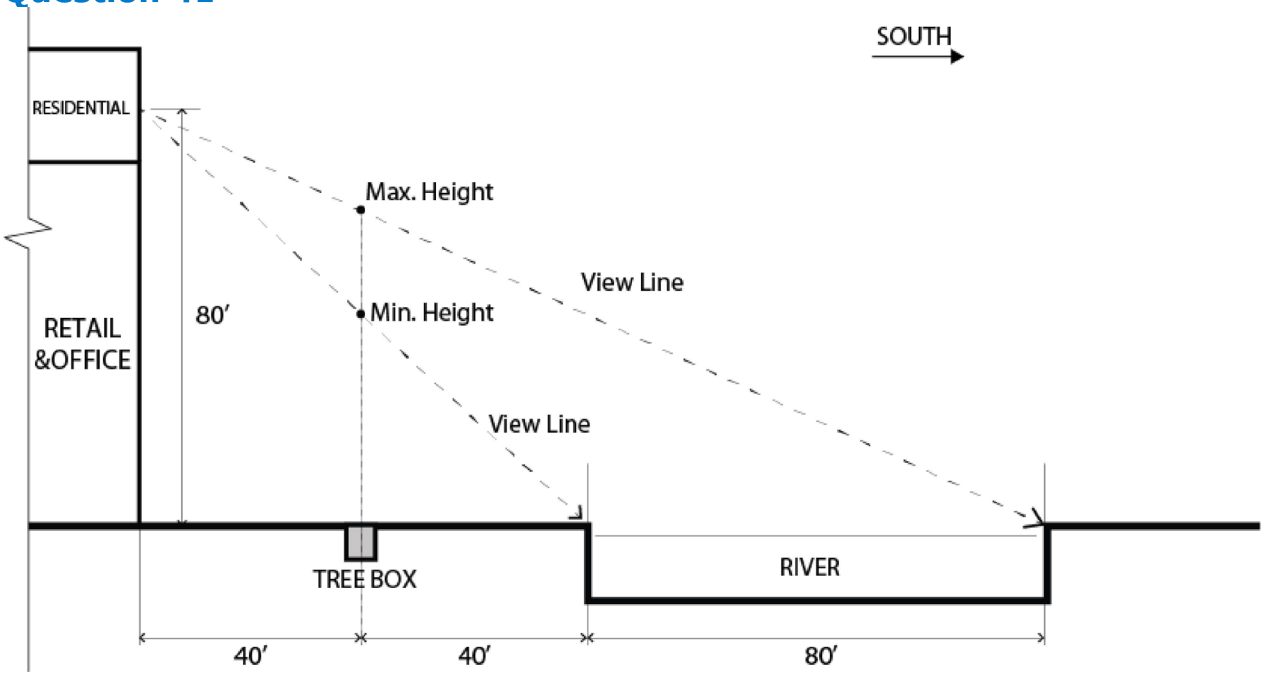
CORRECT RESPONSE
2,127 square feet
This response takes into account the provision stated in Zoning Excerpt 4 that maximum residential floor area shall not exceed 45% of the lot area.

CALCULATIONS

1. Based on the Zoning Map, the area of Lot 28 is calculated as follows: 94.54' x 50' = 4,727 sf
2. Based on Zoning Excerpts 1-3, the floor area is calculated as follows: [lot depth - front yard (20% of the depth of the lot) - back yard] x (lot width - side yard - side yard) = floor area
3. For the front yard: 0.2 (20%) x 94.54' (lot depth) = 18.908'
4. For the north/south sides of the site: 94.54' - 18.908' - 15' (back yard) = 60.632'
5. For the east/west sides of the site: 50' - 5' - 5' = 40'
6. 60.632' x 40' = 2,425.28 sf
7. Per Zoning Excerpt 4, maximum residential floor area shall not exceed 45% of the lot area.
8. For the maximum buildable area: 0.45 (45%) x 4,727 sf = 2,127.15 sf, rounded to 2,127 sf

Section: Codes & Regulations

Question 41



Refer to the exhibit.

A developer has asked an architect for tree type recommendations. The trees are to be planted in a tree box between the building and the river. The developer has the following requirements for the trees:

- Be as tall as possible without blocking the entirety of the residential water view.
- Block sunlight in the summer and allow sunlight in the winter.
- Be suitable for a moist soil type.

Click on the photo of the tree in the Site Plantings Materials List that is most appropriate for the tree box.

Correct answer:

Site Plantings Materials List						
Image	Name	Tree Type	Mature Height	Native Origin	Water Usage	Soil Type
	Jack Pine	Evergreen	65'	Northeast, Midwest	Low	Medium/Dry
	Red Oak	Deciduous	120'	Midwest, South, Southeast	Medium	Moist
	Sugar Maple	Deciduous	75'	Midwest, Southeast, South	Medium	Moist
	Big Cone Pine	Evergreen	80'	West, Northwest	Medium	Medium
	Box Elder	Deciduous	58'	Midwest, North	High	Moist
	Inkberry	Evergreen	8'	Southeast	High	Moist
	White Pine	Evergreen	40'	Northeast, Midwest, Northwest	Medium	Dry-Moist

CORRECT RESPONSE

Box Elder

The tree height is 58', which is below the 60' limit. It is the correct tree type, deciduous, which blocks sunlight in the summer and allows light in the winter. It is also suitable for a moist soil type.

CALCULATIONS

1. Maximum tree height: 80' (distance from ground to the viewing point of the building) / 160' (distance from building to far bank of the river) = H / 120 (distance from tree box to far bank of the river); H = 60'
2. Viewing triangle is 80' high and 160' long, resulting in a 1:2 ratio of height to length.
3. 120' / 2 = 60' maximum tree height

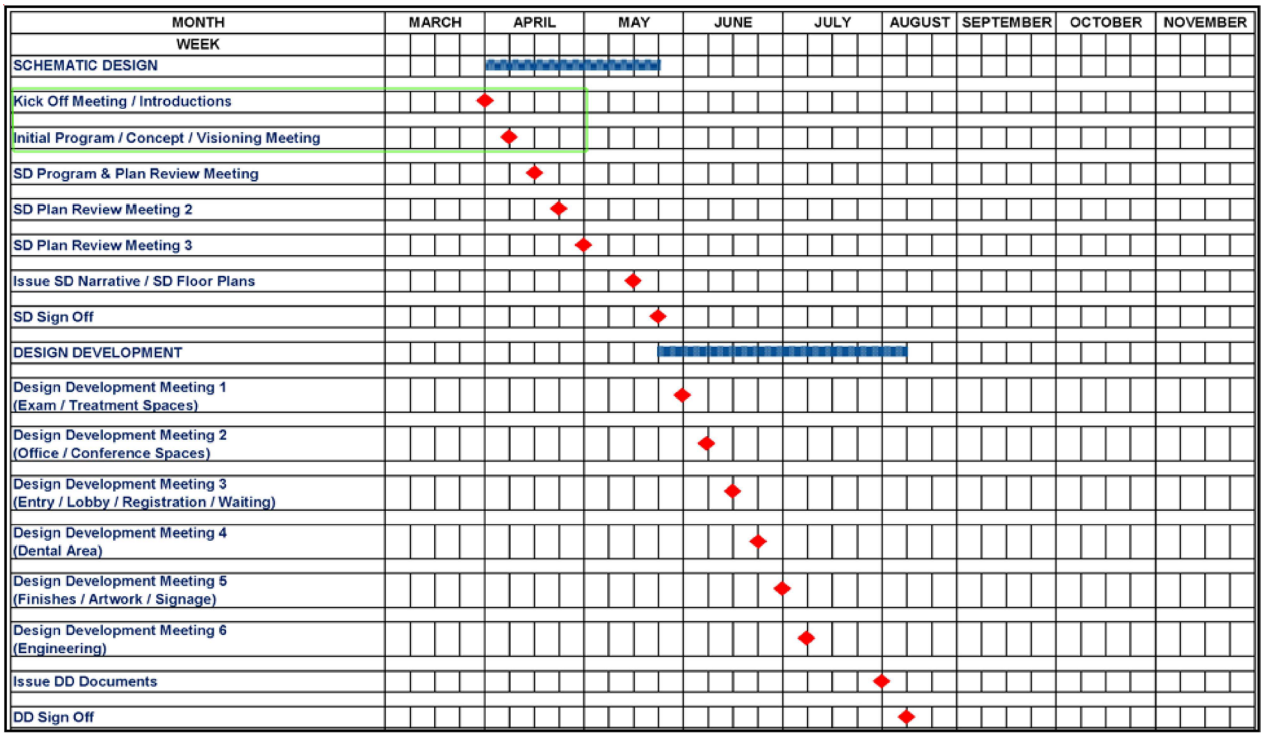
Section: Environmental & Contextual Conditions

Question 42

A healthcare system wants to open a new clinic at a new location. They want the design of this new clinic to become a standard design that will be used at all future locations.

Click on the name of the meeting in the schedule to indicate when the healthcare system should inform the architect of the number of Exam/Treatment Spaces that will be needed in the new design.

Correct answer:



CORRECT RESPONSE

Kick Off Meeting/Introductions or Initial Program/Concept/Vision Meeting

Because this is a site adapt program, the number of exam rooms that will be needed would be discussed at either the Kick Off Meeting or the Initial Program meeting.

