

Architectural Registration Examination Programming & Analysis

"Dr. Saum K. Nour, Ph.D."

PE Civil, PE Electrical, PE Mechanical, CPD, CIPE, CFPE, LEED AP, AIA

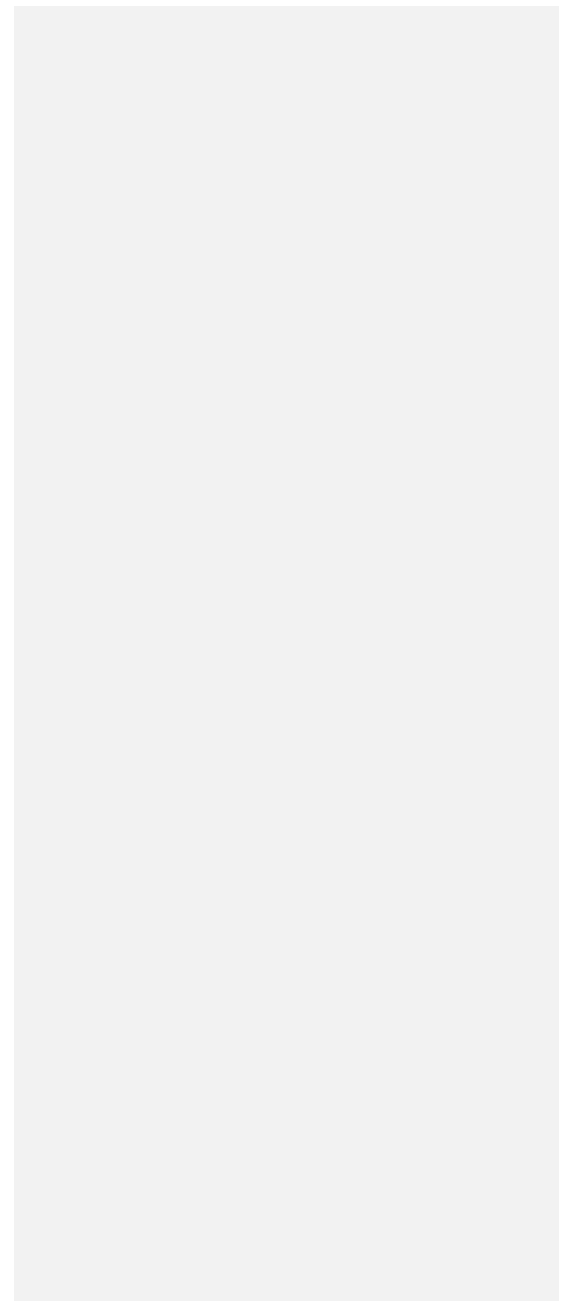
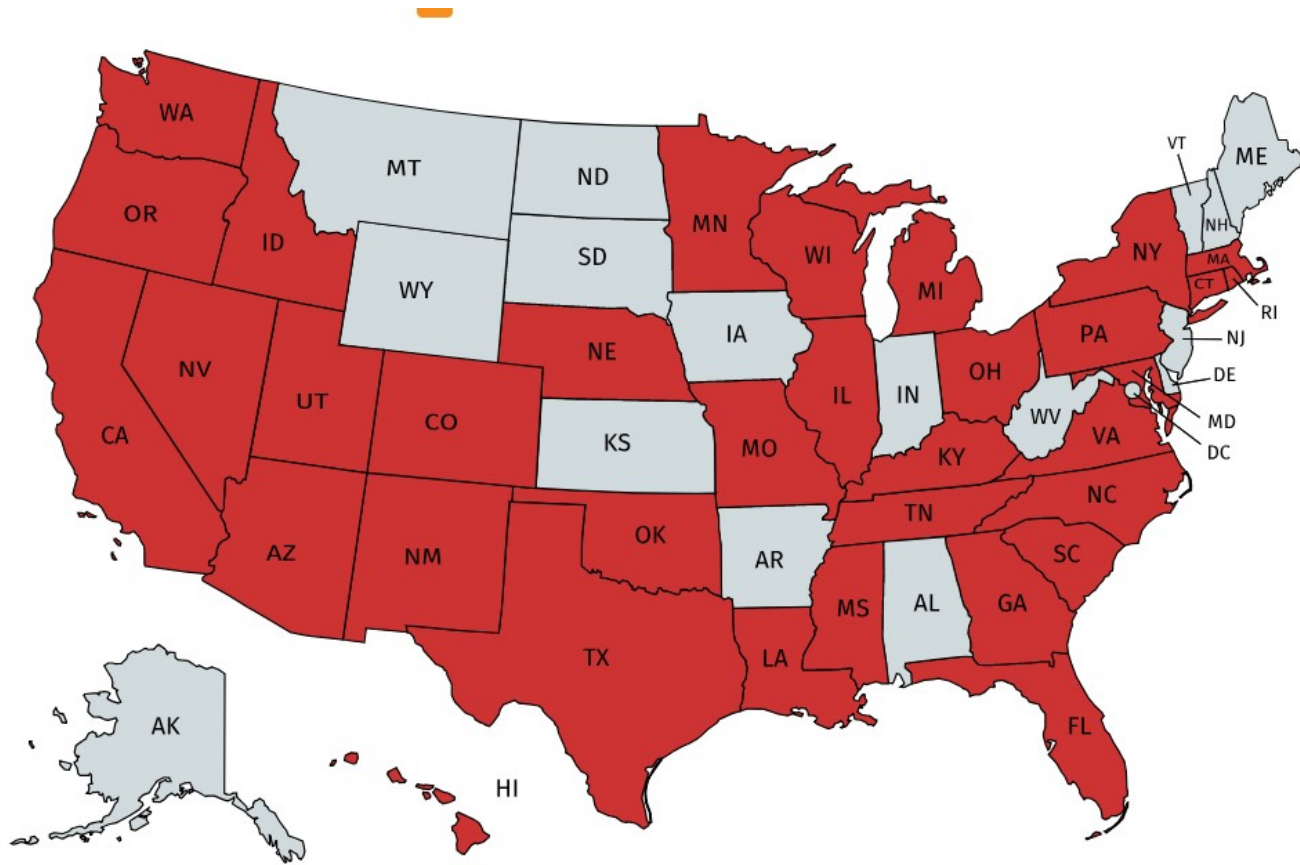


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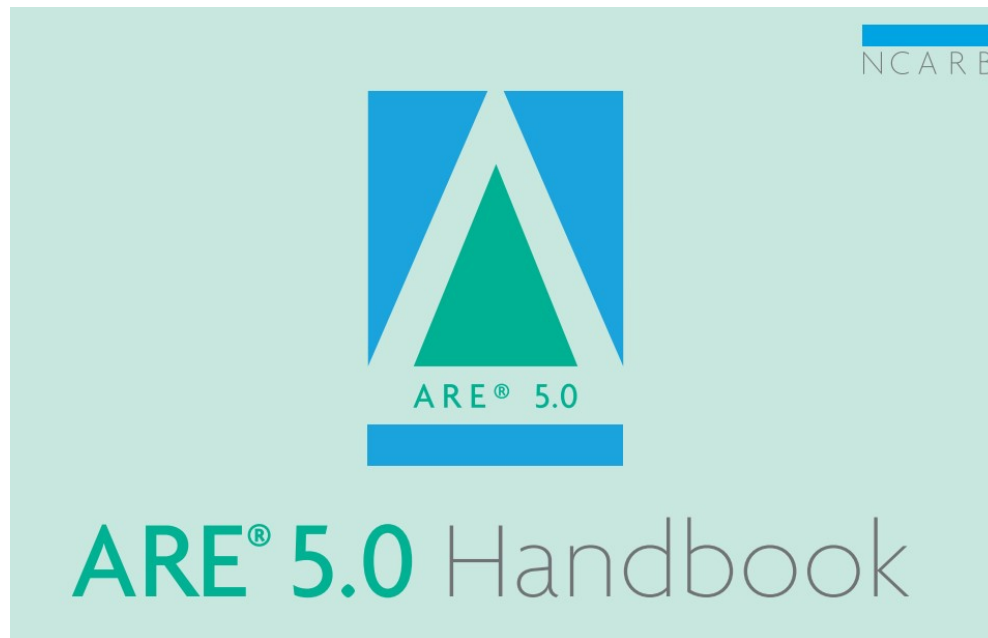
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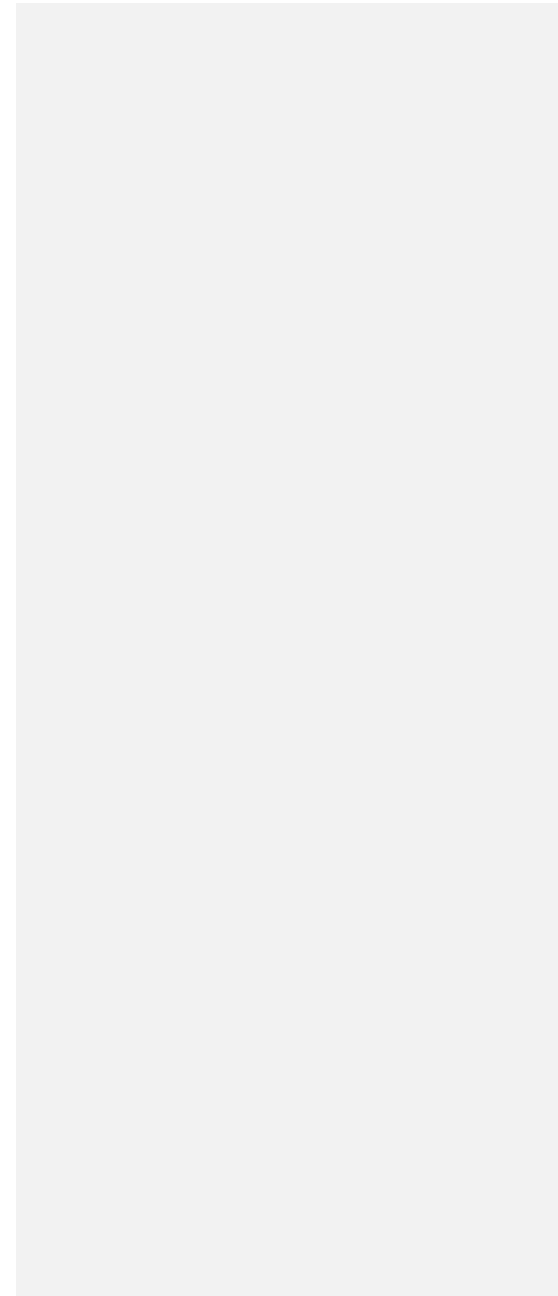
Covering the Nation



ARE Exam:



- PcM** Practice Management
- PjM** Project Management
- PA** Programming & Analysis
- PPD** Project Planning & Design
- PDD** Project Development & Documentation
- CE** Construction & Evaluation



Introduction

What is the ARE?

Understanding ARE 5.0

ARE 5.0 Exam Format

ARE 5.0 Item Types

Practice Management

PcM 80Q (Duration 2:45)

SECTION 1: Business Operations

SECTION 2: Finances, Risk, & Development of Practice

SECTION 3: Practice-Wide Delivery of Services

SECTION 4: Practice Methodologies

Practice Management References

Project Management

PjM 95Q (Duration 3:15)

SECTION 1: Resource Management

SECTION 2: Project Work Planning

SECTION 3: Contracts

SECTION 4: Project Execution

SECTION 5: Project Quality Control

Project Management References.

Programming & Analysis

PA 95Q (Duration 3:15)

SECTION 1: Environmental & Contextual Conditions

SECTION 2: Codes & Regulations

SECTION 3: Site Analysis & Programming
SECTION 4: Building Analysis & Programming
Programming & Analysis References

Project Planning & Design

PPD 120Q (Duration 4:15)

SECTION 1: Environmental Conditions & Context
SECTION 2: Codes & Regulations
SECTION 3: Building Systems, Materials, & Assemblies
SECTION 4: Project Integration of Program & Systems
SECTION 5: Project Costs & Budgeting
Project Planning & Design References

Project Development & Documentation

PDD 120Q (Duration 4:15)

SECTION 1: Integration of Building Materials & Systems
SECTION 2: Construction Documentation
SECTION 3: Project Manual & Specifications
SECTION 4: Codes & Regulations
SECTION 5: Construction Cost Estimates
Project Development & Documentation References

Construction & Evaluation

CE 95Q (Duration 3:15)

SECTION 1: Preconstruction Activities
SECTION 2: Construction Observation
SECTION 3: Administrative Procedures & Protocols
SECTION 4: Project Closeout & Evaluation
Construction & Evaluation References

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Case Studies

ARE 5.0 References

Preparing for ARE 5.0

Resources Available While Testing

Typical Beam Nomenclature

Formulas Available While Testing

Common Abbreviations

ARE 5.0 Reference Matrix

Practice --> Program -----> Project-----> Construction -----> Case Study One or two (90 minutes per case:5 minute/Question)

ARE Item Types

Each division of ARE 5.0 utilizes five different item types throughout the exam's discrete and case study items: multiple choice, check-all-that-apply, quantitative-fill-in-the-blank, hotspot, and drag-and-place. All items are worth one point and there is no partial credit.

Multiple Choice

A multiple choice item contains a question followed by four response options. To respond to this item type, you'll need to select a single response out of the four possible response options.

Check-all-that-apply

A check-all-that-apply item, sometimes called a CATA, is similar to a multiple choice item, except it allows you to select multiple responses. This item type contains a question followed by a prompt to select between two and four responses out of six possible response options. All correct response options must be selected in order to answer the item correctly. There is no partial credit for selecting only some of the correct response options.

Quantitative-fill-in-the-blank

A quantitative-fill-in-the-blank item, sometimes called a QFIB, contains a question followed by an input box where you'll provide a numerical response to the question being asked. The appropriate units for the correct answer will be provided as part of the item.

Hotspot

A hotspot item contains a question followed by a drawing, photograph, diagram, or other image. To

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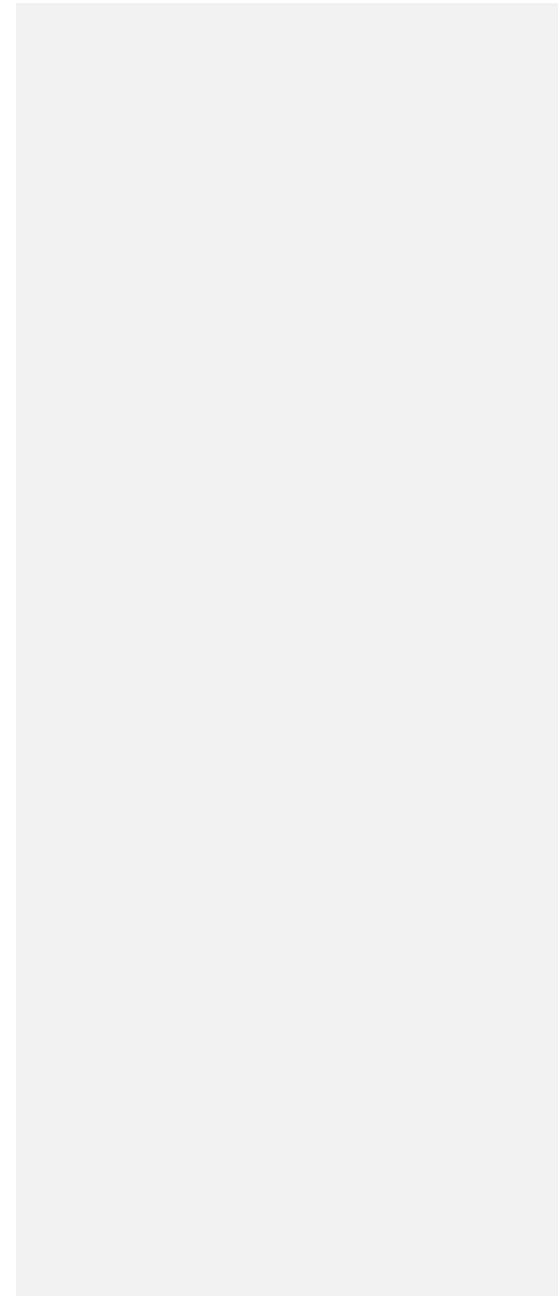
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respond to this item type, you'll need to click on an area or object within the provided image. If your response is located within the acceptable scoring area, it will be scored as correct.

Drag-and-place

A drag-and-place item contains a question followed by a background drawing, photograph, diagram, or other image. You will also be presented with a series of design elements, or tokens, along the left side or top of the background image. To respond to this item type, you'll need to select one or more of the design elements and place them onto the background image. Design elements may be rotated but no other manipulations are permitted. Depending on the item, multiple design elements or not all design elements will be used in the correct response(s). If all your design elements are located within the acceptable scoring areas, the item will be scored as correct.

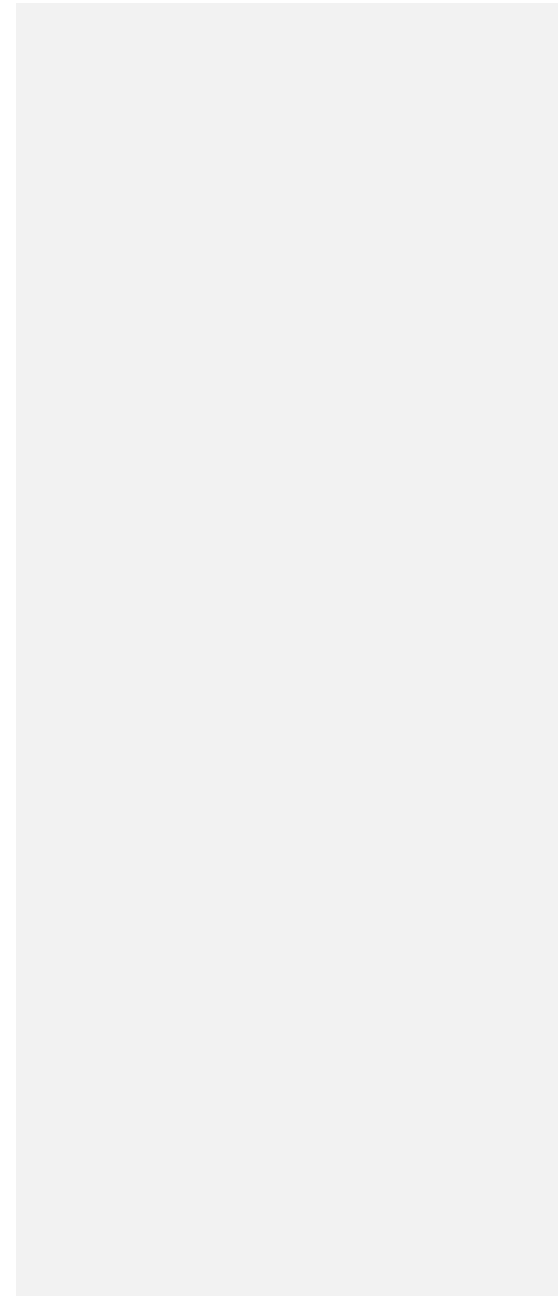
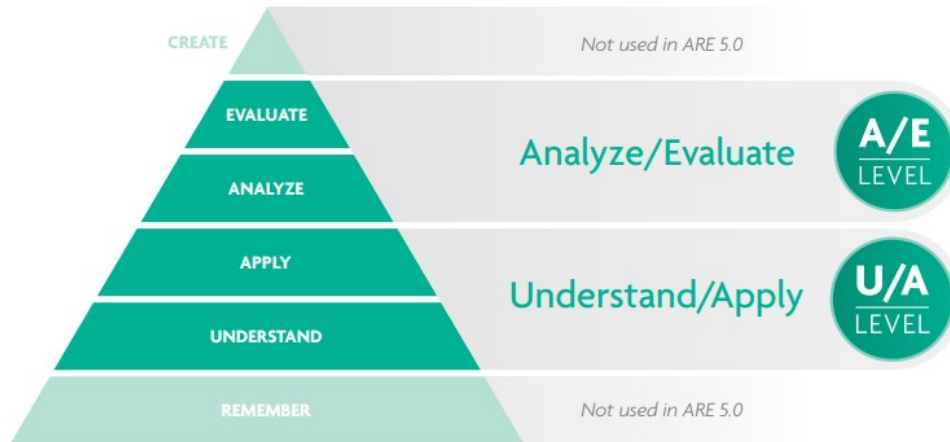


Understand/Apply: deduction of meaning from information, demonstration of comprehension of concepts or processes, application of processes or procedures in familiar or unfamiliar situations.

- Requires conceptual understanding to answer
- Focuses on standard, straight-forward application of knowledge
- May require the employment of a mathematical formula

Analyze/Evaluate: reduction of overall concept into component parts, determination of how parts relate to one another and to the overall structure, arrival at judgments based on given criteria.

- Requires integration of new information with existing information
- May require the prioritization of information
- Often focuses on non-standard situations



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ARE 5.0 Reference Matrix

The ARE 5.0 Reference Matrix provides a comprehensive list of materials and publications used when developing items for each division of ARE 5.0.

2010 ADA Standards for Accessible Design U.S. Department of Justice, 2010

The Architect's Guide to Small Firm Management: Making Chaos Work for Your Small Firm Rena M. Klein, FAIA The American Institute of Architects John Wiley & Sons, 2010

The Architect's Handbook of Professional Practice The American Institute of Architects John Wiley & Sons, 14th edition (2008) and 15th edition (2014)

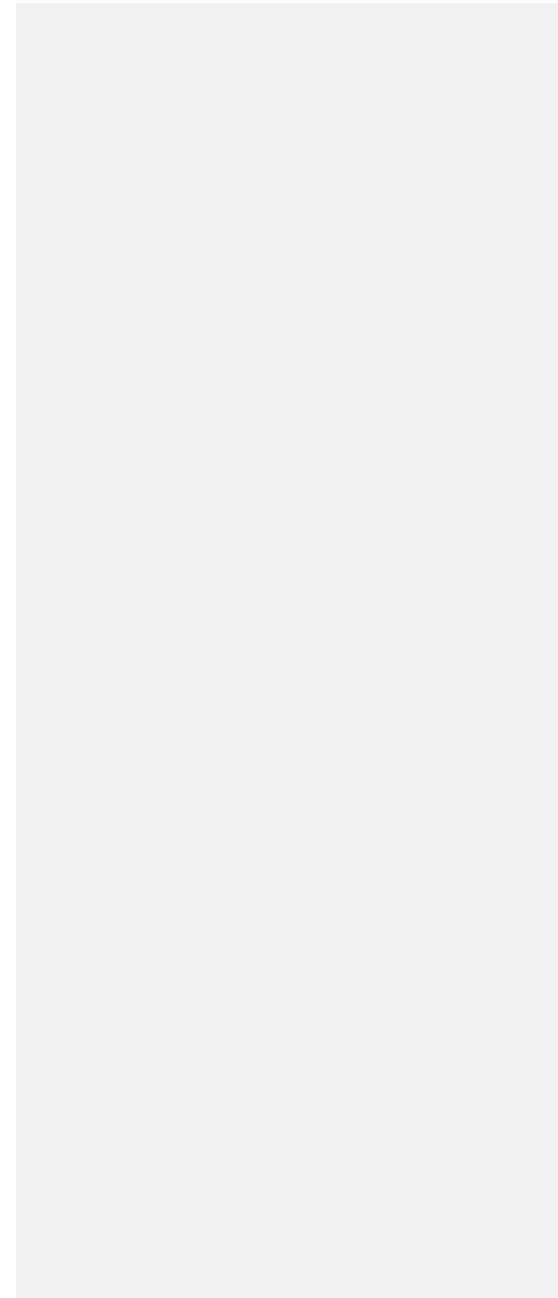
The Architect's Studio Companion: Rules of Thumb for Preliminary Design Edward Allen and Joseph Iano John Wiley & Sons, 6th edition, 2017

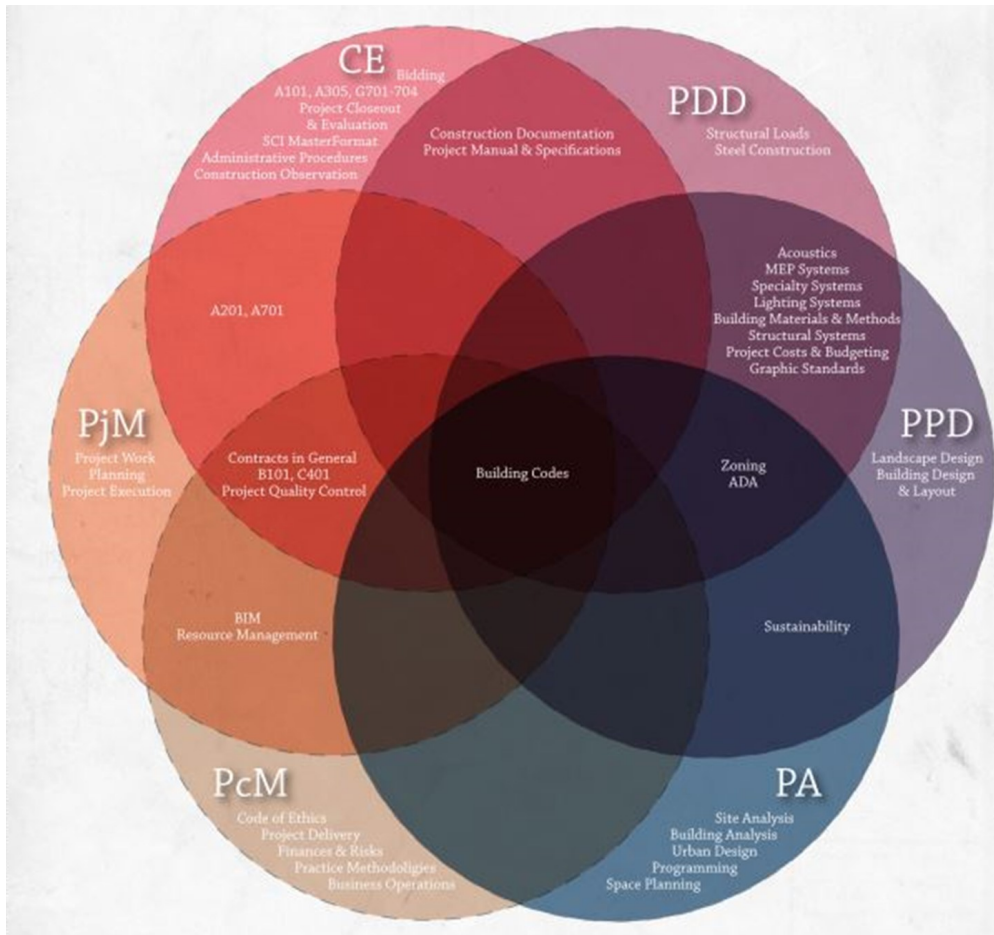
Architectural Acoustics M. David Egan J. Ross Publishing, 2007 Reprint. Original publication McGraw Hill, 1988

Architectural Graphic Standards The American Institute of Architects John Wiley & Sons, 11th edition (2007) and 12th edition (2016)

BIM and Integrated Design: Strategies for Architectural Practice Randy Deutsch, AIA, LEED-AP The American Institute of Architects John Wiley & Sons, 2011

REFERENCE	PcM	PjM	PA	PPD	PDD	CE
2010 ADA Standards for Accessible Design U.S. Department of Justice, 2010						
The Architect's Guide to Small Firm Management: Making Chaos Work for Your Small Firm Rena M. Klein, FAIA The American Institute of Architects John Wiley & Sons, 2010						
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Discussion:

**Who is responsible for installing
wrong toilets which were
specified on the plans?**

3 of 50

Do not Outsmart the Question...

Toilet Wall:

In PA Programming & Analysis

In PPD Project Planning & Design

In PDD Project Development & Documentation

Who is to do Punch List...?

Complacency?

Programming & Analysis

This division will assess objectives related to the evaluation of project requirements, constraints, and opportunities. The division will focus on issues related to programming, site analysis, and zoning and code requirements. Candidates must demonstrate an understanding of and abilities in project type analysis, the establishment of qualitative and quantitative project requirements, evaluation of project site and context, and assessment of economic issues.

SECTION 1: Environmental & Contextual Conditions	13-20 questions	14-21% of test
SECTION 2: Codes & Regulations	15-21 questions	16-22% of test
SECTION 3: Site Analysis & Programming	20-26 questions	21-27% of test
SECTION 4: Building Analysis & Programming	35-41 questions	37-43% of test

Programming & Analysis References

This division will test a candidate’s ability to protect the public’s health, safety, and welfare by:

- Evaluating qualitative and quantitative project requirements
- Analyzing environmental, social, and economic requirements of a project
- Synthesizing project requirements based on gathered information

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The 95 items (3 hours and 15 minutes test- 4 hours appointment) will assess you on four sections related to Programming & Analysis. The number of items from each section will vary based on the targeted percentage of items within each section

Environmental & Contextual Conditions

In this section, you'll evaluate a project site and identify both the opportunities and constraints that may impact future development.

OBJECTIVE 1.1 Evaluate site-specific environmental and socio-cultural opportunities (A/E)

You will need to be able to analyze a project site and identify opportunities that could be incorporated into future site and building development. These opportunities include the potential use of sun, wind, shading, views, water, and the neighborhood context, along with other environmental, social, and cultural conditions.

OBJECTIVE 1.2 Evaluate site-specific environmental constraints (A/E)

You will need to be able to analyze a project site and identify constraints and hazardous conditions that could limit a building's location and future site development. These constraints include issues like a floodplain, unstable soil, radon, lead, a brownfield, abandoned structures, and other natural or built features.

OBJECTIVE 1.3 Determine optimal use of onsite resources by incorporating sustainability principles (U/A)

You must be able to analyze a project site based on sun, wind, water, topography, temperature, and other environmental site data to inform optimal building location, orientation, form and shape, footprint, and passive system design. You will also need to consider opportunities to minimize disturbance of the site and existing natural features

An owner has selected a hilly site for a new two-story residence. The site is located in a temperate climate with winter winds predominantly from the northwest and summer winds from the southwest. Which location on the site is a favorable microclimate for passive heating, cooling, and daylighting?

- *Bottom of the north-facing slope
- *Bottom of the south-facing slope
- *Hilltop
- *Midway up the south-facing slope

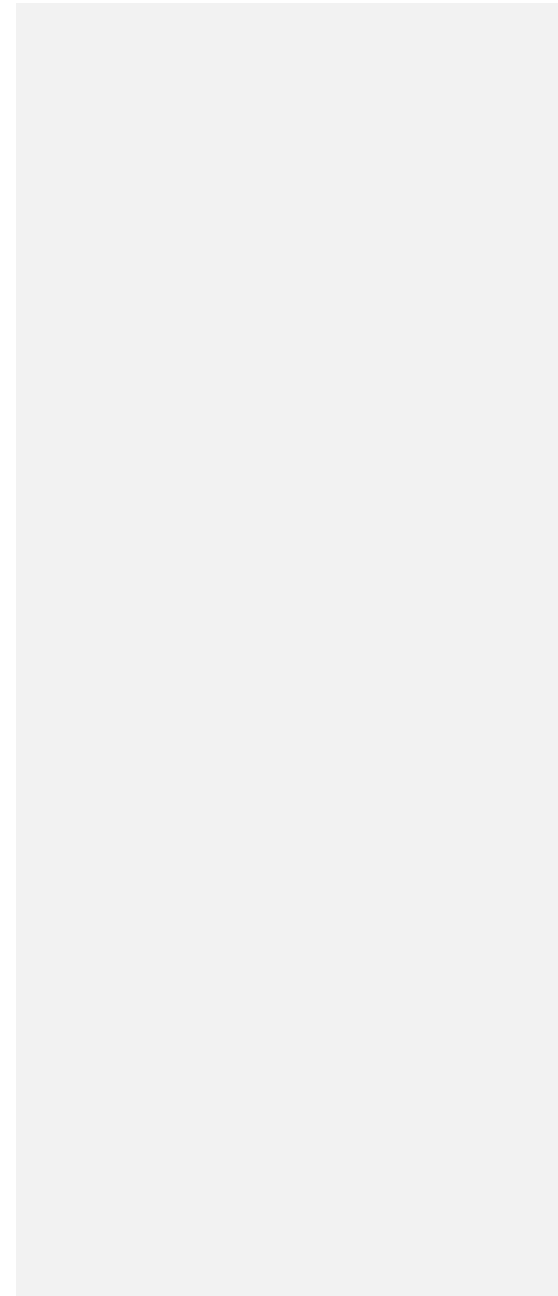
Midway up the south-facing slope

RATIONALE:

According to **Sun, Wind & Light: Architectural Design Strategies**, locating the residence midway up the south-facing slope would be favorable for access to sun and summer winds, which are critical components of passive heating, cooling, and daylighting.

The bottom of the slope would not be favorable due to cold air collection in the winter, and the top of the hill would provide limited wind protection during the winter months.

This is an A/E level item requiring you to analyze the environmental conditions to determine the site location that has the greatest potential to accommodate passive design.



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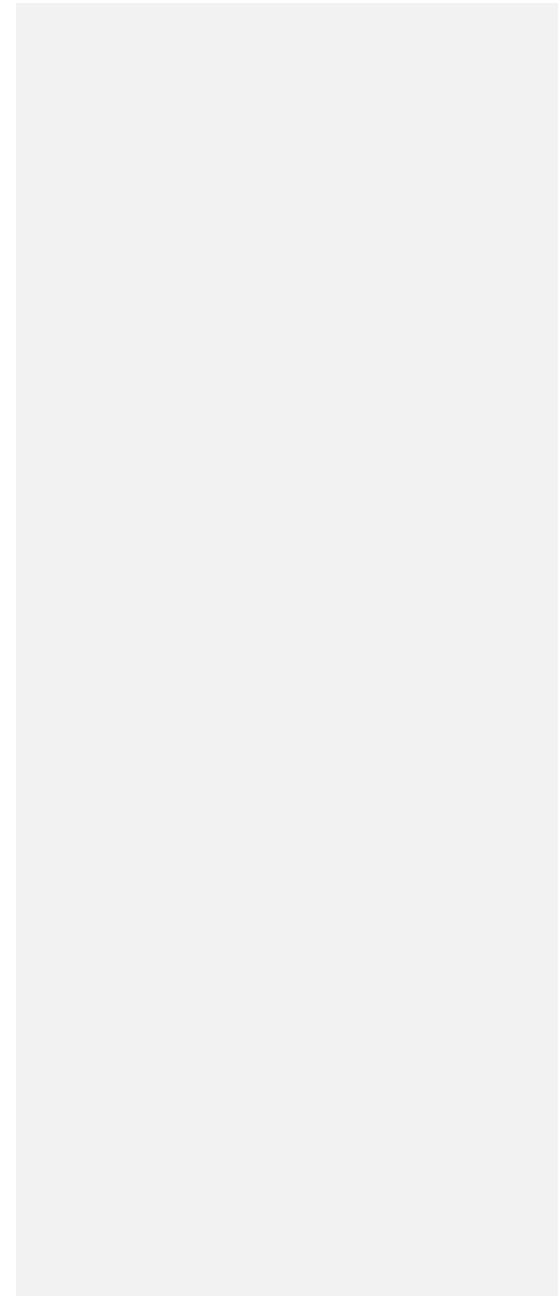
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A parks and recreation society has approached an architect to construct a picnic pavilion, restroom facility, and recreational volleyball courts on a riverfront property. The client has requested the development of the site be environmentally responsive and cost effective.

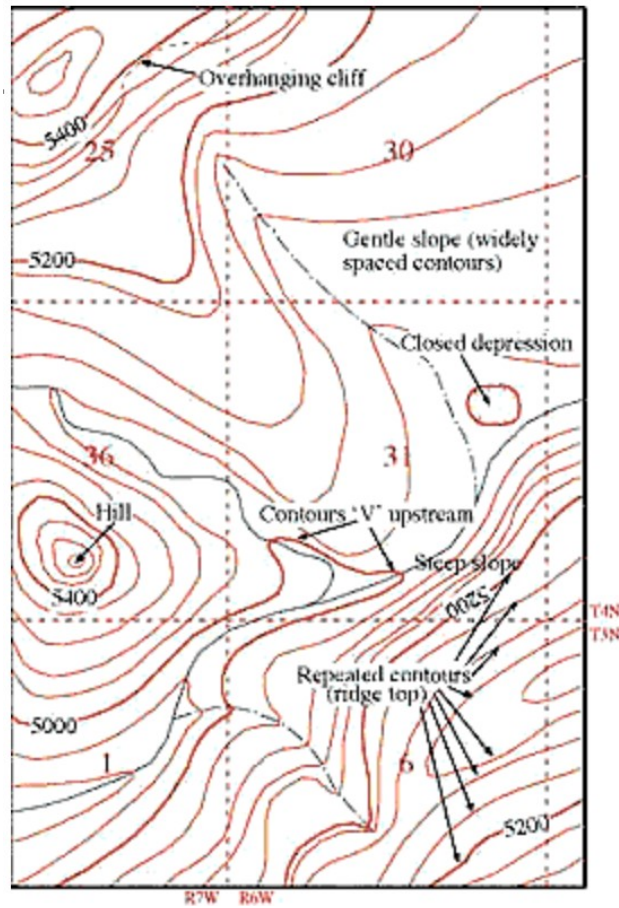
Click on the area of the site plan below where the architect should recommend the development be located.

Need To Know: Topographic Map-Contour Map



Understanding Topographic Maps

A topographic map, simply put, is a two-dimensional representation of a portion of the three-dimensional surface of the earth. Topography is the shape of the land surface, and topographic maps exist to represent the land surface. Topographic maps are tools used in geologic studies because they show the configuration of the earth's surface. Cartographers solve the problem of representing the three-dimensional land surface on a flat piece of paper by using contour lines, thus horizontal distances and vertical elevations can both be measured from a topographic map.



General Information

The terms below indicate what information is contained on a topographic map, and where it can be found.

Map Scale: Maps come in a variety of scales, covering areas ranging from the entire earth to a city block (or less).

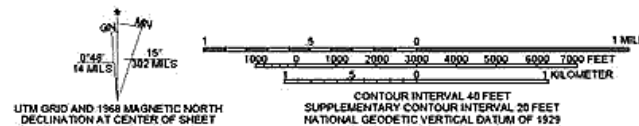
Vertical Scale (contour interval): All maps have a horizontal scale. Topographic maps also have a vertical scale to allow the determination of a point in three dimensional space.

Contour Lines: Contour lines are used to determine elevations and are lines on a map that are produced from connecting points of equal elevation (elevation refers to height in feet, or meters, above sea level).

The following are general characteristics of contour lines:

1. Contour lines do not cross each other, divide or split.
2. Closely spaced contour lines represent steep slopes, conversely, contour lines that are spaced far apart represent gentle slopes.
3. Contour lines trend up valleys and form a "V" or a "U" where they cross a stream.

On most topographic maps, index contour lines are generally darker and are marked with their elevations. Lighter contour lines do not have elevations, but can be determined by counting up or down from the nearest index contour line and multiplying by the contour interval. The contour interval is stated on every topographic map and is usually located below the scale.



Creating topographic profiles: Remember that topographic maps represent a view of the landscape as seen from above. For producing a detailed study of a landform it is necessary to construct a topographic profile or cross-section through a particular interval. A topographic profile is a cross-sectional view along a line drawn through a portion of a topographic map.

A profile may be constructed quickly and accurately across any straight line on a map by following this procedure:

- a. Lay a strip of paper along a line across the area where the profile is to be constructed.
- b. Mark on the paper the exact place where each contour, stream and hill top crosses the profile line.
- c. Label each mark with the elevation of the contour it represents.
- d. Prepare a vertical scale on profile paper by labeling the horizontal lines corresponding to the elevation of each index contour line.
- e. Place the paper with the labeled contour lines at the bottom of the profile paper and project each contour to the horizontal line of the same elevation.
- f. Connect the points.

Stream Gradient: Stream gradient can also be determined from a topographic map. The gradient of a stream or river is determined by measuring a section of a stream or river and dividing the distance (in miles) into the vertical difference (in feet) between the two points. The result is expressed in feet per mile (ft./mi.). The equation used is:

Gradient =	drop in elevation between two chosen points (feet)
	distance between the two points (miles)

Tips for Interpreting Topographic Maps

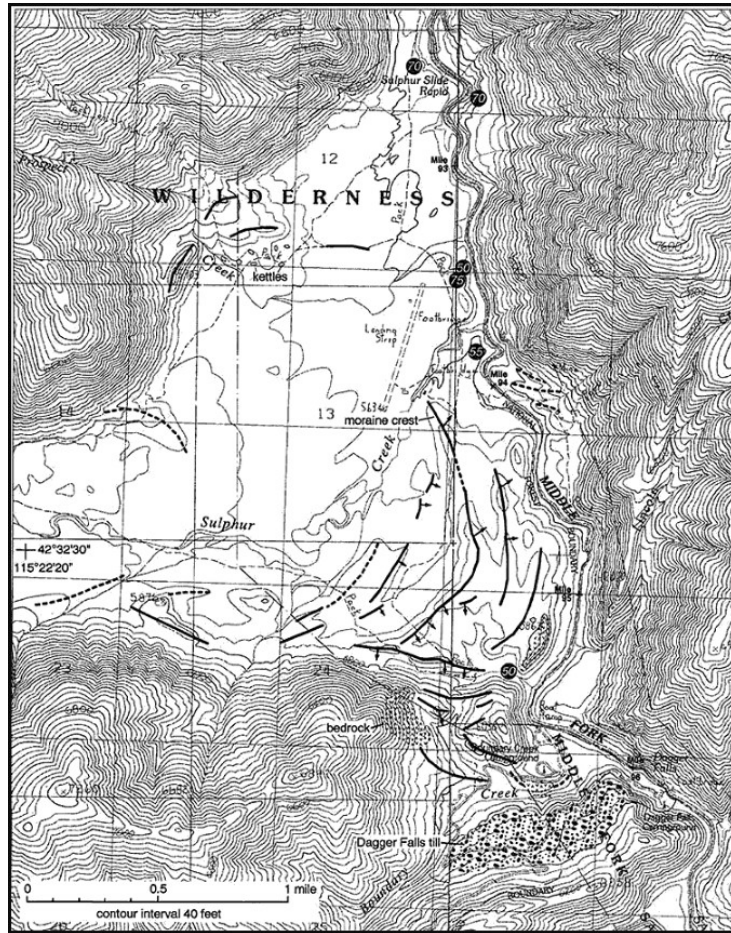
Vertical exaggeration: Vertical exaggeration is the effect that is created when the horizontal and vertical scales on your topographic profile are not the same.

Determining hillslope: Among other things, a topographic map can be used to measure the average slope of a hill (or hills).

Topographic Map Example

As an example, look at a map of the Sulphur-Boundary Creek area along the Middle Fork of the Salmon River. This map is a geologic map of glacial geology in the area, drawn on a topographic map base. The map has a contour interval of forty feet, which means that every place between the marked 6800 foot line and the next lowest line (which is 6760 feet, and not marked) has an elevation equal or greater than 6760 feet, but less than 6800 feet. You can figure out the elevation of any point by finding the nearest labeled line, counting the number of lines above or below it, multiplying by the contour interval, and adding or subtracting the result from the nearest marked contour line. The more closely spaced the contour lines, the steeper the slope. You can find out exactly how steep the slope of the area you are interested in by subtracting the lowest elevation from the highest, and dividing the result by the horizontal distance. Horizontal distance is found on the scale. As you look at the map, notice that the contour lines enclose smaller and smaller areas. The smallest circles represent the tops of peaks, and some are marked with x's with numbers next to them. The numbers are the elevation at the top of the peak.

Follow a contour line along its length. Notice the indentations. As the contour lines cross gullies or stream drainages, they "vee" uphill. Drainages that have water in them year-round have solid lines connecting the points of the vees. Drainages that have water only part of the year are marked with dashed lines.



Contours:

Contours are imaginary lines that connect all points of equal elevation. Existing contours are shown dashed and proposed contours are shown solid. Every fifth contour should be shown darker. Contours are labeled with the number within the lines or on the higher side. Uniform slopes – are indicated by parallel contours which are evenly spaced.

Convex slopes – are shown by parallel contours spaced at increasing intervals going up hill, closer contours are at lower elevations.

Concave slopes – are shown by parallel contours spaced at decreasing intervals going uphill, closer contours are at the higher elevations.

Valleys – are indicated by contours which point uphill.

Ridges – are indicated by contours which point downhill.

Summits and depressions – are represented by concentric closed contours. Both should have a spot elevation that is the highest or lowest point.

Legal surveying

Benchmark: Reference point of project

Public land of 1785: Created townships and sections

Easement on private property: Across created.

Not: Daylight, setbacks, landscaping

Land use restriction by authority having jurisdictions: Setbacks, height/area limits/zoning

Not: Covenants (Local restriction- Specific)

Not: Accessibility regulations: (No restriction) must do

Distance & compass bearings: Metes & bonds, "not" changing- 66', datum elevation, or benchmark

Restrictive covenants on behalf of property owner, not any Engineers, Architects

Right-a-way: A right belonging to a party to pass over land of another.

"Not" : Purchase of land, taking property, picketing/strike

Street

Roadways smallest to largest

Local access streets: Low intensity fronting houses & often in forms of loops or cul de sac

Collector streets: Transition from local access to arterial intersections.

Intersections: Controlled by traffic signals, local streets with stop signs

Arterial streets: Continuous vehicular channels that connect with expressway through ramps generally two to three lanes

Expressways: Large movement between urban center and accesses are limited

Legal constraint on a proposed land:

Deed restrictions: zoning ordinances; easements. "Not" environmental impact statements (EIS). Only +/- impact on potential for the site

Practical & effective dry crawl space?

Provide tight & continuous ground cover using polyethylene film @ least 4 mil thick (vapor barrier floor & sub floor okay but not help)

Non confirming but legal existed prior to enactment of land use is grand fathered,

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not: -easement -dedicated -aggrieved

Deed restrictions: Legal restrictions imposed on land by private parties on buyers to maintain integrity of property

Zoning ordinances include: limited population density; segregated permitted uses, restricted lot coverage, not include: diminished fire danger.

Spot elevation: Proposed finished elevation of single point. Elevation of key structures such as building corners, manholes, and catch basins.

Seismic or resistivity survey: Limited but reliable but enough for foundation.

Zoning ordinances include: Provide building interiors with natural light and ventilation, inhibit fire spread from building to buildings, eventual widening of the streets, preserve setbacks

Topography

Find elevation on topography: The elevation on the two Contours are 60 and 55 ft the interval is 16 ft. What is the elevation 4 ft away from contour 55

$60 - 55 = 5$ ft elevation difference in 16 ft

4 ft is 25% of the distance ($4/16$)

$5 (4/16) = 1.25$ ft + 55 ft = 56.25 ft elevation

Slope: (Contour 1- contour 2)/ change in interval = $V/H = G = 245 - 230 / 5 = 3:1$

Topography: Land layout and Site Slope are critical in evaluating site worth and applicability. Cut and fill costs are not cheap.

Topography critical for routing storm water (natural slope)
not water, electric/ gas

Contour lines: Spaced @ given horizontal intervals show elevation of location_ terrain. Continuous elevation lines with equal elevation lines. Dashed lines are existing or natural topography. Solid lines: New modified contour lines. Lines never split and are always same elevations.

Contour lines: In building design: To minimize grading, buildings are designed in parallel to match hill side contour lines.

Contour lines: 5% grade, interval is 1 ft, $G = V/H = 5/100 = 1 \text{ ft}/h = > H = 20 \text{ ft}$.

Highly irregular contour lines: Most appropriate for cluster type residential development. Concentrated grouping of residential space in open areas through clusters. Cluster was to condense large number of units. Lengths of street reduced, high roads, and moderate slopes.

Uniform slope: When spacing between contours is equal

Valley: When contours elevation increase outward

Ridge: Increase outward

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Steep: When contour lines are close together

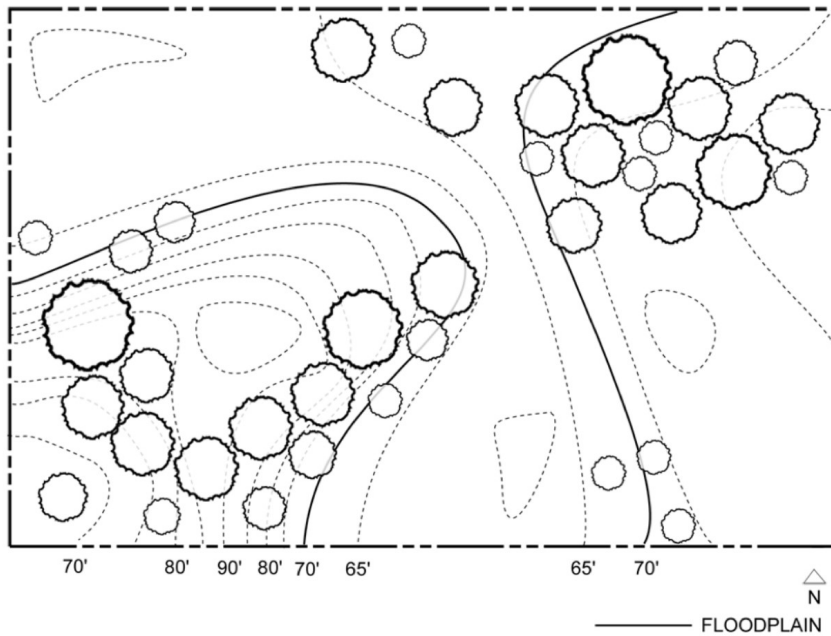
Topographic map includes: Property line, easements, and utilities, location of streams, roads, and buildings- Not shown:
Soil conditions

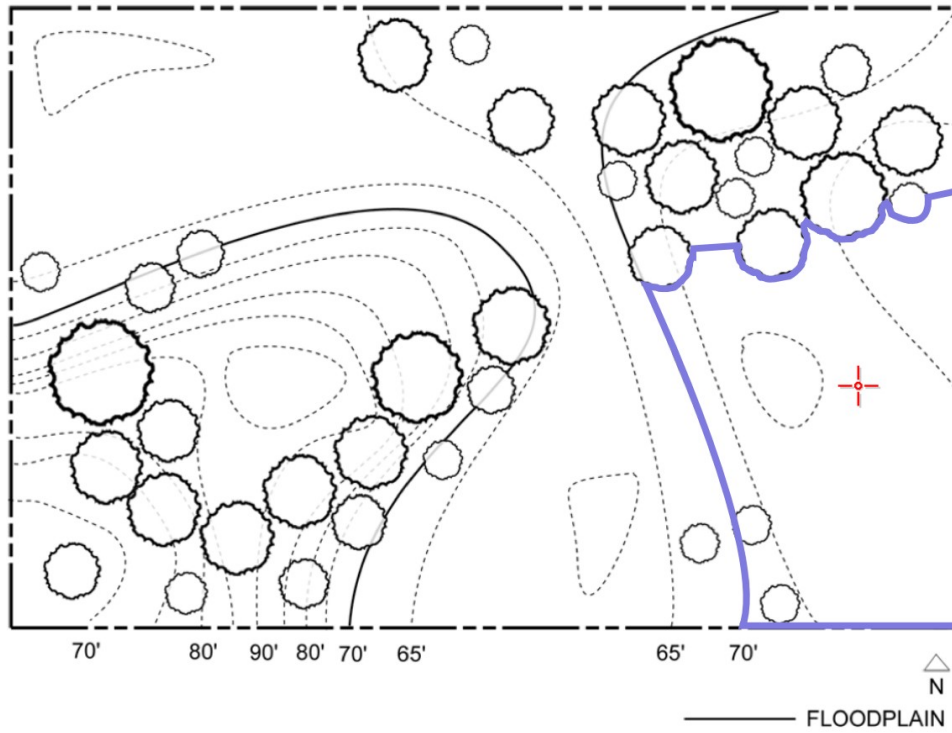
Slope of land: Required for sanitary and sewer/storm. Slope is not required for gas, water, or electric

Arial photograph: Terrain conditions, nothing to do with subterranean

A parks and recreation society has approached an architect to construct a picnic pavilion, restroom facility, and recreational volleyball courts on a riverfront property. The client has requested the development of the site be environmentally responsive and cost effective.

Click on the area of the site plan below where the architect should recommend the development be located.





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RATIONALE: The architect should recommend the southeastern region of the site. The Site Planning and Design Handbook discusses site analysis, sustainability, and development principles that can be directly applied to the evaluation of this riverfront property. The southeastern area of the site is relatively flat, limiting the amount of construction dollars dedicated to excavation and related site work. It is also located outside of the defined floodplain, reducing the potential risk of water damage to the buildings and recreational courts over time.

This is an A/E level item requiring you to evaluate the existing site constraints to determine which areas of the site may inhibit development. You must also determine which areas of the site present design opportunities that fulfill the client's requirements.

Codes & Regulations

In this section, you'll look at the codes and regulations appropriate to the initial analysis and programming phase of a project.

OBJECTIVE 2.1 Identify relevant code requirements for building and site types (U/A)

As an architect, you need to be able to determine and understand the codes and regulations that govern a specific project type and geographic region. This includes distinguishing relevant accessibility and ADA requirements, IBC, IRC, IGCC, and energy codes.

OBJECTIVE 2.2 Identify relevant zoning and land use requirements (U/A)

You need to be able to determine and understand requirements that limit the extent of site and building development. This includes issues like setbacks, footprint limitations, maximum building heights, FAR, parking requirements, easements, and other zoning and land use regulations. Recognizing situations where a special exception or variance is suitable and understanding the process for approval are also included in this objective.

OBJECTIVE 2.3 Identify relevant local and site-specific requirements (U/A)

You must be able to determine and understand local, environmental, and other specialty regulations and how they may impact the site and building development. These include wetlands, floodplains, historic preservation, and other specialty codes

An architect has been selected to complete a major interior and exterior renovation of all areas within a three-story library building. The building was constructed in the early 1980's. During the programming phase of the project, which of the following should the architect recommend to the client regarding accessibility?

- *Only the public spaces need to be made accessible
- *Only the primary function spaces need to be made accessible
- *All areas of the library should be made accessible
- *Since this is a renovation of an existing building, accessibility upgrades are not required

Need to Know: ADA

ADA ramps & parking:

Minimum dimensions of handicapped parking stalls – 20 Ft long by 8 Ft wide. Must have 5 Ft wide adjacent and parallel vehicle pull-up space. An accessible route must be located in front of the stalls, to avoid hazard of handicapped persons having to circulate behind parked vehicles.

Under 5% or 1:20 are considered walks. Ramps shall be 1:12. require a 5' foot landing at top and bottom of ramp and 30' max length. Handrails should be located at each side of a ramp if its rise is greater than 6 inches or its greater than 72".

ADA Accessibility Guidelines (ADAAG):

- State that all newly designed or newly constructed areas must meet accessibility requirements
- Includes all employee work areas and all temporary construction that is open to the public
- Following areas are not required to be accessible:
 - o Temporary facilities associated with the process of construction (trailers, scaffolding)
 - o Raised areas used primarily for security or life safety (security or life guard towers)
 - o Non-occupiable service areas accessed infrequently for maintenance or monitoring (catwalks, penthouses, pump rooms)
 - o Single occupant structures accessed from above or below grade (tollbooths)
 - o Raised structures for officiating sporting events

- o Water slides
- o Non-public animal containment areas
- o Raised boxing & wrestling rings
- Minimum clear door opening width = 32" so typically use a 36" door
- 1:12 maximum ramp slope

Per ADA, Curb ramp slopes shall not exceed 1:12

Not: 1:10, 1:24, 1:20 (short distance)

ADA Ramp Codes : RAMP CODES 4.8*

4.8.1 General

Any part of an accessible route with a slope greater than 1:20 shall be considered a ramp and shall comply with 4.8.

4.8.2 Slope and Rise.

The least possible slope shall be used for any ramp. The maximum slope of a ramp in new construction shall be 1:12. The maximum rise for any ramp run shall be 30 inches. Curb ramps and ramps to be constructed on existing sites or in existing buildings or facilities may have slopes and rises, if space limitations prohibit the use of a 1:12 slope or less.

4.8.3 Clear Width

The minimum clear width of a ramp shall be 36 inches.

4.8.4 Landings

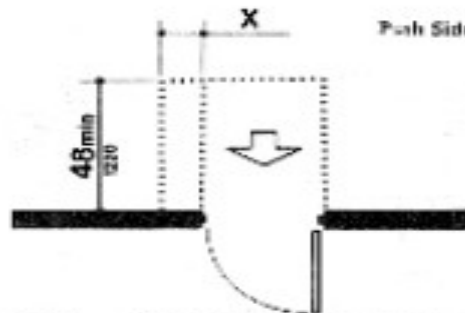
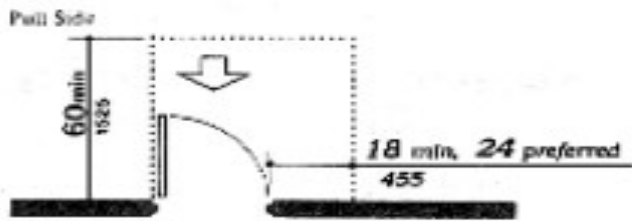
Ramps shall have level landings at the bottom and top of each run. Landings shall have the following features:

1. The landing shall be at least as wide as the widest ramp run leading to it.

2. The landing length shall be a minimum of 60 inches clear.
3. If ramps change direction at landings, the minimum landing size shall be 60 in. x 60 in.
4. If a doorway is located at a landing, then the area in front of the door shall comply with 4.13.6.

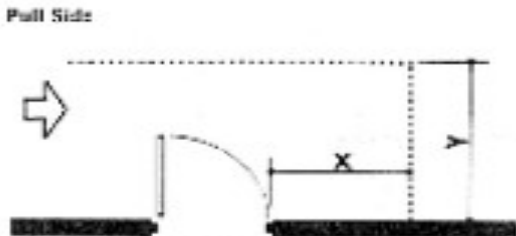
4.13.6 Maneuvering Clearances at Doors

Minimum maneuvering clearances at doors that are not automatic or power assisted shall be as shown in Fig 25 (next page). The floor or ground area within the required clearances shall be level and clear.

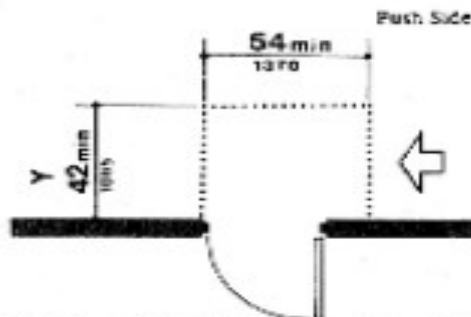


NOTE: x = 12 in (305 mm) if door has both a closer and latch.

(a) Front Approaches — Swinging Doors

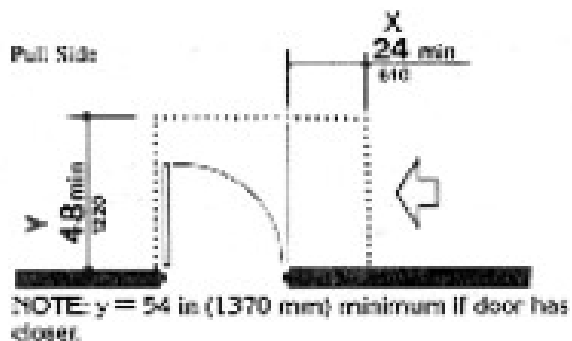


NOTE: x = 36 in (915 mm) minimum if y = 60 in (1525 mm); x = 42 in (1065 mm) minimum if y = 54 in (1370 mm).

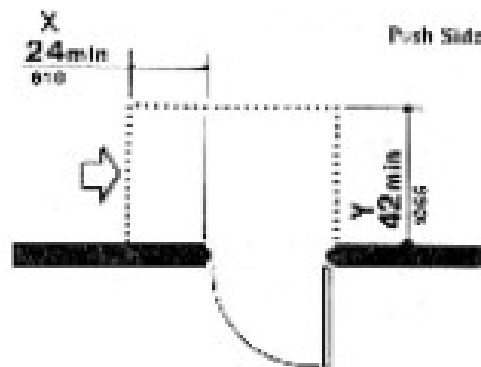


NOTE: y = 48 in (1220 mm) minimum if door has both a latch and closer.

(b) Hinge Side Approaches — Swinging Doors



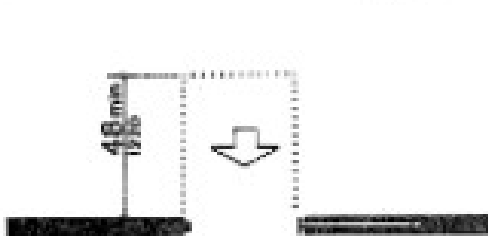
NOTE: y = 54 in (1370 mm) minimum if door has closet.



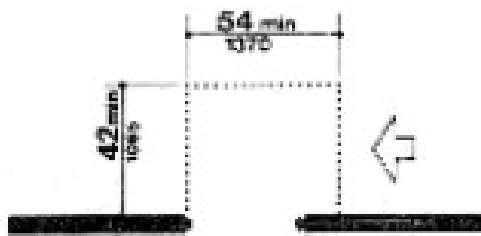
NOTE: y = 48 in (1220 mm) minimum if door has closet.

(c) Latch Side Approaches — Swinging Doors

NOTE: All doors in alcoves shall comply with the clearances for front approaches.



(d) Front Approach — Sliding Doors and Folding Doors



(e) Side Side Approach — Sliding Doors and Folding Doors

4.8.5 Handrails

If a ramp run has a rise greater than 6 inches or a horizontal projection greater than 72 inches, then it shall have handrails on both sides. Handrails are not required on curb ramps. Handrails shall have the following features.

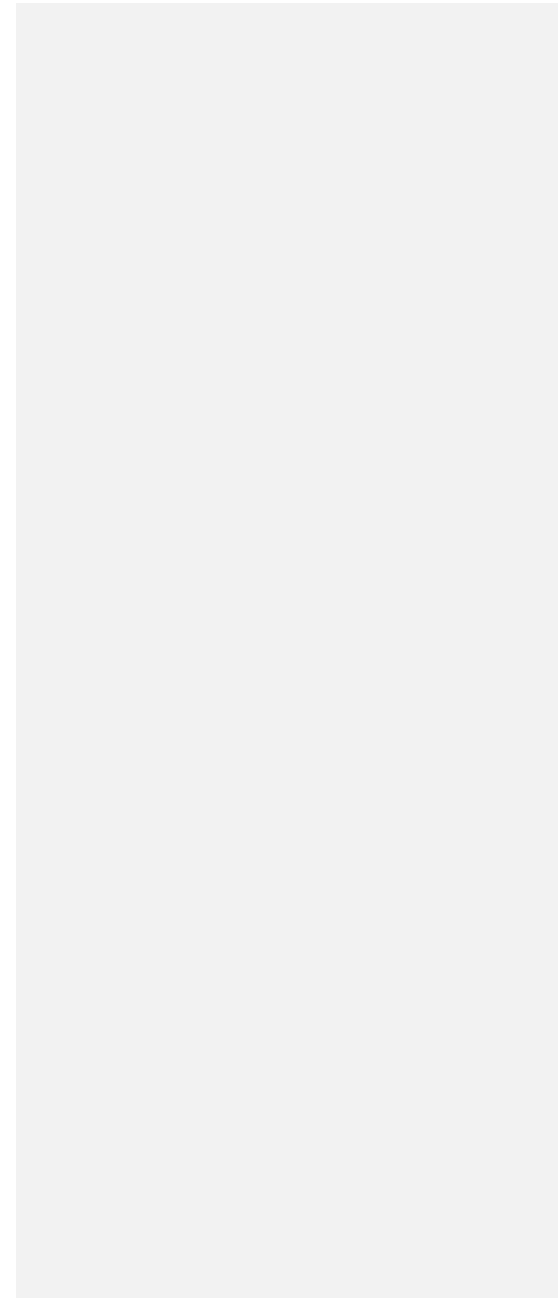
1. Handrails shall be provided along both sides of ramp segments. The inside handrail on switchbacks or dogleg ramps shall always be continuous.
2. If handrails are not continuous, they shall extend at least 12 inches beyond the top and bottom of the ramp segment and shall be parallel with the floor or ground surface.
3. The clear space between the handrail and the wall shall be 1 1/2 inches. Handrails may be located in a recess if the recess is a maximum of 3 inches deep and extends at least 18 inches above the top of the rail.
4. Gripping surfaces shall be continuous, without interruption by newel posts, other construction elements, or obstructions.
5. The diameter or width of the gripping surface of a handrail shall be 1 1/4 inches to 1 1/2 inches or the shape shall provide an equivalent gripping surface.
6. The top of the handrail gripping surfaces shall be mounted between 34 inches and 38 inches above ramp surfaces.
7. A handrail and any wall or other surface adjacent to it shall be free of any sharp or abrasive elements. Edges shall have a minimum radius of 1/8 inch.

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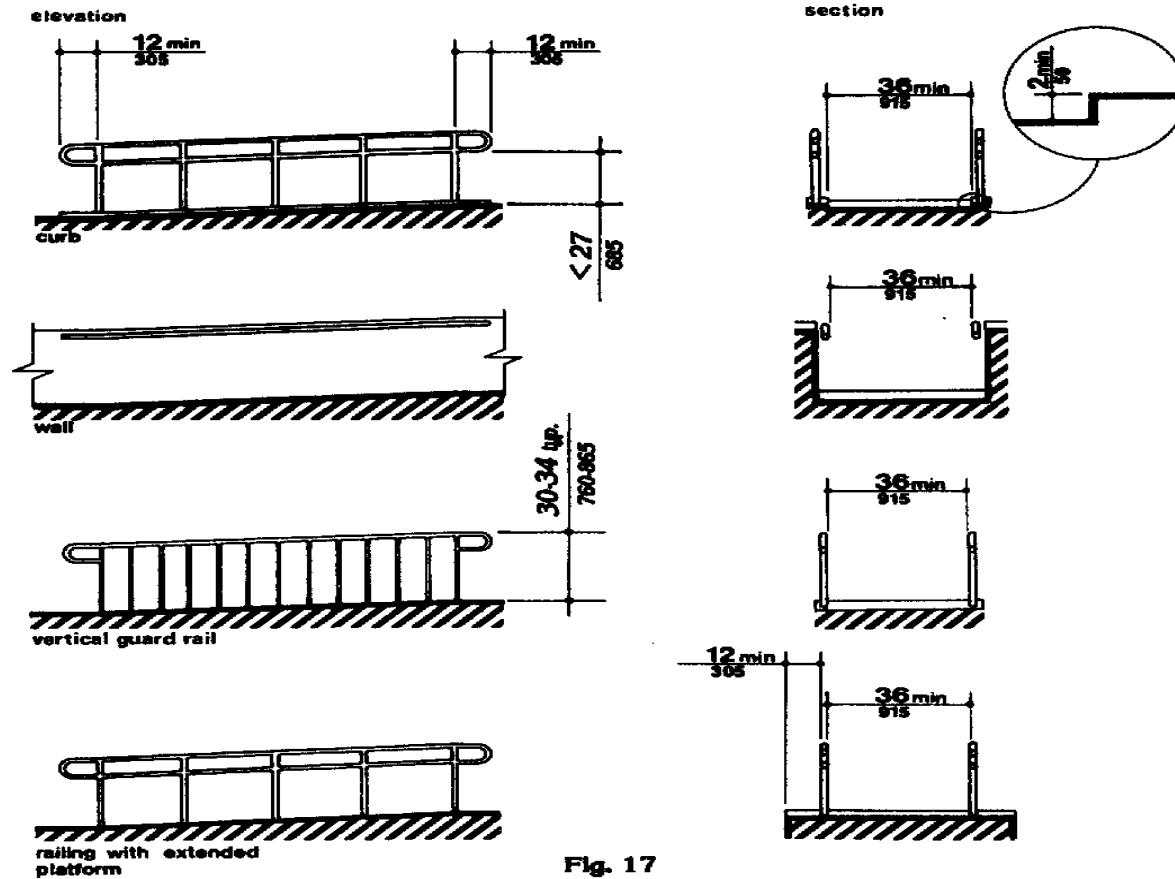


Fig. 17
Examples of Edge Protection and Handrail Extensions

4.8.6 Cross slope and Surfaces

The cross slope of ramp surfaces shall be no greater than 1:50. Ramp surfaces shall comply with 4.5.

4.5.1 General

Ground and floor surfaces along accessible routes and in accessible rooms and spaces including floors, walks, ramps, stairs, and curb ramps shall be stable, firm, slip resistant, and shall comply with 4.5.

4.8.7 Edge Protection

Ramps and landings with drop-offs shall have curbs, walls, railings, or projection surfaces that prevent people from slipping off the ramp. Curbs shall be a minimum of 2 inches high.

4.8.8 Outdoor Conditions

Outdoor ramps and their approaches shall be designed so that water will not accumulate on walking surfaces.

7. Accessible ramp handrails shall extend beyond the top and bottom of the ramp a minimum of

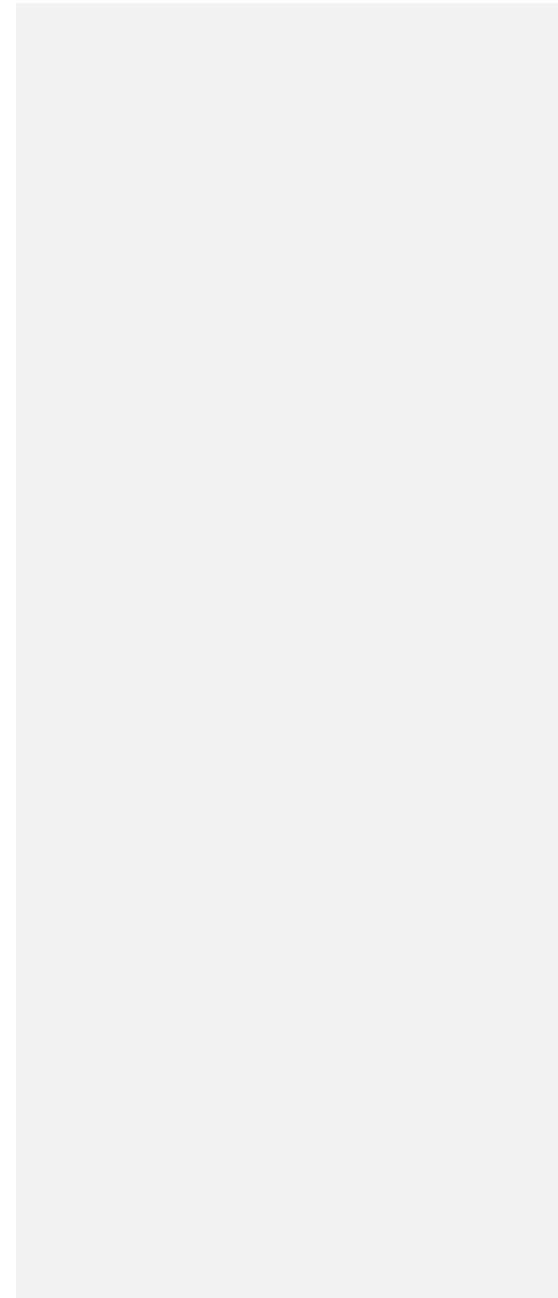
- o 6 in
- o 9 in
- o 12 in**
- o 15 in

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Water Closets for an Assembly Occupancy

Number of Persons of Each Sex	Minimum Number of Water Closets	
	Male	Female
1 - 50	1	2
51 - 75	2	3
76 - 100	2	4
101 - 125	3	5
126 - 150	3	6
151 - 175	4	7
176 - 200	4	8
201 - 250	5	9
251 - 300	5	10
301 - 350	6	11
351 - 400	6	12
Over 400	7 plus 1 for each additional increment of 200 males in excess of 400	13 plus 1 for each additional increment of 100 females in excess of 400

8. Based on the table above, the minimum number of water closets required for women in a theater with a seating capacity of 4,000 is

4000/2= 2000 Male, 2000 Female for over 400:
13 + 1 per increment of 100

Up to 401 Needs 13
2000 – 401 = 1599/100= 15.99 or 16 16

29

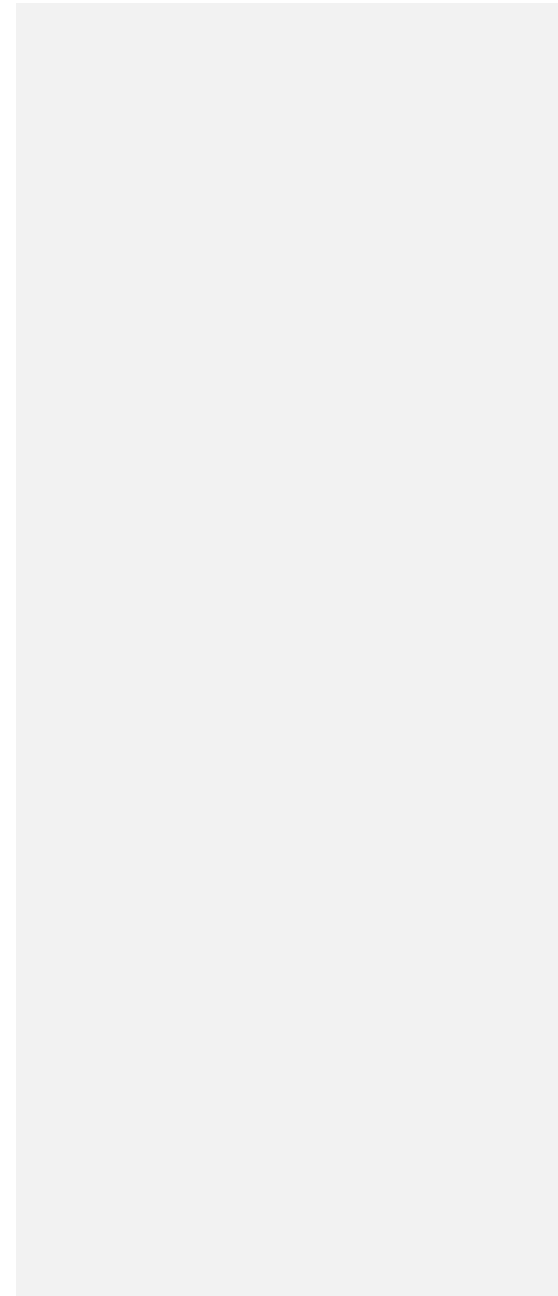
What about the Male?

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All areas of the library should be made accessible

RATIONALE:

The ADA Standards for Accessible Design require all altered elements and spaces within a renovation project to comply with the accessibility standards.

Since this is a major renovation of all areas within the building, the architect should recommend that all areas of the library be made accessible.

This is a U/A level item requiring you to identify accessibility requirements that are applicable to a renovation project.

Setback rules, as prescribed by a zoning ordinance, can accomplish which of the following?

Check the three that apply.

- *Prescribe adjacent building uses
- *Ensure availability of light and air circulation
- *Establish a minimal degree of privacy
- *Establish building exterior wall construction
- *Minimize floor area ratio
- *Provide space for maintenance of building exteriors

*Prescribe adjacent building uses

*Ensure availability of light and air circulation

*Establish a minimal degree of privacy

*Establish building exterior wall construction

*Minimize floor area ratio

*Provide space for maintenance of building exteriors

RATIONALE: As described in Building Construction Illustrated,

a setback in zoning is a prescribed distance in which a structure is set back from a property line or other identified element.

Setbacks ensure access to air and light, provide building privacy, and provide space to perform building maintenance.

Zoning ordinances typically address floor area ratio, adjacent building uses, and exterior wall construction; however, these are **not** accomplished through the implementation of setback rules

This is a U/A level item requiring you to understand setbacks within zoning requirements, as well as what they can accomplish when applied to a building project.