Section: Building Analysis & Programming

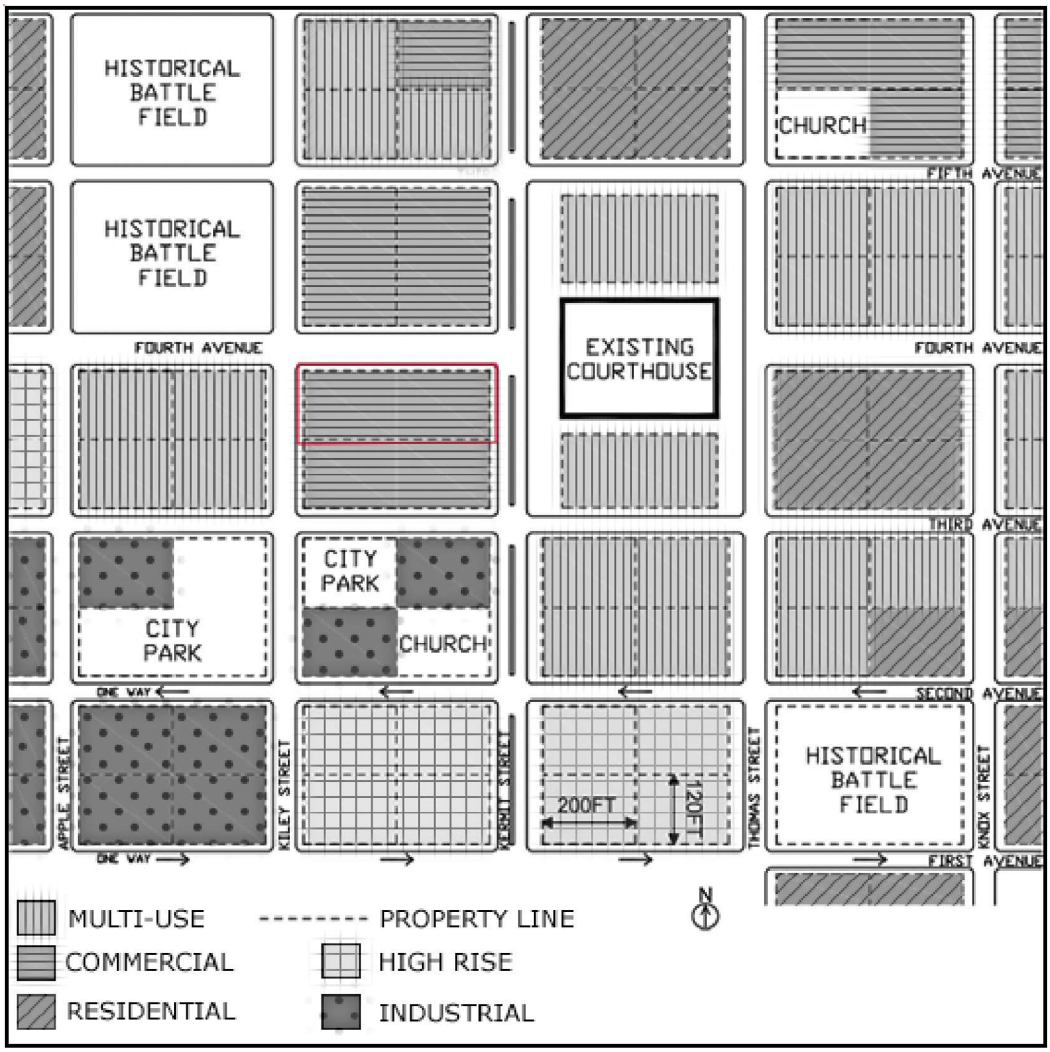
Question 43

A client is buying land for a commercial building. Client requirements follow:

- The client is not willing to rezone.
- The site must be bordered by Kermit Street.
- The site should not be directly across from a historical battle field.
- The client wants to maximize indirect, natural light at the street-facing frontage.
- The combined area of the ground floor and the parking area must be greater than 24,000 square feet.

Click on the parcel in the site plan that meets the client's requirements.

Correct answer:



CORRECT RESPONSE

Commercial parcel bounded by Fourth Street to the north and Kermit Street to the east

This parcel is the correct size, is bordered by Kermit Street, and has a long northern street frontage for maximizing indirect light.

CALULATIONS

1. Site area: 200 ft x 120 ft x 2 (number of lots) = 48,000 sf

Section: Site Analysis & Programming

Question 44

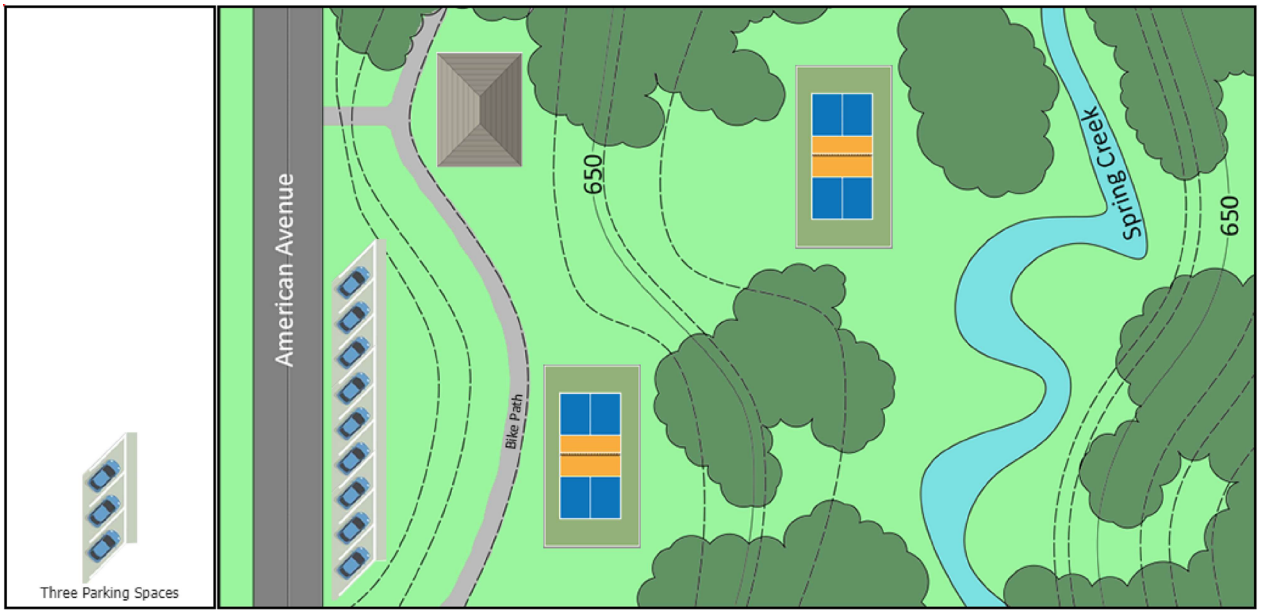
A city is redeveloping a little-used arboretum site. They will add a Restroom Shelter, two Tennis Courts, and at least eight Parking Spaces. The site slopes from American Avenue down toward Spring Creek, with the existing floodplain at an elevation of 646 feet. No permanent structures may be constructed in the floodplain. Other programmatic requirements follow:

- Parking Spaces should provide access to the Bike Path.
- Existing trees should not be disturbed, including from grading.
- The Restroom Shelter should be adjacent to both Tennis Courts.

Drag the program elements onto the areas on the schematic plan to indicate the most appropriate location for each element. Contours are shown at two-

foot intervals. Not all elements will be used.

Correct answer:



CORRECT RESPONSES

Tennis Courts (x2)

The Tennis Courts are an allowable use within the floodplain as they are not a "structure." There are only two locations where the Tennis Courts can be placed that are on level ground and won't require disturbing the trees.

Restroom Shelter

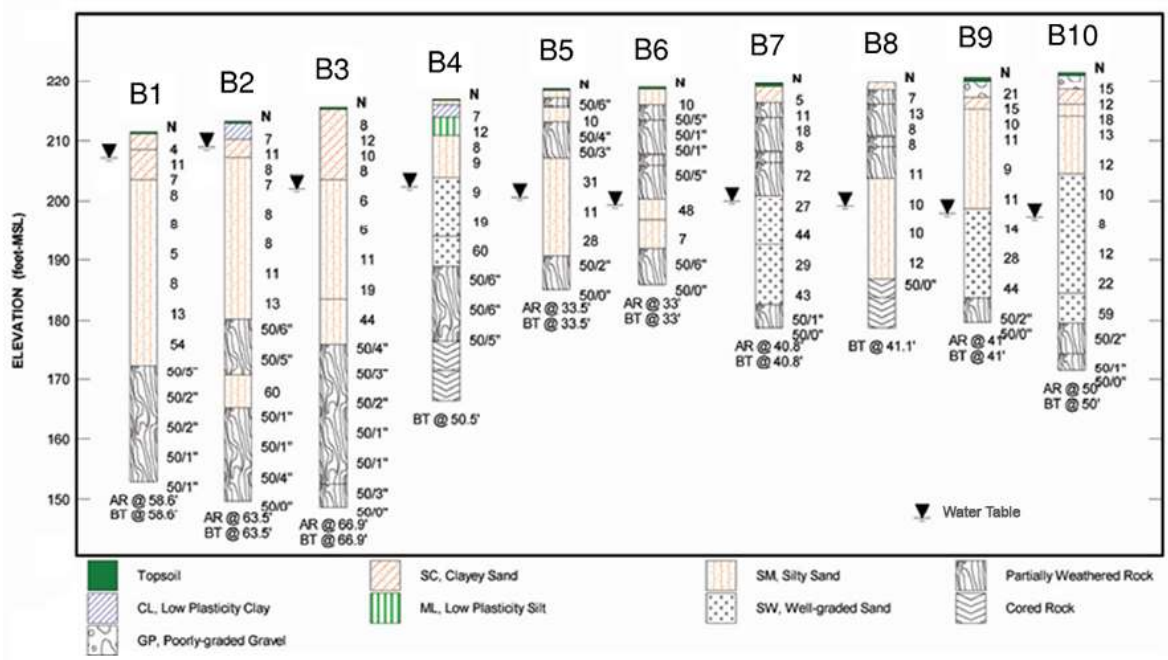
The Restroom Shelter needs to be adjacent to the Tennis Courts, so once the Tennis Courts are placed, the area that remains for the Restroom Shelter is at the top of the site, just to the right of the Bike Path.

Three Parking Spaces (x3)

Because the Parking Spaces must provide access to the Bike Path, they should be located along the right edge of American Avenue, between the avenue and the trail. At least eight parking spaces are required, meaning that three "Three Parking Spaces" elements must be placed.

Section: Site Analysis & Programming

Question 45

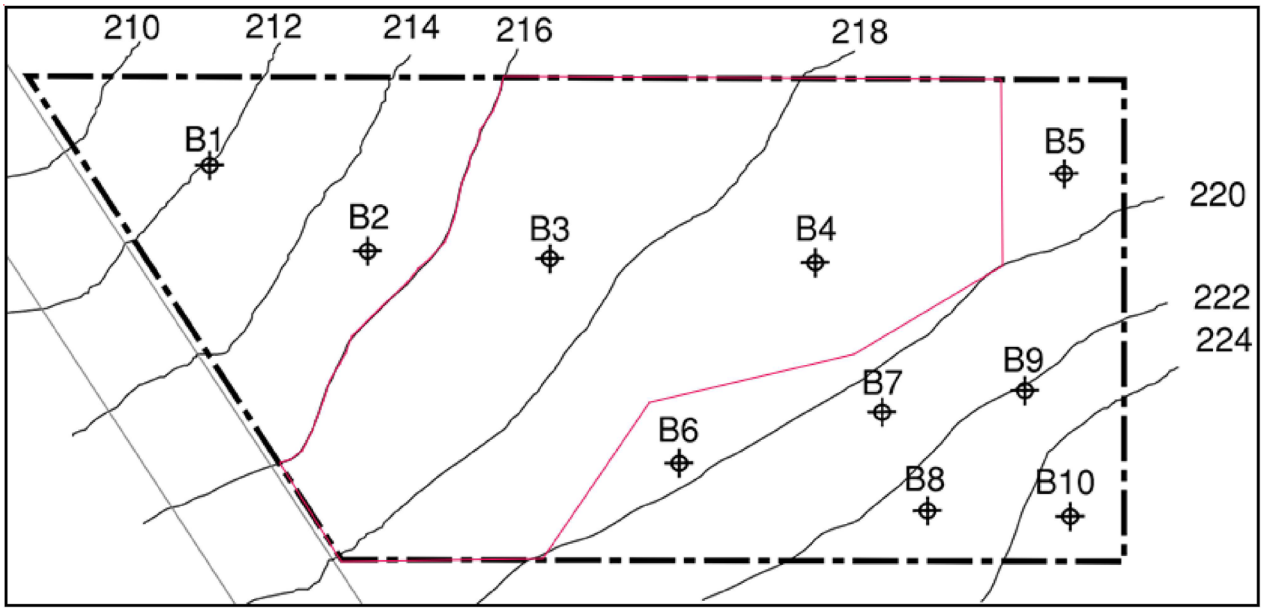


Refer to the exhibit.