Site Analysis & Programming

In this section, you'll need to analyze a project site relative to the program and project requirements.

OBJECTIVE 3.1

Evaluate relevant qualitative and quantitative attributes of a site as they relate to a program (A/E)

This objective assesses your ability to analyze a project site relative to the requirements in the program to determine if it is appropriate and feasible for development. You will need to consider the climate, topography, drainage, soil, built and natural features, utilities, access points, traffic patterns, easements, and other attributes relevant to the project and program.

OBJECTIVE 3.2 Synthesize site reports with other documentation and analysis (A/E)

In addition to analyzing the attributes of the site, you will also need to review and interpret site documentation such as geotechnical reports, landscape reports, existing conditions, utility surveys, topographic maps, demographics, traffic studies, environmental data, historic reports, and other site related reports. This is used to determine the feasibility of a project and verify the selection of site related consultants needed to execute the project.

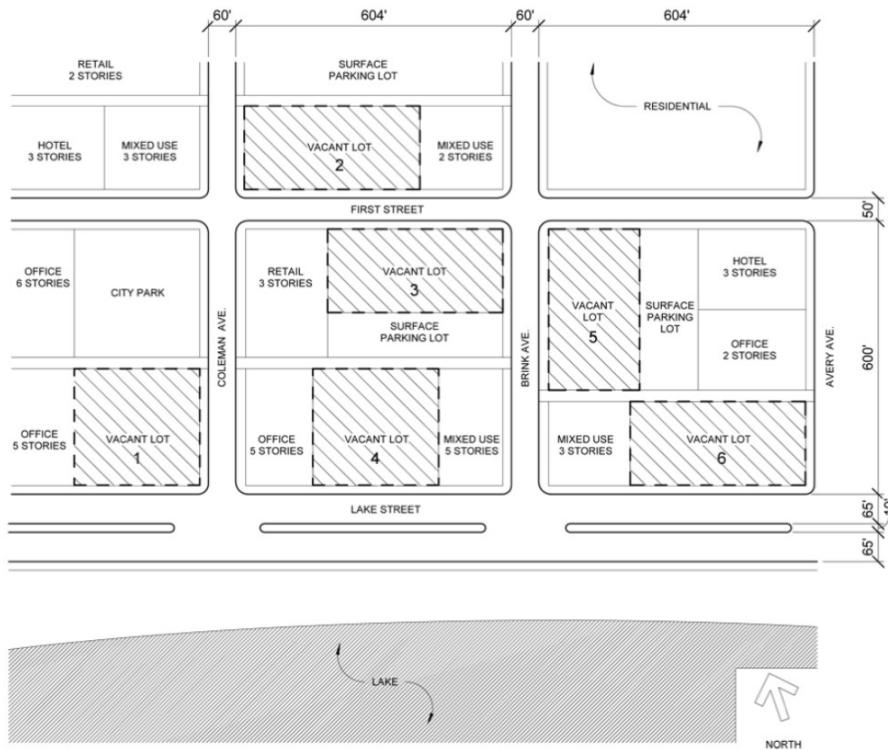
OBJECTIVE 3.3 Analyze graphical representations regarding site analysis and site programming (A/E)

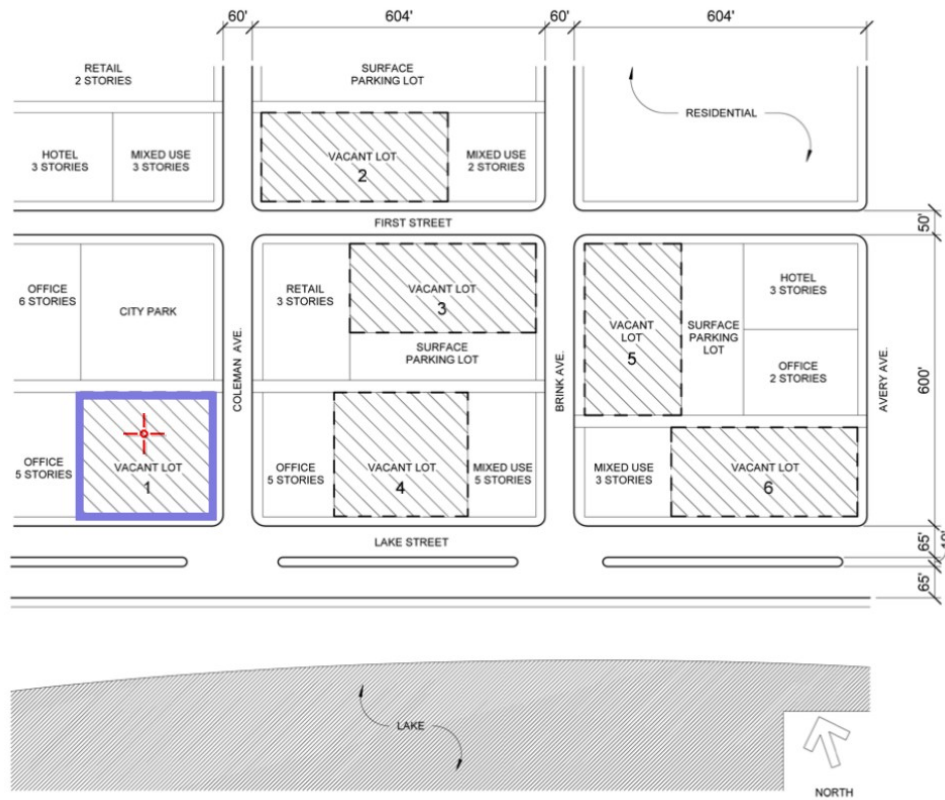
You must be able to evaluate and understand diagrammatic graphics and how they are used to represent and communicate site conditions, relationships, and program requirements. These graphics include topographic, programming, circulation, adjacency, environmental, views, and vegetation diagrams, which communicate site information and relationships.

An architect has been selected to design a new mixed-use development that includes retail spaces, parking, and apartments in an urban community. The client has provided the following programmatic requirements:

- The building should be five stories above grade and two stories below grade.
- Access to daylight should be maximized for all spaces.
- The number of apartments with balconies and a view should be maximized.
- The building should be contextual within the community in regards to massing, scale, and detail.

Click on the vacant lot in the site plan below that the architect should recommend to the client.





should recommend Vacant Lot 1.

RATIONALE: The architect

To make this determination, you'll need to analyze the contextual conditions of each vacant lot, including both environmental conditions and site attributes.

The client has requested that the five-story building fit contextually within the community from a massing, scale, and detail standpoint, making Lots 1 and 4 most contextually appropriate because they are adjacent to five-story structures.

Vacant Lot 1 has access to daylight on three sides with views to the city park to the north and the lake to the south, making it the most appropriate site for the development.

Vacant Lots 2, 3, and 5 have limited views and are located adjacent to buildings of a smaller scale than the proposed development.

Although Vacant Lot 6 has views to the south and access to daylight on three sides, the surrounding context is of a smaller scale.

This is an A/E level item requiring you to evaluate multiple sites relative to views, contextual scale, daylight, and client requirements.

An architect is completing a feasibility study for a small marine research facility.

The following site information has been provided by the client:

- Located in a remote area near the seashore
- Undeveloped, except for a small storage building that will be demolished
- Contains a small area of wetlands
- Adjacent to an environmentally protected area As part of the feasibility study,

what documentation should the architect evaluate?

Check the four that apply.

*FEMA maps

*Geotechnical report

*Traffic report

*Structural report

*Topographic survey

*Hydrologic conditions report

Check the four that apply.

*FEMA maps

*Geotechnical report

*Traffic report

*Structural report

*Topographic survey

*Hydrologic conditions report

RATIONALE: According to the Site Planning and Design Handbook, evaluating FEMA maps, geotechnical reports, topographic surveys, and a hydrologic conditions report are critical in understanding the site's potential for coastal flooding, the makeup and stability of the soils, potential earthwork requirements, and how the presence of water and wetlands may impact development. Since this is an undeveloped and remote site, a traffic report and structural report would not be necessary for this feasibility study

This is an A/E level item requiring you to analyze the site information provided and determine what documentation should be evaluated to assess the feasibility of the project.

Building Analysis & Programming

In this section, you'll analyze new or existing buildings relative to the program requirements, cost, and schedule. This is the largest section in the Programming & Analysis division

OBJECTIVE 4.1 Evaluate relevant qualitative and quantitative attributes of a new or existing building as they relate to the program (A/E)

As an architect, you will need to analyze an existing or new building relative to the requirements in a project program to determine if it is appropriate and feasible for renovation, repurposing, preservation, or demolition. You will consider the structural stability, spatial organization, MEP systems, views, solar exposure, hazardous materials, and other attributes relevant to the project and program requirements.

OBJECTIVE 4.2 Evaluate documentation, reports, assessments, and analyses to inform the building program (A/E)

Similar to the site analysis of Section 3, you will also need to review and interpret technical documentation including geotechnical reports, structural assessments, utility surveys, topographic maps, demographics, regional context, environmental data, historic reports, and other similar information. This is used to consider the feasibility of a project and how the building program may be positively or negatively affected.

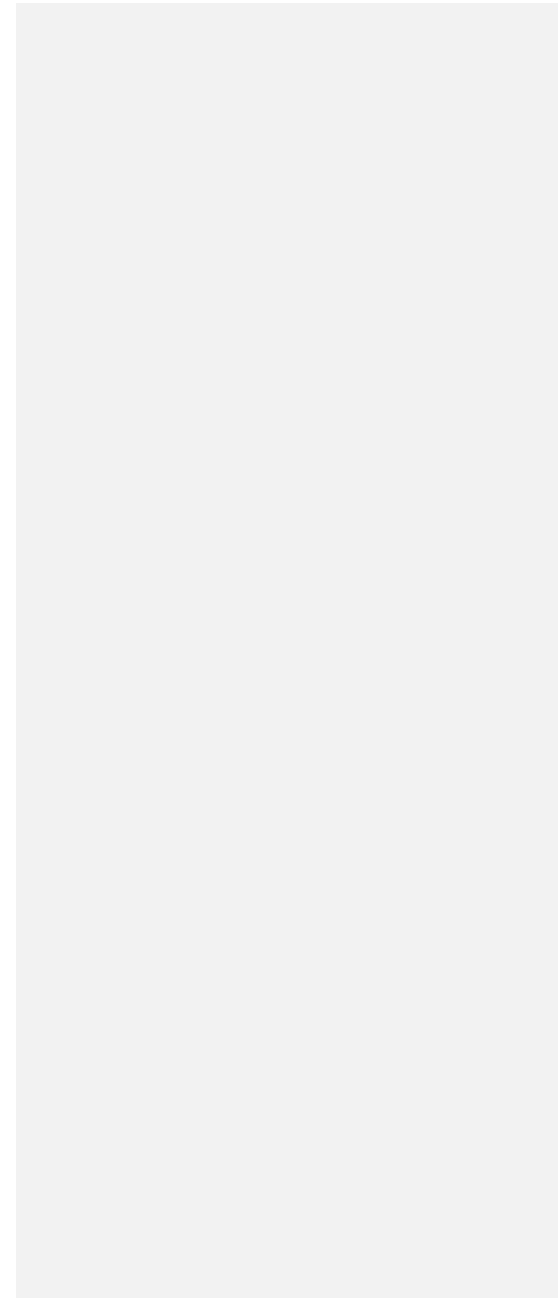
OBJECTIVE 4.3 Identify and prioritize components of the building program (A/E)

As an architect, you must be able to review and understand the building program relative to the client's requirements. This includes the consideration of primary vs. subsidiary, back of house vs. front of house, occupied vs. unoccupied, as well as phasing and major circulation components. Understanding the area requirements of a building type relative to the program, including net square footage and gross square footage, is very important, as are how they relate to each other and the overall program requirements.

Refer to the exhibit. A preliminary budget for the adjacent program was estimated at \$3,000,000 with 60% building efficiency. The client has requested the preliminary cost be reduced by \$500,000 while maintaining the same program spaces and overall construction quality.

What overall building efficiency must the architect achieve to fulfill the client's preliminary cost goals?

SPACE	SIZE (NET SF)	QUANTITY
Break Room	600	1
Conference Room	400	4
Open Work Area	4000	1
Private Office	100	20
Reception/Waiting	300	1
Restroom	175	2
Storage	50	3

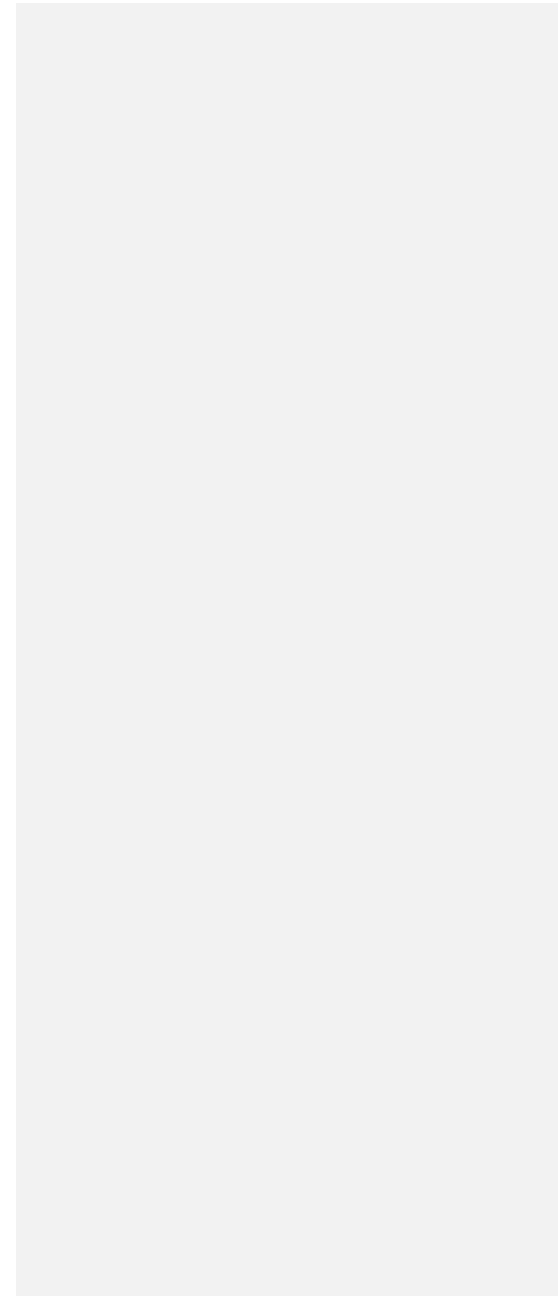


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Space	Size (Net SF)	Quantity	SF Net
Break Room	600	1	600
Conference Room	400	4	1600
Open Work Area	4000	1	4000
Private Room	100	20	2000
Reception/Waiting	300	1	300
Restroom	175	2	350
Storage	50	3	150
Total			9000

Net Square Footage= Gross area * Efficiency

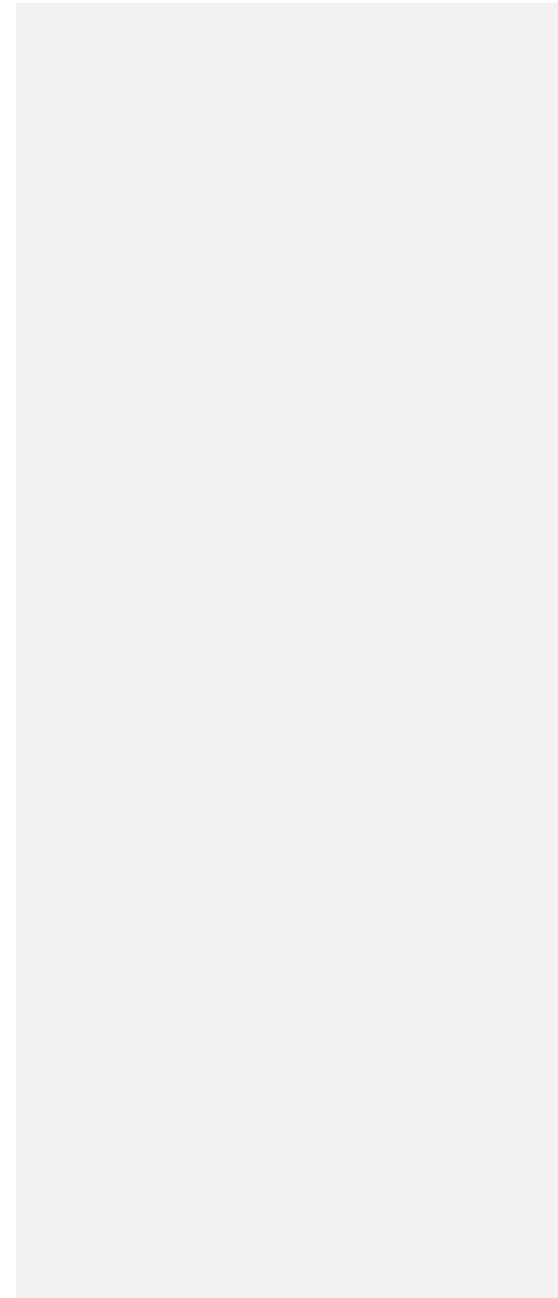
Gross Area= Net Square Footage/Efficiency

Space needs to keep the net square footage. Capital is lower... gross square footage needs to reduce...

Therefore Efficiency must increase.

Gross area:	9000	/	0.6	=	15000
	net sqft		efficiency		

Cost of construction:	\$3,000,000	/	15000	=	\$200
	Total Cost		Gross sf		\$/sqft



Actual Capital	\$3,000,000	-	\$500,000	=	\$2,500,000
Square ft to build	\$2,500,000	/	\$200	=	12500

Efficiency=	Net	/	Gross	=	
	9000	/	12500	=	0.72

72% response

building efficiency= net assignable area/the building gross area.

RATIONALE: Prior to performing any calculations, you'll need to understand

building efficiency as it relates to gross and net area.

Problem Seeking: An Architectural Programming Primer describes

building efficiency as a ratio of the net assignable area to the building gross area. In the provided program, the net assignable area is 9,000 square feet with 60% overall building efficiency. Dividing the net assignable area by the building efficiency factor will give you the gross building area required (Step 1). Since the client has requested to maintain the program and construction quality, the current cost per square foot for construction must be determined (Step 2). If the preliminary budget is reduced to \$2,500,000 and the cost of construction remains constant, the client can only afford 12,500 gs of area (Step 3). Dividing the net assignable area by the gross area

that the client can afford will give you the building efficiency that the architect must achieve to stay on budget (Step 4). Because the % symbol is given next to the answer box, you know the correct answer should be represented as a percentage, not a decimal.

SAMPLE ITEM 7 - CORRECT RESPONSE 72 %

Step 1: $9,000 \text{ nsf} / .6 = 15,000 \text{ gsf}$

Step 2: $\$3,000,000 / 15,000 \text{ gsf} = \200 per sq. ft.

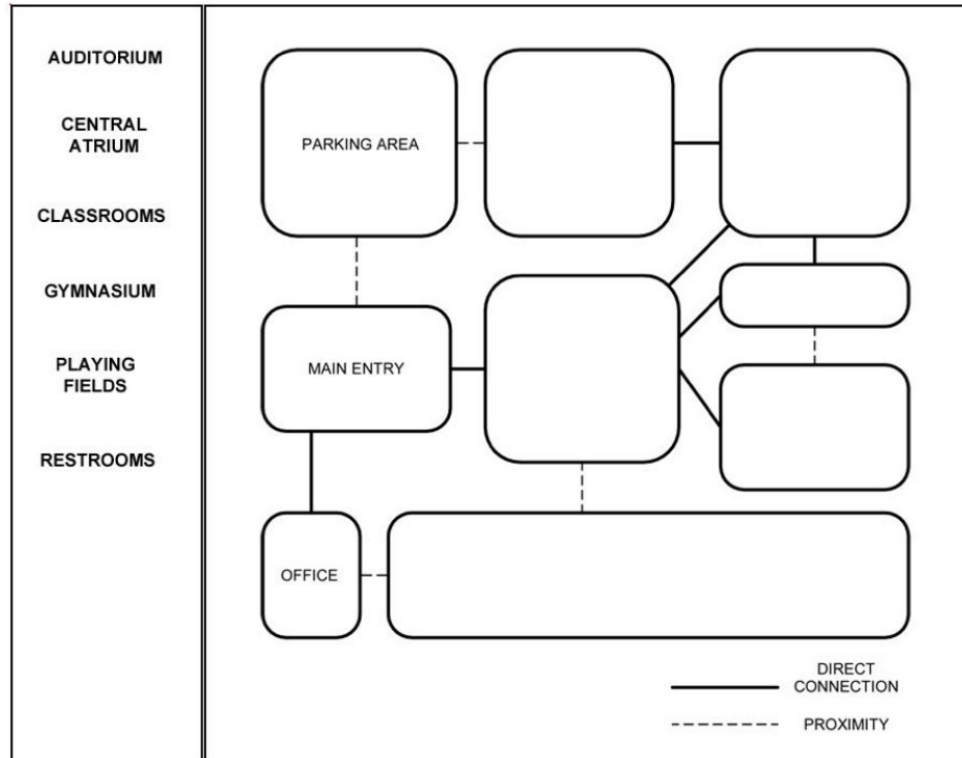
Step 3: $\$2,500,000 / \$200 \text{ per sq. ft.} = 12,500 \text{ gsf}$

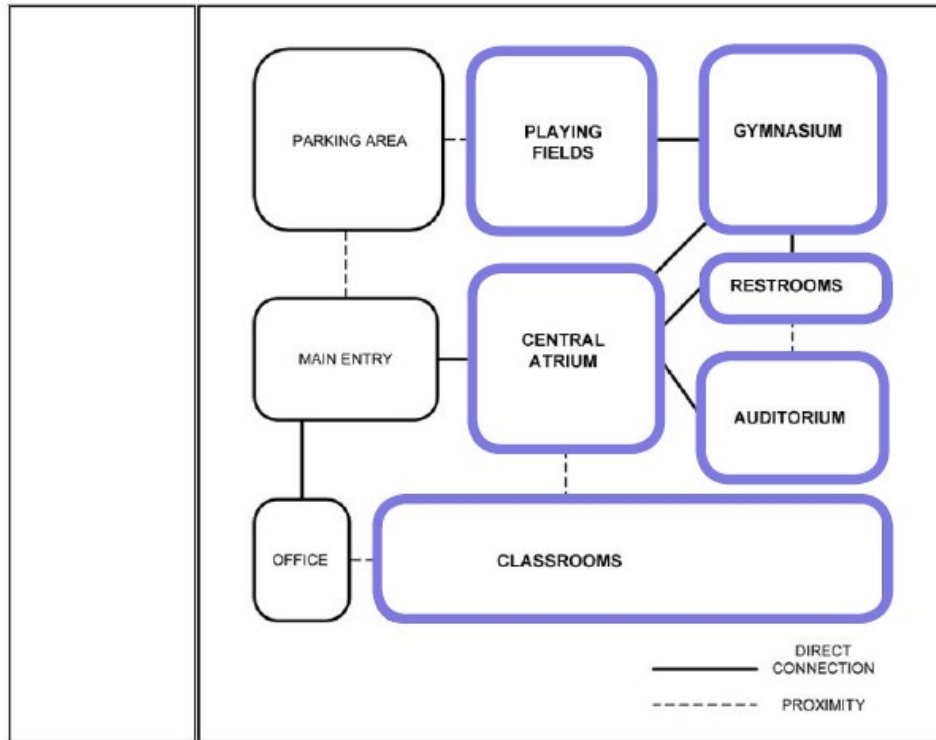
Step 3: 4: $9,000 \text{ nsf} / 12,500 \text{ gsf} = .72$ which is 72%

This is an A/E level item that requires you to evaluate and compare a preliminary budget and program to determine the required gross building area and overall building efficiency.

An architect is completing an adjacency diagram for a new high school in a rural community. The client has provided the following requirements:

- The Playing Fields will be used by the school and community for daytime and evening sporting events. Convenient access to the fields should be provided to all visitors.
- The Central Atrium needs to be a key gathering space during school hours, as well as host school and community related events in the evening. Additionally, it will serve as a pre-function space for events held in the Auditorium.
- The Restrooms need to be connected to both the Gymnasium and Central Atrium.
- The Office will provide faculty and student support throughout the school day.
- The Main Entry will be the secured point of entry for students and visitors. Drag the labels on the left into the appropriate bubbles of the diagram to show the required programmatic relationships.





- The Playing Fields will be used by the school and community for daytime and evening sporting events. Convenient access to the fields should be provided to all visitors.

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- The Central Atrium needs to be a key gathering space during school hours, as well as host school and community related events in the evening. Additionally, it will serve as a pre-function space for events held in the Auditorium.
- The Restrooms need to be connected to both the Gymnasium and Central Atrium.
- The Office will provide faculty and student support throughout the school day.
- The Main Entry will be the secured point of entry for students and visitors. Drag the labels on the left into the appropriate bubbles of the diagram to show the required programmatic relationships

RATIONALE: To complete this bubble diagram, you'll need to understand the spatial relationships of the high school as they relate to the program and the client's requirements.

The Playing Fields require convenient access for both daytime and evening activities, making the best location within close proximity to the school as well as the Parking Area.

The Central Atrium should be located central to the major program spaces with a connection to the Main Entry for secured access to evening events.

Since the Central Atrium is also a pre-function space for the Auditorium, the spaces should be directly connected.

The Restrooms have a direct connection between the Gymnasium and Central Atrium, while also being in close proximity to the Auditorium for use during performances and events.

The Classrooms' proximity to the Office provides convenient access for faculty and student support throughout the school day.

This is an A/E level item requiring the analysis of horizontal functional relationships as they relate to the building program and client requirements.

As part of the programming phase, an architect is required to create a preliminary project schedule for the renovation of a 50,000 sq. ft. laboratory facility. Which items should the architect consider when creating this schedule?

Check the three that apply.

- *Coordination meeting schedule
- *Lead time for construction materials
- *Project delivery method
- *Project budget
- *Regulatory requirements
- *Shop drawings

Check the three that apply.

*Coordination meeting schedule

*Lead time for construction materials

*Project delivery method

*Project budget

*Regulatory requirements

*Shop drawings

RATIONALE: According to The Architect's Handbook of Professional Practice, project delivery method, project budget, and regulatory requirements can have an impact on a project's schedule.

Multiple project delivery methods exist today, each implementing a different process with specific requirements and deliverables.

The project budget impacts the schedule directly, specifically regarding economic inflation over the duration of a project and staff hours required to complete a project.

Regulatory requirements vary by jurisdiction and may contain a complex and time-consuming approvals process. A coordination meeting schedule, lead time for construction materials, and shop drawings would be unknown in the programming phase of a project

This is a U/A level item requiring you to understand the factors that can influence a preliminary project schedule

References

PUBLICATIONS

The following sources are provided as the top references to assist candidates in preparation for this division.

For a more comprehensive list of potential reference material, please see the Reference Matrix at the end of this handbook.

Architectural Graphic Standards The American Institute of Architects John Wiley & Sons, 11th edition (2007) and 12th edition (2016)

Building Codes Illustrated: A Guide to Understanding the 2015 International Building Code Francis D.K. Ching and Steven R. Winkel, FAIA, PE, CASp John Wiley & Sons, 2016

Problem Seeking: An Architectural Programming Primer William M. Peña and Steven A. Parshall John Wiley & Sons, 5th edition, 2012

Site Planning and Design Handbook Thomas H. Russ McGraw-Hill, 2nd edition, 2009

CODES

The following code and accessibility requirements have content covered in the Programming & Analysis division.

2010 ADA Standards for Accessible Design U.S. Department of Justice, 2010

ICC A117.1-2009 Accessible and Usable Buildings and Facilities International Code Council, 2010

International Building Code (2015) International Code Council, 2014 PA References

AIA CONTRACT DOCUMENTS

None of the standard list of AIA Contract Documents related to the ARE have specific content covered in the Programming & Analysis division.

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Internet Exam

Which of the following are considered public utilities? **Select any that apply.**

- Electric service
- Trash removal
- Sewers
- Water
- Gas

A public utility is defined as, “an organization supplying a community with electricity, gas, water, or sewer
Trash removal is a service not a utility.

What is floor area ratio?

- Ratio of the gross floor area within a structure to the area of the lot on which the structure is situated
- Ratio of the area of the lot on which the structure is situated to the volume the structure occupies
- Ratio of the gross floor area within a structure to the volume the structure occupies
- Ratio of the area of the lot on which the structure is situated to the gross floor area within a structure

The floor area ratio, often referred to as FAR, is the total square feet of a building divided by the total square feet of the lot the building is located on. A high FAR tends to indicate more urban (dense) construction.

$FAR = \text{square footage of building} / \text{square footage of lot}$

Which of these statements regarding the advantages of using timber as a building material is true?

- It is used in two-way structural systems
- It is strong in compression but not tension
- Load is usually transmitted in two ways at a time
- It is strong in both compression and tension
- It has the highest tensile strength from all building materials

One of the advantages of using timber as a building materials is that **it is strong in both compression and tension.**

An Architect is designing a building in Southern California. What type of climatic region should the Architect anticipate to design for?

- Cool region
- Hot-humid region
- Hot-arid region
- Temperate region
- Tropical-wet region

An Architect designing a building in Southern California, would design for a **hot-arid region**

What is a general obligation bond?

- A bond issued by cities and counties to finance facilities for public enterprises
- A specific tax issued for a specific purpose that require a majority vote in by the people
- A municipal bond that uses legally available resources to repay bond holders
- A bond issued for general government purposes
- A bond issued to allow and promote private development
- A bond issued with a license to kill

A general obligation bond is a **municipal bond that uses legally available resources to repay bond holders.**

Which of the following are generally located beneath roads? **Check the three that apply.**

- Electric lines
- Communication lines
- Sanitary sewers
- Telephone lines
- Water mains
- Storm sewers
- Fiber optic cables

Sewers (both sanitary and storm) are generally located beneath roads. The same is true for water mains.

Communication lines such as telephone, and fiber optics, as well as electrical lines are located adjacent to the roads.

Lines carrying gas may be located under roads or under adjacent to them.

What is a setback?

- Average distance a building is placed from a property line
- Maximum distance a building must be placed from a property line
- Median distance a building is placed from a property line
- Minimum distance a building must be placed from a property line

Setback

A distance from a curb, property line, or structure within which building is prohibited.

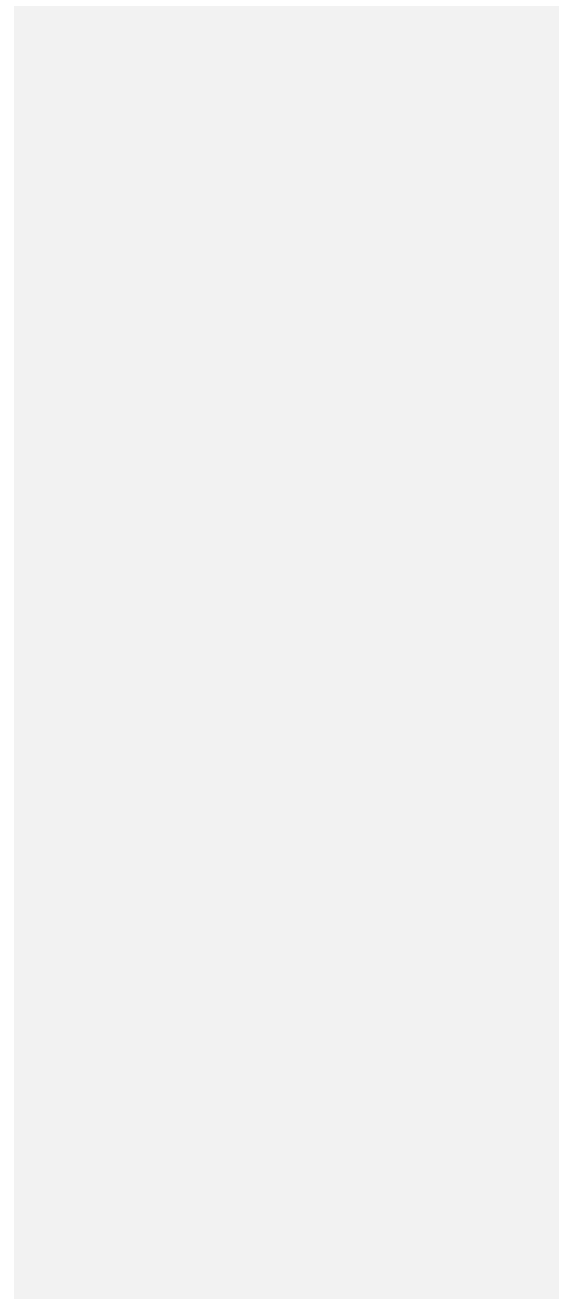
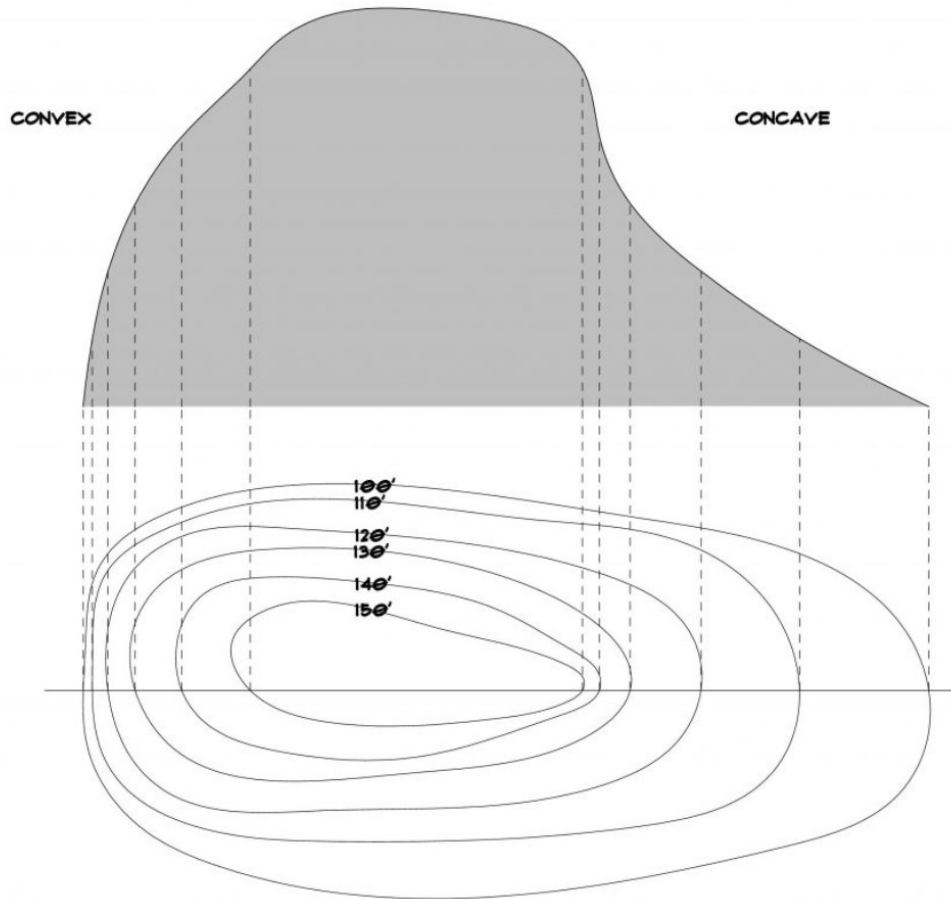
Setbacks are building restrictions imposed on property owners. Local governments create setbacks through ordinances and **Building Codes**, usually for reasons of public policy such as safety, privacy, and environmental protection. Setbacks prevent landowners from crowding the property of others, allow for the safe placement of pipelines, and help to preserve wetlands. Setbacks form boundaries by establishing an exact distance from a fixed point, such as a property line or an adjacent structure, within which building is prohibited. Generally, prospective buyers learn that land is subject to setback provisions when they are considering purchasing it. This information is important to future development plans, because setbacks remain in effect until changed by law or special action of a local government.

Setbacks can significantly affect a property owner's right to develop land or to modify existing structures on the land. For this reason they can influence property values; severe restrictions on land can decrease its value. Violating setback provisions can lead to legal action against a property owner, and penalties can include fines as well as an order to remove noncompliant structures. Property owners whose desire to build is stymied by setbacks have few remedies. They can petition their local government by applying for a variance—a special permission to depart from the requirements of **Zoning** ordinances—but variances are generally granted only in cases of extreme hardship. Litigation over setbacks is common.

On a topographic map, a slope is represented with contour lines that are spaced closer together at the lower elevations. Which landform would this represent?

- Concave slope
- Uniform slope
- Ridge
- Convex slope
- Plateau .

A slope represented by contour lines that have closer intervals at the lower level would represent a **convex slope**.



An Architect is requested to develop a concept for a computer store. The client wants the design to have flexibility to be converted to a classroom to teach children how to code. What would be a possible programmatic concept, suitable for this situation?

- Accessibility
- Hierarchy
- Tolerance
- Character
- Density

'Tolerance' may be a good programmatic concept for this scenario.

According to *Problem Seeking: An Architectural Programming Primer*, tolerance is defined as a concept that may add space to the program. Is a particular space tailored precisely for a static activity or is it provided with a loose fit for a dynamic activity?

What steps can an Architect take to minimize the impact of a parking lot the site? **Check the three that apply.**

- Separate the pedestrian and vehicular paths
- Have only the minimum parking required by the local zoning ordinance
- Provide some parking under the building
- Have single-loaded parking lots
- Have double-loaded parking lots that share access lanes

An Architect can take the following steps to minimize the area of site development required for parking lots:

- **Have only the minimum parking required by the local zoning ordinance**
- **Provide some parking under the building**
- **Have double-load parking lots that share access lanes**

In which situation might a developer petition for a variance?

- The building Owner wants to use the building for a different use
- Zoning conditions create undue hardship on the property owner
- When a fire station is located in close proximity to the building
- For a single-family residence whose unique design would make the building non-compliant with the code

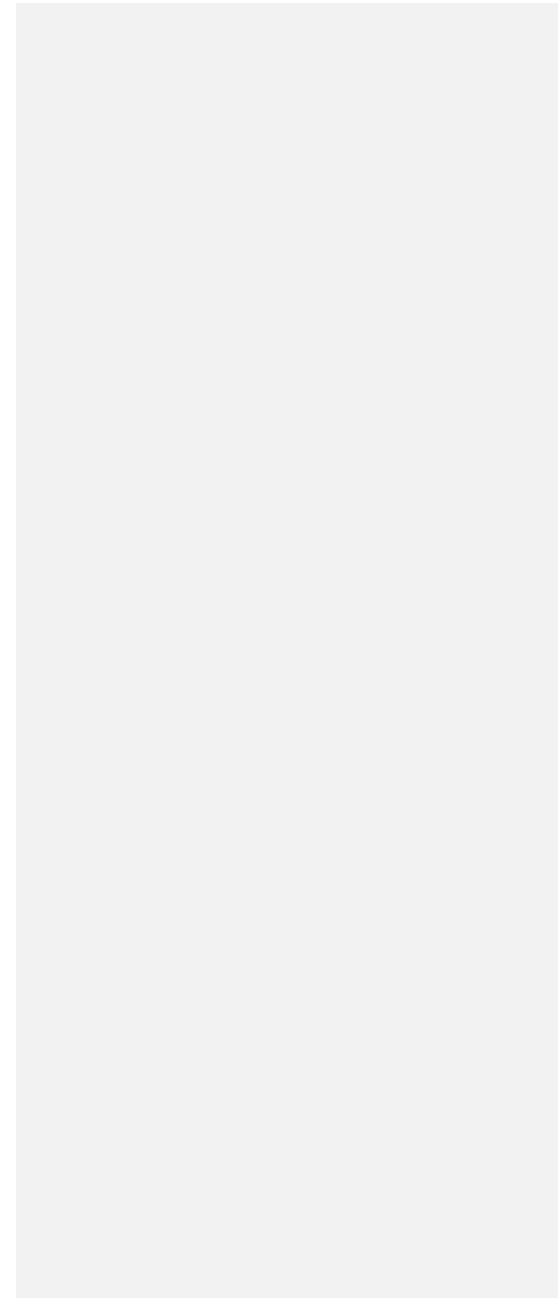
Variations are granted when designing a project to conform to the zoning ordinance would create undue financial hardship on an Owner.

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An Architect documenting an existing building might need to do which of the following? **Check the three that apply.**

- Document dimensions of the structure, external walls and partition walls
- Provide a cost estimate for demolition
- Take photos and videos of the building
- Provide a preliminary project schedule
- Inquire from the client if the as-built drawings are available

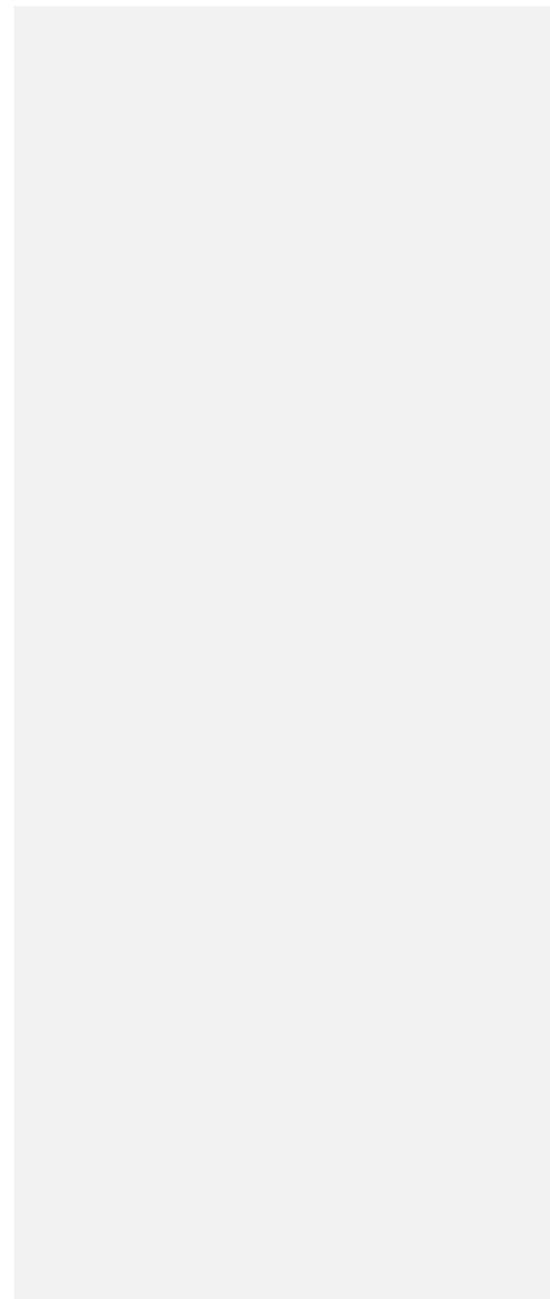
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- **Have only the minimum parking required by the local zoning ordinance**
- **Provide some parking under the building**
- **Have double-load parking lots that share access lanes**

A typical property description would contain which of the following data? **Check the four that apply.**

- Lot number
- Bearings and lengths of the property lines
- Area of the site
- Zoning requirements
- Corner markers

- **Lot number**
- **Bearings and lengths of the property lines**
- **Area of the site**
- **Corner markers**

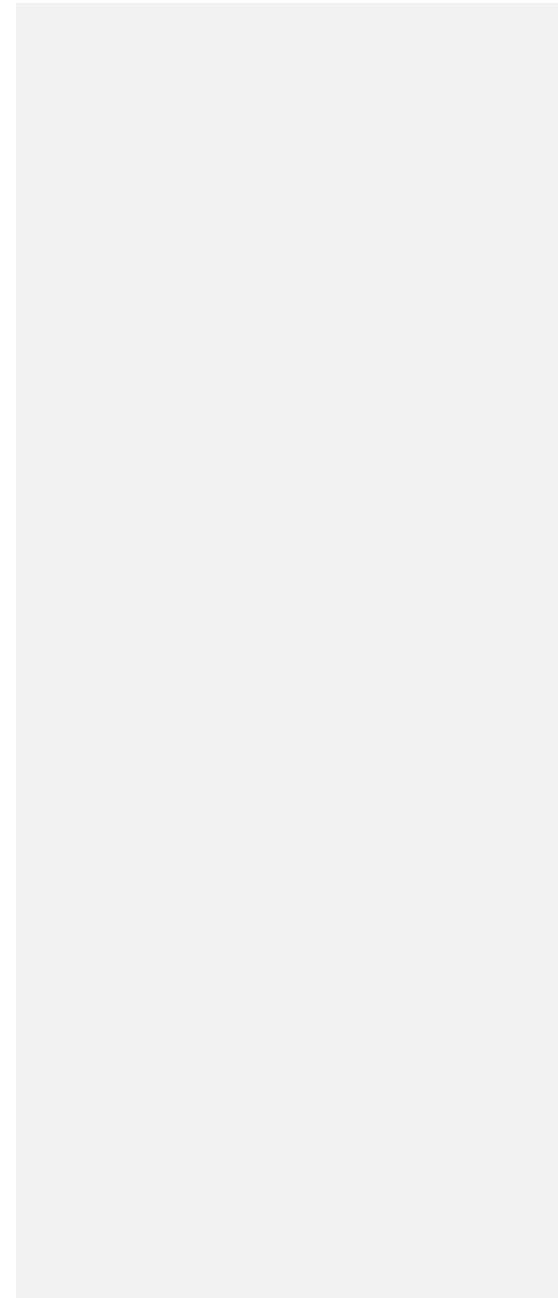


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A client wants to restore a 19th century bank building and wants to receive Federal tax incentives when doing so. Which of the changes listed below are permitted when following the Standards of Rehabilitation?

- Demolishing and removing a damaged section of retaining wall
- Sandblasting stone walls and exposed wood joists
- Adding a contemporary style entrance
- Replacing decorative timber work from the ceiling
- Preserving sections added after initial construction

Preserving sections added after the initial construction is permitted when rehabilitating, according to the Standards of Rehabilitation.

What is meant by the term 'bond' in financing?

- Rate of return
- A negotiable loan (debt security) issued by a government entity
- The security interest of the lender
- A short-term loan to purchase property
- A short-term loan used in distressed financial situations

A bond is a negotiable loan (debt security) issued by a government entity.

What is the maximum length of a corridor with a dead end? (Answer in feet without units Ex: 12)

According to section **1018.1 Dead Ends** of the IBC

*Where more than one exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than **20 feet**.*

The correct answer is 20 feet, which should have been answered as 20.

A hospital has 20,500 sq ft in net area. It's gross floor area is 30,000 sq ft. What is the efficiency of the building? (Answer without units and round to the nearest whole number)

The efficiency of a building is the ratio of the net area to the gross area.

Efficiency = 20,500 sq ft/30,000 sq ft

Efficiency = 68.33% rounded to **68%**

Which of the following is an example for 'abatement' of a property?

- Desirable features of a property that have been paid for by a tenant
- A reduction of the selling price of a house due to a visible crack on a non-load bearing wall
- An appraisal of the value of a property
- An area in a city where buildings are not in good condition and need improvements
- Accessing one's house through the property of another due inaccessibility from another rout

A reduction of the selling price of a house due to a visible crack on a non-load bearing wall is an example for 'abatement'.

In this case, abatement is simply used as a reduction of price. This is not the same as a property tax abatement.

"Some cities have property tax abatement programs that eliminate or significantly reduce property tax payments on a home for years or even decades. The purpose of these programs is to attract buyers to locations with lower demand, such as areas of the inner city that are in the midst of revitalization efforts." via Investopedia

A firm assigns the design of a 50-person office building to an Architect. The net area per office staff member recommended by planning guidelines is 175 sq ft. To meet the company's goal of a building efficiency of 75% what should be the total gross area of the building? (Answer without units or separators. Round to the nearest whole number.)

Net office space needed = $50 \times 175 \text{ sq ft} = 8,750 \text{ sq ft}$

The efficiency of a building is the ratio of the net area to the gross area.

Efficiency = net area / gross area

which can be rearranged to...

Gross area = net area / efficiency

Gross area = $8,750 \text{ sq ft} / 75\% = 11,666.67 \text{ sq ft}$ or **11667**

Which statements on the *solar reflectance index* (SRI) are true? **Check any that apply.**

- The lower the SRI value, the better the chances of reducing the heat island effect
- The SRI value is a measure of the ability to absorb solar heat
- The SRI values range from 0 to 1000
- The higher the SRI value, the better the material's chances of reducing the heat island effect
- The SRI value is lowest when the material is coolest

The only statement that is true is **“The higher the SRI value, the better the material’s chances of reducing the heat island effect”**.

What type of development pattern is mostly amorphous?

- Field pattern
- Naturalistic pattern
- Star pattern
- Satellite pattern

A **field pattern** is mostly amorphous.

A project site has 50,000 s.f. of land area and 10,000 s.f. of gross building floor area. The zoning ordinance has a required ratio of 3 s.f. of parking area to 1 s.f. of gross building area. How many parking spaces are required at 400 s.f./car?

To solve this problem we must first calculate the total parking area required. The question states that:
3 s.f. of parking area / 1 square foot of gross building area.

So in our case

$((3 \text{ s.f. parking}) * X) / (1 \text{ s.f. gross building area}) * (10,000 \text{ s.f. gross building area})$

If we solve for X we get 30,000 sq. ft. of parking area required.

The question states that each parking space is 400 s.f. so we can divide the total required area by the space per car to determine the parking count.

$30,000 \text{ s.f.} / 400 \text{ s.f.} = 75$

The answer is 75.

The project land area of 50,000 s.f. is not required to answer the question.

During the various steps of programming such as establishing goals and collecting facts, which factors should be taken into consideration?

- Time, cost, and quality
- Schedule, climate, and users
- Function, form, economy, and time
- Hierarchy, order, and composition
- Rhythm, datum, and transformation

During programming, function, form, economy, and time should be taken into consideration.

NCARB Recommended References for the ARE PA

NCARB ARE Handbook [Free] – An overview of what is tested on each of the ARE 5.0 divisions.

2010 ADA Standards for Accessible Design – [Free] – [Also Recommend for: PPD]

Building Codes Illustrated: A Guide to Understanding the 2012 International Building Code [\$] – Code can be hard to get through, but this book really makes it much easier. Obviously it can't replace the code books, but it helps develop the understanding an intent of the code. [Also Recommend for: PPD, PDD]

ICC A117.1-2009 Accessible and Usable Buildings and Facilities [\$\$] – Great reference for required ADA guidelines.

International Building Code (2012) [\$\$\$] – Old faithful. Sometimes it can be hard to get through and understand code. A lot of it just comes with memorization. I've linked the commentary here because it helps you understand the intent behind the code. [Also Recommend for: PPD, PDD]

Planning and Urban Design Standards [\$\$\$] – “This book is tremendously broad in its coverage of planning topics, though not in depth. Most topics get only 2 pages, though some get 4-5. References are listed for each topic to help you find more detailed information.”

Problem Seeking: An Architectural Programming Primer [\$\$] – For anyone look to understand the fundamentals of programming in architecture.

Site Planning & Design Handbook [\$\$\$] – This book has mixed reviews but it's on NCARB's list... so here it is. [Also Recommend for: PPD]

Space Planning Basics [\$\$] – A great recourse for understanding the fundamentals of creating a building program and developing one into an initial schematic plan.

Programming Planning Practice

FAR (Floor Area Ratio) =

Site area =

One acre =

Allow 400 sf per car

Project construction budget =
15%

Building Efficiency =

gross floor area

Efficiency factor has no bearing*

43,560 sf

for parking & circulation

85% construction costs

surveys, testing, fees, furnishings

Net Area / Gross Area 2

Programming and Analysis

- Asses Needs and Requirements
- Develop Master Plan and programs
- Design Objectives
- Site Characteristics
- Spatial and Functional relationships
- Building Systems
- Establish Project Scope
- Building Systems
- Establish Project Scope
- Phasing
- Budget
- Schedule
-

Town/City development history

Started as rectilinear land pattern (agricultural) or circular (herdsmen). Greek cities at first were irregular, but in the fifth century a planner named **Hippodamus** set a grid pattern on the proposed site. The grid was superimposed on rocky hillside sites in disregard to the natural terrain, occasionally a street would require steps. Had center of town called **Agora**, or market place.

Medieval town was a labyrinthine form and surrounded by heavy fortified walls. The church was the center of the town.

Renaissance development became more intellectual, more formal and more monumental. Renaissance introduced spacious urban plazas, broad boulevards and vast, formal gardens.

Pierre Charles L'Enfant was the 1st city planner in this country, Washington DC. He used a geometric plan, which had diagonal and radial streets superimposed on a typical grid layout.

The **machine age** shifted from the farm to the factory having the effect of soaring expansion in population density. The speed of this dramatic change took its toll on the urban environment in the form of congestion, pollution and painfully unhealthy living conditions.

20th century planners came up with the idea of the garden city.

Ebenezer Howard proposed the creation of a city on 1,000 acres with 30,000 inhabitants. At the central core was public buildings surrounded by commercial shops and dwellings with industrial facilities located on the city's outskirts. All of this was encircled by a permanent green belt of about 5,000 acres.

Henry Wright and Clarence Stein tried to minimize the conflicts between automobiles and people, they conceived the superblock. The superblock was an island of green, bordered by dwellings, with roads and parking placed at the periphery, which was used at Radburn, NJ.

CPTED (vandalism prevention & security thru design)

Defensible space is a concept first proposed by the architect Oscar Newman and developed further by Alice Coleman. It is the idea that crime and delinquency can be controlled and mitigated through environmental design. The idea is important because it relates an individual's environment to his or her expectation of crime in the community. There are

four factors that make a defensible space:

1. **Territoriality** – or the idea that one’s home is scared.
2. **Natural surveillance** – the link between an area’s physical characteristics and the residents’ ability to see what is happening.
3. **Image** – the capacity of physical design to impart a sense of security.
4. **Milieu (environment)** – other features that may affect security, such as proximity to a police substation or busy commercial area

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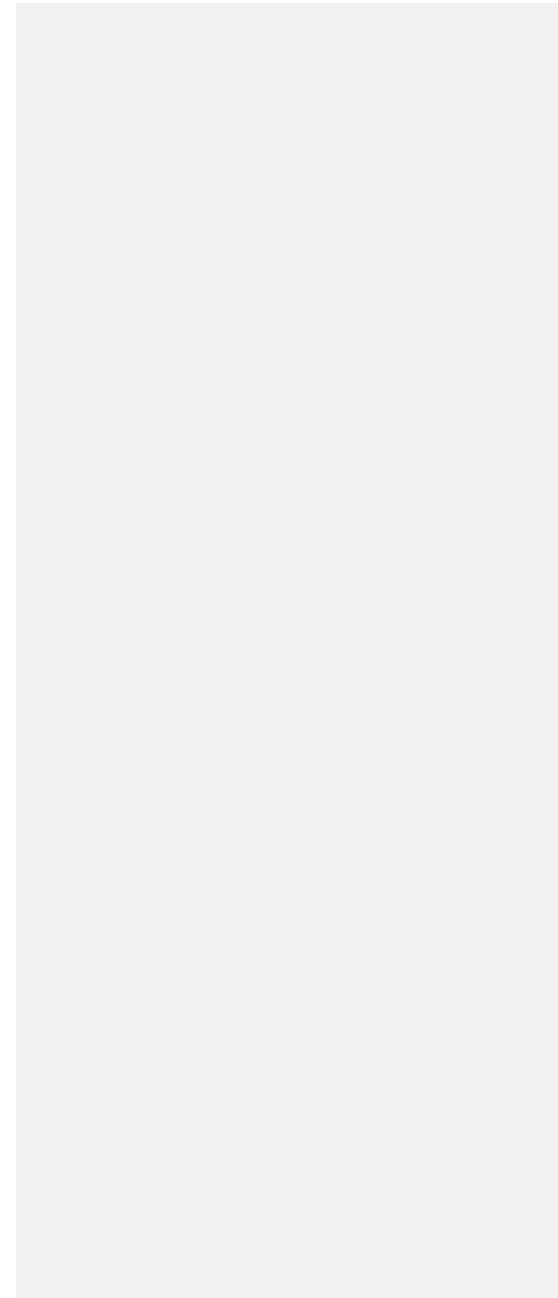
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Environmental, Social, and Economics

- Building Surveys
- Physical Impacts
- Environmental Impact
- Social Impact
- Develop Concepts
- Sustainable
- Energy Efficient
- Alternate Energy
- New Materials
- Basic Design
- Historic Precedents
-



Basic site programming:

Sun

Solar Radiation is the sun's energy. Most of it never reaches us. It reaches us in two forms – direct radiation and diffuse radiation. Amount of radiation received is determined by the angle of the sun's rays, the more perpendicular the more energy. By having overhangs on the south face of the building, the summer sun is blocked, but winter sun can enter. Should have major glass on the south face, Moderate on the east and west faces and minimum on the north face.

Wind

cold winds typically come from the north and west and summer breezes come from the southwest. North and west sides of a building should be minimized or avoid windows or entrances and use trees or other windbreaks to block the wind. Summer breezes should be channeled to cool the interior and exterior spaces. Snow – where snow fall is heavy, the location and design of entrances and outdoor balconies are critical. Also, design with the reflection of snow glare.

Humidity

the ratio of the actual amount of moisture the air could hold at a given temperature. Relief from high humidity in the form of natural ventilation or mechanical cooling. Comfort zone is between 65 to 75 degrees and 20 to 75% relative humidity.

Degree Days

the number of degrees that the mean temperature for the day is below 65 degrees F. (50 degrees has 15 heating degree days).

Regional design/methods:

Macroclimate

general climate of the region; determined by many factors – solar energy it receives from the sun, mountains and oceans, latitude

Microclimate

climatic characteristics unique to a small area, caused by local features. The site can be modified to make the site more comfortable.

Water

designer shall preserve any existing streams and can introduce water to the site as a pool, etc. In summer the water can have a cooling effect, physical or psychological.

Trees

they provide shade, block the wind, cool, humidify, filter the air and help to prevent rapid, destructive runoff. Deciduous trees can block summer sun, but allow winter sun to penetrate.

Albedo

is the reflectivity of a surface. Natural ground cover has a low albedo value, therefore reflects less heat.

Hills

cold air, being heavier than warm air, flows downhill. In hilly areas the coldest ground surfaces and air are found in the valleys, which may be desirable in warm climates, but not cooler climates. Slopes are more preferable in cooler climates than the valley.

Landforms and Structures

On windward side of a hill, wind speeds are highest near the crest, while the leeward slope has less turbulent winds. Near the bottom of the hill on the leeward side, the winds decrease to almost zero, creating a "wind shadow".

Other factors

structures may be built in the ground for natural insulation and to minimize exposure to winds.

Glare from water or snow shall be minimized. Minimize west facing windows and outdoor activity areas.

Take advantage of cooling summer breezes with walls or hedges to channel the breezes to cool indoor or outdoor spaces.

Urban Microclimate

the elimination of natural ground cover and the emission of heat, creates a microclimate which is warmer and drier than rural areas, with more rain, clouds and fog. There is also more noise, air pollution and glare.

Both Macro and Micro consists of **five** major elements –

1. **sun,**
2. **wind,**
3. **temperature,**
4. **humidity and,**
5. **precipitation.**

Climate – four climate zones in USA:

1. **Cool zone** – very long cold winters, strong winds and deep snow
2. **Temperate Zone** – largest climate zone. Warm and hot summer, cool and cold winters and moderate spring and fall.
3. **Hot-Arid zone** – desert like region – clear skies, dry air, long periods of overheating and large daily temp. Variations Days are hot, nights are cold, rainfall is minimal and vegetation is sparse.
4. **Hot-Humid zone** – high, relatively constant temp. and humidity, variable winds with occasionally hurricane force and torrential rains

Elements affecting building type size and orientation

1. **Cool zone site** planning would be to control the wind, maximizing the winter sun, group activities to minimize outdoor travel and avoid local cold air pockets
2. **Temperate zone site** planning would include blocking cold winter winds while admitting cool summer breezes, maximizing shade in the summer, providing for extreme conditions of high wind, flooding and snow.
3. **Hot-Arid site** planning should use shading and screening to provide relief from the heat and glare of the sun, preserves natural plant materials while adding compact plants and maximizes humidity and summer air movement
4. **Hot-Humid sites** are designed to provide shade and air movement, while protecting against rains, flooding and strong winds.

Temperature climate:

Best configuration for a temperature climate

- Short wall facing west
- Overhang on long side on south
- Primary heat gain on roof
- Stagger horizontal or vertical
- Stacked high rise

City Planning: City (Northern, CA) or Minnesota best climate design

-Town structure closely dense, larger buildings grouped sheltering wind, but utilize sun/ solar

“Not” design loosely/free layout

- Dense but with shades
- Town character to be loosed/scattered

City planning - Thermal environment: Characted of existing & new structures affects thermal environment : Shadow pattern.

“Not”: Mechanical system, texture, foot prints

Climatic characteristics: Temperature, humidity, wind velocity

Solstice: Winter December 21st-Longest night, Summer June 21st- Longest day

In hot arid climate:

Thick walls-Thermal mass: Materials with high heat storage value used in arid lands. (Arizona, New Mexico)

- Wide overhangs
- High ceilings are good designs

Southwest desert buildings:

Most significant: Recognize the climate and other problems of the area.
Deeply recessed openings are best shading for glazing in any directions.

Shaded glass is more important than insulated glass.
Radiation is more value than conduction.
Roof area is not that critical when compared to recessed glazing.
Vertical louvers (especially south) diminish solar radiation

Solar radiation:

South wall get maximum winter radiation.
Roof and east / west walls receive maximum radiation in summer

Cold climates vapor barriers in attic: Minimize moisture migration.

Not: Serve secondary water proofing, support insulation, protection from insects

Roof overhang built in northern hemisphere seasonal adjustment for solar radiation: South facing overhang

Most important factor in residential units: Recieve sun part of winter day

Not: -West facing @ a premium
-Bedrooms away from harsh wind
-Mask units from breezes

Innovative technologies - Cost effective:

Site driven technologies: Wind turbines, photovoltaic, small scale hydroelectric. They are also relatively cost effective.
Fuel cell technologies and groundwater aquifer for cooling and heating depending on climate/environment.

Solar energy is limited in building on north side of high rises. High rises cause shadow on their northerly buildings

Solar: Sun chart shows: A) Path of sun by means of attitude & azimuth (21st day month). Sunrise to Sunset

B) Amount of sunshine based
C) Cloudiness not in chart
D) Heating degree days in not in chart

Solar site depends on slope & latitude. All earth @ same latitude gets same sun regardless longitude

Building Orientations: External influences: Climate, noise, views & solar. Foundation is not related.

Town 1 @ base of mountain & town 2 @ 3000' above town 1
Town 2 is always cooler

Rural versus urban climate - Planted rural area:

Stabilize microclimate hard surfaces swing temperature fast plants absorbs & store heat. Plants increase transpiration & increase rainfall. Plants purify air

Geothermal: Needs mechanical for design & Architect to implement. Landscape (& structural) not involved. Outside beneath earth

Best use of overhang:

Sun @ low angle is fully captured

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Ideal orientation and fenestration based on climate:

Latitude

Adjacent reflective surfaces

Interior room functions

Building heights

Avoid tree screens of sunlight

HVAC is an external to building issue - Secondary concern

Wind

Air movement - Degree of comfort @75 F degrees, 30 R.M., 100 FPM = Quite pleasant.
Less than 50 FPM = Not noticeable.
> 25 F PM: Drafty & annoying

Wind: Open plaza windward side of high rise:
Shelter Hotel, relocate the entrance, placing walls, trees are not very effective

Wind: Two building, smooth surface and one is steps or jagged

- Smooth surface building creates more turbulence, "not" wind acts same way regardless
- Turbulence is more on stepped building energy is dissipated
- Turbulence is a minimum concern in high rise & street

Wind and pressure: When velocity doubles, the pressure quadruples.
 $P = c V^2$

Soils & bearing

Soil:

Soil: Mixture of rock particles, minerals, decayed organic materials (humus), water and air. Soils are different due to variation in composition.

Clay: Fine grained, firm cohesive is introduced by decomposition + hydration of rocks. Clay is plastic (wet) & hard (dry), impervious (relative), swells when absorbing water, shrinks when dry, very unstable & predictable for support of buildings maybe used for foundation & needs engineers.
Clay is smaller than sand or silt. Clay is cohesive.

Silt: Fine grained, sedimentary, <.002" or less
Silt plus water makes mud, soft, sticky, plastic

Sand: Loose granular, .002" to 1/4", not plastic, & not cohesive
"course- grained solid"= sand +gravel=
base foundation relative + excellent drainage =
relatively permeable
quick Sand= sand + moving water, unstable, "sink hole"

Gravel: Larger soil particles with most void has higher permeability than clay, sand, silt. 1/4" to 3 1/2"; greater than 3 1/2"= cobblestone, greater than cobblestone= boulder

Hard pan: Mixture of Gravel, clay, sand foundation phase

Decomposed rock: Disintegrator rock mass that were solid

Boulders: Rock detached from bedrock

Shale/ slate bedrock: Fine textured soft rock (sheets); Solid material/ earth's crust.

Humus: Well decomposed, more or less stable, organic matter in soil, dead plants, animals

Mulch: Conserve moisture and temperature, prevent surface compaction, reduce runoff, and erosion. Improve soil structure and control weed

Muck: combination of soil, water, higher mineral content than peat. The level of decomposed is high and original plant part cannot be identified.

Peat: peat (turf) is an accumulation of partially decayed vegetation matter or histosol. Peat forms in wetland bogs, moors, muskegs, pocosins, mires, and peat swamp forests.

Compost: Used as organic fertilizer; mixed nitrogen and soil. Compost is to permit organic material to become crumbly and to reduce carbon- nitrogen ratio of the material

Mortar: Cement + water+ sand+Lime; less stiff than concrete and handle with trowel

Concrete/grout: Cement + water+ sand+ Gravel;

Grout: Quite fluid poured in bricks

Compare large amount of loose silt site and organic soil for cost:

Organic soil (peat) is elastic, weak, little cohesion and organic will cost more. It must be removed and replace.
Loose silt can be compacted.

Land has loose fill, sloped, and large area: Site usefulness:

Identify the potentials, level the site and make recreational. Do not deny based on soils.

Bulb tee foundation: Underpinning as a temporary support. Usually in gypsum concrete construction. In bridges, they are permanent.

Building built to next existing building with shallower foundation: Both footings must be at same length. Temporary support: major shoring to take place.

Expansive soil:

- Locate the footings in soils below the zone of seasonal moisture change
- Extend concrete piers below the zone of seasonal moisture change
- Design foundation for soil bearing pressure greater than the swell pressure of the expansive soil
- Expansive soil is silty, clayey expands wet
- High upward pressure
- Oversize the footings will not help- More area for the upward pressure.

Exceeding the load bearing capacity of soil:

- Settlement can occur and uneven movement and cracks occur
- Structure fails
- Mat or raft foundation is good for poor soil
- Not enough for poor soil with insufficient soil capacity- Even for mat
- Overhanging to a pile is also not sufficient
- Piles must transfer to deep bedrock is the only response

Three types of rock

Sedimentary Rock

covers most of the earth's surface, deposition of sediments transported by streams, ocean currents, ice or wind. Types – sandstone, shale, limestone.

Igneous Rock

is formed when molten rock material cools and solidifies. Types granite is strong, hard, dense and very high bearing capacity.

Metamorphic Rock

Igneous and sedimentary rock can be changed as a result of heat into metamorphic rock. Can be foliated (slate, schist and gneiss) or unfoliated (quartzite and marble).

Soils

Bedrock, horizon C (which is partially decomposed bedrock, supports little plant life), horizon B (subsoil, has been further weather and decomposed) and horizon A (topsoil, fertility of the soil).

Unified Soil Classification

groups soils into coarse-grained, fine grained and highly organic.

G – gravel and gravelly soils (coarse)

S – sand and sandy soil (coarse)

M – very fine sand and inorganic silt (fine)

C – inorganic clays (fine)

O – organic silts and clays (fine)

P – peat (highly organic)

Coarse grained soils are given an additional letter:

W – well graded (containing a mixture of particles of various size)

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C – well graded with clay

P – poorly graded

Fine grained soils are given an additional letter:

L – low compressibility and low plasticity

H – high compressibility and high plasticity.

Different soil test:

Test pits

excavated of the soil to expose subsurface soils

Borings (wash boring, auger & core boring)

exploratory borings, from which samples of undisturbed subsurface soils are obtained to determine the types of soils. How many and how depth are determine by the engineer.

Rock has the highest bearing capacity, followed by coarse-grained soils (sands and gravels), then clays and silts (fair foundation material) to organic soils (unsuitable to support buildings).

If soil is unsuitable to support the require loads the material can be removed and fill brought in to the site. The fill is then compacted to bearing strength with a sheepsfoot roller.

Undesirable soils should be removed and replaces with granular materials. Hardpan can be artificially produced to improve undesirable soils. Adding compacted ash, subsurface drainage or lots of short piles.

Boring and tests:

Soil test - No guessing- Liability

Test pits: Simple excavation, visual excavation of soil condition, soil layer in open pit (access to soil). Do not go below water table

Wash borings: >100', use 2" or 4" diameter + water jet to soften soil to find bed rock (mistake => boulder is not bedrock)

Soil load: Use loading platform, incremental load applied, pressure continues till settlement becomes regular loadings, test= (2) contemplated load tests

Core boring: More cost, more reliable, penetrates thru, diamond blade cut thru rocks, 5"sample taken out for tests. # of

bores, locations, Geotechnical Engineer to analyze for city

Dry samples: Drive pipes with special sampling and tip, 5" samples/lifted/stored/test every 5" each, # of bore, location, plus depth

Properties >>>>>>>>> Foundations >>>>>>>>> Soil bearings

Specific gravity: Density/density of water used to determine void ratio

Grain size: For granular soil) to determine permeability, frost action, compaction, shear strength

Grain shape: To estimate shear strength

Liquid/ plastic limit: (In cohesive soil) to determine compressibility & compaction values

Water content: (Cohesive soil)

Void ratio: To determine compressibility

Slump test: To measure the consistency of a mix. Concrete, mortar and grout stiff to loose.

Unconfined compression: (Cohesive soil) to estimate shear strength

Percolation test: On site sewage disposal for property "not" evaporation test, soil alkalinity, or soil density

Soil exploration & testing: Intrinsic character of soil. "Not" bearing capacity, depth or water table or bedrock

Proctor test: Optimum moisture content and density of soil.

Test boring: Highly accurate data for specific site.

Compacted fill: If soil is soft. Remove and replace with compacted soil. Fill or imported soil. Compact every 6" layer (sheep foot roller). Compacted fill needed for buildings, walkways and pavements.

Sub surface investigation reports includes

- Field results
 - Laboratory results
 - Foundation type recommendation
- "Not"
- Soil sieve analysis: This is an inner component data only important to lab. analyst

Number of test boring when uniform sub surface. More spaced boring; When building foot print is more complex & square feet is high number of test boring increases

"Not" affected: Encountering firm strata; Regardless of strata, boring extends to 20' min. unless rock is encountered

Geotechnical Engineer: Provides soil characteristics plus bearing capacity of soil

Soil damage

Water table:

- When soil is saturated, the line above is water table
- Parallels earth surface
- Varies with seasonal fluctuations
- Precipitation, on ground surface
- In practice: water table to be below foundation to avoid damage [hydro static/ capillary action]
- Water to be drained away "from building"
- Drainage tiles: 6" below lowest floor slab
- Open joists to be covered with wire mesh then coarse gravel or stone back fill
- Slab on grade with no hydrostatic pressure is on gravel fill (6"-8"), water not drawn by capillary
- Sealant are used in all connections

Water table:

Boundary between aeration (zone) & saturation zone

Increased moisture content in bearing soils effects:

Change in volume and reduction in bearing capacity
"not" increase in cohesion, or decrease in compatibility

Sudden loss of shearing resistance in a cohesionless soil

Liquifaction

"Not" plasticity, collapsing soil, or expansive soil

Unstable differential settlement: building failures due to unstable subsoil that causes differential settlement of foundation:

Based on large beds of clay contained in gravel

"not" stratified rocks, small boulders in gravel, or deep layer of dry sand and gravel

Erosion: Removal of vegetation from site causes erosion

"not" pollution, disorientation, defoliation

To reduce potential vertical movement due to expansive clay:

- Over excavate below footing grade & fill with compacted gravel,
- Extend footings & foundations to a depth of consistent ground moisture
- Drain surface water away from foundation
- Control roof water run off

"Not": Water proof foundation to reduce filtration plant trees near building to stabilize ground

Settlement: As wp (weight) of buildings increase, soil under footing compresses, reduce void volume then bldg settles. Even bedrock has to be verified slight even settlement is okay.. Differential settlement creates cracks/ failures continuous survey of site as construction occurs is required settlement continuous with time due to void, moisture, movements

Earth movement: Great with easy subsoil, clay swells (wet) & shrinks moisture content @ surface with clay creates each movements @ 5' earth movement is great. Serious issues if footings are different. adjacent excavations affect clay moisture content this causes settlement or slippage @ sub surface clay slope surface + raw or moisture moves earth mass evidence: Structure with tilt or rows or sloping power poles

Cubic yard: Units measuring cuts & soils is volume "not" square yard (area), acres (area_, tonnage (weight)

Balancing cut & fill is for site grading

"not" Sediment control, land reclamation, footing excavation

Contours:

Contours are imaginary lines that connect all points of equal elevation. Existing contours are shown dashed and proposed contours are shown solid. Every fifth contour should be shown darker. Contours are labeled with the number within the lines or on the higher side. Uniform slopes – are indicated by parallel contours which are evenly spaced.

Convex slopes – are shown by parallel contours spaced at increasing intervals going up hill, closer contours are at lower elevations.

Concave slopes – are shown by parallel contours spaced at decreasing intervals going uphill, closer contours are at the higher elevations.

Valleys – are indicated by contours which point uphill.

Ridges – are indicated by contours which point downhill.

Summits and depressions – are represented by concentric closed contours. Both should have a spot elevation that is the highest or lowest point.

Legal surveying

Benchmark: Reference point of project

Public land of 1785: Created townships and sections

Easement on private property: Across created.

Not: Daylight, setbacks, landscaping

Land use restriction by authority having jurisdictions: Setbacks, height/area limits/zoning

Not: Covenants (Local restriction- Specific)

Not: Accessibility regulations: (No restriction) must do

Distance & compass bearings: Metes & bonds, "not" changing- 66', datum elevation, or benchmark

Restrictive covenants on behalf of property owner, not any Engineers, Architects

Right-a-way: A right belonging to a party to pass over land of another.

"Not" : Purchase of land, taking property, picketing/strike

Street

Roadways smallest to largest

Local access streets: Low intensity fronting houses & often in forms of loops or cul de sac

Collector streets: Transition from local access to arterial intersections.

Intersections: Controlled by traffic signals, local streets with stop signs

Arterial streets: Continuous vehicular channels that connect with expressway through ramps generally two to three lanes

Expressways: Large movement between urban center and accesses are limited

Legal constraint on a proposed land:

Deed restrictions: zoning ordinances; easements. "Not" environmental impact statements (EIS). Only +/- impact on potential for the site

Practical & effective dry crawl space?

Provide tight & continuous ground cover using polyethylene film @ least 4 mil thick (vapor barrier floor & sub floor okay but not help)

Non confirming but legal existed prior to enactment of land use is grand fathered,

not: -easement -dedicated -aggrieved

Deed restrictions: Legal restrictions imposed on land by private parties on buyers to maintain integrity of property

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Zoning ordinances include: limited population density; segregated permitted uses, restricted lot coverage, not include: diminished fire danger.