A developer wants to build subsidized housing units on a site with two levels of underground parking. The underground parking should have access to the street, and the first floor of the housing units should be near street level. The cost of removing existing bedrock and of the de-watering system is more than the budget will allow.

Click on the area in the site plan to indicate where the housing should be constructed.

Correct answer:



CORRECT RESPONSE
Area between 220-foot and 216-foot elevations that encompasses B3 and B4

The area encompassing boreholes B3 and B4 has a water table that isn't too high and bedrock that isn't too shallow. This area will allow for the construction of the housing.

Section: Building Analysis & Programming

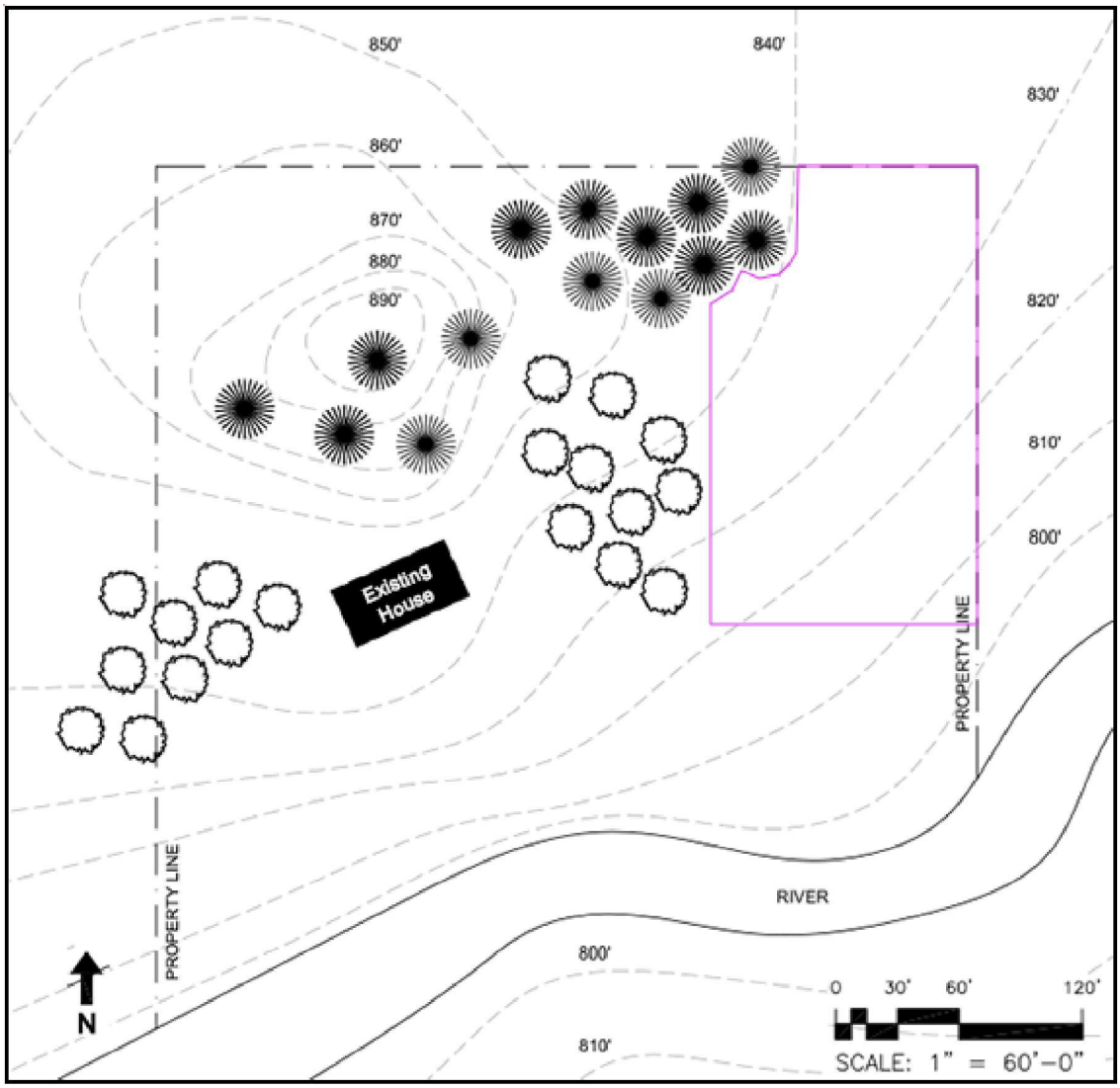
Question 46

A homeowner wants to place a ground-mounted photovoltaic (PV) array to provide electricity for their home. Requirements for the placement of the PV array follow:

- The homeowner does not want to see the PV array from the house when looking south towards the river.
- The area required for the PV array is approximately the same size as the house.
- Existing tress and shrubs cannot be disturbed.

Click on the area of the site plan to indicate the most appropriate location for the PV array.

Correct answer:



CORRECT RESPONSE

Northeastern corner of the property
This area is the most appropriate location for the PV array because it is within the property line, existing trees will not need to be disturbed, and there is space to accommodate it. Additionally, placing the PV array in this location will not impact the owner's view of the river and there will be nothing to block solar energy from reaching this location, such as a hill.

Section: Environmental & Contextual Conditions

Question 47

WATERFRONT FRAMEWORK PLAN

Target	PLANNING ISSUES	GOALS
1 A Clean and Active River	Environmental Healing 1. Improving water quality. 2. Eliminating sources of pollution. 3. Restoring natural systems. 4. Completing landscape networks and continuity. 5. Defining various park boundaries.	• Provide a river suitable for swimming. • Restore riparian function in the watershed in both urban and natural environments. • Implement "green" guidelines and standards to require sustainable development. • Increase all types of maritime activity. • Enhance environmental education on the river's watershed.
2 Breaking Down Barriers and Gaining Access	Enhancing Movement and Connections 1. Getting to the river. 2. Moving along the river. 3. Crossing the river. 4. Using the river for commuting. 5. Minimizing/eliminating barriers.	• Provide continuous pedestrian and bicycle access along the entire waterfront. • Aggressively promote a modal shift to public transit. • Create great urban boulevards with mixed uses, landscaping, and great civic spaces. • Redesign bridges across the river in the tradition of great civic architecture. • Redesign highways and freeways to become less of a barrier between neighborhoods and waterfront parks. • Reconnect the city street grid to waterfront parks.
3 A Great Riverfront Park System	Enjoying the River 1. Maritime activities and boating. 2. Active recreational and sports facilities. 3. Special/memorable places. 4. Special view-corridors and vistas. 5. Great public and open spaces. 6. Completing/enhancing promenades and trails.	• Improve circulation to and between waterfront open spaces in order to create an interconnected park system. • Enhance underutilized parkland along the river to become important public amenities. • Ensure continuous access along the waterfront for pedestrians and bicyclists. • Increase recreational opportunities along the waterfront parks system. • Create distinct park destinations at the neighborhood, regional and national scales.

Refer to the exhibit.

A developer hires an architect to renovate a waterfront warehouse into a new apartment building. All improvements to waterfront property must serve the goals outlined in the Waterfront Framework Plan.

Which design strategies should the architect consider? **Check the two that apply.**

A. Add a bike storage room on the first floor.
B. Provide an indoor gym with a waterfront view.
C. Design an outdoor theater along the waterfront trail.
D. Remove the mangrove forest to build a pier for a water taxi stop.
E. Renovate the existing pier as a private club for apartment residents.
F. Demolish the historical lighthouse to expand the waterfront public park.

Correct answer: AC

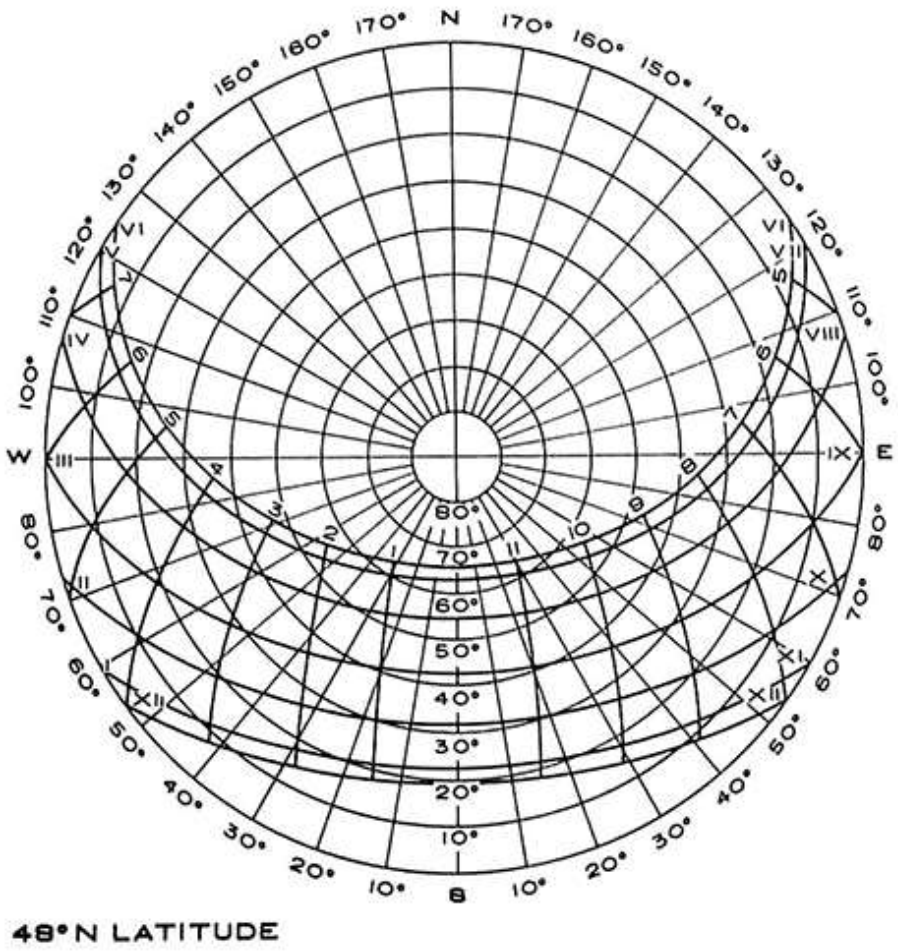
CORRECT RESPONSES
Add a bike storage room on the first floor.

Adding long-term bike storage in the garage will be helpful to the Framework Plan goal of providing bicycle access to the waterfront.

Design an outdoor theater along the waterfront trail.
Designing an outdoor theater can reinforce the waterfront connection, increase recreational opportunities, and provide a civic space in the waterfront area.

Section: Codes & Regulations

Question 48



Refer to the exhibit.

A new recreation center is being proposed in the northern United States. The current design calls for the entire north wall of the gymnasium to have floor-to-ceiling glass. The owner is concerned about direct sunlight shining into the gymnasium in the mornings and evenings.

For which one of the following months will the potential for direct sunlight be the greatest concern?

A. March
B. May
C. September

Correct answer: B

CORRECT RESPONSE
May
At this latitude, north facing windows will receive direct sunlight in the month of May in the mornings and evenings.

Section: Site Analysis & Programming

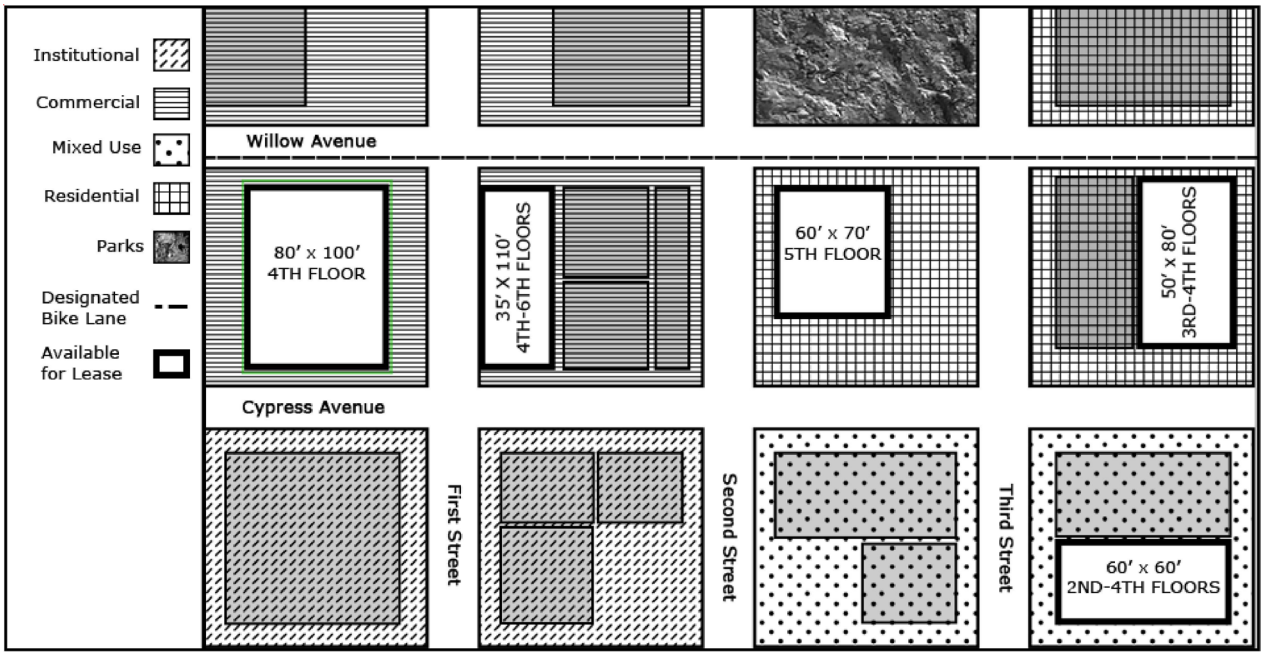
Question 49

A university wants to expand its business school into a downtown area. A study of about 12 city blocks is being evaluated for available tenant space. University requirements include:

- 8,000 square feet of classroom and office space and must be on one or two levels.
- Located within a commercial or mixed-use city block.
- The university prefers a location along the city's designated bike lane for student use.

Click on the site available for lease in the plan that is most appropriate for the business school.

Correct answer:



CORRECT RESPONSE
80' x 100' 4TH FLOOR
This location is in a commercial city block, is along the designated bike trail, can be placed on one or two floors, and meets the 8,000-square-foot size requirement.

CALCULATION
1. For the square footage of the site: 80' x 100' = 8,000 square feet

Section: Site Analysis & Programming

Question 50

A client hires an architect to design a new 500' x 600' open-air amphitheater and help with site evaluation and selection. The site will require the following:

- Number of parking spaces: 1,450
- Parking space dimensions: 10' x 18'
- Double-loaded 24-foot-wide drive aisle

How many acres will be required for the venue? Round to the nearest whole number.

Reference Formula:
1 acre = 43,560 sf

_____ acres

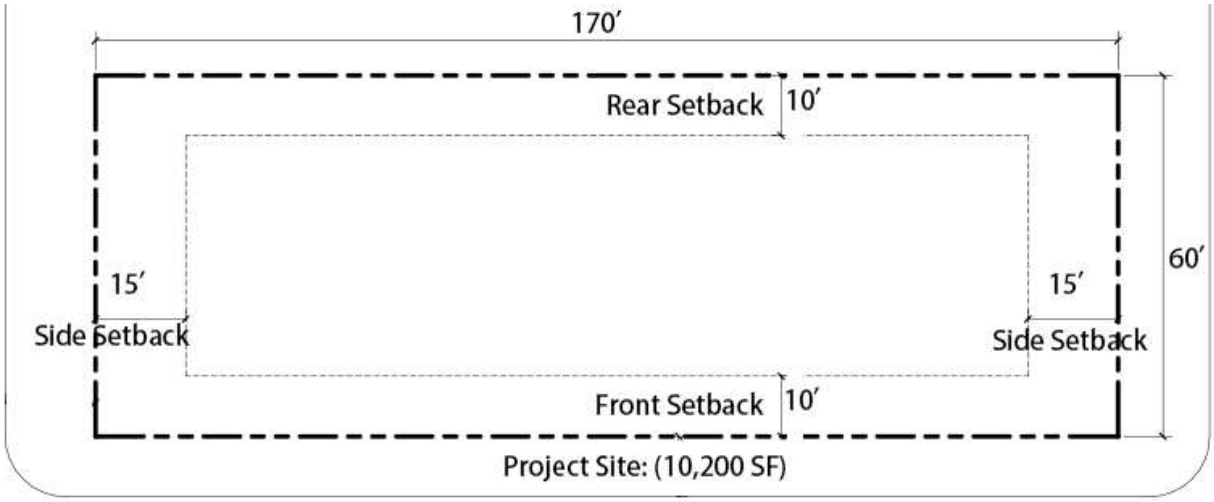
Correct answer: 17

CORRECT RESPONSE
17 acres
The combined square footage required for parking and for the amphitheater will give the number of acres required for the venue.

CALCULATIONS
1. Square footage per parking space: 10' x [18' + 12' (half of the square footage for the drive aisle is allocated to each parking space)] = 300 sf per space
2. Square footage for all parking: 1,450 parking spaces x 300 sf per space = 435,000 sf
3. Square footage of amphitheater: 500' x 600' = 300,000 sf
4. Total square footage required: 435,000 sf (for parking) + 300,000 sf (for the amphitheater) = 735,000 sf
5. Total acreage required: 735,000 sf / 43,560 sf per acre = 16.87 acres, rounded to 17 acres

Section: Site Analysis & Programming

Question 51



Allowable Number of Stories									
	Sprinkler Type	Type I		Type II		Type III		Type V	
		A	B	A	B	A	B	A	B
A-1	NS*	Unlimited	5	3	2	3	2	2	1
	S**	Unlimited	6	4	3	4	3	3	2
R-2	NS	Unlimited	11	4	4	4	4	3	2
	S	Unlimited	12	5	5	5	5	4	3
Note:									
*	NS: Building not equipped throughout with an automatic sprinkler system								
**	S:Building equipped throughout with an automatic sprinkler system								

Refer to the exhibit.

A developer hires an architect to design a sprinklered apartment building with occupancy R-2 for a vacant parcel of land in a high-density neighborhood. The developer wants the apartment building to have the maximum number of floors allowed by zoning. The land has the following zoning requirements:

- The maximum FAR is 3.5
- Building height limit is 85'

Which construction types should the architect consider using? **Check the three that apply.**

A. Type I-A
B. Type II-A
C. Type III-A
D. Type V-A
E. Type I-A podium with Type III-A above
F. Type I-A podium with Type V-A above

Correct answer: AEF

CORRECT RESPONSES

Type I-A
The maximum number of stories the client can build is six; Type I-A has unlimited stories.