Spot elevation: Proposed finished elevation of single point. Elevation of key structures such as building corners, manholes, and catch basins.

Seismic or resistivity survey: Limited but reliable but enough for foundation.

Zoning ordinances include: Provide building interiors with natural light and ventilation, inhibit fire spread from building to buildings, eventual widening of the streets, preserve setbacks

Topography

Find elevation on topography: The elevation on the two Contours are 60 and 55 ft the interval is 16 ft. What is the elevation 4 ft away from contour 55

$60 - 55 = 5$ ft elevation difference in 16 ft

4 ft is 25% of the distance ($4/16$)

$5 (4/16) = 1.25$ ft + 55 ft = 56.25 ft elevation

Slope: (Contour 1- contour 2)/ change in interval = $V/H = G = 245 - 230 / 5 = 3:1$

Topography: Land layout and Site Slope are critical in evaluating site worth and applicability. Cut and fill costs are not cheap.

Topography critical for routing storm water (natural slope)
not water, electric/ gas

Contour lines: Spaced @ given horizontal intervals show elevation of location_ terrain. Continuous elevation lines with equal elevation lines. Dashed lines are existing or natural topography. Solid lines: New modified contour lines. Lines never split and are always same elevations.

Contour lines: In building design: To minimize grading, buildings are designed in parallel to match hill side contour lines.

Contour lines: 5% grade, interval is 1 ft, $G = V/H = 5/100 = 1$ ft/h = $> H = 20$ ft.

Highly irregular contour lines: Most appropriate for cluster type residential development. Concentrated grouping of residential space in open areas through clusters. Cluster was to condense large number of units. Lengths of street reduced, high roads, and moderate slopes.

Uniform slope: When spacing between contours is equal

Valley: When contours elevation increase outward

Ridge: Increase outward

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Steep: When contour lines are close together

Topographic map includes: Property line, easements, and utilities, location of streams, roads, and buildings- Not shown:
Soil conditions

Slope of land: Required for sanitary and sewer/storm. Slope is not required for gas, water, or electric

Arial photograph: Terrain conditions, nothing to do with subterranean

Foundation types:

Shallow:

Spread footing – for light buildings with suitable soils

Column footing – square pad of concrete that spreads the column load over a large area so bearing capacity is not exceeded.

Wall Footing – cont. spread footing.

Combined or Cantilever footing – connects exterior column footing to the first interior column footing.

Mat (raft) footing – one large footing under the entire building (used for poor soil).

Boat footing – similar to mat, soil is removed is equal to load of the building.

Deep:

Piles – piles are driven thru the unbearable soil to adequate bearing capacity. Piles can be wood, steel or concrete.

Caissons – holes drilled into the soil to the adequate bearing capacity and hole is filled with concrete

Excavation:

Solder beam – are wide flange steel sections driven vertically into the earth to lower the depth. Wood boards are placed horizontally.

Sheet piling – vertical planks which fit tight together and are driven into the earth making a barrier before excavation.

Wellpoints – are used to dewater an excavation.

Retaining walls:

Retaining wall creates a level area by cutting vertically through a bank and eliminating the slope. Retaining walls are generally constructed of masonry or concrete, but other materials like rock, timber or steel can be used.

footings

Piles are best for low bearing capacity (a boat) transmit load to deeper more firm soil. Structure with heavy loads on dense earth: Structural steel pile

-Jetted pile= rarely used

-Wood pile= light for moderate loads

-Boat footing, mat foundation= low bearing capacity

Pile with "driven to refusal":

Pile driven to a point where additional blows will result in no significant penetration. Pile does not need for bedrock

Wood piles: Where untreated wood piles permitted:

If they are below the longest ground water level.

If untreated wood is constantly wet.

They are in no danger of deterioration.

Wet and dry causes mold and decay.

They are not subject the allowable unit stresses.

Piles: When upper soils have insufficient bearing capacity, then piles transfer loads to firmer soil.

Load on footings= Reduction of soil's void volume, "not" shrinkage, differential settlement, reduce bearing capacity

Ratio of load to bearing capacities are high: best to use mat foundation
area is very high p/a= low match bad bearing capacity (bath tub)

6 story building with 25 ft of loose fill: Great beams and piles extending the loose fill.

Spread footings: Good soil at shallow depth. On re-compacted soil is not economical. Loose leaf with 5 ft depth will not satisfy

Mat foundation: Large whole building mat is only for fair to poor soil. Loose fill is not known to be used weith mat

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foundation.

Foundations: Conventional: Concrete and cost less

Piles: Costly, wider range of materials. Timber, steel, concrete, very slow construction process

Frost:

Frost line level: Foundation design in northern climate is 5ft down to frost line level.
"Not" earthquake, against snow drift, rest on undisturbed soil

Frost action: Freezing then thawing---> heave of ground stress to building --> serious damage

Soil frost depth varies frost line= Soil does not freeze below frost line

Frozen footings: Place concrete footings below freeze line. Three to five feet below grade. Below frost penetration

If soil in parking lot rise in winter: Frost and heaving of sub soil - Ice expands

Footing excavation is frozen:

Excavate frozen ground

Never place concrete on frozen ground, when thaw, it shrink and cracks

Hating and thawing: Not practical, not reliable

Frost line in North Dakota: 6 ft

Waterproofing (natural and manmade)

The primary purpose of installing a moisture vapor barrier is to prevent condensation with a structure.

Mastics are intended to seal (keep out water). It is a material used to seal joints, gaps, and cracks against dust, odors and sound. It should remain plastic and permit to move and remain free of cracks and blisters.

A building or structure needs waterproofing as concrete itself will not be watertight on its own. The conventional system of waterproofing involves 'membranes'. This relies on the application of one or more layers of membrane (available in various materials: e.g., bitumen, silicate, PVC, EPDM etc.) that act as a barrier between the water and the building structure, preventing the passage of water. However, the membrane system relies on exacting application, presenting difficulties. Problems with application or adherence to the substrate can lead to leakage.

Over the past two decades, the construction industry has had technological advances in waterproofing materials, including integral waterproofing systems as well as more advanced membrane materials.

Integral systems work within the matrix of a concrete structure, giving the concrete itself a waterproof quality.

There are two main types of integral waterproofing systems: the hydrophilic and the hydrophobic systems. A hydrophilic system typically uses a crystallization technology that replaces the water in the concrete with insoluble crystals. Various brands available in the market claim similar properties, but not all can react with a wide range of cement hydration by-products, and thus require caution. Hydrophobic systems use fatty acids to block pores within the concrete, preventing water passage.

New membrane materials seek to overcome shortcomings in older methods like PVC and HDPE. Generally, new technology in waterproof membranes relies on polymer based materials that are extremely adhesive to create a seamless barrier around the outside of a structure.

Methods for pollution treatment.

Brownfields are abandoned or underused industrial and commercial facilities available for re-use. Expansion or redevelopment of such a facility may be complicated by real or perceived environmental contaminations.

In United States city planning, brownfield land (or simply a brownfield) is land previously used for industrial purposes or certain commercial uses. The land may be contaminated by low concentrations of hazardous waste or pollution, and has the potential to be reused once it is cleaned up.

Innovative remedial techniques employed at distressed brownfield properties in recent years include bioremediation, a remedial strategy that uses naturally occurring microbes in soils and groundwater to expedite a cleanup, and in situ oxidation, which is a remedial strategy that uses oxygen or oxidant chemicals to enhance a cleanup. Often, these strategies are used in conjunction with each other or with other remedial strategies such as soil vapor extraction. In this process, vapor from the soil phase is extracted from soils and treated, which has the effect of removing contaminants from the soils and groundwater beneath a site. Some brownfields with heavy metal contamination have even been cleaned up through an innovative approach called phytoremediation that utilizes deep-rooted plants to soak up metals in soils into the plant structure as the plant grows. After they reach maturity, the plants – which now contain the heavy metal contaminants in their tissues – are removed and disposed of as hazardous waste.

Sewer systems, including some special situations and non-conventional options:

Sanitary sewers – must have cover to prevent breaking or freezing, but not be too deep that excavation becomes prohibitively. Lines must be sloped to provide a rate of 2 ½ to 10 feet per second. Sewage lines start at 8” for a lateral connection to many feet for trunk lines. Materials can be vitrified clay, cast iron, plastic and lightweight fiberglass reinforced mortar plastic. Waste can be a health hazard, produce offensive odors and render water unsuitable. Treatment plants change the composition of the waste material prior to its discharge into bodies of water.

Septic tank – is used when connection to treatment plant is not feasible. Septic tanks change waste into gases and effluent liquid through the action of anaerobic bacteria. Tanks are buried and vented. Their size is determined by the estimated quantity of sewage to be treated. The effluent disposal method is largely dependent on soil conditions, topography and the amount of waste to be disposed. There are three principal types of systems:

Leaching cesspools – requires a small amount of land regardless of slope. Low cost. Cannot be located in either semi-imperious or impervious soil.

Subsoil disposal beds (underground drain fields) – can be used in any soil except impervious, but not where ground water is less than two feet below grade. Medium cost

Sand filters – can be used in impervious soils and require relatively small area. However, they require the use of collection drains, their effluent must be carried to a non-potable watercourse and they are expensive

Traffic calming: Traffic calming is a set of strategies used to slow down or reduce traffic, thereby improving safety for pedestrians and bicyclists as well as improving the environment for residents.

- Narrower traffic lanes — streets can be narrowed by extending the sidewalk, adding bollards or planters, or adding a bike lane or parking. Narrowing traffic lanes differs from other road treatments by making slower speeds seem more natural to drivers and less of an artificial imposition, as opposed to most other treatments used that physically force lower speeds or restrict route choice.
- Speed bumps, sometimes split or offset in the middle to help emergency vehicles reduce delay
- Speed humps, parabolic devices that are less aggressive than speed bumps and used on residential streets
- Speed tables, long flat-topped speed humps that slow cars more gradually than humps
- Speed cushions, a series of three small speed humps that slow cars down but allow emergency vehicles to straddle them so as not to slow response time
- Chicanes, which create a horizontal deflection causing vehicles to slow as they would for a curve
- Raised pedestrian crossings and raised intersection
- Curb extensions (also called bulbouts) which narrow the width of the roadway at pedestrian crossings
- Pedestrian refuges or small islands in the middle of the street
- Median diverters to prevent left turns or through movements into a residential area
- Changing the surface material or texture (for example, the selective use of brick or cobblestone)

- Additional give way (yield) signs
- Converting one-way streets into two-way streets
- Chokers, which are curb extensions that narrow the roadway to a single lane at points[1]
- Allowing parking on one or both sides of a street
- Converting an intersection into a cul-de-sac or dead end
- Boom barrier, restricting through traffic to authorised vehicles only.
- Closing of streets to create pedestrian zones
- Reducing speed limits near institutions such as schools and hospitals
- Vehicle activated sign, signs which react with a message if they detect a vehicle exceeding a pre-determined speed.
- Watchman, traffic calming system

Site accessibility – minimums/maximums, etc.

Need to locate the site access not to interfere with street intersections. Left turns should be a minimum of 200' from a street intersection, to not have the access blocked by cars at the intersection. Access points to sites on opposite sides of the street should avoid interfering with each other. Locate driveways directly opposite each other.

Site access main consideration might be the preservation of the natural environment. Don't destroy a row of trees to cut a path for a road, select a path that passes over less valuable land. Align the site access and path of roads with existing contours. This will cut the cost of grading and cutting the natural grade.

Ramps to and from site shall be steeper than 15%. For slopes over 10%, a transition of at least 8' in length should be provided at each end of the ramp at one-half the slope of the ramp itself.

Site drainage:

Drainage of the land refers to the method used to collect, conduct and dispose of unwanted rain water. A typical drainage system begins with the roof water from a building. This water flows to roof drains and downspouts that eventually conduct it to the street. Once on the street, the water flows downhill until it reaches a catch basin, where it continues in an underground drain line. The drain line may lead to a concrete channel that ultimately discharges the original roof water, plus all other runoff, into a lake or other body of water.

Following are some general rules for drainage: water flows as a result of gravity, water flows perpendicular to the contours, good drainage requires a continuous flow (to slow creates bogs, to fast causes erosion), water should be drained from the building, large amounts of water should never be drained across a path.

Drainage:

- Begins with grading all water on top surface away from building & out to right- away
- Gutters, flumes, berm, gentle wrap of paved surfaces direct water to drains, catch basins & penetration soil works

Pipe (trench) perforated outside next to foundation footing

-To reduce hydrostatic pressure on water.

“Not”

-Maintain uniform or increase hydrostatic pressure

-Decrease vapor pressure in basement room

Drainage: Connecting on site drainage to existing city drainage

Wastewater collection: Always flows by gravity, pipes at constant slope, mains are below street level (one to two pipes). Grades to transport solids is ½% to 2%, and diameters are up to 4 ft and 20 ft long

Surface water management: Natural or mechanical site drainage systems

Green codes: Minimum volume of water to ground water

Runoff: Amount water- What does not seep into ground beyond saturation. Seepage is function of porosity, slope, vegetation

5 year storm: Residential

25- 50 year storm: Shopping center

Drainage systems: Culvert, gutters, "sheet flows", pipes

"Check dams": To reduce speed at high slopes

Final/ finished ground surface: + positive drainage; Free of un-drained depressions. No water stagnation

To control or avoid erosion: Use channels, pipes, hard surface, lower grade, finally connect to underground pipes below traffic & surge pressures (-3 to -4ft in colder area).
Deep excavation may be cost prohibitive.
Destructive wears must be prevented.

Simpler the better: Minimum pipe length, access, slopes, ..., filters

Green Code: Swales, surface drainage, native grasses used as green codes
Sub surface drains are function of permeability, depth of drain, size of drain, slope of drain, spacing of joints, perforated PVC/clay

Vapor extraction: Site contamination leads to ground water contamination: Clean up to remediate unsaturated zone: Vapor extraction "not" insitu incineration, bio degradation, photolysis

Extraction/treatment: Ground water remediation projects: Extraction/ treatment "Not" with in situ aeration, biological barriers/filters, gas chromatography

Water detention areas: Used for control surface water run off,
Not: To create swimming & recreation
To create aesthetically pleasing vistas
To act as reservoir during drought

Permeable water aquifer

Aquifer: Underground permeable material through which water flows

Permeability: A measure of ease with a particular fluid flows through voids. "Not" compressibility, osmosis, or cohesion

Hydrostatic pressure: Fluid force exerting pressure on building.
"Not" dynamic, water, or wedge

If 5 yr storm is not adequate: Go for 10 year storm (100 year too costly), or use growth vegetation area for absorb or swales

To reduce complex drainage system:

Create thick ground cover of plant materials to absorb and slow down
Drainage to collect, conduct, and dispose rain
Paving does not absorb
Best is to greater absorption and percolation- Reduce erosion
Earth berm only diverts flow

Probability of poor drainage:

Flat site, high water table, no storm drain system

Septic tank: Soil must be pervious (permeable). Slope= 1 inch in 24 ft 1 inch/24 ft (not ¼"/ft- too fast). 100 ft from any body of water.

Rain water: Keep natural runoff and runoff after construction the same. Removal of vegetation decreases transpiration, impervious surfaces reduce infiltration.

Desirable slopes for drainage:

Open land – 1/2 % min

Streets – 1/2 % min

Planted areas – 1% min to 25% max

Large paved areas – 1% min

Land adjacent to building – 2%

Drainage swales – 2% min to 10% max

Planted banks – up to 50% max

Common methods of surface drainage: Swale – graded flow paths similar to valleys. Are grade around structures.

Sloping plane – area tilts in one direction, so water drains to that side. The cheapest and structures should be to the high side.

Warped plane – similar to sloping plane, but entire area drains to one low corner.

Gutter – two sloping planes that create a valley. The planes are slightly warped so that water can run down the valley to a collection point.

Central inlet – slopes drain toward a center location, used for courtyards, patios, etc. needs catch basin and sub-surface piping to dispose of water.

Slopes

Sheet flows: Land 1 to 1 1/2 % slope, adjacent to building: 2%

Drainage ditches: 2 to 10%

Grass slopes: Maximum 25%; turf: <25% for mowing; 25% max. grassland

Un-mowed (planted banks) lawns: Maximum 50% (ivy)

[>50%: Avoid erosion]

Flat: 4% or less- Considered
level <4% ; 4% intensive activity

Moderate: 4--> 10% slope effect to climb/ descend
easy grade 4%to 10%; 4-10% informal

Steep: 10-50 % steep/ unusable
step grade> 10%; >10% limited
>10% is costly & more complications,
split level = very usual

Grassy recreational <3%; 5%< erosion

Un-retained earth cuts: 50% to 100% depending on soil

Walk next to buildings max= 4%

Minimum slope of land 0.5%,

5% slopes of parking

2% away from building

Streets 10% max

Storm drains: 0.3% to 1%

Short ramp 15%

Pedestrians 10%

Parking stalls must have slopes of .5 to 10% max if slope is 25 ft in 100 ft run (25%) the area must be regarded as steep.

Vehicular slope limit is 15%.

Vehicular parking lot ramp: 12% at 32'. Rise @ 8 ft long transitions.

If the slope is greater than 10%, then slope of transitions is to be ½ slope of central portion. 12%/2= 6% and 6% of 8 ft= 5.76 " rise.

Pipes are sloped for self- cleansing (0.3% minimum)

Drainage ditch = 10% max

Sub-surface drainage:

Open sub-surface system – collects water utilizes gravel-filled ditches and perforated drain pipe, or drain pipe laid with open joints. Runoff seeps thru the earth to the pipe and the pipe collects the free flowing water and carries it away in a sloping pipe.

Closed sub-surface system – closed sections of pipe that carry water from the collection points to disposal areas. Drainage independent of ground slope.

Area drain – device that collects water from a low point of a limited area and conducts it directly to underground pipes. It has a grate to prevent debris from getting into the pipes. Rim elevation – height of rim/grate. Invert elevation – depth of drain pipe.

Catch Basin – similar to area drain, except deeper and larger to collect sediment which can clog the system.

Trench drain – used to collect water along a strip before conducting it to underground pipes.

Culverts – underground pipe that runs beneath roads, driveways or paths. Should be straight, cross the road at right angle.

Drainage needs:

Topography – steep areas drain quickly, too fast for percolation. Channels should be provided above and below steep banks.

Type of soil – soil types determines the amount of speed and water absorption.

Vegetation – thick ground covers slows down the rate of runoff, reduces erosion and reduces the need for elaborate drainage.

Rainfall data – rainfall data is required to calculate the frequency and intensity of rain water to be drained.

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Land use – rural can have water disperse into landscape. Urban areas surface runoff occurs for short distances only and then must be directed to subsurface drainage.

Size of area- limited percolation such roofs, roads, driveways.

New Urbanism:

The New Urbanism is a reaction to sprawl. A growing movement of architects, planners, and developers, the New Urbanism is based on principles of planning and architecture that work together to create human-scale, walkable communities.

The heart of the New Urbanism is in the design of neighborhoods, which can be defined by 13 elements, according to town planners Andres Duany and Elizabeth Plater-Zyberk, two of the founders of the Congress for the New Urbanism. An authentic neighborhood contains most of these elements:

- 1) The neighborhood has a discernible center. This is often a square or a green and sometimes a busy or memorable street corner. A transit stop would be located at this center.
- 2) Most of the dwellings are within a five-minute walk of the center, an average of roughly 2,000 feet.
- 3) There are a variety of dwelling types — usually houses, rowhouses and apartments — so that younger and older people, singles and families, the poor and the wealthy may find places to live.
- 4) At the edge of the neighborhood, there are shops and offices of sufficiently varied types to supply the weekly needs of a household.
- 5) A small ancillary building is permitted within the backyard of each house. It may be used as a rental unit or place to work (e.g., office or craft workshop).
- 6) An elementary school is close enough so that most children can walk from their home.
- 7) There are small playgrounds accessible to every dwelling — not more than a tenth of a mile away.
- 8) Streets within the neighborhood form a connected network, which disperses traffic by providing a variety of pedestrian and vehicular routes to any destination.

9) The streets are relatively narrow and shaded by rows of trees. This slows traffic, creating an environment suitable for pedestrians and bicycles.

10) Buildings in the neighborhood center are placed close to the street, creating a well-defined outdoor room.

11) Parking lots and garage doors rarely front the street. Parking is relegated to the rear of buildings, usually accessed by alleys.

12) Certain prominent sites at the termination of street vistas or in the neighborhood center are reserved for civic buildings. These provide sites for community meetings, education, and religious or cultural activities.

13) The neighborhood is organized to be self-governing. A formal association debates and decides matters of maintenance, security, and physical change. Taxation is the responsibility of the larger community.

Erosion:

The process by which the surface of the earth is worn away by the action of natural elements, such as water and wind. The site is vulnerable during construction. It is not limited to sites undergoing constructions only, but can happen naturally depending on type of soils, steepness of the slopes, vegetative cover and speed and volume of runoff.

Measures to control erosion:

Disturb as little area as possible

Do not remove any planting unless absolutely necessary.

Stockpile and protect topsoil to be reuse after construction.

Provide temporary dams and channels to slow down runoff and collect eroded soil.

Leave soil exposed for as short a time as possible.

Avoid steep banks.

Replant exposed areas as soon as feasible.

Minimize erosion can be done by employing a variety of slope stabilization techniques:

Planting

Applying mulch

Facing banks with rubble or riprap

Retaining banks with cribbing or retaining walls

Slides can occur naturally or result of improper grading.

Steep slopes will more likely slide

Fine grained soils are more likely to susceptible to sliding than coarse grained soils.

Water may trigger a slide because of the increase in the soil weight and the planes being lubricated.

Layered soils slide more readily than homogeneous soils.

Undercutting an existing slope – cutting away the toe.

ADA ramps & parking:

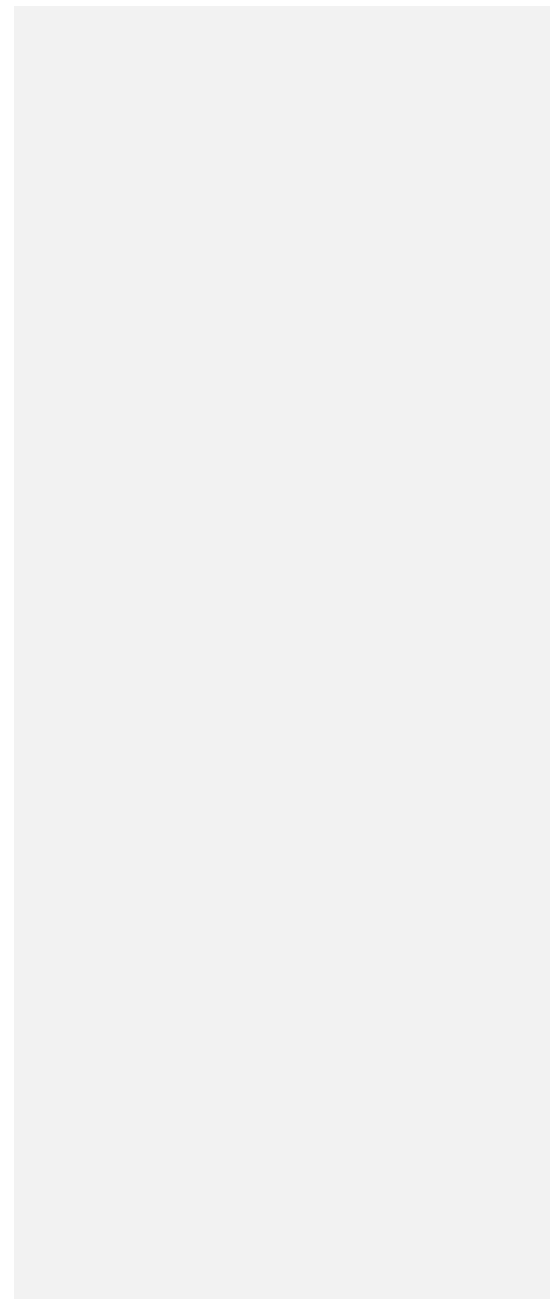
Minimum dimensions of handicapped parking stalls – 20 Ft long by 8 Ft wide. Must have 5 Ft wide adjacent and parallel vehicle pull-up space. An accessible route must be located in front of the stalls, to avoid hazard of handicapped persons having to circulate behind parked vehicles.

Under 5% or 1:20 are considered walks. Ramps shall be 1:12. require a 5' foot landing at top and bottom of ramp and 30'

max length. Handrails should be located at each side of a ramp if its rise is greater than 6 inches or its greater than 72".

Wetlands:

A wetland is an area of land whose soil is saturated with moisture either permanently or seasonally. Such areas may also be covered partially or completely by shallow pools of water. Wetlands include swamps, marshes, and bogs, among others. The water found in wetlands can be saltwater, freshwater, or brackish. Wetlands are considered the most biologically diverse of all ecosystems.



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Codes and Regulations

- Identify, analyze, incorporate
- Manage Process
- Codes:
 - Building
 - Specialty Codes
 - Zoning
 - Other Regulatory AHJ

Project and Practice Management

- Develop Service and project delivery method
- Project Budgeting and finance method
- Team Members: Consultants ...
- Project Meetings
- Manage Project Schedule
- Manage Project Design
- Assist Construction Procurement
- Manage: Legal issues, fees, insurance, professional contracts

LEED:

Site Concepts

Stormwater – should not be used for potable needs if there are sources available that pose less health risk. Stormwater can be used in many locales to reduce potable water needs for irrigation, toilets, custodial needs and fire suppression.

Civil engineering drawings: Review site symbols **on page 102 of Kaplan**.

- Calculations:

Grading – Convenient way to measure ground slope is by percentages. If H is horizontal distance and V is vertical distance, then g is the grade

= $V/H(100)$ for example 50% slope refers to a vertical dimension of 1 ft and a horizontal dimension of 2 ft.

General grades –

Fewer than 4% are considered flat – less than 4' per 100' horiz. – all activities

Between 4% & 10% are moderate – 4'-10' per 100' horiz – require effort to climb or descend

Between 10% & 50% are steep – 10'-50' per 100' horiz – steep, may be usable for limited activity only.

Over 50% are very steep – 50'-100' per 100' horiz – subject to soil erosion

Handicapped ramps – for every 1' vertical 12' horizontal is required, $1/12 (100) = 8.3\%$

Generally, roads should not exceed a 10% slope. A 15% slope (15' vertical rise per 100' horizontal run) approached the limit a vehicle can climb for a sustained period of time.

Parking lot areas should not exceed 5% slope (5' per 100' horiz)

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Grass areas should not exceed 25% slope (25' per 100' horiz)

Streets, paved drives should not exceed 10% slope (10' per 100' horiz)

Planted areas should have at least 1% slope (1' per 100' horiz).

Parking estimates – 400 SF per parked vehicle

To protect trees if construction work is being done around them.

1. Barriers shall be placed at the canopy line of mature trees and a minimum of 2 feet from shrubs to protect branches from tall equipment and root systems from compaction. They shall be constructed of durable materials in sturdy manner to surround the plant.
2. Limit soil placement over existing tree and shrub roots to a maximum of 3 inches.
3. Where grades are to be lowered use a retaining wall and terrace to protect the roots. These should begin at the drip line of the tree. For small trees and shrubs the stem diameter is converted to feet and doubled, such that a 3 inch tree should be protected to 6 feet.
4. Where grades are to be raised use retaining walls of durable material, as specified, to form a tree well. Wells deeper than 12 inches will be provided with a drain tile at the original ground surface to facilitate water removal. Drain tile should drain to a sump or well with small stone.
5. In wooded areas wood chips spread to a depth of 4 inches can be used to prevent soil compaction over the root system.
6. Trenching across tree root systems shall pass no closer to the trunk than 6 feet. Tunnels for utilities under root systems should be at least 18 inches below ground surface.

Landscapes:

Trees: Used for screen wind, increase ventilation

Vegetation: Capture moisture, reduce fog, increase sunlight reaching ground

Plats: Aesthetic value, screen or disguise as required, trees absorb sound

Planted area: Cooler during hot days, less heat loss during night

Deciduous tree: Looses leaves in winter

Coniferous tree: Has leaves throughout the year

Conversion: 1 gallon = 0.133680 cubic foot

Conversion: yard square= 27 sqft; Cubic yard= 27 cubic ft;

acre= 43560 sqft (66x660)

Volume of Rectangular box: Cubic footage – Length, ft x Width, ft x Height, ft

- know how to read the sun angle chart.

Different charts for different Latitudes. Can plot suns travel through the sky and know where it will be at any time of the day.

- know the special conditions to a septic tank on high water table condition – Anyone know anything about this?

Handicap

Handicap design: Path less than 1: 20; ramp < 1:12; <30 ft. max.

Handicap pathway surface: Asphalt surface is the best: smooth, no transition Bad: Tanbark, brick, flag stone are rough on wheel chair

Handicap slope maximum: Ramp 1:12 and flatter the better ramp anything steeper than 1:20 is a ramp.
Ramps other than those are used by non-handicap is limited 1:8

City planning

City planning: Mixture of central business district & residential

-A viable community asset

“Not “ prohibited due to land cost; all substandard units converted to commercial; future units to be low income & elderly

- Best orientation towards sea view: The maximum number of units facing the ocean

Site preparation

-Clear all object

-Demolish her plan

-All utilities to be dealt with

-Undisturbed plants to be protected

-Batter boards offset from building or excavations

-Top 6 inches of soil Removed

Catchment area: Market area or trade area, tributary area from which a facility derives its user population; depending on type & size of shopping center, the catchment area fluctuates with size on basis of traveling & convenience in reaching facility type & size of shopping center is primacy determined by its catchment basis

To reduce cost: Compact low cost housing development main cost: Grading, road construction, utility

Configuration of conventional suburban shopping mall

Axial: Anchor tenants very similar to linear but an anchors create main axis for design

Precinctual organizational pattern:

Gradual accumulation of self-contained building complexes.

Each serving district activity & interrelated with neighbors. It allows growth in any direction. Flexible/compact Street

Site issues- Bearing capacity, sub- surface, water shrinkage, seismic, stable earth

Life cycle

Life cycle components under Architect's control:

- Includes construction (15%), Operating, maintenance, & replacement, renovation, ... are in Architects control
- Not in control taxes & financing
- Financing cost can be reduced for fast track construction
- Higher quality materials reduce long term costs

Parking

Site parking calculation: 50000 sqft, building 10000 sqft, parking: Building (3:1) ratio, 400 sqft per car: Number of parking slots

Building: Parking

10K: ? 1:3--> parking (3X 10K)---> 30K

30000/400= 75 parking

New rental center factor: Accessibility to market area traffic

FAR (Floor to Area Ratio): 30% in 12000 sqft lot. Therefore (0.3*12000)=) 3600 sqft allotted. If four story building, 900 sqft per floor, and 2700 sqft will be above grade.

60 degrees parking= Easy to use, not efficient

90 degree parking= Most efficient

Parking ANSi standard for handicap: 8 ft stall plus 5 ft sides 3 ft curb for access

Parking lot large: Do not do: Dead level paved areas causes ponding of water and dead end aisles creates congestions

Entrance versus exiting parking lot: Slow exit even stop to yield. Entrance faster speed of advancement road

Parking layout

Correct: traffic aisles arranged to serve buildings they serve

- > Angled parking requires one way traffic
- > Circulation of traffic in parking is continuous
- > Slow (not rapid) traffic towards 90 degrees perpendicular parking layout

Area for parking cars: Good/car therefore 300 cars
300*400 cars= 120,000

For retail: 3000 to 4000 sqft parking per 1000 retail space

To reduce vehicle usage: Central city area:

Incentives for car pool, monthly rate parking fee,
-No parking (or united parking) with tax system earmarked for public transportation

Area for parking lot: 325 cars park @90 degrees parking.

325 cars x 400 square feet for = 130,000/ 43560 =2.98 acre

Road/circulations: Curvilinear is similar to natural environmental. Others "not" grid, radial, linear

Fastest volume of traffic- Free express way (no stops/lights). Not: Access, distributor, collector, arterial, highway, interchange

Land use and development use: Street system. Not: Topographic, climate (factors) or utility system

Shopping centers to be located @ intersection of arterial/collections

Street design criteria: Curb radii min.= 12'; traffic lanes (12ft); Intersections to be @ right angle; Avoid Compound curves; Parking lanes to be included

Street design criteria:

Light street: 4" roll-curb

Heavy traffic: 6" curb & gutter; 9'0" shoulder on each side of street and concrete paving. Asphalt is best choice.

Vehicle width for lanes 11 to 12 ft

Power lines installed above: Are cheaper

Pedestrians circulations: Only safety matters

Non-ambulatory disabilities: Physical layout

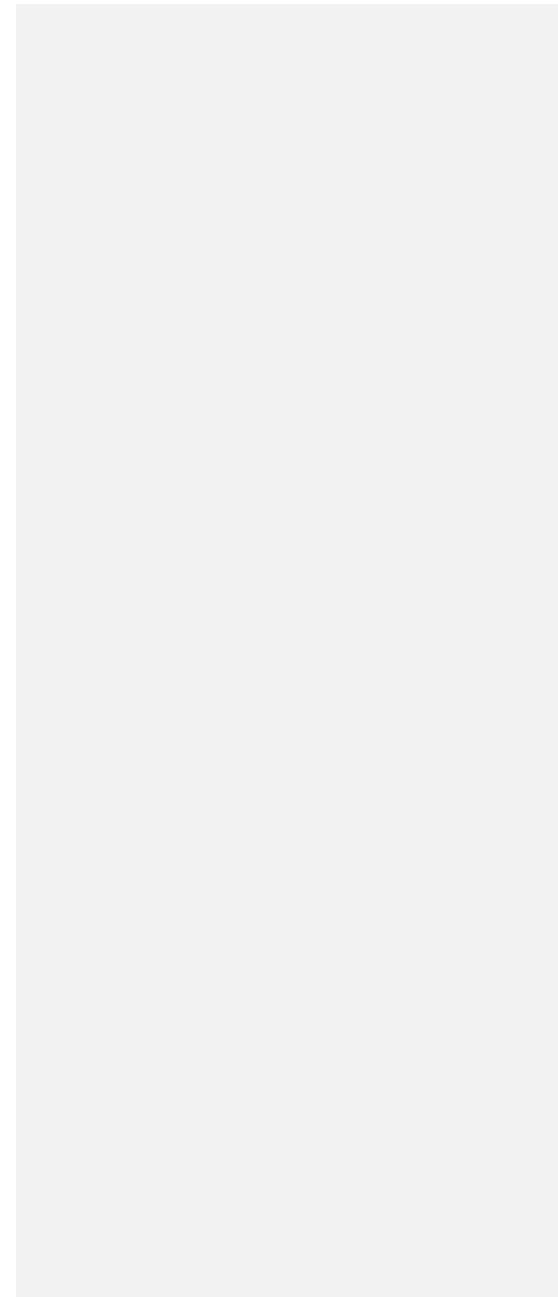
2 Wheelchairs pass = 60" in diameter (clear 180 degree turn).

Walkway not interrupted by cracks or edge 1/2" or more in height.
Walkways not greater than 5% gradient.
Ramp minimum 36" side

Road Position: Gradient is 5%: 5:100
150 ft away elevation 142.5' on hill
5% of 150 ft= 7.5 ft
142.50 +7.5 = 150 ft <<<<<<<<<<<<<--

Parking 361 cars minimum Accessible requirements
Over 150 - 249 5 + two cars per 100
250- 349 7
350- 449 9

Parking: 2 accessible cars stall: 8'+5'+8' = 21 ft



Site Zoning Vignette:

1 hour total

1 problem with 2 tasks

Problem:

- Delineate areas suitable for construction of buildings & other site improvements
- Respond to regulatory restrictions & programmatic requirements
- Define:
 1. Site profile
 2. Maximum buildable envelope based on zoning regulations & environmental constraints

General notes / Tips:

- Exact problem w/ single answer
- Follow the program exactly
- Be aware of sun exposure planes; corner of building will likely be clipped
- Use sketch pad
- Establish building limits
- Use grid
- Use ortho
- Note benchmark & accurately locate
- Check math
- Use full cursor
- Note scale of grids as vertical and horizontal may differ
- Use measure tool to double check dimensions
- To draw angled lines draw sketch line & rotate
- Use circles for non - linear setbacks
 - o Software won't draw circles so use straight lines to follow curved setbacks

Task One: Plan Process:

1. Note all relevant requirements from program
2. Sketch all setbacks – rear, side & front yard

3. Draw Surface Improvements:

- o Reference lot lines
- o Can go over easements

4. Draw Buildable area:

- o Cannot build in easements

Task Two: Profile

General Notes:

- Reference the section line given
- Project points down
- Draw grade profile at the section line; be aware of swales / ridges
- Do not retrace grade
- Do not go underground
- Benchmark is given by the program
- Reference height restrictions for the overall property and for certain areas / zones
- Note the sun exposure plane -
 - o Where does it start?