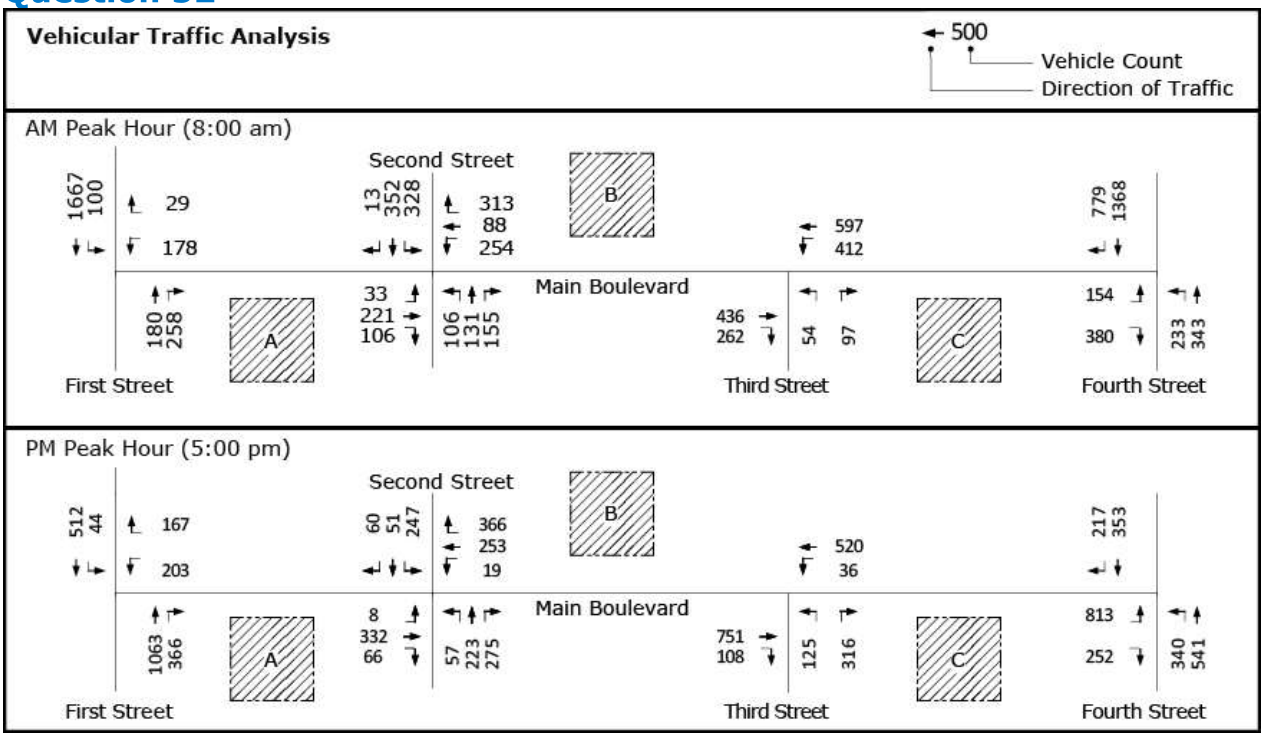
Type I-A podium with Type III-A above
One story of Type I-A podium plus five stories of Type III-A meets the six-story requirement.

Type I-A podium with Type V-A above
Two stories of Type I-A podium plus four stories of Type V-A meets the six-story requirement.

CALCULATIONS
1. For the maximum gross square footage: 10,200 sf (site area) x 3.5 (FAR) = 35,700 sf
2. For the length of the building footprint: 60' (length of the site) - 10' (front setback) - 10' (rear setback) = 40'
3. For the width of the building footprint: 170' (width of the site) - 15' (side setback) - 15' (side setback) = 140'
4. For the maximum building footprint = 40' x 140' = 5,600 sf
5. For the number of floors: 35,700 sf / 5,600 sf = 6.375 floors, rounded to 6 floors

Section: Building Analysis & Programming

Question 52



Refer to the exhibit.

A client wants to build a new coffee shop with a drive-through window on Main Boulevard, which has a planted median preventing non-intersection left turns. The coffee shop will have operating hours from 5:00 am to 12:00 p.m.

Based on current traffic loads, which one of the potential sites is most appropriate for the coffee shop?

A. A
B. B
C. C

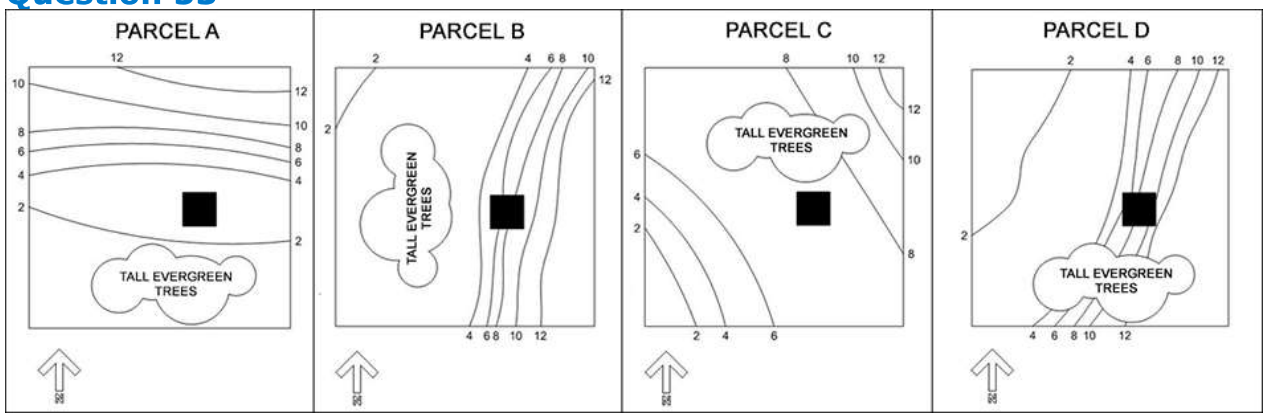
Correct answer: B

CORRECT RESPONSE
B
651 cars will pass site B during the AM peak traffic hour, serving the largest potential customer base during operating hours.

CALCULATIONS
1. Cars passing site B on Main Boulevard at the AM peak hour: 597 cars
2. Cars passing site B from Third Street at the AM peak hour: 54 cars
3. Total cars passing site B at the AM peak hour: 651 cars

Section: Site Analysis & Programming

Question 53



Refer to the exhibit.

An owner hires an architect to recommend a parcel of land for the construction of a solar residence. The owner wants the most cost-effective option.

Which parcel should the architect recommend?

A. Parcel A
B. Parcel B
C. Parcel C
D. Parcel D

Correct answer: C

CORRECT RESPONSE
Parcel C
The tall evergreen trees are located where they don't affect solar exposure, and the parcel is not on a steep slope, meaning that construction costs will be kept to a minimum.

Section: Environmental & Contextual Conditions

Question 54

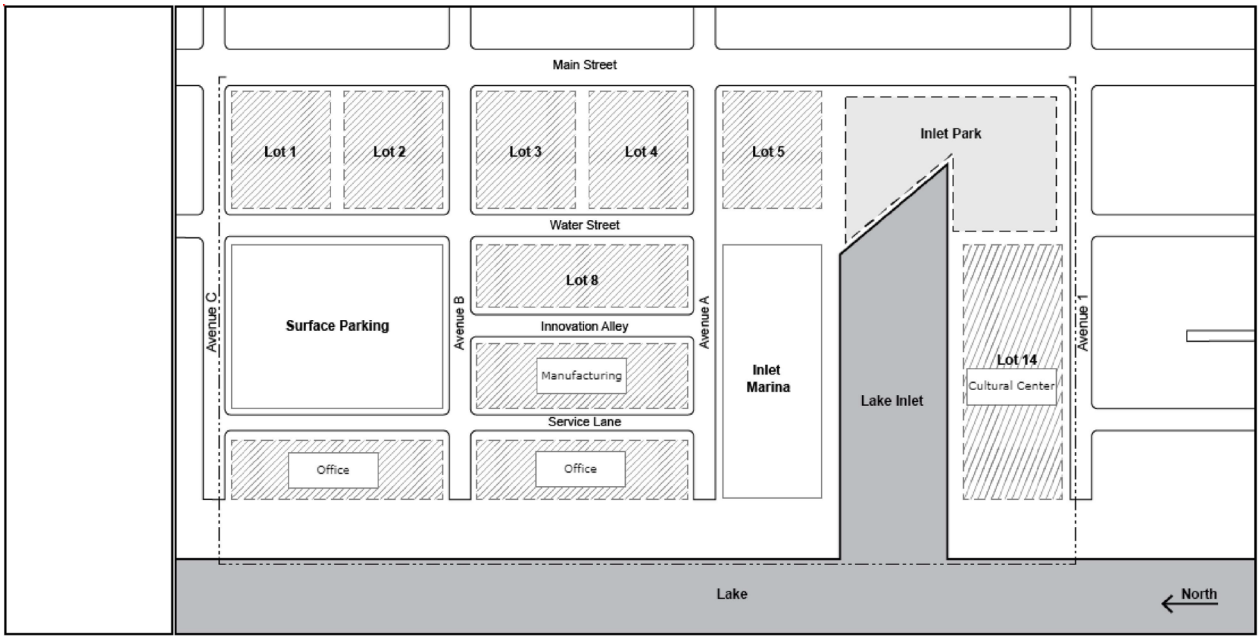
A client hires an architect to create a masterplan for a new mixed-use waterfront development. The client provides the following requirements:

- Five Residential Towers must be located on corner lots farthest from the Lake.

- Inlet Park must be adjacent to a Residential Tower and the Cultural Center.
- Office buildings must be located on lots closest to the Lake.
- Manufacturing must be located along Innovation Alley and be served by a service lane.

Drag the building labels into the lots on the site plan to meet the client's requirements.

Correct answer:



CORRECT RESPONSES

Cultural Center - Lot 14

The Cultural Center goes on Lot 14 because the five Residential Towers must occupy the sites farthest from the lake (Lots 1-5) and because the Inlet Park must be adjacent to the Cultural Center. Lot 14 is the only Lot that meets this criteria.

Manufacturing - Lot 10

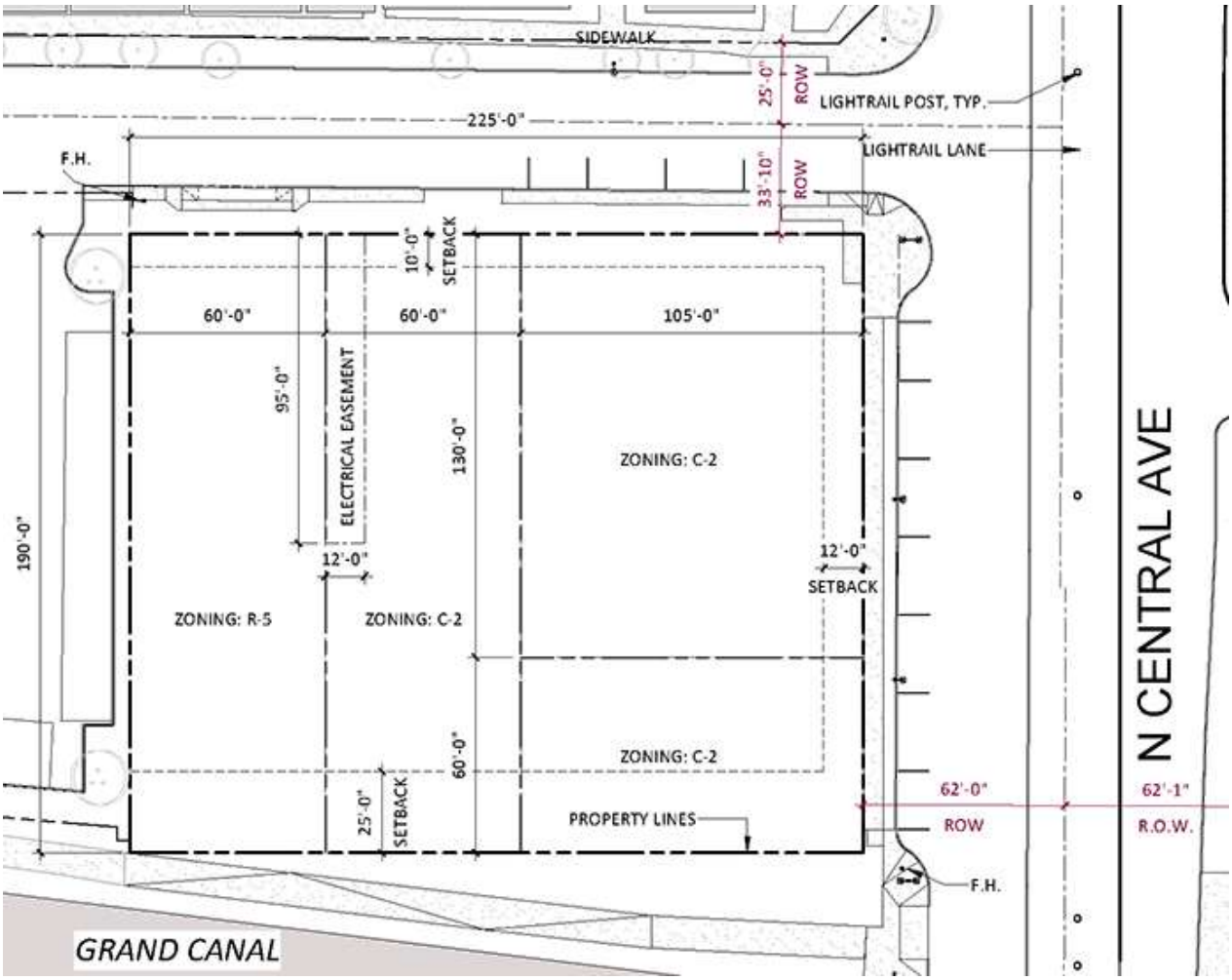
Manufacturing goes on Lot 10 as it is along Innovation Alley and is served by a service lane, per the client's requirements.

Offices - Lots 11 & 12

One of the Offices should be placed on Lot 11 and the other should be placed on Lot 12, as these lots are closest to the Lake, per the client's requirements for the Offices.

Section: Site Analysis & Programming

Question 55



Refer to the exhibit.

An owner wants to develop a residential multifamily building on the lot zoned as R-5 with the maximum allowable gross area. In addition to the setbacks already established for the canal to the south and the street to the north, the following side setbacks are required:

- For one-story buildings: 10 feet
- For two-story buildings: 15 feet
- For three- to five-story buildings: 20 feet

The owner wants to build each story to the extent of the required setbacks. Based on the buildable land area, the floor area ratio for the property is 4.0.

What is the maximum square footage for the building?

A. 3,100 square feet
B. 6,200 square feet
C. 12,400 square feet

Correct answer: C

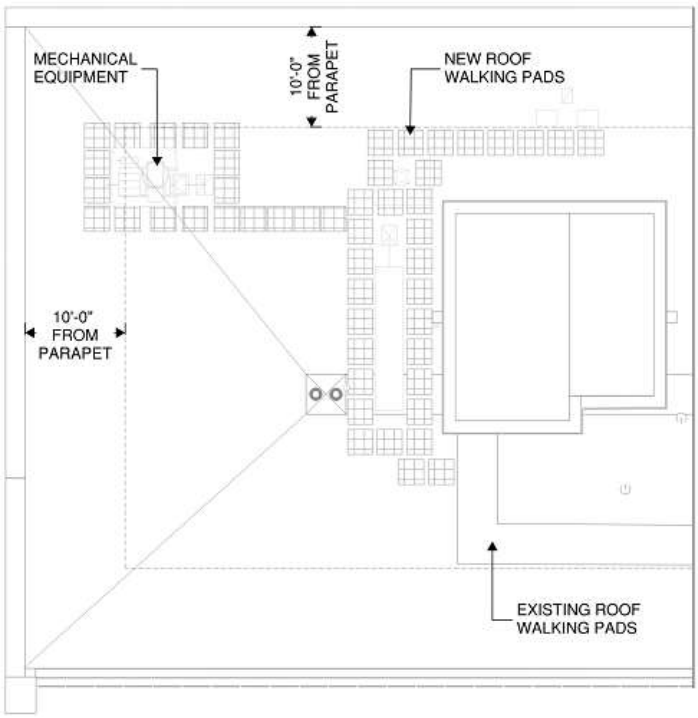
CORRECT RESPONSE

12,400 square feet

CALCULATIONS
1. For the north/south sides of the site: 190' (length of R-5 lot) - 10' (north setback) - 25' (south setback) = 155'
2. For the east/west sides of the site: 60' (width of R-5 lot) - 20' (side setback) - 20' (side setback) = 20'
3. For the building footprint area: 155' (length allowed) x 20' (width allowed) = 3,100 sf
4. For the maximum square footage: 3,100 sf x 4 (FAR) = 12,400 sf

Section: Site Analysis & Programming

Question 56



1015.3 Height

Required guards shall be not less than 42 inches (1067 mm) high, measured vertically as follows:
1. From the adjacent walking surfaces.
2. On stairways and stepped aisles, from the line connecting the leading edges of the tread nosings.
3. On ramps and ramped aisles, from the ramp surface at the guard.

1015.6 Mechanical Equipment, Systems and Devices

Guards shall be provided where various components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of such components. The guard shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.

Exception: Guards are not required where personal fall arrest anchorage connector devices that comply with ANSI/ASSE Z 359.1 are installed.

Refer to the exhibit.

An architect is working on a commercial fit-out project that includes a commercial kitchen. The kitchen requires the placement of mechanical equipment on the roof, which is flat and has a 30-inch-high parapet. The mechanical equipment must allow for maintenance access on all sides, and the architect specifies walking pads for this purpose.

Which safety measure should be taken to provide for the maintenance of the mechanical equipment?

A. Provide access to two sides of the mechanical equipment within the 10-foot roof edge zone.
B. Install safety tieback anchors outside of the 10-foot roof edge zone.
C. Install safety tieback anchors within the 10-foot roof edge zone.
D. Use the existing 30-inch-high parapet for fall protection.

Correct answer: B

CORRECT RESPONSE

Install safety tieback anchors outside of the 10-foot roof edge zone.

Safety tieback anchors are considered personal fall-arrest devices. They need to be installed outside of the 10-foot roof edge zone so the person connecting the fall protection does not have to encroach on the 10-foot roof edge zone.

Section: Building Analysis & Programming

Question 57

An owner hires an architect to develop a coffee shop with a drive-through window on an abandoned lot. The lot is on the corner of a principal arterial roadway and a minor arterial roadway. A traffic consultant conducts a peak service hour traffic study with information on the following traffic patterns:

- Existing traffic patterns. (Existing)
- Anticipated traffic patterns if the coffee shop is constructed. (Build)
- Anticipated traffic patterns if the coffee shop is constructed with mitigation measures, such as traffic signal timing modifications. (Build w/ Mitigation)

The local ordinance stipulates that if the traffic in a given direction operates at an "F" Level of Service during the Existing condition, then the delays must decrease in the Build w/ Mitigation condition. If the delays increase in the Build w/ Mitigation condition, then the coffee shop cannot be constructed unless additional mitigation measures are provided.

Click on the row in the Anticipated Levels of Service table to indicate the direction of movement that will require additional mitigation measures.

Correct answer:

Anticipated Levels of Service

Direction / Movement		AM PSH					
		Existing		Build		Build w/ Mit.	
		LOS	Delay	LOS	Delay	LOS	Delay
EB	L	D	48.6	D	48.6	E	56.3
	TR	F	97.1	F	97.1	F	89.4
WB	L	D	50.8	D	50.8	E	55.6
	TR	F	85.5	F	88.7	F	80.9
NB	L	F	118.5	F	134.2	F	125.1
	TR	C	27.1	C	27.1	C	27.5
SB	L	B	19.1	B	19.1	B	18.9
	TR	E	56.7	E	56.7	E	60.6

* LOS represents Level of Service rated on scale of A to F with A being best and F being worst
** Delay represents seconds of delay per vehicle
***L represents left lane traffic
****TR represents through lane traffic

CORRECT RESPONSE
The row for the left lane of the northbound direction/movement
The delay that results from Build w/ Mitigation in the northbound direction is at an F level (a 125.1-second delay) and it exceeds the existing traffic delay (a 118.5-second delay).

Section: Site Analysis & Programming

Question 58

An architect is designing a new suburban office building for a client. The client has the following requirements for their new facility:

- Separate employee and visitor parking.
- Ease of wayfinding for visitors to the facility.
- Control over all access points to the building.
- Employee gym and locker rooms to promote staff well-being.
- Frequent deliveries should not interfere with normal business operations.

Which of the following options related to building access should be considered by the design team? **Check the three that apply.**

A. Visibility of main entry
B. Combined service entry and main entry
C. New traffic light at main entry to campus
D. Separate service entry with loading dock

E. Shared parking area for all building users
F. Dedicated staff entry adjacent to employee gym

Correct answer: ADF

CORRECT RESPONSES
Visibility of main entry
The main entry serves as a wayfinding tool, and, because the client requires ease of wayfinding, the visibility of that main entry will be an important consideration of the design team.

Separate service entry with loading dock
A separate service entry with loading dock will prevent frequent deliveries from interfering with business hours, which is a requirement of the client.

Dedicated staff entry adjacent to employee gym
A dedicated staff entry will facilitate separate employee parking. Also, locating the entry near the employee gym provides a convenient amenity to staff.

Section: Building Analysis & Programming

Question 59

A developer hires an architect to create a masterplan for an urban infill site that is one entire city block. The developer owns most of the lots on the block and is working to acquire the three remaining lots, which are owner-occupied. The city offers incentives if the project can move forward with construction in less than a year and can incorporate a bus stop and public garden space on the site.

Which of the following steps should the architect take first in order to secure the incentives? **Check the three that apply.**

A. Complete a full pricing set of drawings for all proposed buildings.
B. Discuss the project with the nearby neighborhood association.
C. Recommend that the owner delay design until all parcels are purchased.
D. Coordinate details for the bus stop with the transportation authority.
E. Have soil tests performed to find the best location for the public garden.
F. Schedule a preapplication meeting with the city planning and zoning department.

Correct answer: BDF

CORRECT RESPONSES
Discuss the project with the nearby neighborhood association.
Proactive community engagement helps streamline the development process and it is always best to do so quickly if concerned about incentives or schedule.

Coordinate details for the bus stop with the transportation authority.
It can take several months to navigate the jurisdictional process and different committees within city government. If the incentives hinge on including a bus stop, then engaging the transportation authority early will be necessary as they will impact later design.

Schedule a preapplication meeting with the city planning and zoning department.
A preapplication meeting can be scheduled while still in the schematic design phase and will often highlight site challenges and city concerns. This should be done early in the process.