Site Zoning Vignette:

1 hour total

1 problem with 2 tasks

Problem:

- Delineate areas suitable for construction of buildings & other site improvements
- Respond to regulatory restrictions & programmatic requirements
- Define:

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Task Two: Profile

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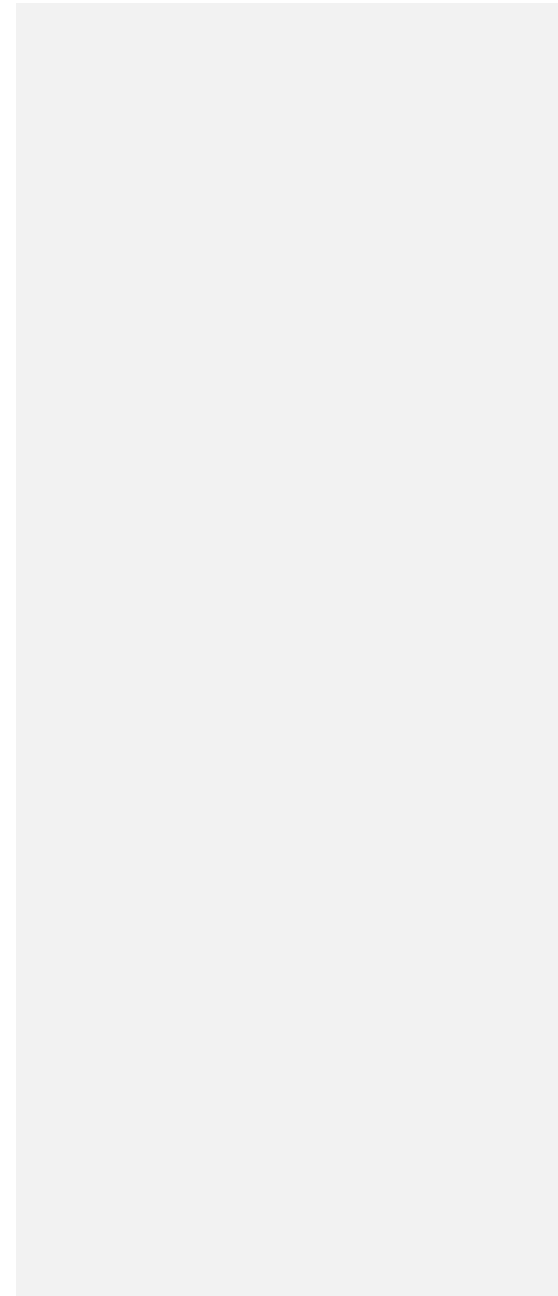
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 - o Where does it start?

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Programs: ARE PPP

Architectural Program should include: Budget limitation, Owners' Goals, Inventory of space required, statement on functional relationships

Not: Soil bearing capacity, structural systems

Programs: CPM, CPM, Gantt, Pert

Objectives of Programming Process is realistic requirements:

Not: Aesthetics, evaluation of materials, Project Financing

Outline Specification during the programming phase is broken down in divisions

Not: Rooms, Costs, Products

Blocking and stacking within programming process is critical for site limitations

Not space requirements, special equipment, building systems

A detailed program during PPP for the project such as courthouse provides a much more efficient building

Not: Aesthetically pleasing, longer construction, higher life cycle building cost

An active public use site to encourage the public for use requires no barriers, obstructions, or elevation change

Codes/Laws: ARE PPP

Per ADA, Curb ramp slopes shall not exceed 1:12

Not: 1:10, 1:24, 1:20 (short distance)

Majority of indoor adequate quality of air: is based on inadequate ventilation:

Not inside contamination, construction materials, contamination from outside

Per US EPA: Lead paint base in an existing building to be renovated for elderly: Occupant health risk are less in a situation where there are no children present

Not: Lead content are less for buildings after 1960, Paints to be completely removed, contractor health risks are of concern if lead paint is sawed, ground, or sandblasted

Mold on pipe insulation: Excessive moisture; improper ventilation, organic feedstock

Not: Poor soils, high water tables, insufficient light levels

Ponding: City required for project) is an area where excessive rainwater can be retained and discharged into a storm water

Not: decorative water pond in lot, trench French drain system to hold water, a system of underground and disposal of rainwater

Sound causes fatigue after long exposure of 80 db sound and
STC applied to buildings is sound transmission class

Codes: ARE PPP

What does Zoning cover vs building codes:

Zoning code defines the local interests and conditions.

- Can restrict specific areas to certain types of building occupancies (commercial, residential and industrial).
- Can limit heights, floor area, coverage and setbacks.
- Can restrict building types in specific areas (materials)

Building code intended to provide for public health and safety. Provides use classifications, construction classifications, fire safety, means of egress.

Leed or sustainable design

Sustainable design: Economics, aesthetics, environments, mechanical systems

Natural step: Organized 1996, preservation of ecosphere & bio sphere (-5 within each to +5 miles above surface of earth).

Natural step principles

- Zone of earth that supports human life is highly fragile eco system last 100 years has affected the earth "wrong" biosphere affecting human is relatively stable & resistant 5 mile in/ out
- Vast majority of technological building environment is inefficient. innovation has improved, but not there
- Toxic substance affect large areas beyond time & space are above "great lakes" is toxic with DDT many years after it has been banned, jet streams bring toxicity elements & pesticides in other continents
- Recycling is only beginning: More buildings to be recyclable & biodegradable

LEED: Cost of design for Engineers & Architects increase

Vandalism: Impact is to use impact resistance materials

- In housing projects
- Exterior paths & entrance doors are visible
- Surveillance, well lighted, avoid cursed paths

-Durable & vandal & tamper proof of elements

Planning phasing sustainable projects:

- Use native landscaping- functional, aesthetic..
- Sun orientation (neighbors...) topographic relief
- Scale of other buildings
- Location of project with respect to public transportation

Elements in sustainable design:

- Solar shading devices
- Urban heat island effect
- Fenestration & glazing

Slope/ curve? based on topography

Sustainable goals: Use less, recycle, do not deplete natural resources, do not buy from long distance, least amount of demolition, keep existing

LEED indoor air quality: Sick building syndrome: Poor indoor Air Quality based on indoor tobacco smoking, inadequate ventilation, off gassing of fabrics and coatings

Leed substitution by Architects: Architectural supervision: Product substitution to insure original design standards are met

Leed: Requires Architect, Wetland Engineer, Energy Engineer Commissioners, Landscape Architect, Energy Model Engineers

Site selection

Site selection (Every Building): Sun orientation, topographic relief, scale of adjacent buildings, location of trees and plants, landscaping, avoid erosion surfaces, and area prone to fire.

Next to flood lines 1 ft above and 100 ft away
Be next to public transportation

Flood Plain: Very limited construction: Agricultural or recreation, build only above flood plain, 100 year storm.

Notify Architect: When unknown object are uncovered during construction

CSI Specifications: Security steel gate is In section 10 for Specialties not doors, or metals, or equipments.

Site Preparation: Site clearing, Removal top soil, rough grading, then finish grading.

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Environmental

Environmental impact considered site analysis: Reflection, air movement, and sun & shadow patterns. "Not" archeological finds

Development potential of parcel: Verify these issues: wetland/ endangered species/ hazardous waste. Not: acid rain has nothing be controlled.

After "sight" what other senses is important: hearing. "Not": Touch, smell, taste
To remove noise: best way increase distance to receiver

Restroom facilities are controlled by building codes

Not: Deed restrictions, zoning ordinances (bylaws), life safety

Development of project are controlled by regional master plans and zoning ordinances (Bylaws)

Not: Enterprise zones, restrictive covenants, tax incentives, sewer permits

Zoning ordinances (bylaws) used by municipalities control following:

Density development, flood impact, land usage

Not: Project costs

Zoning regulation controls: Densities, setbacks, heights, parking requirements

Not: Life safety requirements

Municipal impact fees such as sewer development fee assessed on proposed project offsets local infrastructure improvement costs

Not: Pay for building permits, distributed to owners in neighborhood, ensures speedy planning board reviews and approval

Building in urban core permitted by floor area and heights in excess of the zoning requirements: because street level functions are regarded as public activities

Not: Clad in materials specified by city, excess vertical transportations, onsite advantage of superior views

Covenants include Deeds restrictions

Not: Topography, Utility locations, benchmarks

Costs: PPP ARE

Greatest percentage of project fees in school projects is Mechanical

Not: Civil, structural, or electrical engineers

Estimate most accurate: using the unit price take-off

Not: Order of magnitude, square fee cost, cubic feet cost, assembly system cost

Analysis of rebuilding or constructing new building, architect to study and prepare feasibility study

Not: Obtain community input, renovation cost versus construction cost, local historical society to be consulted

There are bid alternative to choose materials: Architect to attempt to control construction cost

Not: Incorporate energy savings, anticipate neighborhood covenants, and accommodate various climatic conditions

Cost of asbestos removal is by Owners

Not: General Contractor, Authority having jurisdiction, Federal/State Agencies

Unit area cost: is most frequent construction estimate cost when programming is complete

Not: Contractor estimate, construction loan value, capitalization ratio

During the programming phase: Construction cost is based on dollar per square feet of similar buildings

Not: Material take-offs, operating programs, dollar per cubic feet

Contract: PPP ARE

A Series: agreement between

- an owner and
- a contractor.

B Series: agreement between

- an owner and
- an architect for professional services.

C Series: agreement between an

- architect and
- other professionals, including engineers, consultants, (including joint ventures), and other architects.

D Series: agreement for:

- Industry Standard Documents

G Series: agreement for:

- Contract & Office Administration Forms – bid documents log, change order, construction change directive

A101: Owner + Contractor Stipulated Sum

- Documents partners with A201: Contract Documents
 - Agreement
 - Conditions of the Contract – General, Supplementary
 - Drawings
 - Specifications
 - Addenda
 - Other listed documents
 - Contract supersedes prior negotiations, representations or agreements, written or oral
- Date of the commencement of work is date of agreement unless other date is listed
- Contract time is measured from the date of commencement
- Set the date for substantial completion
- Call out provisions for liquidated damages or early completion bonuses
- Contract sum is called out in a lump sum amount based on:
 - Alternates
 - Unit prices
- Application for payment time period = 1 month ending on the last day of the month unless specified differently
- Pay App based on the schedule of values supplied by the contractor
- Indicate the % of work complete
- Progress Payment = % of contract sum complete – retainage + stored materials & equipment – previous payments
- Contractor shall not make advanced payments to suppliers for materials / equipment which has not been delivered & stored on site
- Final payment issued when
 - Contractor has fully performed contract requirements except correction of work AND
 - Final certificate of payment is issued by the architect
 - Owner to pay w/in 30 days of the final certificate of payment
- Contract Termination / Suspension called out in A201
- Identify Owner's Representative, Contractor's representative
- Changes in these parties require 10 days written notice

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- original copies executed – owner, contractor, architect

A Series: agreement between

- an owner and
- a contractor.

A101 Owner-Contractor Agreement Form—Stipulated Sum

This is a standard form of agreement between owner and contractor for use where the basis of payment is a stipulated sum (fixed price).

The A101 document adopts by reference and is designed for use with AIA Document A201, General Conditions of the Contract for Construction, thus providing an integrated pair of legal documents. When used together, they are appropriate for most projects. For projects of limited scope, however, use of AIA Document A107 might be considered.

A101/CMa Owner-Contractor Agreement Form—Stipulated Sum—Construction Manager- Adviser Edition

A101/CMa is a standard form of agreement between owner and contractor for use on projects where the basis of payment is a stipulated sum (fixed price), and where, in addition to the contractor and the architect, a construction manager assists the owner in an advisory capacity during design and construction. The document has been prepared for use with AIA document A201/CMa, General Conditions of the Contract for Construction Construction Manager-Adviser Edition. This integrated set of documents is appropriate for use on projects where the Construction Manager serves only in the capacity of an adviser to the owner, rather than as constructor (the latter relationship being represented in AIA Documents A121/CMc and A131/CMc). A101/CMa is suitable for projects where the cost of construction has been predetermined, either by bidding or by negotiation.

A105 Standard Form of Agreement Between Owner and Contractor for a Small Project

A205 General Conditions of the Contract for Construction of a Small Project

AIA Documents A105 and A205 are intended to be used in conjunction with one another. The two documents are only sold as a set, and they share a common Instruction Sheet. They have been developed for use where payment to the Contractor is based on a stipulated sum (fixed price) and where the project is modest in size and brief in duration. A105 and A205 are two of the three documents that comprise the Small Projects family of documents. They have been developed for use with AIA Document B155, Standard Form of Agreement Between Owner and Architect for a Small Project. These documents are specifically coordinated for use as a set. Although A105, A205, and B155 may share some

similarities with other AIA documents, the Small Projects documents should NOT be used in tandem with other AIA document families without careful side-by-side comparison of contents. A205 is considered to be the keystone document of the Small Projects family, since it is specifically adopted by separate reference into both A105 and B155. A205 is a vital document, in that it is used to allocate proper legal responsibilities among the parties, while providing both a common ground and a means of coordination within the Small Projects family. In order to maintain the condensed nature of this document, arbitration and other ADR provisions have been omitted. ADR provisions may be included in A105 under Article 6.

A107 Abbreviated Standard Form of Agreement Between Owner and Contractor for Construction Projects of Limited Scope, Stipulated Sum As an abbreviated form of agreement between owner and contractor, this document is intended for use where the basis of payment is a stipulated sum (fixed price). It is appropriate for construction projects of AIA Contract Document Synopses 5 limited scope not requiring the complexity and length of the combination of AIA Documents A101 and A201. The document contains abbreviated general conditions. It may be used when the owner and contractor have established a prior working relationship (e.g., a previous project of like or similar nature), or where the project is relatively simple in detail or short in duration.

A111 Standard Form of Agreement Between Owner and Contractor, Cost of the Work Plus A Fee, With a Negotiated Guaranteed Maximum Price

This standard form of agreement between owner and contractor is appropriate for use on most projects requiring a negotiated guaranteed maximum price, when the basis of payment to the contractor is the cost of the work plus a fee. A111 adopts by reference and is intended for use with AIA Document A201, General Conditions of the Contract for Construction, thus providing an integrated pair of legal documents.

A121/CMc Owner-Construction Manager Agreement Where the Construction Manager Is Also the Constructor (AGC Document 565)

This document represents the collaborative efforts of The American Institute of Architects and The Associated General Contractors of America. AIA designates this document as A121/CMc and AGC designates it as AGC 565. A121/CMc is intended for use on projects where a construction manager, in addition to serving as adviser to the owner, assumes financial responsibility for construction of the project. The construction manager provides the owner with a guaranteed maximum price proposal, which the powner may accept, reject, or negotiate. Upon the owner s acceptance of the proposal by execution of an amendment, the construction manager becomes contractually bound to provide labor and

materials for the project. The document divides the construction manager's services into two phases: the preconstruction phase and the construction phase, portions of which may proceed concurrently in order to fast track the process. A121/CMc is coordinated for use with AIA Document A201, General Conditions of the Contract for Construction, and B141, Standard Form of Agreement Between Owner and Architect. Check Article 5 of B511 for guidance in this regard. Caution: To avoid confusion and ambiguity, do not use this construction management document with any other AIA or AGC construction management document.

A131/CMc Owner-Construction Manager Agreement

Where the Construction Manager Is Also the Constructor—Cost Plus a Fee, No Guarantee of Cost (AGC Document 566) Similar to A121/CMc, the new CM-constructor agreement is also intended for use when the owner seeks a constructor who will take on responsibility for providing the means and methods of construction. However, the method of determining cost of the work diverges sharply in the two documents, with A121/CMc allowing for a Guaranteed Maximum Price (GMP) while A131/CMc uses a control estimate. A131/CMc employs the cost-plus-a-fee method, wherein the owner can monitor cost through periodic review of the control estimate, which is revised as the project proceeds. It is important to note that, while the CM-constructor may be assuming varied responsibilities, there are still just three primary players on the project: the owner, architect, and CMc. The A201 General Conditions continues to apply, although it is modified (in part) by the A131/CMc agreement. Caution: To avoid confusion and ambiguity, do not use this construction management document with any other AIA or AGC construction management document.

A171 Owner-Contractor Agreement Form—Stipulated Sum—for Furniture, Furnishings, and Equipment

This is a standard form of agreement between owner and contractor for furniture, furnishings, and equipment (FF&E) where the basis of payment is a stipulated sum (fixed price). A171 adopts by reference and is intended for use with AIA Document A271, General Conditions of the Contract for Furniture, Furnishings, and Equipment. It may be used in any arrangement between the owner and the contractor where the cost of FF&E has been determined in advance, either through bidding or negotiation. A177 Abbreviated Owner-Contractor Agreement Form—Stipulated Sum—for Furniture, Furnishings, and Equipment A177 is an abbreviated document that philosophically derives much of its content from a combination of the more complex and lengthy A171 and A271 documents. Its abbreviated terms and conditions may be used on projects where the contractor for furniture, furnishings, and equipment (FF&E) has a prior working relationship with the owner, or where the project is relatively simple in detail or short in duration. Caution: This document is not intended for use on major construction work that may involve life safety systems or structural components.

A191 Owner-Design/Builder Agreements

This document contains two agreements to be used in sequence by an owner contracting with one entity serving as a single point of responsibility for both design and construction services. Design/build entities may be architects, contractors, or even businesspersons, so long as they comply with governing laws; especially those pertaining to licensing and public procurement regulations. The first agreement covers preliminary design and budgeting services, while the second deals with final design and construction. Although it is anticipated that an owner and a design/builder entering into the first agreement will later enter into the second, the parties are not obligated to do so and may conclude their relationship after the terms of the first agreement have been fulfilled.

A201 General Conditions of the Contract for Construction

The General Conditions are an integral part of the contract for construction, in that they set forth the rights, responsibilities, and relationships of the owner, contractor, and architect. While not a party to the contract for construction between owner and contractor, the architect does participate in the preparation of the contract documents and performs certain duties and responsibilities described in detail in the general conditions. This document is typically adopted by reference into certain other AIA documents, such as owner-architect agreements, owner-contractor agreements, and contractor-subcontractor agreements. Thus, it is often called the “keystone” document. Since conditions vary by locality and by project, supplementary conditions are usually added to amend or supplement portions of the General Conditions as required by the individual project. Review the model language provided in A511 as a guide in creating supplementary conditions for A201.

A201/CMa General Conditions of the Contract for Construction—Construction Manager- Adviser Edition

A201/CMa is an adaptation of AIA Document A201 and has been developed for construction management projects where a fourth player a construction manager has been added to the team of owner, architect, and contractor. Under A201/CMa, the construction manager has the role of an independent adviser to the owner. Thus, the document carries the CMa suffix. A major difference between A201 and A201/CMa occurs in Article 2, Administration of the Contract, which deals with the duties and responsibilities of both the architect and the construction manager-adviser. Another major difference implicit in A201/CMa is the use of multiple construction contracts directly with trade contractors. Caution: It is vital that A201/CMa not be used in combination with documents where it is assumed that the construction manager takes on the role of constructor, gives the owner a guaranteed maximum price, or contracts directly with those who supply labor and materials

for the project.

A201/SC Federal Supplementary Conditions of the Contract for Construction

A201/SC is intended for use on certain federally assisted construction projects. For such projects, A201/SC adapts A201 by providing (1) necessary modifications of the General Conditions, (2) additional conditions, and (3) insurance requirements for federally assisted construction projects.

A271 General Conditions of the Contract for Furniture, Furnishings, and Equipment

When the scope of a contract is limited to furniture, furnishings, and equipment (FF&E), A271 is intended for use in a manner similar to the way in which A201 is used for construction projects. The document was jointly developed by the AIA and the American Society of Interior Designers (ASID). Because the Uniform Commercial Code (UCC) has been adopted in virtually every jurisdiction, A271 has been drafted to recognize the commercial standards set forth in Article 2 of the UCC, and uses certain standard UCC terminology. Except for minor works, A271 should not be used for construction involving life safety systems or structural components.

A305 Contractor's Qualification Statement

An owner preparing to request bids or to award a contract for a construction project often requires a means of verifying the background, references and financial stability of any contractor being considered. These factors, along with the time frame for construction, are important for an owner to investigate. A305 provides a sworn, notarized statement with appropriate attachments to elaborate on important aspects of the contractor's qualifications.

A310 Bid Bond

This simple one-page form establishes the maximum penal amount that may be due the owner if the selected bidder fails to execute the contract and provide any required performance and payment bonds.

A312 Performance Bond and Payment Bond

This form incorporates two bonds covering the contractor's performance and the contractor's obligations to pay subcontractors and others for material and labor. In addition, A312 obligates the surety to act responsively to the owner's requests for discussions aimed at anticipating or preventing a contractor's default.

A401 Standard Form of Agreement Between Contractor and Subcontractor

This document is intended for use in establishing the contractual relationship between the contractor and subcontractor. It spells out the responsibilities of both parties and lists their respective obligations, which are written to parallel AIA Document A201, General Conditions of the Contract for Construction. Blank spaces are provided where the parties can supplement the details of their agreement. A401 may be modified for use as a subcontractor- sub-subcontractor agreement.

A491 Design/Builder-Contractor Agreements

A491 contains two agreements to be used in sequence by a design/builder and a construction contractor. The first agreement covers management consulting services to be provided during the preliminary design and budgeting phase of the project, while the second covers construction. It is presumed that the design/builder has contracted with an owner to provide design and construction services under the agreements contained in AIA Document A191. Although it is anticipated that a design/builder and a contractor entering into the first agreement will later enter into the second, the parties are not obligated to do so, and may conclude their relationship after the terms of the first agreement have been fulfilled. It is also possible that the parties may forgo entering into the first agreement and proceed directly to the second.

A501 Recommended Guide for Bidding Procedures and Contract Awards

This guide outlines appropriate procedures in the bidding and award of contracts when competitive lump sum bids are requested in connection with building and related construction. The Guide is a joint publication of the AIA and the Associated General Contractors of America (AGC).

A511 Guide for Supplementary Conditions

A511 is a guide for modifying and supplementing A201, the General Conditions of the Contract for Construction. It provides model language with explanatory notes to assist users in adapting A201 to local circumstances. Although A201 is considered the keystone in the legal framework of the construction contract, because it is a standard document, it cannot cover all the particulars of a specific project. Thus, A511 is intended as an aid to users of A201 in developing supplementary conditions. This document is printed with model text and accompanying explanatory notes to the user. Excerpting of the model text is permitted by the AIA under a limited license for reproduction granted for drafting the supplementary conditions of a particular project.

A511/CMa Guide for Supplementary Conditions—Construction Manager-Adviser Edition

Similar to A511, the A511/CMa document is a guide to model provisions for supplementing the general conditions of the

contract for construction, construction manager-adviser edition (AIA Document A201/CMA). A511/CMA should only be employed as should A201/CMA on projects where the construction manager is serving in the capacity of adviser to the owner (as represented by the CMA document designation), and not in situations where the Construction Manager is also the constructor (CMc document-based relationships).

Like A511, this document contains suggested language for supplementary conditions, along with notes on appropriate usage. However, many important distinctions are made to ensure consistency with other construction manager-adviser documents. Caution: CMc documents are based on utilization of the A201 document, which in turn should be modified using A511 as a guide.

A521 Uniform Location of Subject Matter

A521 is a joint publication of the AIA and the Engineers Joint Contract Documents Committee (EJCDC), which is composed of the National Society for Engineers, American Consulting Engineers Council, and American Society of Civil Engineers. A521 guides the user in the determining the proper placement and phrasing of information customarily used on a construction project.

A571 Guide for Interiors Supplementary Conditions

Similar to A511, AIA Document A571 is intended as an aid to practitioners in preparing supplementary conditions on interiors projects. AIA Document A571 provides additional information to address local variations in project requirements where A271, General Conditions of the Contract for Furniture, Furnishings, and Equipment, is used.

A701 Instructions to Bidders

This document is used when competitive bids are to be solicited for construction of the project. Coordinated with A201 and its related documents, A701 contains instructions on procedures to be followed by bidders in preparing and submitting their bids, including bonding. Specific instructions or special requirements, such as the amount and type of bonding, are to be attached to A701 as supplementary conditions.

A771 Instructions to Interiors Bidders

Similar to A701, A771 is used for projects dealing with furniture, furnishings, and equipment (FF&E). It parallels A701, but contains minor changes to maintain consistency with A271 and its related FF&E documents.

[AIA Documents Summary Page](#)

B Series: agreement between

- an owner and
- an architect for professional services.

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B141 Standard Form of Agreement Between Owner and Architect with Standard Form of Architect's Services

B141 is a flexible contracting package that allows architects to offer a broad range of services to clients spanning the life of a project, from conception to completion and beyond. It is structured in a multi-part format consisting of an agreement form, Standard Form of Agreement, that contains initial information, terms and conditions, and compensation; and a service form, Standard Form of Architect's Services:

Design and Contract Administration, that defines the architect's scope of services, one that approximates the level of services in the prior edition of B141. The separation of the scope of services from the rest of the owner-architect agreement allows users the freedom to choose alternative scopes of services. The AIA intends to publish additional scopes of services that correlate to the terms and conditions of B141.

B141/CMA Standard Form of Agreement Between Owner and Architect, Construction Manager-Adviser Edition

The B141/CMA is a standard form of agreement between owner and architect for use on building projects where construction management services are to be provided under separate contract with the owner. It is coordinated with AIA Document B801/CMA, an owner-construction manager-adviser agreement where the construction manager is an independent, professional adviser to the owner throughout the course of the project. Both B141/CMA and B801/CMA are based on the premise that a separate construction contractor will also contract with the owner. The owner-contractor agreement is jointly administered by the architect

AIA Contract Document Synopses 10 and the construction manager under AIA Document A201/CMA, General Conditions of the Contract for Construction Manager-Adviser Edition.

B144/ARCH-CM Standard Form of Amendment for the Agreement Between Owner and Architect Where the Architect Provides Construction Management Services as an Adviser to the Owner

B144/ARCH-CM is an amendment for use in circumstances where the architect agrees to provide the owner with a package of construction management services to expand upon, blend with, and supplement the architect's design and other construction administrative services described in AIA Document B141.

B151 Abbreviated Standard Form of Agreement Between Owner and Architect

AIA Document B151 is an abbreviated standard form of agreement between Owner and Architect intended for use on construction projects of limited scope where the complexity and detail of AIA Document B141, Standard Form of Agreement Between Owner and Architect, are not required, and where services are based on five phases: Schematic Design, Design Development, Construction Documents, Bidding and negotiation, and Construction. This document may be used with a variety of compensation methods, including percentage of Construction Cost, multiple of Direct Personnel Expense and stipulated sum. B151 is intended to be used in conjunction with A201, General Conditions of the Contract for Construction.

B155 Standard Form of Agreement Between Owner and Architect for a Small Project

AIA Document B155 is a standard form of agreement between Owner and Architect intended for use on a Small Project; one that is modest in size and brief in duration. B155 is one of three documents that comprise the Small Projects family of documents. It has been developed for use with AIA Document A105, Standard Form of Agreement Between Owner and Contractor for a Small Project, and A205, General Conditions of the Contract for Construction of a Small Project. These documents are specifically coordinated for use as a set. Although A105, A205, and B155 may share some similarities with other AIA documents, the Small Project documents should NOT be used in tandem with other AIA document families without careful side-by-side comparison of contents. In addition, B155 adopts the A205 document by reference as it pertains to the architect's responsibilities in administration of the construction contract between owner and contractor.

B163 Standard Form of Agreement Between Owner and Architect for Designated Services

B163 is the most comprehensive AIA owner-architect agreement. This three-part document contains, among other things, a thorough list of 83 possible services divided among nine phases, covering predesign through supplemental services. This detailed classification allows the architect to more accurately estimate the time and personnel costs required for a particular project. Both owner and architect benefit from the ability to clearly establish the scope of services required for the project, as responsibilities and compensation issues are negotiated and defined. The architect's compensation may be calculated on a time/cost basis through use of the worksheet provided in the instructions to B163.

Part One of the document deals with variables typical of many owner-architect agreements, such as compensation and scope of services. The scope of services is delimited through use of a matrix that allows the parties to designate their agreed-upon services and responsibilities. Part Two contains detailed descriptions of the specific services found in Part One's matrix. Part Three contains general AIA Contract Document Synopses 11 descriptions of the parties' duties and

responsibilities. B163 s list of services has been expanded beyond those of any of its predecessor documents through inclusion of construction management and interiors services.

B171 Standard Form of Agreement for Interior Design Services

B171 is intended for use when the architect agrees to provide an owner with design and administrative services for the procurement of interior furniture, furnishings, and equipment (FF&E). Unlike B141, which is used for building design, this document includes programming of the interior spaces and requirements as part of the overall package of basic services. The authority to reject goods is left in the hands of the owner rather than the architect, since the procurement of goods is governed by the Uniform Commercial Code (UCC), which would in turn make the architect s mistaken rejection or acceptance of goods binding upon the owner. B171 is coordinated with and adopts by reference AIA Document A271, General Conditions of the Contract for Furniture, Furnishings, and Equipment. When B171 is used, it is anticipated that A271 will form part of the contract between the owner and the contractor for FF&E.

B177 Abbreviated Form of Agreement for Interior Design Services B177 is an abbreviated document that is similar to B171, but with less complexity and detail. This document may be used where the owner and architect have a continuing relationship from previous work together or where the project is relatively simple in detail or short in duration.

B181 Standard Form of Agreement Between Owner and Architect for Housing Services

This document, developed with the assistance of the U.S. Department of Housing and Urban Development and other federal housing agencies, is primarily intended for use in multiunit housing design. B181 requires that the owner (and not the architect) furnish cost-estimating services. B181 is coordinated with and adopts by reference AIA Document A201, General Conditions of the Contract for Construction.

B188 Standard Form of Agreement Between Owner and Architect For Limited Architectural Services for Housing Projects

Unlike its distant cousin B181, B188 is intended for use in situations where the architect will provide limited architectural services for a development housing project. It anticipates that the owner will have extensive control over the management of the project, acting in a capacity similar to that of a developer or speculative builder of a housing project. As a result, the owner or consultants retained by the owner likely will provide the engineering services, specify the brand names of materials and equipment, and administer payments to contractors, among other project responsibilities. Caution: B188 is not coordinated for use with any other AIA standard form contract.

B352 Duties, Responsibilities and Limitations of Authority of the Architect's Project Representative When and if the owner wants additional project representation at the construction site on a full- or part time basis, B141 and other AIA owner-architect agreements reference B352 to establish the project representative's duties, responsibilities, and limitations of authority. The project representative is employed and supervised by the architect. B352 is coordinated for use with both B141 and B163, as well as A201.

B431 Architect's Qualification Statement

B431 is a standardized outline of information that a client may wish to review before selecting an architect. It may be used as part of an RFP or as a final check on the architect's credentials. Under some circumstances, B431 may be attached to the owner-architect agreement to show, e.g., the team of professionals and consultants expected to be employed on the project.

B511 Guide for Amendments to AIA Owner-Architect Agreements

The model provisions in this guide may be used to amend most of the AIA's owner-architect agreements. Many of the provisions in B511 require special care in their application. Some provisions, such as a limitation of liability clause, further define or limit the scope of services and responsibilities. Other provisions introduce a different approach to a project, such as fast-track construction. In all cases, these provisions were chosen for this model document because they deal with circumstances that are not typical enough for AIA's standard documents.

B727 Standard Form of Agreement Between Owner and Architect for Special Services

B727 is the most flexible of the AIA owner-architect agreements, in that the description of services is left entirely to the ingenuity of the parties. Otherwise, the terms and conditions are similar to those found in B141. B727 is often used for planning, feasibility studies, and other services (such as construction administration) that do not follow the phasing sequence of services set forth in B141 and other AIA documents. If construction administration services are to be provided, care must be taken to coordinate B727 with the appropriate general conditions of the contract for construction.

B801/CMa Standard Form of Agreement Between Owner and Construction Manager Where the Construction Manager Is Not a Constructor

This standard form of agreement is intended for use on projects where construction management services are assumed by a single entity who is separate and independent from the architect and the contractor, and who acts solely as an adviser (CMa) to the owner throughout the course of the project. B801/CMa is coordinated for use with AIA Document B141/CMa, Standard Form of Agreement Between Owner and Architect Construction Manager-Adviser Edition. Both B801/CMa and B141/CMa are based on the premise that there will be a separate, and possibly multiple, construction contractor(s) whose contracts with the owner are jointly administered by the architect and the construction manager under AIA Document A201/CMa. Caution: B801/CMa is not coordinated with and should not be used with documents where the construction manager acts as the constructor (i.e., contractor) for the project, such as AIA Documents A121/CMc or A131/CMc.

B901 Standard Form of Agreement Between Design/Builder and Architect

This document contains two agreements to be used in sequence by a design/builder and an architect, the first covering preliminary design and the second covering final design. It is presumed that the design/builder has previously contracted with an owner to provide design and construction services under the agreements contained in AIA Document A191. Although it is anticipated that a design/builder and an architect entering into the first agreement will later enter into the second, the parties are not obligated to do so and may conclude their relationship after the terms of the first agreement have been fulfilled. Design/build entities may be architects, contractors, or even businesspersons, so long as they comply with the governing laws, especially those pertaining to licensing and public procurement regulations. Prior to proceeding in this fashion or entering into either agreement contained in this document with any other entity, architects are advised to contact their legal, insurance, and management advisers.

C Series: agreement between an

- architect and
- other professionals, including engineers, consultants, and other architects.

C141 Standard Form of Agreement Between Architect and Consultant

This is a standard form of agreement between architect and consultant, establishing their respective responsibilities and mutual rights. C141 is most applicable to engineers, but may also be used by consultants in other disciplines providing services to architects. Its provisions are in accord with those of B151 and AIA Document A201, General Conditions of the Contract for Construction.

C142 Abbreviated Architect-Consultant Agreement

This is an abbreviated form of agreement between architect and consultant, and adopts the terms of a prime agreement between owner and architect by reference.

C727 Standard Form of Agreement Between Architect and Consultant for Special Services

This is a standard form of agreement between architect and consultant for special services, and is intended for use when other C-Series documents are inappropriate. It is often used for planning, feasibility studies, post-occupancy studies, and other services that require specialized descriptions.

C801 Joint Venture Agreement for Professional Services

This document is intended to be used by two or more parties to provide for their mutual rights and obligations. It is intended that the joint venture, once established, will enter into a project agreement with the owner to provide professional services. The parties may be all architects, all engineers, a combination of architects and engineers, or another combination of professionals. The document provides a choice between two methods of joint venture operation. The "Division of Compensation" method assumes that services provided and the compensation received will be divided among the parties in the proportions agreed to at the outset of the project. Each party's profitability is then dependent on individual performance of pre-assigned tasks and is not directly tied to that of the other parties. The "Division of Profit and Loss" method is based on each party performing work and billing the joint venture at cost plus a nominal amount for overhead. The ultimate profit or loss of the joint venture is thus divided between the parties at completion of the project, based on their respective interests.

Programming & Analysis Topics:

Problem Seeking – Programmatic concepts:

1. Phasing – project must be completed in stages to accommodate cost or time constraints

Floor Area Ratio (FAR)

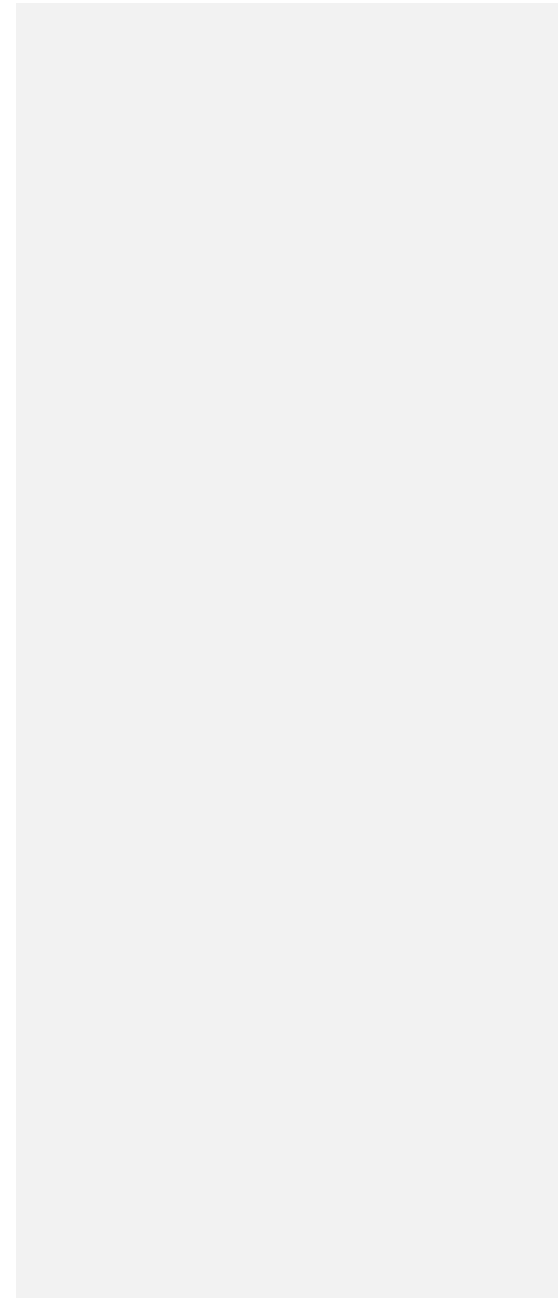
Floor Area Ratio = Total building area
Total site area

Programming Process: (short)

1. State broad objectives & problems
2. Develop functional requirements described by size & relationships
3. Develop detailed requirements

Programming Process: (long)

1. Establish objectives / goals
 - a. Primary
 - b. Secondary
 - c. Tertiary
 - d. Etc.
2. Collect Data
 - a. Site
 - b. Costs
 - c. Spatial requirements
 - d. Systems
3. Formulate Relationships
 - a. Elements
 - b. Components
 - c. Sub-groups
 - d. Interrelationships
4. Establish Priorities
 - a. Primary functions
 - b. Secondary (servant) functions
 - c. Locational priorities
 - d. Circulation priorities
5. Program Statement
 - a. Review and refine draft statement
 - b. Proof of concept analysis of draft
 - c. Final Statement



Programming Process (other):

1. Owner describes project goals
2. Collect data
3. Develop programmatic concepts
4. Reconcile list of spaces with project budget
5. Define the problem

Programming Statement – states the problem but does not offer a solution or strategy

Design Concept – suggests a physical solution to a problem 3

Functional Program – provides raw data for analysis and development of a Facilities Program; sometimes provided by an owner as standard space requirements

Facilities Program – considers scope, area requirements, adjacencies, costs and site analysis

Programming Framework Matrix / Index: Goals	Facts	Concepts	Needs	Problem
Function				
Form				
Economy				
Time				

History Topics:

- Gothic Architecture - 1100 – 1300:

- o Popular for religious structures

- o Featured the development of the pointed arch

- Exerts less thrust than a rounded arch of similar size

- Allows for vaults to be constructed over bays which were square, rectangular or oddly shaped

- o Use of flying buttresses allowed exterior walls to be thinner & larger glass

- o Ribbed vault is comprised of three arches oriented diagonally, transversely and longitudinally

- Symmetry – major design principle used to represent formality

- Zeitgeist – intellectual, cultural & artistic culture of a time and place; “the spirit of the time”

- Mies

- Le Corbusier

- o “a house is a machine for living in”

- o theory of modern architecture that spaces should be functional like a machine

- o distanced himself from the past; based designs on functionality w/o ornament

- Buckminster Fuller

- Walter Gropius in Internationale Architektur, and Ludwig Hilberseimer in Internationale neue Baukunst.