Section: Environmental & Contextual Conditions

Question 60

An architect is designing a new community center in an arid climate that is predominately exposed to southern winds. The client has the following requirements:

- The community center will be made up of three rectangular buildings arranged in a U-shape configuration.
- A meditation garden will be located in the center of the U-shape and must be usable for as much of the year as possible.
- Building location and orientation on the site should maximize passive design strategies, including cooling.

Which direction should the open end of the U-shape face?

A. North
B. South
C. East
D. West

Correct answer: B

CORRECT RESPONSE
South
Southern winds will create a cooling effect on the courtyard in the summer months.

Section: Environmental & Contextual Conditions

Question 61

An owner hires an architect to evaluate the advantages of a site's microclimate. The site experiences the following:

- A range of 23-27 inches of total precipitation during frost-free months.
- A range of 180-190 heavy cloud days per year.
- An average annual wind speed of 4-6 miles per hour.

What is the most appropriate sustainable system for this site?

A. Rainwater harvesting system
B. Small wind electric system
C. Solar panel system

Correct answer: A

CORRECT RESPONSE

Rainwater harvesting system
A total precipitation of 23-27 inches during frost-free months is high, making a rainwater harvesting system advantageous at this site.

Section: Environmental & Contextual Conditions

Question 62

Due to budget concerns, the city decides to split the regional community center project into two phases. Phase 1 will include the following spaces:

- Entry Lobby: 600 gsf
- Community Health Center: 2,540 nsf
- Administrative Suite: 1,620 nsf

The preliminary cost estimate for this project is $150 per gross square foot.

What is the cost for the Phase 1 development?

$ _____

Correct answer: 857850

CORRECT RESPONSE
$857,850

CALCULATIONS
1. For the gross square footage of the Community Health Center: 2,540 nsf x 1.25 (25% net-to-gross factor) = 3,175 gsf
2. For the gross square footage of the Administrative Suite: 1,620 nsf x 1.2 (20% net-to-gross factor) = 1,944 gsf
3. For the gross square footage in total: 3,175 (Health Center) + 1,944 (Administrative Suite) + 600 (Entry Lobby) = 5,719 gsf
4. For the total cost: 5,719 gsf x $150 per gsf = $857,850

CASE STUDY RESOURCES USED
Scenario
Client Space Requirements

Section: Building Analysis & Programming

Question 63

The city hires an architect to evaluate the most appropriate site for the new regional community center. Purchase price is not a factor in the choice of site, but the city's insurance provider prevents them from constructing in a floodplain.

Which site should the architect recommend?

A. Urban Infill
B. Urban Renewal
C. Suburban Wooded

Correct answer: A

CORRECT RESPONSE
Urban Infill
This site satisfies the following key client site requirements: close proximity to transit; identifiable and visible front entrance from main road; minimal impact to existing site conditions.

CASE STUDY RESOURCES USED
Scenario
Site Plan

Section: Environmental & Contextual Conditions

Question 64

In consultation with an architect, the city has decided the regional community center should be 25,000 square feet and one story. The architect wants to calculate the square footage needed for the Multipurpose Spaces in order to determine how many square feet will remain to devote to the rest of the building program. Supplemental Multipurpose Space requirements from the city follow:

- Conference Center: 30 square feet per person
- Teen Room: 15 square feet per person
- Restroom Set: 1,200 square feet
- The Gymnasium will consist of a single basketball court including the safety zone.

How much area remains for the rest of the building program?

_____ square feet

Correct answer: 6853

CORRECT RESPONSE
6,853 square feet

CALCULATIONS
1. Determine the net area requirements of each room:

- Conference Center: 150 persons x 30 square feet per person = 4,500 square feet
- Gymnasium: 104 feet x 70 feet = 7,280 square feet
- Locker Areas: 500 square feet x 2 = 1,000 square feet
- Restroom Set: 1,200 square feet
- Kitchen: 1,500 square feet
- Teen Room: 20 persons x 15 square feet per person = 300 square feet

2. Calculate total net area: 4,500 + 7,280 + 1,000 + 1,200 + 1,500 + 300 = 15,780 square feet
3. Calculate total gross area: 15,780 square feet x 15% gross factor (per Client Space Requirements) = 18,147 square feet
4. Calculate remaining area: 25,000 square feet - 18,147 square feet = 6,853 square feet

CASE STUDY RESOURCES USED
Scenario

Client Space Requirements
Recreational Space Standards

Section: Building Analysis & Programming

Question 65

The Conference Center was originally programmed as unconcentrated assembly space, but the owner decides to change the programmed use of the space to a classroom for K-12 education classes. The owner wants the classroom to accommodate 150 people maximum at any time.

How much area must be added to the Conference Center space?

A. 750 square feet
B. 1,950 square feet
C. 2,250 square feet

Correct answer: A

CORRECT RESPONSE
750 square feet
Originally, the space calculation was 150 people x 15 sf per person (unconcentrated assembly), but now it is 150 people x 20 sf per person (educational classroom area). The area that must be added to the Conference Center space is therefore the difference between the original square footage needed (2,250 sf) and the new square footage needed (3,000 sf).

CALCULATIONS
1. Square footage needed for the original use (unconcentrated assembly): 150 people x 15 sf per person = 2,250 square feet
2. Square footage needed for the new use (educational classroom area): 150 people x 20 sf per person = 3,000 square feet
3. Difference in square footage: 3,000 - 2,250 = 750 square feet of additional space is needed

CASE STUDY RESOURCES USED
Scenario
IBC Excerpts
Client Space Requirements

Section: Building Analysis & Programming

Question 66

Upsilon Architects is assembling a proposed construction budget. Construction costs are $350 per gross square foot, and the city has provided them with the following guidance for the interior spaces of the new regional community center:

- If 1 Floor: Use 1.0 cost multiplier
- If 2 Floors: Use 1.1 cost multiplier
- If 3 Floors: Use 1.2 cost multiplier

The city has decided on the following supplemental space requirements:

- Community Health Center: 3,500 nsf

- Administration Suite: 2,400 nsf
- Multipurpose Spaces: 8,900 nsf
- Maximum area per floor: 9,500 gsf

What is the construction budget for the interior spaces?

$ _____

Correct answer: 6964650

CORRECT RESPONSE
$6,965,000

CALCULATIONS
1. Determine gross floor areas:

- Entry Lobby: 600 gsf
- Community Health Center: 3,500 nsf x 1.25 (net-to-gross factor) = 4,375 gsf
- Administration Suite: 2,400 nsf x 1.20 (net-to-gross factor) = 2,880 gsf
- Multipurpose Spaces: 8,900 x 1.15 (net-to-gross factor) = 10,235 gsf

2. Calculate sum of gross floor areas: 600 gsf + 4,375 gsf + 2,880 gsf + 10,235 gsf = 18,090 gsf
3. Calculate number of floors: 18,090 / 9,500 = 1.9 floors = 2 floors
4. Calculate construction cost: 18,090 gsf x $350 = $6,331,500
5. Calculate floor cost multiplier: $6,331,500 x 1.1 (cost multiplier for a two-floor community center) = $6,964,650

CASE STUDY RESOURCES USED
Scenario
Client Space Requirements

Section: Building Analysis & Programming

Question 67

Due to site constraints, the architect recommends using two stories for the building. The owner, though, wants the general public to have easy access to public spaces from the first floor Entry Lobby.

Which program elements should be placed on the second floor? **Check the two that apply.**

A. Executive Director's Office
B. Doctor's Office
C. Locker Rooms
D. Exam Room
E. Breakroom
F. Kitchen

Correct answer: AE

CORRECT RESPONSES

Executive Director's Office
As part of the Administration Suite, it is appropriate to place the Executive Director's Office on the second floor.

Breakroom
As part of the Administration Suite, it is appropriate to place the Breakroom on the second floor.

CASE STUDY RESOURCES USED
Scenario
Client Space Requirements

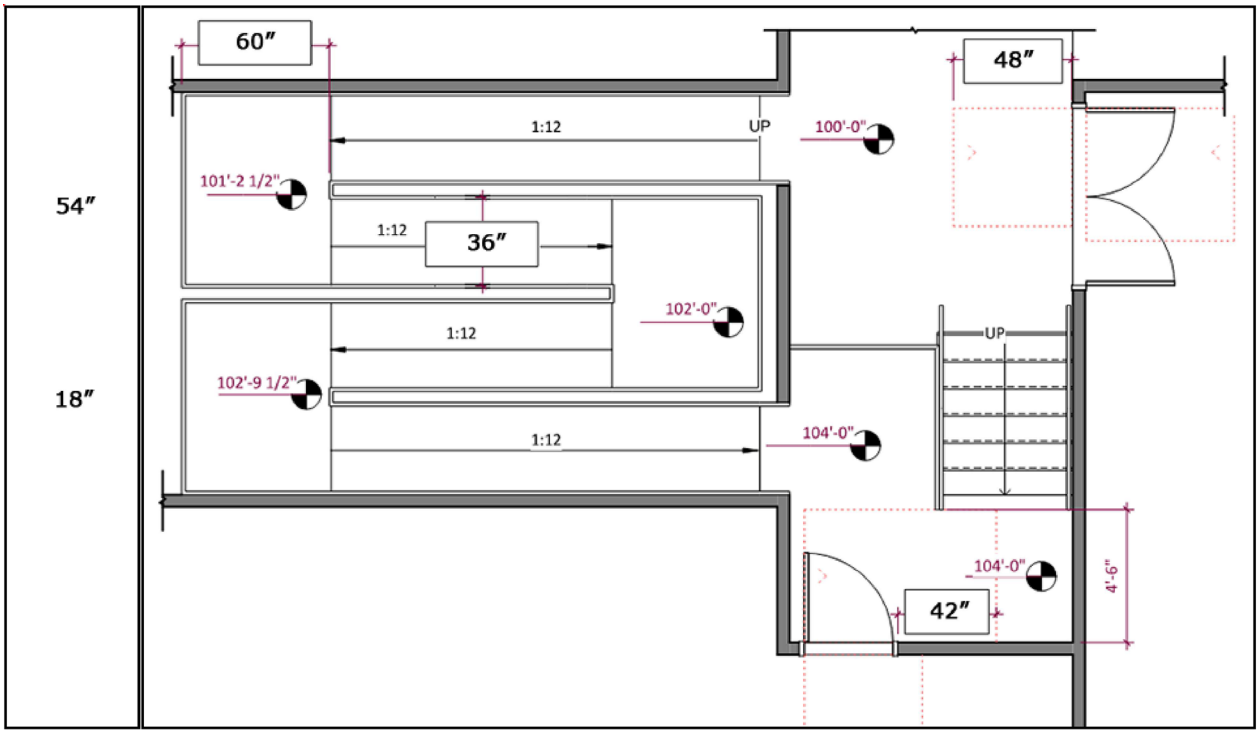
Section: Building Analysis & Programming

Question 68

As part of the congregation's requirement that all buildings need to be connected and accessible, the architect is presenting options to connect the Church building, the Gymnasium, and the Fellowship Hall.

Drag the dimension labels into the boxes on the floor plan to indicate the dimensions that will comply with ADA requirements. Not all labels will be used.

Correct answer:



CORRECT RESPONSES
60"
The minimum required landing depth for a 36-inch-wide ramp is 60".

36"
This is the width of the ramp.

48"
This is the required clearance for a front approach, push side condition.

42"
Based on the provided 54" of clear space and the latched approach, pull side condition of the door to the Church, 42" is the required minimum distance for this door.

CASE STUDY RESOURCES USED
Scenario
ADA Excerpts

Section: Building Analysis & Programming

Question 69

The congregation requests that sidewalks connect the parking areas to existing building entrances, and ADA-compliant ramps will be needed to accommodate this request. Refer to the following spot elevations:

- Sidewalks at Church Street: 100'
- Sidewalks around new and existing parking areas: 99'
- Parking lot elevation: 98.5'

Which of the following locations will require an ADA-compliant ramp? **Check the two that apply.**

A. West entrance of Church
B. South entrance of Church
C. North door of Gymnasium
D. South entrance of Gymnasium
E. South entrance of Fellowship Hall
F. Corridor connecting Church and Gymnasium

Correct answer: BF

CORRECT RESPONSES
South entrance of Church
The congregation wants to connect the parking areas to building entrances with sidewalks, which means that a sidewalk with ADA-compliant ramp should connect the parking area to the Church. The Floor Plan shows that the parking area is at a lower elevation than the Church and that there is no existing ADA accessible connection. An ADA-compliant ramp will be needed to connect the parking area to the Church.

Corridor connecting Church and Gymnasium
An ADA-compliant ramp will be needed for the corridor connecting the Church and the Gymnasium because, as indicated on the Floor Plan, the Gymnasium is at a lower elevation than the Church and there is no existing ADA accessible connection.

CASE STUDY RESOURCES USED
Scenario
Floor Plan

Section: Building Analysis & Programming

Question 70

The architect of the church expansion is locating the main access drive into the church campus. The city has prohibited new curb cuts.

Which one of the following streets should provide main access to the church campus?

A. First Street
B. Third Street
C. Church Street

Correct answer: B

CORRECT RESPONSE
Third Street
According to the Zoning Review, the city has stipulated that "main access shall be from a road designated as a collector or arterial [street] on the City's comprehensive plan." Third Street is considered to be a collector or arterial street by the city, and main access can be routed from this street because it has an existing curb cut.

CASE STUDY RESOURCES USED
Scenario
Site Plan
Zoning Review

Section: Site Analysis & Programming

Question 71

During a pre-application meeting, the AHJ asks the architect how they plan to address existing water, sewer, and electrical lines that run under the Vacated Street. City records indicate that the lines were installed approximately 60 years ago to serve residences that used to line the street, and the current condition and serviceability of the lines is unknown. The client has asked the architect to recommend the most appropriate way of addressing the abandoned utilities.

What should the architect recommend?

A. Reuse the existing utility lines and meters for the new buildings.
B. Leave the existing lines in place and run new lines in a new location.
C. Remove all existing utilities and replace with new lines in the same location.

Correct answer: B

CORRECT RESPONSE
Leave the existing lines in place and run new lines in a new location.
Being in the center of the site, the existing utility lines will greatly limit where a new structure can be located. The most appropriate solution is to run new lines in a location that will allow for the addition of new buildings to the site. Also, the most economical decision is to abandon the existing lines in place rather than remove them.

CASE STUDY RESOURCES USED
Scenario

Site Plan

Section: Site Analysis & Programming

Question 72
The city is considering a modification to the program that would replace the proposed Conference Center with a performing arts center consisting of a theater with fixed seating. The regional community center will be of Type II-B construction and not equipped with an automatic sprinkler system.

Which one of the following IBC requirements will change as a result of the modification to the program?

A. Maximum allowable stories
B. Maximum allowable building height
C. Maximum allowable building area per floor

Correct answer: C

CORRECT RESPONSE
Maximum allowable building area per floor
The modification of the program to a theater with fixed seating would change the occupancy classification to A-1. According to the IBC, the maximum allowable building area per floor for an A-2 occupancy, which would be the occupancy classification of the originally proposed Conference Center, is 9,500 square feet. The maximum allowable building area per floor for an A-1 occupancy, which would be the occupancy classification for a theater with fixed seating, is 8,500 square feet.

CASE STUDY RESOURCES USED
Scenario
IBC Excerpts
Client Space Requirements

Section: Codes & Regulations

Question 73
The congregation wants the architect to provide maximum occupant capacity for the existing Church seating area. The Church only includes chairs that are not fixed.

What is the maximum occupant load based on a church seating area of 3,700 square feet? Round to the nearest whole number.

A. 400 occupants
B. 529 occupants
C. 740 occupants

Correct answer: B

CORRECT RESPONSE
529 occupants

CALCULATIONS
1. Existing Church square footage: 3,700 square feet
2. Occupant load factor for assembly without fixed seats (chairs only - not fixed): 7 net
3. Maximum occupant load: 3,700 sf / 7 nsf = 528.57 occupants, rounded to 529 occupants

CASE STUDY RESOURCES USED
Scenario
Program Elements
IBC Excerpts

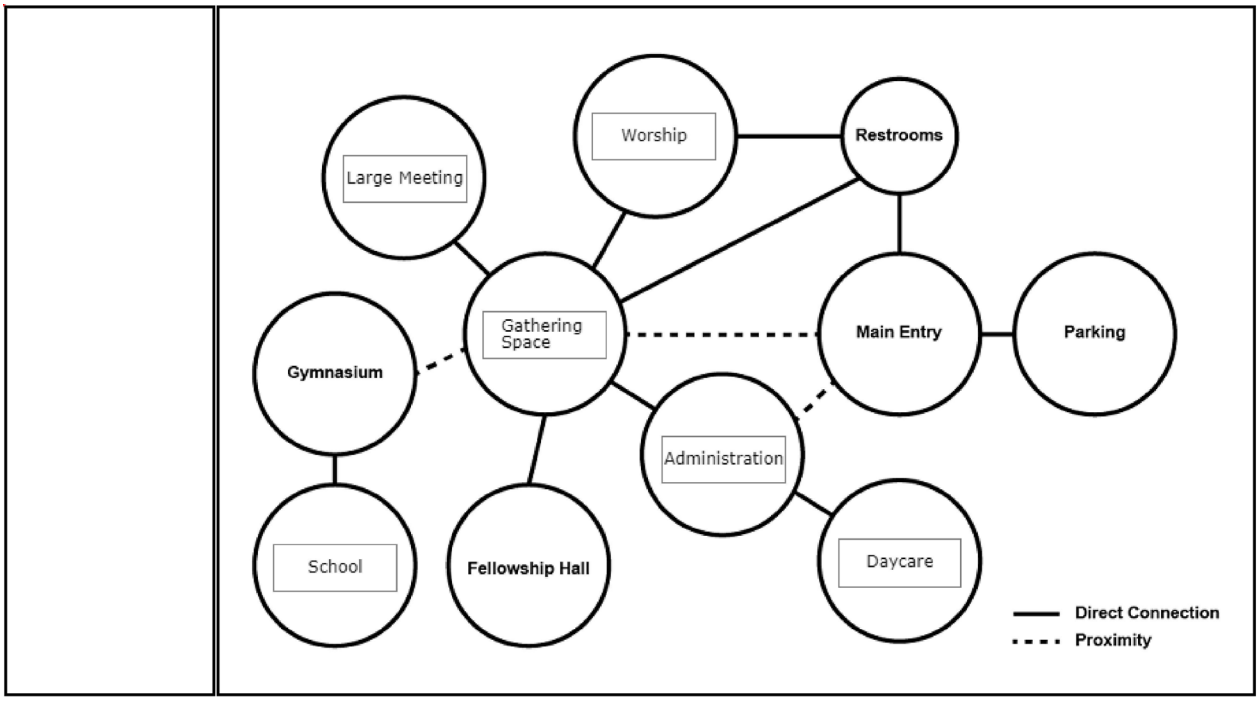
Section: Codes & Regulations

Question 74

The congregation has decided to add a daycare space to the building program. The daycare will be open during the week in addition to providing childcare to congregation members during worship services. Daycare should be adjacent to the Administration.

Drag the labels into the bubbles on the adjacency diagram to show the required programmatic relationships.

Correct answer:



CORRECT RESPONSES
Gathering Space
The bullet points in the Program Elements resource indicate that the Gathering Space should be centrally located to promote community. The chart in the Program Elements resources indicates that the Gathering Space should be adjacent to Worship, Large Meeting Space, Administration, and Fellowship Hall.

Large Meeting
The chart in the Program Elements resource indicates that the Large Meeting Space should be adjacent to the Gathering Space. There are three potential locations for the Large Meeting

space, but because the Administration takes one of those locations in order to meet its requirement of being near the Main Entry, and because the Worship hall takes another one of those potential locations in order to meet its requirement of being adjacent to the Restrooms, only one location is left for the Large Meeting space.

School
The Floor Plan resource indicates that the School is adjacent to the Gymnasium.

Administration
The bullet points in the Program Elements resource calls for an "identifiable administration area near the main entry." The chart in the Program Elements resource indicates that the Gathering Space should be adjacent to the Administration.

Worship
The bullet points in the Program Elements resource indicate that the Restrooms should be adjacent to the Worship Space. The chart in the Program Elements resource indicates that the Restrooms should be located off the Gathering Space and Main Entry.

Daycare
In the situation above, the Congregation requires that a Daycare be adjacent to the Administration.

CASE STUDY RESOURCES USED
Scenario
Program Elements
Floor Plan

Section: Building Analysis & Programming

Question 75

Which of the following occupancy classifications will be used for the majority of the church campus building area? **Check the two that apply.**

A. Assembly: Group A-1
B. Residential: Group R-1B
C. Education: Group E
D. Business: Group B
E. Assembly: Group A-3
F. Assembly: Group A-5

Correct answer: CE

CORRECT RESPONSES
Education: Group E
The site contains a school (35,000 gsf) with 550 students.

Assembly: Group A-3
A-3 specifically covers places of religious worship.

CASE STUDY RESOURCES USED
Scenario
IBC Excerpts

Section: Codes & Regulations

Testing Resources
For more information on test preparation references and resources, as well as testing policies and procedures, please refer to the ARE 5.0 Guidelines, available on ncarb.org.