- international style:

- o as such blossomed in 1920s Western Europe. Researchers find significant contemporary common ground among the Dutch de Stijl movement, the work of visionary French/Swiss architect Le Corbusier and various German efforts to industrialize craft traditions, which resulted in the formation of the Deutscher Werkbund, large civic worker-housing projects in Frankfurt and Stuttgart, and, most famously, the Bauhaus. The Bauhaus was one of a number of European schools and associations concerned with reconciling craft tradition and industrial technology.

- o By the 1920s the most important figures in modern architecture had established their reputations. The big three are commonly recognized as Le Corbusier in France, and Ludwig Mies van der Rohe and Walter Gropius in Germany

- piazza Saint Peter:

- o The open space which lies before the basilica was redesigned by Gian Lorenzo Bernini from 1656 to 1667, under the direction of Pope Alexander VII, as an appropriate forecourt, designed "so that the greatest number of people could see the Pope give his blessing, either from the middle of the facade of the church or from a window in the Vatican Palace". Bernini had been working on the interior of St. Peter's for decades; now he gave order to the space with his renowned colonnades, using the Tuscan form of Doric, the simplest order in the classical vocabulary, not to compete with

the palace-like facade by Carlo Maderno, but he employed it on an unprecedented colossal scale to suit the space and evoke emotions of awe

- Charles Mckim(Mckim, mead, and white): American academy in rome, boston public library,

Morgan Library, NY herald building, Penn station

Philip Johnson: glass building, At&t building, seagram building with mies van der rohe, NY state theater at Lincoln center, etc.

- Beaux Arts architecture

denotes the academic classical architectural style that was taught at the Ecole des Beaux Arts in Paris. The style "Beaux Arts" is above all the cumulative product of two and a half centuries of instruction under the authority, first of the Academie royale d'architecture, then, following the Revolution, of the Architecture section of the Academie des Beaux-Arts. The organization under the Ancien Regime of the competition for

the Grand Prix de Rome in architecture, offering a chance to study in Rome, imprinted its codes and esthetic on the course of instruction, which culminated during the Second Empire (1850-1870) and the Third Republic that followed. The style of instruction that produced Beaux-Arts architecture continued without a major renovation until 1968

- Beaux-Arts in the United States

o The first American architect to attend the Ecole des Beaux-Arts was Richard Morris Hunt, followed by Charles Follen McKim. They were followed by an entire generation. Henry Hobson Richardson absorbed Beaux-Arts lessons in massing and spatial planning, then applied them to Romanesque architectural models that were not characteristic of the Beaux-Arts repertory. His Beaux-Arts training taught him to transcend slavish copying and recreate in the essential, fully digested and idiomatic manner of his models. Richardson evolved a highly personal style (Richardsonian Romanesque) freed of historicism that was influential in early Modernism

o The "White City" of the World's Columbian Exposition of 1893 in Chicago was a triumph of the movement and a major impetus for the short-lived City Beautiful movement

City Beautiful movement:

was a Progressive reform movement in North American architecture and urban planning that flourished in the 1890s and 1900s with the intent of using beautification and monumental grandeur in cities to counteract the perceived moral decay of poverty-stricken urban environments. The movement, which was originally most closely associated with Chicago, Detroit, and Washington, D.C., did not seek beauty for its own sake, but rather as a social control device for creating moral and civic virtue among urban populations.[1] Advocates of the movement believed that such beautification could thus provide a harmonious social order that would improve the lives of the inner-city poor.

Beaux-Arts city planning:

with its Baroque insistence on vistas punctuated by symmetry, eye-catching monuments, axial avenues, uniform cornice heights, a harmonious "ensemble" and a somewhat theatrical nobility and accessible charm, embraced ideals that the ensuing Modernist movement decried or just dismissed

The first US university to institute a Beaux-Arts curriculum was MIT in 1893, when the French architect, Constant-Désiré Despradelles was brought to MIT to teach. Subsequently the Beaux-Arts curriculum was begun at Columbia University, The University of Pennsylvania, and elsewhere

The best known architectural firm specializing in Beaux-Arts style was McKim, Mead, and White

Among universities designed in the Beaux-Arts style there are, most notably: Columbia University, (commissioned in 1896), designed by McKim, Mead, and White; the campus of MIT (commissioned in 1913), designed by William W. Bosworth, and the University of Texas (commissioned in 1931), designed by Paul Philippe Cre

Two of the best American examples of the Beaux-Arts tradition stand within a few blocks of each other: Grand Central Terminal and the New York Public Library.

New Urbanism:

is an American urban design movement that arose in the early 1980s. Its goal is to reform all aspects of real estate development and urban planning, from urban retrofits to suburban infill. New urbanist neighborhoods are designed to contain a diverse range of housing and jobs, and to be walkable. New Urbanism is also known as traditional neighborhood

design, neotraditional neighborhood design, and transit-oriented development. A more idealistic variant of New Urbanism, founded in 1999 by Michael E. Arth, is known as New Pedestrianism. The ideas of New Urbanism also are embraced by the European Urban Renaissance movement. In 1991, the Local Government Commission, a private nonprofit group in Sacramento, California, invited architects Peter Calthorpe, Michael Corbett, Andres Duany, Elizabeth Moule, Elizabeth Plater-Zyberk, Stefanos Polyzoides, and Daniel Solomon to develop a set of community principles for land use planning. Named the Ahwahnee Principles (after Yosemite National Park's Ahwahnee Hotel), the commission presented the principles to about one

hundred government officials in the fall of 1991, at its first Yosemite Conference for Local Elected Officials.

New urbanists support regional planning for open space, appropriate architecture and planning, and the balanced development of jobs and housing. They believe their strategies are the best way to reduce traffic congestion, increase the supply of affordable housing, and rein in urban sprawl. The Charter of the New Urbanism also covers issues such as historic preservation, safe streets, green building, and the renovation of brownfield land

Lugi Nervi-the Olympic game building using fly buttress system
Palazzo Dello Sport by Pier Luigi Nervi

Facility: Palazzo Dello Sport -Great Sports Palace

Engineer: Pier Luigi Nervi

Description: 330' diameter with seating for 17,000. Ribbed reinforced concrete dome.

Location: Rome,Italy

Cost: 2 Billion Lire

Built in 1958 to 1960 for the 1960 Summer Olympic Games

Planning Influences:

- Industrial Revolution
 - o Prompted a reform movement that lead to many ideas about planning
 - o Influenced urban design in Europe & US

- Garnier's Cite Industrielle
 - o Developed in response to the Industrial Revolution
 - o First to use the idea of zoning
- L'Enfant's plan of Washington, DC
 - o Baroque planning approach was never widely adopted
 - o Widely praised and publicized as a major planning effort
- Ordinance of 1785
 - o started the rectangular survey system
 - o reinforced the idea of grid planning that began with the plan for Philadelphia
- 1893 Columbian Exposition
 - o revived interest in city planning
 - o showed desirable results could be achieved through organized efforts
 - o prompted many cities to plan civic centers & parkways

Town Planning:

- Savannah, GA
 - o Based on grid system
 - o Wards of 40 houses are bounded by major streets with each section having a public square
- Washington, DC –
 - o Example of Baroque planning approach
- Philadelphia
 - o Based on grid system
- Paris
 - o beginning in 1852, the Baron Haussmann's urbanisation program involved leveling entire quarters to make way for wide avenues lined with neo-classical stone buildings of bourgeoisie standing
- London
- Letchworth
- Wlewyn Garden City

- Radburn, NJ
 - o 1928 plan developed by Clarence Stein & Henry Wright
 - o First plan to take on planning for pedestrians and automobiles
 - o Use of underpasses to allow pedestrian traffic to pass under automobile traffic
 - o Intended to prevent accidents and separate traffic types
 - o Only one underpass constructed
- Reston, VA
 - o Influenced by Radburn, NJ plan
 - o Features a series of underpasses that promote travel on foot throughout the community
- Charleston, SC
 - o 1931 - First city in the US to establish a "historic district" in 1931 as a response to attrition of aging building stock through theft, demolition & neglect
- Williamsburg, VA
 - o Late 1920's - 1930's – part of city was acquired & restored, preserved, reconstructed by what is now the Colonial Williamsburg Foundation led by Rev. W.A.R. Goodwin & financed by John D. Rockefeller
- New Orleans
 - o 1937 - Designated the Vieux Carre a historic district in 1937 adopting mechanisms from Charleston
- Seaside, FL
 - Planning Concepts:
 - Medieval city planning
 - Garden City Planning
 - Cite Industrielle
 - City Beautiful
 - New Urbanism
 - Planners:
 - Christopher Wren
 - o one of the best known and highest acclaimed English architects in history,[1] responsible for rebuilding 55 churches in the City of London after the Great Fire in 1666, including his masterpiece St Paul's Cathedral, completed in 1710
 - o St Paul's has always been the touchstone of Wren's reputation. His association with it spans his whole architectural career, including the thirty-six years between the start of the new building and the declaration by parliament of its completion in 1711

- o now known as the greatest architect of the English baroque style
- o After the great fire of 1666 Wren prepared a master plan for the reconstruction of London, which was never executed. He designed, however, many new buildings that were built, the greatest of which was Saint Paul's Cathedral .
- o In 1669 Wren was named royal architect, a post he retained for more than 45 years. From 1670 to 1711 he designed 52 London churches, most of which still stand, notable for their varied and original designs and for their fine spires. They include St. Stephen, Walbrook; St. Martin, Ludgate; St. Bride, Fleet Street; and St. Mary-le-Bow, the latter manifesting the type of spire in receding stages generally associated with Wren's name. Among his numerous secular works are the Sheldonian Theatre, Oxford; the elegant library of Trinity College, Cambridge; the garden facade of Hampton Court Palace; Chelsea Hospital; portions of Greenwich Hospital; and the buildings of the Temple, London. Wren also built residences in London and in the country, and these, as well as his public works, received the stamp of his distinctive style. His buildings exhibit a remarkable elegance, order, clarity, and dignity. His influence was considerable on church architecture in England and abroad. Wren was knighted in 1675, and is buried in the crypt of St. Paul's.

- Kevin Lynch - Image of the City

- o Path, edge, node, center, district

- o an American urban planner and author.

- o Lynch studied at Yale University, Taliesin (studio) under Frank Lloyd Wright, Rensselaer Polytechnic Institute, and received a Bachelor's degree in city planning from MIT in 1947. He worked in Greensboro, NC as an urban planner but was recruited to teach at MIT by Lloyd Rodwin. He began lecturing at MIT the following year, became an assistant professor in 1949, was tenured as an associate professor in 1955, and became a full professor in 1963.

- o Lynch provided seminal contributions to the field of city planning through empirical research on how individuals perceive and navigate the urban landscape. His books explore the presence of time and history in the urban environment, how urban environments affect children, and how to harness human perception of the physical form of cities and regions as the conceptual basis for good urban design.

- o Lynch's most famous work, The Image of the City published in 1960, is the result of a five-year study on how users perceive and organize spatial information as they navigate through cities. Using three disparate cities as examples (Boston, Jersey City, and Los Angeles), Lynch reported that users understood their surroundings in consistent and predictable ways, forming mental maps with five elements:

- o paths, the streets, sidewalks, trails, and other channels in which people travel;

- o edges, perceived boundaries such as walls, buildings, and shorelines;

- o districts, relatively large sections of the city distinguished by some identity or character;

- o nodes, focal points, intersections or loci

- o landmarks, readily identifiable objects which serve as reference points
- o In the same book Lynch also coined the words "imageability" and "wayfinding". Image of the City has had important and durable influence in the fields of urban planning and environmental psychology.
- o Kevin Lynch. Memorize his concept about Pattern Language.
- Haussmann
 - o was a work commissioned by Napoléon III and led by the Seine prefect, Baron Georges-Eugène Haussmann between 1852 and 1870, though work continued well after the Second Empire's demise in 1870.
 - o The project encompassed all aspects of urban planning, both in the centre of Paris and in the surrounding districts: streets and boulevards, regulations imposed on facades of buildings, public parks, sewers and water works, city facilities and public monuments. The planning was influenced by many factors, not the least of which was the city's history of street revolutions.
 - o Haussmann's approach to urban planning was strongly criticised by some of his contemporaries, ignored for a good part of the twentieth century, but later re-evaluated when modernist approaches to urban planning became discredited. His restructuring of Paris gave its present form; its long straight, wide boulevards with their cafés and shops determined a new type of urban scenario and have had a profound positive productive influence on the everyday lives of Parisians. Haussmann's boulevards established the foundation of what is today the popular representation of the French capital around the world, by cutting through the old Paris of dense and irregular medieval alleyways into a more rationally-designed city with wide avenues and open spaces which extended outwards far beyond the old city limits.
- Ebenezer Howard
 - o known for his publication Garden Cities of To-morrow (1898), the description of a utopian city in which man lives harmoniously together with the rest of nature. The publication led to the founding of the Garden city movement, that realized several Garden Cities in Great Britain at the beginning of the Twentieth Century
 - o called for the creation of new suburban towns of limited size, planned in advance, and surrounded by a permanent belt of agricultural land. These Garden cities were used as a role model for many suburbs. Howard believed that such Garden Cities were the perfect blend of city and nature. The towns would be largely independent, and managed and financed by the citizens who had an economic interest in them
 - o ideas attracted enough attention and financial backing to begin Letchworth Garden City, a suburban garden city north of London. A second garden city, Welwyn Garden City, was started after World War I
- Tony Garnier:

o Tony Garnier 1869-1948, French architect. His greatest achievement was in urban planning. After his study of sociological and architectural problems of an industrial city, he began in 1901 to formulate an elaborate solution, published as *Une cité industrielle* (1918). His proposals served as a stimulus to young architects of the 1920s. From 1905 to 1919 Garnier was architect to the city of Lyons. In this capacity he built the municipal slaughterhouse, a hospital, and a stadium, which are of interest for their use of reinforced concrete

- L'Enfant

o asked (1791) by Washington to submit plans for the capital city at Washington. His plans were presented in 1791, but he antagonized Congress and was opposed by Thomas Jefferson

o L'Enfant's plans were exhumed from the archives, and in 1901 the design of the capital was developed along the lines that he had laid down

- Daniel Burnham

o American architect and urban planner whose impact on the American city was substantial. He was instrumental in the development of the skyscraper and was noted for his highly successful management of the World's Columbian Exposition of 1893 and his ideas about urban planning.

o He was the Director of Works for the World's Columbian Exposition in Chicago and designed several famous buildings, including the Flatiron Building in New York City and Union Station in Washington D.C

o American architect and city planner b. Henderson, N.Y. He was trained in architects' offices in Chicago. In that city he established (1873) a partnership with John W. Root and soon gained many of the most important architectural commissions of the day. Their Chicago works include the Monadnock Building; the 20-story Masonic Temple Building (1892), the first important skeleton skyscraper; the Reliance Building; and the "Rookery" offices. Among their other works were the Flatiron Building and the Wanamaker store in New York City, Union Station in Washington, D.C., and buildings in Cleveland, Buffalo, and San Francisco.

o Burnham and Root also designed the general plan for Chicago's World's Columbian Exposition (1893) and through it exerted an enormous influence upon contemporaneous civic design. In 1901, Burnham served with C. F. McKim, F. L. Olmsted, Jr., and Augustus Saint-Gaudens on the Senate Park Commission in planning for the future beautification of Washington, D.C. With E. H. Bennett he created a civic improvement plan of great importance for Chicago (1907), much of which has since been put into execution. He also prepared plans for Baltimore, Duluth, and San Francisco, and was commissioned by the U.S. government to design plans for Manila and other cities in the Philippines.

- Olmstead

o was an American journalist, landscape designer and father of American landscape architecture. Frederick was famous for designing many well-known urban parks, including Central Park and Prospect Park in New York City

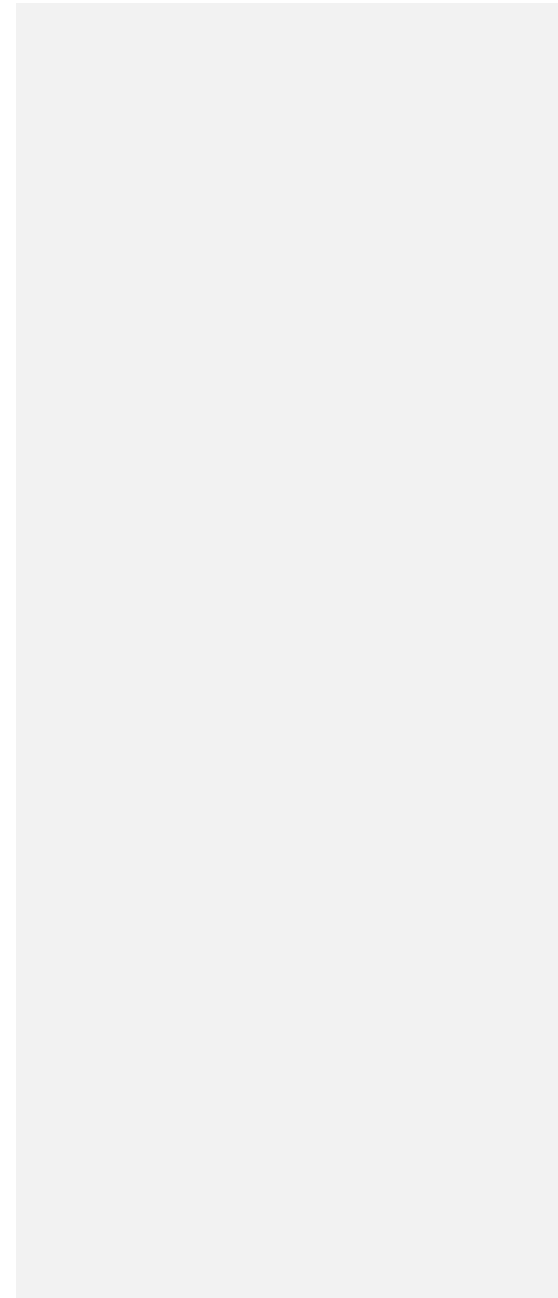
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- Frank Lloyd Wright
- Corbu



Road & Parking Design:

- Entrance locations:
 - o Most desirable to be located on a collector street rather than arterial street
 - o Sufficiently separated from an intersection
 - o Reasonable angle for connection
- Parking Configurations:
 - o 90 degree
 - most difficult for a driver to maneuver within only configuration that allows for a two-way travel lane
 - most efficient; 11 cars per 100 lineal feet of curb
 - o 60 degree
 - Relatively economical
 - Allow easy access to and from parking spaces
 - 9 cars per 100 lineal feet of curb
 - o 45 degree
 - Relatively economical
 - Allow easy access to and from parking spaces
 - 8 cars per 100 lineal feet of curb
 - o 30 degree
 - Least efficient, uneconomical
 - 5 cars per 100 lineal feet of curb
- Slope percentage for different uses:
 - o parking is 5%max,
 - o street is 10%

4

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- Parking Space Sizes

- o Accessible space is minimum 96" wide (8 ft) with access alley 60" (5 ft) wide for cars or 96" (8 ft) wide for vans adjacent to the space

5

Codes & Regulation Topics:

Code Analysis:

- Building Codes
- Life Safety Codes
- Plumbing Codes
- Handicapped / Accessibility Codes
- Zoning Ordinances
- Other specialty code requirements

Zoning Ordinances – regulate land usage, function, size & certain exterior aspects

- Segregate uses
- Control density
- Parking & loading requirements
- Heights, sizes & setbacks
- Site layout & coverage
- Signage & landscaping
- Water retention & detention

Note – if zoning ordinance and building code give different maximum heights or areas, the lower of the two takes precedence

Incentive Zoning:

- way to encourage private developers to provide amenities for public use in exchange for the opportunity to build larger or taller structure on the site
- must include a base floor area (standard for comparison) and a bonus ratio (the floor area ratio (FAR) that is provided if the public space is part of the design
- value of additional leasable floor area must exceed the cost of providing the public amenity o be a true incentive

Easements - easement in law, the right to use the land of another for a specified purpose, as distinguished from the right to possess that land

Deed Restrictions - restrictions on the deed that place limitations on the use of the property. Restrictive covenants are an example of deed restrictions Deed restrictions are usually initiated by the developers - those who determined what the

land would be used for, divided the land into plots, and built homes, office buildings, or retail buildings on it. Deed restrictions come with the property and usually can't be changed or removed by subsequent owners.

Covenants – dictate type and appearance of exterior materials for aesthetic reasons, ex. Allowable color schemes

Egress Requirements:

- Exit Access Travel Distance- distance a building occupant must travel from the most remote point in the occupied portion of the exit access to the entrance of the nearest exit
- Common Path of Egress Travel – portion of an exit access that occupants are required to traverse before two separate and distinct paths of egress travel to two exits are available
- Exit Separation Distance- minimum distance by which two exits must be separated when two exits are required
- Exits cannot pass through:
 - o Kitchens
 - o Storerooms
 - o Closets
 - o Other spaces used for similar purposes

- o Through rooms that can be locked to prevent egress
- Spaces with more than 50 occupants must have 2 exits; doors swing in the direction of travel

ADA Accessibility Guidelines (ADAAG):

- State that all newly designed or newly constructed areas must meet accessibility requirements
- Includes all employee work areas and all temporary construction that is open to the public
- Following areas are not required to be accessible:
 - o Temporary facilities associated with the process of construction (trailers, scaffolding)
 - o Raised areas used primarily for security or life safety (security or life guard towers)
 - o Non-occupiable service areas accessed infrequently for maintenance or monitoring (catwalks, penthouses, pump rooms)
 - o Single occupant structures accessed from above or below grade (tollbooths)
 - o Raised structures for officiating sporting events
 - o Water slides
 - o Non-public animal containment areas
 - o Raised boxing & wrestling rings
- Minimum clear door opening width = 32" so typically use a 36" door
- 1:12 maximum ramp slope

Architectural Area – definitely read AIA Doc D101.

Know which areas are multiplied by 0.5. include basement and 0.5 of covered balcony

Legal Issues:

Mediation: not legal. Just need mediator to reach agreement between each party

Arbitration: this is legal technique for the resolution of disputes outside the courts, wherein the parties to a dispute refer it to one or more persons (the "arbitrators", "arbiters" or "arbitral tribunal"), by whose decision (the "award") they agree to be bound. Arbitration in the United States and in other countries often includes alternative dispute resolution (ADR), a category that more commonly refers to mediation (a form of settlement negotiation facilitated by a neutral third party). It is more helpful, however, simply to classify arbitration as a form of binding dispute resolution, equivalent to litigation in the courts, and entirely distinct from the various forms of non-binding dispute resolution, such as negotiation, mediation, or nonbinding determinations by experts.

Litigation is lawsuit

Subrogation:

legal technique where a insurer "steps into the shoes" of a party to whom it has made a payment

Example – damage to a property under construction caused by a subcontractor. Insurance covers the damage claim and then "steps into the shoes" of the owner and sues subcontractor in the owner's name

Fees:

Traditional Consultant Fee %:

Mechanical – 15%

Electrical – 12.5%

Civil – 10.5%

Structural – 9.4%

Methods of Calculating Compensation for Architectural Services:

Time Based Methods:

1. Multiple of Direct Salary Expense:

2. Multiple of Direct Personnel Expense:

Include the salaries of people working on the job and their required benefits PLUS overhead and profit

Each hour spent working on the project includes a profit factor

Best for new clients with speculative work / minimizes the risk to the architect

3. Professional Fee plus Expenses:

4. Hourly Billing Rate:

Other Methods:

1. Stipulated sum:

2. Percentage cost of the work:

3. Square footage:

Best used for repetitive projects with good historical time and expense data

4. Unit cost:

5. Multiple of Consultant's Billings:

6. Royalty

Utilization Ratio:

Used by firms to determine the amount of time spent on billable work as a percentage of total time the employee is compensated

Used in the analysis of profitability & financial standing of a firm

UR = billable hours / total hours

Lower level employees have higher UR's than PA's & Managers b/c of overhead responsibilities like marketing, firm management, etc.

Insurance:

Schedules are impacted by:

1. Size of project
2. Complexity of project
3. Number of people working on the project
4. Client action / reaction time

Types of Project Schedules:

1. Gantt / Bar
 2. CPM – Critical Path Method – sequence of events that must happen as scheduled for project to be completed on time
 - o Float – range of time during which noncritical activities may start or end w/o affecting the overall schedule
 - o Total Float – individual float times added together & does not influence the critical path time
- Full wall schedule – most likely to have the best commitment from the architects project team
 - Bar chart
 - CPM diagram
 - Milestone

Project Scope

Delivery Methods:

1. Design – Bid – Build

- . Three prime players – owner, designer, builder
- . Two separate contracts – owner + designer; owner + builder
- . Typically involves competitively bid, lump sum construction contracts based on complete and prescriptive contract documents
- . Work is conducted in a linear sequence
- . Public work has traditionally used this method
- . Final contractor selection based on lowest responsible bid or total contract price
- . Established process with legal and procedural guidelines
 - . 2. Design – Build
- . Two prime players – owner, designer-builder
- . Single Contract – owner + design-build entity

Design-build entity can be lead by either architect or general contractor
Timing of agreeing on GMP varies by project
Consolidated entity provides design and construction services to the owner
Offers the owner a single source of responsibility
Provides continuous execution of design and construction
Phases overlap – design and build (fast track)

3. Construction Management at Risk (CM@R, CMc, CM/GC)

Three prime players – owner, designer, CM@R
Two separate contracts – owner + designer; owner + CM@R
CM@R often provides preconstruction services during the design phase then takes on the financial obligation for construction under a specified cost agreement
Frequently based on a GMP – guaranteed maximum price
Timing for agreeing on a GMP varies by project
CM@R contracts with the subcontractors who are bound only to the CM@R
No contractual relationship between the designer & CM@R
Phases will often overlap – design & build (fast track)

Contractor Selection Approaches:

- Typically based on price, qualifications, or a combination of the 2

- Qualification Selections:
 - o RF*– request for qualifications
 - o RFP – request for proposal
 - o Interviews to review bidders
- Low bid – based solely on the lowest total cost
- Best Value Bid – final selection based on weighting of total cost and other criteria sus as qualifications

Fast Track – can reduce time of project from 10-30%

Project Team

Responsibilities of Consultants during major design phases of the project:

Construction Manager benefits a project:

- with fast tracked multiple prime contracts
- joins early in the design phase, allows owner to take advantage of construction expertise to minimize risks of major revisions later in the process
- may take on the role of construction administration

CM can act as:

1. advisor to the owner – no direct financial responsibility for the project
2. construction contractor – responsible for delivering a finished product for the agreed upon price

Risk Management

Limited Liability

Project Phases:

Traditional Phase %:

SD - 15%

DD - 15%

CD - 35%

11 Bid - 5%

CA - 30%

Cost Projections:

Cost Factors:

1. Scope
2. Quality
3. Budget

Architect's estimates can't account for:

- . Inflation
- . Market conditions
- . Contractor means & methods

Preliminary Costs – SF Cost Estimates; based on occupancy, size & type of construction

Detailed Costs – Itemized break down

Building Owners Management Association Office Standards:

Rentable area calculations:

- . When measuring from an exterior wall which is more than 50% glass, measure from the inside face of glass
- . Measure to the centerline of demising walls
- . Measure to the inside face of walls
- . Rentable area includes a share of common restrooms & corridors
- . No deductions are made for columns or projections necessary to the building

AIA Ethical Standards

- Code applies to all AIA members regardless of membership category

- Anyone ma file a complaint
- Penalties for Violations:
 - Admonition (private) – letter of ruling sent to the parties and kept in the member's file
 - Censure (public) – letter is sent and notification of the case and ruling is published to AIA membership
 - Suspension of membership – membership is suspended for period of time; 1 or 2 years & ruling is published
 - Termination of membership – membership is terminated & ruling is published
- Common ethics violations:
 - Attribution of credit
 - Accurate representation of qualifications
 - Attainment and provision of examples of work
 - Basic honesty

Architect's Cost Estimates – Inclusions & Exclusions

FFE

Fixtures, Furnishings and Equipment

Joint Venture Agreement

Policy board

Project Development Issues

Tax Increment Financing:

Method cities use to issue bonds to pay for improvements (new sewers, streets) within a specified district intended to stimulate development w/in the district

During time of redevelopment taxes are based on the assessed value of the property prior to the redevelopment

After the development, the increase in taxes due to the development (tax increment) is used to repay the bonds

General Obligation Bonds:

Typically used to fund a specific project such as a library or fire station

Not used to encourage private development

All taxpayers in the jurisdiction issuing the general obligation bonds must pay off the bonds through a property tax so a voter majority is required

Developer Impact Fees:

Generally used to fund infrastructure improvements made necessary by new developments

Common method of raising money but can have a negative effect b/c developers look for areas with the lowest impact fees

Business Improvement Districts:

Used to fund public space improvements (streetscapes) to enhance an area's appeal and indirectly increase property values

Taxes assessed to property owners in the district who would benefit from the improvements

Not intended to encourage private development

Ad Valorem Tax:

Tax based on the value of the property being taxed

Debt Service:

Cost to pay off the construction loan for a project

Considered an ongoing cost over many years, not part of the original project costs

Contractor's Overhead & Profit typically = 15% to 40% of the construction costs

Development Loan Types:

- Blanket loan – used for the purchase of land that the developer intends to subdivide and resell; generally includes a clause that releases each subdivided plot from the loan as it is purchased and a portion of the debt is repaid
- Bridge loan – short-term loan used to close quickly on a property or to finance a project that must begin immediately while waiting on another lender to approve a long term loan
- Hard money loan – similar to a bridge loan; based on the value of the property against which the loan is made; amount of loan depends on the quick-sale value of the property or the loan-to-value ratio
- Mezzanine loan – often used by developers; large loan with variable interest rate that increases substantially near the time repayment is due; stock in developers company is used as collateral; loan requires gamble that property will produce enough revenue to repay the loan when the interest rates escalate
- Conventional mortgage – fixed or adjustable interest rate; secured by the property purchased; when debt is repaid borrower has clear title to the property

Location Factors for Construction:

- Sub-urban areas – lowest costs typically; well connected to urban areas
- Urban areas – highest costs, higher labor rates
- Rural areas – access and transportation affect costs
- Labor unions – increase labor costs greatly over “open shop”

Eminent domain:

- in common law legal systems is the inherent power of the state to seize a citizen's private property, expropriate property, or rights in property, without the owner's consent. The property is taken either for government use or by delegation to third parties who will devote it to "public use" or in some cases, economic development.
- The most common uses of property taken by eminent domain are public utilities, highways, and railroads. Some states require that the government body offer to purchase the property before resorting to the use of eminent domain

Deed Restrictions:

- restrictions on the deed that place limitations on the use of the property
- Restrictive covenants are an example of deed restrictions.
- Usually initiated by the developers - those who determined what the land would be used for, divided the land into plots, and built homes, office buildings, or retail buildings on it.
- Come with the property and usually can't be changed or removed by subsequent owners.

- Deed restrictions such as restrictive covenants are often put in place to maintain a desired look in a neighborhood. To that end, deed restrictions may prevent owners from building more than a pre-established number of homes on one lot. Deed restrictions can also specify what materials or style a building may or may not be constructed of, and how close to the street it can be. Deed restrictions can even specify the minimum size that a house on the lot may be! Deed restrictions govern more than just the construction of buildings on a property.

Restrictive covenants:

- in a residential neighborhood dictate what types of materials fences may be made out of, or establish limits regarding pets, such as how many pets can be kept in a home or the conditions they must be kept in.
- Covenants often protect the aesthetic appearance of the neighborhood by providing a list of acceptable paint colors for the exterior of the house, regulating tree-cutting and other landscaping issues, or prohibiting the use of the lot for storage of campers, trailers, or cars that don't run. Covenants might also establish road maintenance or amenities fees

Amortization:

- process of decreasing or accounting for an amount over a period of time.
- Amortization (business), the allocation of a lump sum amount to different time periods, particularly for loans and other forms of finance, including related interest or other finance charges.
- Amortization schedule, a table detailing each periodic payment on a loan (typically a mortgage), as generated by an amortization calculator.
- Negative amortization, an amortization schedule where the loan amount actually increases through not paying the full interest
- Amortization is also used in the context of zoning regulations and describes the time in which a property owner has to relocate when the property's use constitutes a preexisting Nonconforming use under zoning regulations.

Building Efficiencies by Type:

55% - Hospital

60% - College, Student Union; Court House; Retail Stores

65% - Apartments; College, Class room & Admin

70% - Auditoriums; Banks; Restaurant

75% - Jails/Prisons; Office

80% - Department Store

85% - Garage, Service

Site Zoning Vignette:

1 hour total

1 problem with 2 tasks

Problem:

- Delineate areas suitable for construction of buildings & other site improvements
- Respond to regulatory restrictions & programmatic requirements
- Define:
 - Site profile
 - Maximum buildable envelope based on zoning regulations & environmental constraints

General notes / Tips:

- Exact problem w/ single answer
- Follow the program exactly
- Be aware of sun exposure planes; corner of building will likely be clipped
- Use sketch pad
- Establish building limits
- Use grid
- Use ortho
- Note benchmark & accurately locate

- Check math
- Use full cursor
- Note scale of grids as vertical and horizontal may differ
- Use measure tool to double check dimensions
- To draw angled lines draw sketch line & rotate
- Use circles for non-linear setbacks
 - Software won't draw circles so use straight lines to follow curved setbacks

Task One: Plan

Process:

1. Note all relevant requirements from program
2. Sketch all setbacks – rear, side & front yard
3. Draw Surface Improvements:
 - Reference lot lines
 - Can go over easements
4. Draw Buildable area:
 - Cannot build in easements

Task Two: Profile

General Notes:

- Reference the section line given
- Project points down
- Draw grade profile at the section line; be aware of swales / ridges
- Do not retrace grade
- Do not go underground
- Benchmark is given by the program
- Reference height restrictions for the overall property and for certain areas / zones
- Note the sun exposure plane-
 - Where does it start?
 - What angle?
 - Use sketch lines – angle is shown at the bottom of the screen; draw as close to possible to give angle; extend out to be more exact
- Draw the building profile at the section line

Process:

1. Draw existing grade by dropping points on the grid with straight sketch lines
2. Connect the points with the draw grade command
3. Using sketch tools draw required setbacks, easements, height restrictions; benchmark @ both sides of the section & solar access planes
4. Double check
5. Locate point in space where solar access plane initiates – zoom in & be as accurate as possible
6. Outline maximum volume following the guidelines
7. Double click to end the profile

Contract has been awarded, what next: Schedule construction
Not: (1) request for payments, lien release, list materials

AIA C141-1997 (NPP9): Coordinate sequence architect and Consultant Services
Not: Owner, contractor, construction manager

Joint Venture: When two firms work together
Not: Associated firm, partnering, multiple prime

Important factor in success of the firm: Communicate with employees to increase and improve production
Not: Office renovation, purchase equipments, increase benefits

Architect to transfer ownership of CD's to government
Not: Corporations, commercial, health care

Manger's first key challenge (Per Architects Handbook of Professional Practice) is to clearly identify the clients expectations
Not: profitability goal, contractual obligations, team members' judgments and creativity

Geotechnical observation contracts are with Owner.
Not: Architect, Structural Engineer, Contractor

Scope of services is most important part of contract between owner and architect.
Not: Client background check, type of consultant, construction delivery method

Mediation: Architect to resolve the contract disputes first.
Not: Resign contract, refund fees, amend contract

Most efficient construction document phase coordination with consultant is to meet consultants regularly:
Not: call daily, emails, memos

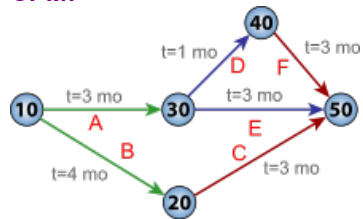
Presentation model for clients' promotional use is not a "basic Service" in a standard owner/architect agreement.

Not: standard practice, part of design process, not reimbursable

To reduce conflicts between engineers and architects drawings- hold regular coordination meetings

Not: Use in-house engineers, schedule peer review of documentations, owners to review documentations

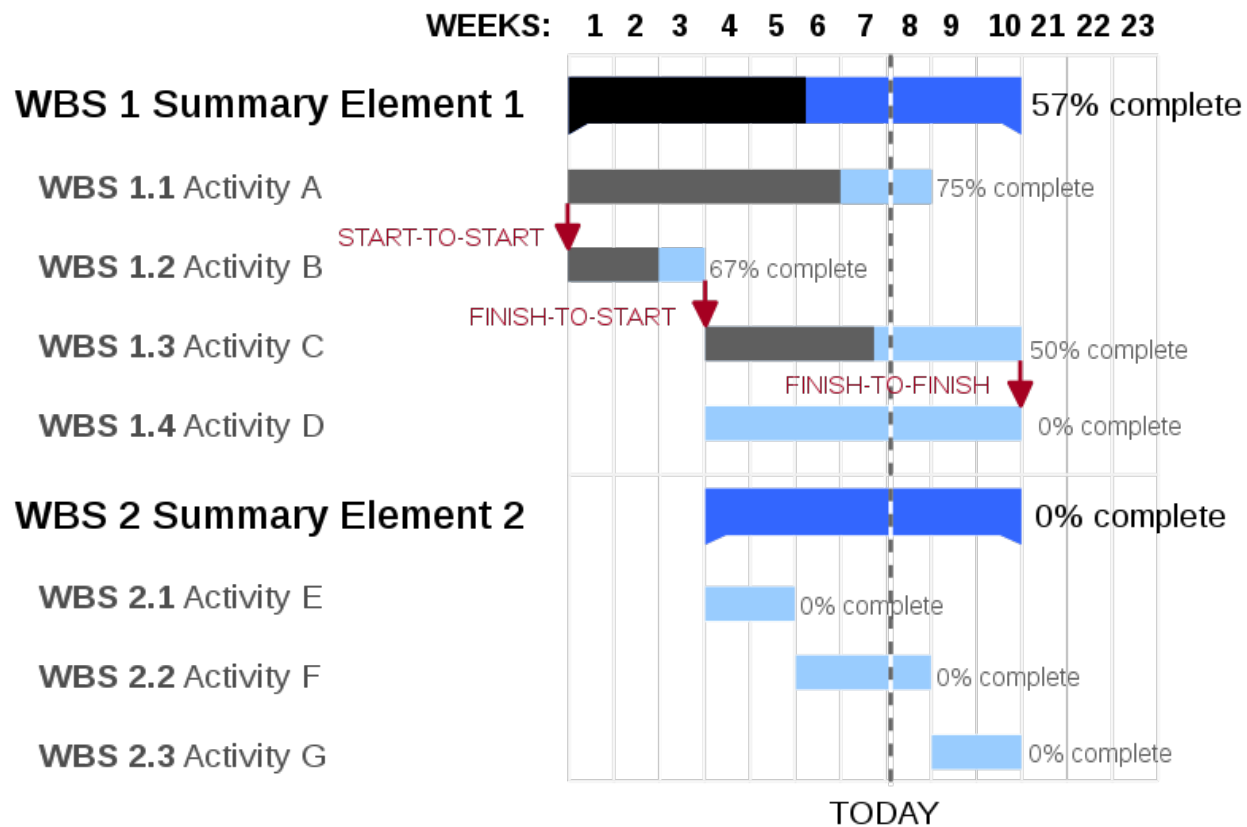
CPM:



PERT chart for a project with five **milestones** (10 through 50) and six activities (A through F). The project has two critical paths: activities B and C, or A, D, and F – giving a minimum project time of 7 months with fast tracking. Activity E is sub-critical, and has a **float** of 1 month.

The **critical path method (CPM)** is an **algorithm** for scheduling a set of project activities.^[1] It is an important tool for effective **project management**

Gantt Chart:



A **Gantt chart** is a type of [bar chart](#), developed by [Henry Gantt](#), that illustrates a [project schedule](#). Gantt charts illustrate the start and finish dates of the terminal elements and summary elements of a [project](#). Terminal elements and summary elements comprise the [work breakdown structure](#) of the project. Some Gantt charts also show the [dependency](#) (i.e., precedence network) relationships between activities. Gantt charts can be used to show current schedule status using percent-complete shadings and a vertical "TODAY" line as shown here.

Although now regarded as a common charting technique, Gantt charts were considered revolutionary when first introduced^{[[citation needed](#)]}. In recognition of [Henry Gantt](#)'s contributions, the [Henry Laurence Gantt Medal](#) is awarded for distinguished achievement in management and in community service. This chart is also used in Information Technology to represent data that has been collected.

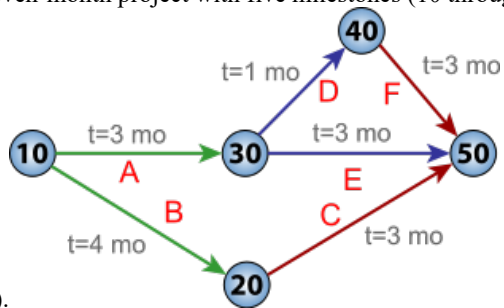
PCM:

Project/Program Cycle Management (PCM) is the method employed by NGO's, UN agencies and non-profit organizations to carry out and manage their projects and programmes. Learning PCM is important for submitting successful proposal and solicitation of funding from donors worldwide. PCM seminar will equip the participants with enhanced designing and management tools to tailor projects more adequately to meet the needs of the beneficiaries.



Pert:

The **Program (or Project) Evaluation and Review Technique**, commonly abbreviated **PERT**, is a statistical tool, used in [project management](#), that is designed to analyze and represent the tasks involved in completing a given [project](#). First developed by the [United States Navy](#) in the 1950s, it is commonly used in conjunction with the [critical path method](#) or **CPM**. PERT network chart for a seven-month project with five milestones (10 through 50) and six activities (A through



F).

Soil damage

Water table:

- When soil is saturated, the line above is water table
- Parallels earth surface
- Varies with seasonal fluctuations
- Precipitation, on ground surface
- In practice: water table to be below foundation to avoid damage [hydro static/ capillary action]
- Water to be drained away "from building"
- Drainage tiles: 6" below lowest floor slab
- Open joists to be covered with wire mesh then coarse gravel or stone back fill
- Slab on grade with no hydrostatic pressure is on gravel fill (6"-8"), water not drawn by capillary
- Sealant are used in all connections

Water table:

Boundary between aeration (zone) & saturation zone

Increased moisture content in bearing soils effects:

Change in volume and reduction in bearing capacity
"not" increase in cohesion, or decrease in compatibility

Sudden loss of shearing resistance in a cohesionless soil

Liquifaction

"Not" plasticity, collapsing soil, or expansive soil

Unstable differential settlement: building failures due to unstable subsoil that causes differential settlement of foundation:

Based on large beds of clay contained in gravel

"not" stratified rocks, small boulders in gravel, or deep layer of dry sand and gravel

Erosion: Removal of vegetation from site causes erosion
"not" pollution, disorientation, defoliation

To reduce potential vertical movement due to expansive clay:

- Over excavate below footing grade & fill with compacted gravel,
- Extend footings & foundations to a depth of consistent ground moisture
- Drain surface water away from foundation
- Control roof water runoff

"Not": Waterproof foundation to reduce filtration plant trees near building to stabilize ground

Settlement: As weight (weight) of buildings increase, soil under footing compresses, reduce void volume then bldg settles. Even bedrock has to be verified slight even settlement is okay.. Differential settlement creates cracks/ failures continuous survey of site as construction occurs is required settlement continuous with time due to void, moisture, movements

Earth movement: Great with easy subsoil, clay swells (wet) & shrinks moisture content @ surface with clay creates each movements @ 5' earth movement is great. Serious issues if footings are different. adjacent excavations affect clay moisture content this causes settlement or slippage @ sub surface clay slope surface + rain or moisture moves earth mass evidence: Structure with tilt or rows or sloping power poles

Cubic yard: Units measuring cuts & soils is volume "not" square yard (area), acres (area_, tonnage (weight)

Balancing cut & fill is for site grading

"not" Sediment control, land reclamation, footing excavation

Soil:

Soil: Mixture of rock particles, minerals, decayed organic materials (humus), water and air. Soils are different due to variation in composition.

Clay: Fine grained, firm cohesive is introduced by decomposition + hydration of rocks. Clay is plastic (wet) & hard (dry), impervious (relative), swells when absorbing water, shrinks when dry, very unstable & predictable for support of buildings maybe used for foundation & needs engineers.
Clay is smaller than sand or silt. Clay is cohesive.

Silt: Fine grained, sedimentary, $<.002$ " or less
Silt plus water makes mud, soft, sticky, plastic

Sand: Loose granular, $.002$ " to $1/4$ ", not plastic, & not cohesive
"course- grained solid"= sand +gravel=
base foundation relative + excellent drainage =
relatively permeable
quick Sand= sand + moving water, unstable, "sink hole"

Gravel: Larger soil particles with most void has higher permeability than clay, sand, silt. $1/4$ " to $3\ 1/2$ "; greater than $3\ 1/2$ "= cobblestone, greater than cobblestone= boulder

Hard pan: Mixture of Gravel, clay, sand foundation phase

Decomposed rock: Disintegrator rock mass that were solid

Boulders: Rock detached from bedrock

Shale/ slate bedrock: Fine textured soft rock (sheets); Solid material/ earth's crust.

Humus: Well decomposed, more or less stable, organic matter in soil, dead plants, animals

Mulch: Conserve moisture and temperature, prevent surface compaction, reduce runoff, and erosion. Improve soil structure and control weed

Muck: combination of soil, water, higher mineral content than peat. The level of decomposed is high and original plant part cannot be identified.

Peat: **peat (turf)** is an accumulation of partially decayed vegetation matter or histosol. Peat forms in wetland bogs, moors, muskegs, pocosins, mires, and peat swamp forests.

Compost: Used as organic fertilizer; mixed nitrogen and soil. Compost is to permit organic material to become crumbly and to reduce carbon- nitrogen ratio of the material

Mortar: Cement + water+ sand+Lime; less stiff than concrete and handle with trowel

Concrete/grout: Cement + water+ sand+ Gravel;

Grout: Quite fluid poured in bricks

Compare large amount of loose silt site and organic soil for cost:

Organic soil (peat) is elastic, weak, little cohesion and organic will cost more. It must be removed and replace. Loose silt can be compacted.

Land has loose fill, sloped, and large area: Site usefulness:

Identify the potentials, level the site and make recreational. Do not deny based on soils.

Bulb tee foundation: Underpinning as a temporary support. Usually in gypsum concrete construction. In bridges, they are permanent.

Building built to next existing building with shallower foundation: Both footings must be at same length. Temporary support: major shoring to take place.

Expansive soil:

- Locate the footings in soils below the zone of seasonal moisture change
- Extend concrete piers below the zone of seasonal moisture change
- Design foundation for soil bearing pressure greater than the swell pressure of the expansive soil
- Expansive soil is silty, clayey expands wet
- High upward pressure
- Oversize the footings will not help- More area for the upward pressure.

Exceeding the load bearing capacity of soil:

- Settlement can occur and uneven movement and cracks occur
- Structure fails
- Mat or raft foundation is good for poor soil
- Not enough for poor soil with insufficient soil capacity- Even for mat
- Overhanging to a pile is also not sufficient
- Piles must transfer to deep bedrock is the only response

Boring and tests:

Soil test - No guessing- Liability

Test pits: Simple excavation, visual excavation of soil condition, soil layer in open pit (access to soil). Do not go below water table

Wash borings: >100', use 2" or 4" diameter + water jet to soften soil to find bed rock (mistake => boulder is not bedrock)

Soil load: Use loading platform, incremental load applied, pressure continues till settlement becomes regular loadings, test= (2) contemplated load tests

Core boring: More cost, more reliable, penetrates thru, diamond blade cut thru rocks, 5"sample taken out for tests. # of bores, locations, Geotechnical Engineer to analyze for city

Dry samples: Drive pipes with special sampling and tip, 5" samples/lifted/stored/test every 5" each, # of bore, location, plus depth

Properties >>>>>>>>> Foundations >>>>>>>>>>>>>>>Soil bearings

Specific gravity: Density/density of water used to determine void ratio

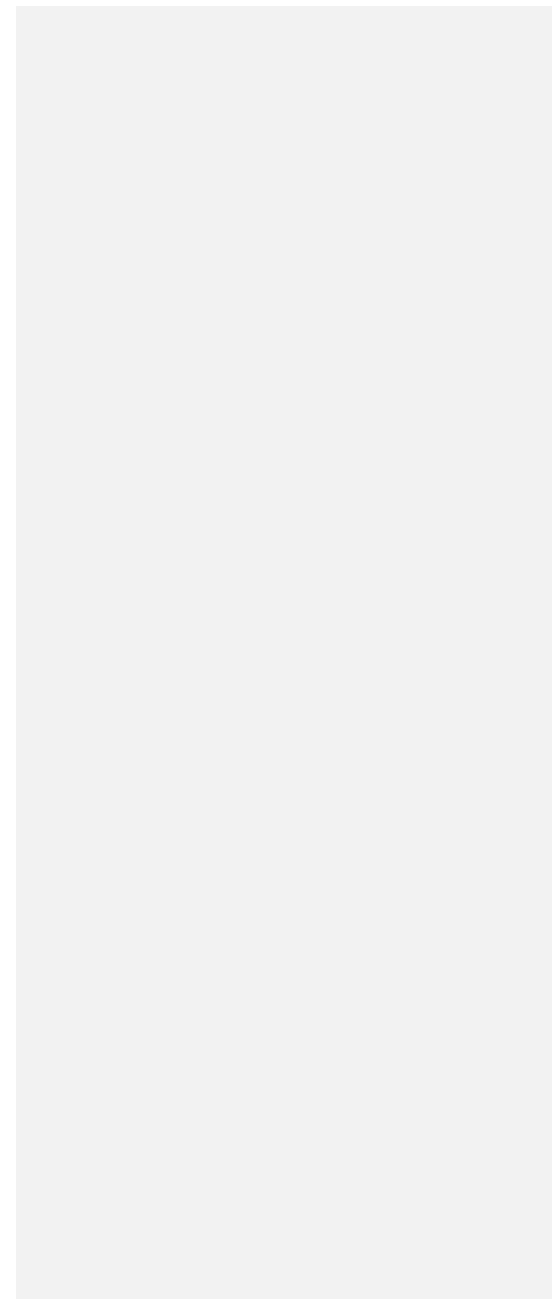
Grain size: For granular soil) to determine permeability, frost action, compaction, shear strength

Grain shape: To estimate shear strength

Liquid/ plastic limit: (In cohesive soil) to determine compressibility & compaction values

Water content: (Cohesive soil)

Void ratio: To determine compressibility



Slump test: To measure the consistency of a mix. Concrete, mortar and grout stiff to loose.

Unconfined compression: (Cohesive soil) to estimate shear strength

Percolation test: On site sewage disposal for property "not" evaporation test, soil alkalinity, or soil density

Soil exploration & testing: Intrinsic character of soil. "Not" bearing capacity, depth or water table or bedrock

Proctor test: Optimum moisture content and density of soil.

Test boring: Highly accurate data for specific site.

Compacted fill: If soil is soft. Remove and replace with compacted soil. Fill or imported soil. Compact every 6" layer (sheep foot roller). Compacted fill needed for buildings, walkways and pavements.

Sub surface investigation reports includes

- Field results
 - Laboratory results
 - Foundation type recommendation
- "Not"
- Soil sieve analysis: This is an inner component data only important to lab. analyst

Number of test boring when uniform sub surface. More spaced boring; When building foot print is more complex & square feet is high number of test boring increases

"Not" affected: Encountering firm strata; Regardless of strata, boring extends to 20' min. unless rock is encountered

Geotechnical Engineer: Provides soil characteristics plus bearing capacity of soil

footings

Piles are best for low bearing capacity (a boat) transmit load to deeper more firm soil. Structure with heavy loads on dense earth: Structural steel pile

-Jetted pile= rarely used

-Wood pile= light for moderate loads

-Boat footing, mat foundation= low bearing capacity

Pile with "driven to refusal":

Pile driven to a point where additional blows will result in no significant penetration. Pile does not need for bedrock

Wood piles: Where untreated wood piles permitted:

If they are below the longest ground water level.

If untreated wood is constantly wet.

They are in no danger of deterioration.

Wet and dry causes mold and decay.

They are not subject the allowable unit stresses.

Piles: When upper soils have insufficient bearing capacity, then piles transfer loads to firmer soil.

Load on footings= Reduction of soil's void volume, "not" shrinkage, differential settlement, reduce bearing capacity

Ratio of load to bearing capacities are high: best to use mat foundation
area is very high p/a= low match bad bearing capacity (bath tub)

6 story building with 25 ft of loose fill: Great beams and piles extending the loose fill.

Spread footings: Good soil at shallow depth. On re-compacted soil is not economical. Loose leaf with 5 ft depth will not satisfy

Mat foundation: Large whole building mat is only for fair to poor soil. Loose fill is not known to be used weith mat

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foundation.

Foundations: Conventional: Concrete and cost less

Piles: Costly, wider range of materials. Timber, steel, concrete, very slow construction process

Frost:

Frost line level: Foundation design in northern climate is 5ft down to frost line level.
"Not" earthquake, against snow drift, rest on undisturbed soil

Frost action: Freezing then thawing---> heave of ground stress to building --> serious damage

Soil frost depth varies frost line= Soil does not freeze below frost line

Frozen footings: Place concrete footings below freeze line. Three to five feet below grade. Below frost penetration

If soil in parking lot rise in winter: Frost and heaving of sub soil - Ice expands

Footing excavation is frozen:

Excavate frozen ground

Never place concrete on frozen ground, when thaw, it shrink and cracks

Hating and thawing: Not practical, not reliable

Frost line in North Dakota: 6 ft

Drainage:

- Begins with grading all water on top surface away from building & out to right- away
- Gutters, flumes, berm, gentle wrap of paved surfaces direct water to drains, catch basins & penetration soil works

Pipe (trench) perforated outside next to foundation footing

- To reduce hydrostatic pressure on water.
- “Not”
- Maintain uniform or increase hydrostatic pressure
- Decrease vapor pressure in basement room

Drainage: Connecting on site drainage to existing city drainage

Wastewater collection: Always flows by gravity, pipes at constant slope, mains are below street level (one to two pipes). Grades to transport solids is ½% to 2%, and diameters are up to 4 ft and 20 ft long

Surface water management: Natural or mechanical site drainage systems

Green codes: Minimum volume of water to ground water

Runoff: Amount water- What does not seep into ground beyond saturation. Seepage is function of porosity, slope, vegetation

5 year storm: Residential

25- 50 year storm: Shopping center

Drainage systems: Culvert, gutters, "sheet flows", pipes

“Check dams”: To reduce speed at high slopes

Final/ finished ground surface: + positive drainage; Free of un-drained depressions. No water stagnation

To control or avoid erosion: Use channels, pipes, hard surface, lower grade, finally connect to underground pipes below traffic & surge pressures (-3 to -4ft in colder area).
Deep excavation may be cost prohibitive.
Destructive wears must be prevented.

Simpler the better: Minimum pipe length, access, slopes, ..., filters

Green Code: Swales, surface drainage, native grasses used as green codes
Sub surface drains are function of permeability, depth of drain, size of drain, slope of drain, spacing of joints, perforated PVC/clay

Vapor extraction: Site contamination leads to ground water contamination: Clean up to remediate unsaturated zone: Vapor extraction "not" insitu incineration, bio degradation, photolysis

Extraction/treatment: Ground water remediation projects: Extraction/ treatment "Not" with in situ aeration, biological barriers/filters, gas chromatography

Water detention areas: Used for control surface water run off,
Not: To create swimming & recreation
To create aesthetically pleasing vistas
To act as reservoir during drought

Permeable water aquifer

Aquifer: Underground permeable material through which water flows

Permeability: A measure of ease with a particular fluid flows through voids. "Not" compressibility, osmosis, or cohesion

Hydrostatic pressure: Fluid force exerting pressure on building.
"Not" dynamic, water, or wedge

If 5 yr storm is not adequate: Go for 10 year storm (100 year too costly), or use growth vegetation area for absorb or swales

To reduce complex drainage system:

- Create thick ground cover of plant materials to absorb and slow down
- Drainage to collect, conduct, and dispose rain
- Paving does not absorb
- Best is to greater absorption and percolation- Reduce erosion
- Earth berm only diverts flow

Probability of poor drainage:

Flat site, high water table, no storm drain system

Septic tank: Soil must be pervious (permeable). Slope= 1 inch in 24 ft 1 inch/24 ft (not 1/4"/ft- too fast). 100 ft from any body of water.

Rain water: Keep natural runoff and runoff after construction the same. Removal of vegetation decreases transpiration, impervious surfaces reduce infiltration.

Slopes

Sheet flows: Land 1 to 1 ½ % slope, adjacent to building: 2%

Drainage ditches: 2 to 10%

Grass slopes: Maximum 25%; turf: <25% for mowing; 25% max. grassland

Un-mowed (planted banks) lawns: Maximum 50% (ivy)
[>50%: Avoid erosion]

Flat: 4% or less- Considered
level <4% ; 4% intensive activity

Moderate: 4--> 10% slope effect to climb/ descend
easy grade 4%to 10%; 4-10% informal

Steep: 10-50 % steep/ unusable
step grade> 10%; >10% limited
>10% is costly & more complications,
split level = very usual

Grassy recreational <3%; 5%< erosion

Un-retained earth cuts: 50% to 100% depending on soil

Walk next to buildings max= 4%

Minimum slope of land 0.5%,

5% slopes of parking

2% away from building

Streets 10% max

Storm drains: 0.3% to 1%

Short ramp 15%

Pedestrians 10%

Parking stalls must have slopes of .5 to 10% max if slope is 25 ft in 100 ft run (25%) the area must be regarded as steep.
Vehicular slope limit is 15%.

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Vehicular parking lot ramp: 12% at 32'. Rise @ 8 ft long transitions.

If the slope is greater than 10%, then slope of transitions is to be $\frac{1}{2}$ slope of central portion. $12\%/2= 6\%$ and 6% of 8 ft= 5.76 " rise.

Pipes are sloped for self-cleansing (0.3% minimum)

Drainage ditch = 10% max

Legal surveying

Benchmark: Reference point of project

Public land of 1785: Created townships and sections

Easement on private property: Across created.

Not: Daylight, setbacks, landscaping

Land use restriction by authority having jurisdictions: Setbacks, height/area limits/zoning

Not: Covenants (Local restriction- Specific)

Not: Accessibility regulations: (No restriction) must do

Distance & compass bearings: Metes & bonds, "not" changing- 66', datum elevation, or benchmark

Restrictive covenants on behalf of property owner, not any Engineers, Architects

Right-a-way: A right belonging to a party to pass over land of another.

"Not" : Purchase of land, taking property, picketing/strike

Street

Roadways smallest to largest

Local access streets: Low intensity fronting houses & often in forms of loops or cul de sac

Collector streets: Transition from local access to arterial intersections.

Intersections: Controlled by traffic signals, local streets with stop signs

Arterial streets: Continuous vehicular channels that connect with expressway through ramps generally two to three lanes

Expressways: Large movement between urban center and accesses are limited

Legal constraint on a proped land:

Deed restrictions: zoning ordinances; easements. "Not" environmental impact statements (EIS). Only +/- impact on potential for the site

Practical & effective dry crawl space?

Provide tight & continuous ground cover using polyethylene film @ least 4 mil thick (vapor barrier floor & sub floor okay but not help)

Non confirming but legal existed prior to enactment of land use is grand fathered,
not: -easement -dedicated -aggrieved

Deed restrictions: Legal restrictions imposed on land by private parties on buyers to maintain integrity of property

Zoning ordinances include: limited population density; segregated permitted uses, restricted lot coverage, not include: diminished fire danger.

Spot elevation: Proposed finished elevation of single point. Elevation of key structures such as building corners, manholes, and catch basins.

Seismic or resistivity survey: Limited but reliable but enough for foundation.

Zoning ordinances include: Provide building interiors with natural light and ventilation, inhibit fire spread from building to buildings, eventual widening of the streets, preserve setbacks

Topography

Find elevation on topography: The elevation on the two Contours are 60 and 55 ft the interval is 16 ft. What is the elevation 4 ft away from contour 55

$60 - 55 = 5$ ft elevation difference in 16 ft

4 ft is 25% of the distance (4/16)

$5 (4/16) = 1.25$ ft + 55 ft = 56.25 ft elevation

Slope: (Contour 1- contour 2)/ change in interval= V/H= G = $245 - 230 / 5 = 3:1$

Topography: Land layout and Site Slope are critical in evaluating site worth and applicability. Cut and fill costs are not cheap.

Topography critical for routing storm water (natural slope)
not water, electric/ gas

Contour lines: Spaced @ given horizontal intervals show elevation of location_ terrain. Continuous elevation lines with equal elevation lines. Dashed lines are existing or natural topography. Solid lines: New modified contour lines. Lines never split and are always same elevations.

Contour lines: In building design: To minimize grading, buildings are designed in parallel to match hill side contour lines.

Contour lines: 5% grade, interval is 1 ft, $G = V/H = 5/100 = 1 \text{ ft}/h = > H = 20 \text{ ft}$.

Highly irregular contour lines: Most appropriate for cluster type residential development. Concentrated grouping of residential space in open areas through clusters. Cluster was to condense large number of units. Lengths of street reduced, high roads, and moderate slopes.

Uniform slope: When spacing between contours is equal

Valley: When contours elevation increase outward

Ridge: Increase outward

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Steep: When contour lines are close together

Topographic map includes: Property line, easements, and utilities, location of streams, roads, and buildings- Not shown:
Soil conditions

Slope of land: Required for sanitary and sewer/storm. Slope is not required for gas, water, or electric

Arial photograph: Terrain conditions, nothing to do with subterranean

Parking

Site parking calculation: 50000 sqft, building 10000 sqft, parking: Building (3:1) ratio, 400 sqft per car: Number of parking slots

Building: Parking

10K: ? 1:3--> parking (3X 10K)---> 30K

30000/400= 75 parking

New rental center factor: Accessibility to market area traffic

FAR (Floor to Area Ratio): 30% in 12000 sqft lot. Therefore $(0.3 \times 12000) = 3600$ sqft allotted. If four story building, 900 sqft per floor, and 2700 sqft will be above grade.

60 degrees parking= Easy to use, not efficient

90 degree parking= Most efficient

Parking ANSi standard for handicap: 8 ft stall plus 5 ft sides 3 ft curb for access

Parking lot large: Do not do: Dead level paved areas causes ponding of water and dead end aisles creates congestions

Entrance versus exiting parking lot: Slow exit even stop to yield. Entrance faster speed of advancement road

Parking layout

Correct: traffic aisles arranged to serve buildings they serve

- > Angled parking requires one way traffic
- > Circulation of traffic in parking is continuous
- > Slow (not rapid) traffic towards 90 degrees perpendicular parking layout

Area for parking cars: Good/car therefore 300 cars
 300×400 cars= 120,000

For retail: 3000 to 4000 sqft parking per 1000 retail space

To reduce vehicle usage: Central city area:

- Incentives for car pool, monthly rate parking fee,
- No parking (or united parking) with tax system earmarked for public transportation

Area for parking lot: 325 cars park @90 degrees parking.

325 cars x 400 square feet for = 130,000/ 43560 =2.98 acre

Road/circulations: Curvilinear is similar to natural environmental. Others "not" grid, radial, linear

Fastest volume of traffic- Free express way (no stops/lights). Not: Access, distributor, collector, arterial, highway, interchange

Land use and development use: Street system. Not: Topographic, climate (factors) or utility system

Shopping centers to be located @ intersection of arterial/collections

Street design criteria: Curb radii min.= 12'; traffic lanes (12ft); Intersections to be @ right angle; Avoid Compound curves; Parking lanes to be included

Street design criteria:

Light street: 4" roll-curb

Heavy traffic: 6" curb & gutter; 9'0" shoulder on each side of street and concrete paving. Asphalt is best choice.

Vehicle width for lanes 11 to 12 ft

Power lines installed above: Are cheaper

Pedestrians circulations: Only safety matters

Non-ambulatory disabilities: Physical layout

2 Wheelchairs pass = 60" in diameter (clear 180 degree turn).

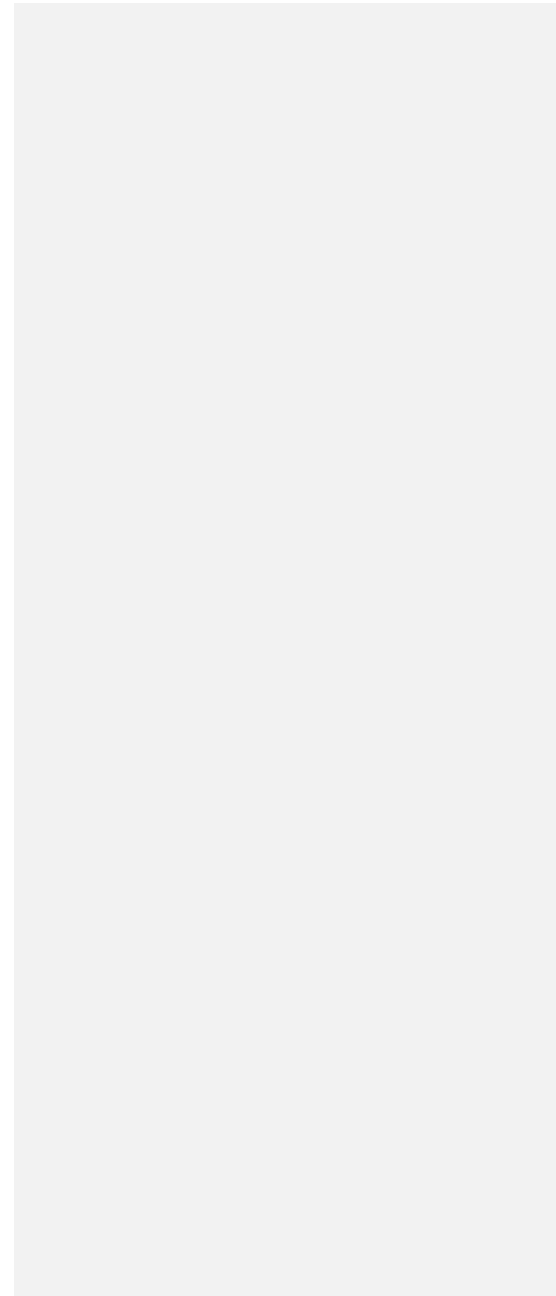
Walkway not interrupted by cracks or edge 1/2" or more in height.
Walkways not greater than 5% gradient.
Ramp minimum 36" side

Road Position: Gradient is 5%: 5:100
150 ft away elevation 142.5' on hill
5% of 150 ft= 7.5 ft
142.50 +7.5 = 150 ft <<<<<<<<<<<<<--

Parking 361 cars minimum Accessible requirements

Over 150 - 249	5 + two cars per 100
250- 349	7
350- 449	9

Parking: 2 accessible cars stall: 8'+5'+8' = 21 ft



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Landscapes:

Trees: Used for screen wind, increase ventilation

Vegetation: Capture moisture, reduce fog, increase sunlight reaching ground

Plats: Aesthetic value, screen or disguise as required, trees absorb sound

Planted area: Cooler during hot days, less heat loss during night

Deciduous tree: Loses leaves in winter

Coniferous tree: Has leaves throughout the year

Handicap

Handicap design: Path less than 1:20; ramp < 1:12; <30 ft. max.

Handicap pathway surface: Asphalt surface is the best: smooth, no transition Bad: Tanbark, brick, flag stone are rough on wheel chair

Handicap slope maximum: Ramp 1:12 and flatter the better ramp anything steeper than 1:20 is a ramp.

Ramps other than those used by non-handicap is limited 1:8

City planning

City planning: Mixture of central business district & residential

-A viable community asset

“Not “ prohibited due to land cost; all substandard units converted to commercial; future units to be low income & elderly

- Best orientation towards sea view: The maximum number of units facing the ocean

Site preparation

-Clear all object

-Demolish her plan

-All utilities to be dealt with

-Undisturbed plants to be protected

-Batter boards offset from building or excavations

-Top 6 inches of soil Removed

Catchment area: Market area or trade area, tributary area from which a facility derives its user population; depending on type & size of shopping center, the catchment area fluctuates with size on basis of traveling & convenience in reaching facility type & size of shopping center is primacy determined by its catchment basis

To reduce cost: Compact low cost housing development main cost: Grading, road construction, utility

Configuration of conventional suburban shopping mall

Axial: Anchor tenants very similar to linear but an anchors create main axis for design

Precinctual organizational pattern:

Gradual accumulation of self-contained building complexes.

Each serving district activity & interrelated with neighbors. It allows growth in any direction. Flexible/compact Street

Site issues- Bearing capacity, sub- surface, water shrinkage, seismic, stable earth

Life cycle

Life cycle components under Architect's control:

- Includes construction (15%), Operating, maintenance, & replacement, renovation, ... are in Architects control
- Not in control taxes & financing
- Financing cost can be reduced for fast track construction
- Higher quality materials reduce long term costs

Climate

Temperature climate:

Best configuration for a temperature climate

- Short wall facing west
- Overhang on long side on south
- Primary heat gain on roof
- Stagger horizontal or vertical
- Stacked high rise

City Planning: City (Northern, CA) or Minnesota best climate design

-Town structure closely densed, larger buildings grouped sheltering wind, but utilize sun/ solar

“Not” design loosely/free layout

- Dense but with shades
- Town character to be loosed/scattered

City planning - Thermal environment: Characted of existing & new structures affects thermal environment : Shadow pattern.

“Not”: Mechanical system, texture, foot prints

Climatic characteristics: Temperature, humidity, wind velocity

Solstice: Winter December 21st-Longest night, Summer June 21st- Longest day

In hot arid climate:

Thick walls-Thermal mass: Materials with high heat storage value used in arid lands. (Arizona, New Mexico)

- Wide overhangs
- High ceilings are good designs

Southwest desert buildings:

Most significant: Recognize the climate and other problems of the area.
Deeply recessed openings are best shading for glazing in any directions.
Shaded glass is more important than insulated glass.
Radiation is more value than conduction.
Roof area is not that critical when compared to recessed glazing.
Vertical louvers (especially south) diminish solar radiation

Solar radiation:

South wall get maximum winter radiation.
Roof and east / west walls receive maximum radiation in summer

Cold climates vapor barriers in attic: Minimize moisture migration.

Not: Serve secondary water proofing, support insulation, protection from insects

Roof overhang built in northern hemisphere seasonal adjustment for solar radiation: South facing overhang

Most important factor in residential units: Recieve sun part of winter day

Not: -West facing @ a premium
-Bedrooms away from harsh wind
-Mask units from breezes

Innovative technologies - Cost effective:

Site driven technologies: Wind turbines, photovoltaic, small scale hydroelectric. They are also relatively cost effective.
Fuel cell technologies and groundwater aquifer for cooling and heating depending on climate/environment.

Solar energy is limited in building on north side of high rises. High rises cause shadow on their northerly buildings

Solar: Sun chart shows: A) Path of sun by means of attitude & azimuth (21st day month). Sunrise to Sunset
B) Amount of sunshine based

- C) Cloudiness not in chart
- D) Heating degree days in not in chart

Solar site depends on slope & latitude. All earth @ same latitude gets same sun regardless longitude

Building Orientations: External influences: Climate, noise, views & solar. Foundation is not related.

Town 1 @ base of mountain & town 2 @ 3000' above town 1
Town 2 is always cooler

Rural versus urban climate - Planted rural area:

Stabilize microclimate hard surfaces swing temperature fast plants absorbs & store heat. Plats increase transpiration & increase rainfall. Plants purify air

Geothermal: Needs mechanical for design & Architect to implement. Landscape (& structural) not involved. Outside beneath earth

Best use of overhang:

Sun @ low angle is fully captured

Ideal orientation and fenestration based on climate:

- Latitude
- Adjacent reflective surfaces
- Interior room functions
- Building heights
- Avoid tree screens of sunlight

HVAC is an external to building issue - Secondary concern

Wind

Air movement - Degree of comfort @75 F degrees, 30 R.M., 100 FPM = Quite pleasant.
Less than 50 FPM = Not noticeable.
> 25 F PM: Drafty & annoying

Wind: Open plaza windward side of high rise:
Shelter Hotel, relocate the entrance, placing walls, trees are not very effective

Wind: Two building, smooth surface and one is steps or jagged

- Smooth surface building creates more turbulence, "not" wind acts same way regardless
- Turbulence is more on stepped building energy is dissipated
- Turbulence is a minimum concern in high rise & street

Wind and pressure: When velocity doubles, the pressure quadruples.
 $P = c V^2$

Leed or sustainable design

Sustainable design: Economics, aesthetics, environments, mechanical systems

Natural step: Organized 1996, preservation of ecosphere & bio sphere (-5 within each to +5 miles above surface of earth).

Natural step principles

- Zone of earth that supports human life is highly fragile eco system last 100 years has affected the earth "wrong" biosphere affecting human is relatively stable & resistant 5 mile in/ out
- Vast majority of technological building environment is inefficient. innovation has improved, but not there
- Toxic substance affect large areas beyond time & space are above "great lakes" is toxic with DDT many years after it has been banned, jet streams bring toxicity elements & pesticides in other continents
- Recycling is only beginning: More buildings to be recyclable & biodegradable

LEED: Cost of design for Engineers & Architects increase

Vandalism: Impact is to use impact resistance materials

- In housing projects
- Exterior paths & entrance doors are visible
- Surveillance, well lighted, avoid cursed paths
- Durable & vandal & tamper proof of elements

Planning phasing sustainable projects:

- Use native landscaping- functional, aesthetic..
- Sun orientation (neighbors...) topographic relief
- Scale of other buildings
- Location of project with respect to public transportation

Elements in sustainable design:

- Solar shading devices
- Urban heat island effect
- Fenestration & glazing

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Slope/ curve? based on topography

Sustainable goals: Use less, recycle, do not deplete natural resources, do not buy from long distance, least amount of demolition, keep existing

LEED indoor air quality: Sick building syndrome: Poor indoor Air Quality based on indoor tobacco smoking, inadequate ventilation, off gassing of fabrics and coatings

Leed substitution by Architects: Architectural supervision: Product substitution to insure original design standards are met

Leed: Requires Architect, Wetland Engineer, Energy Engineer Commissioners, Landscape Architect, Energy Model Engineers

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Site selection

Site selection (Every Building): Sun orientation, topographic relief, scale of adjacent buildings, location of trees and plants, landscaping, avoid erosion surfaces, and area prone to fire.

Next to flood lines 1 ft above and 100 ft away
Be next to public transportation

Flood Plain: Very limited construction: Agricultural or recreation, build only above flood plain, 100 year storm.

Notify Architect: When unknown object are uncovered during construction

CSI Specifications: Security steel gate is in section 10 for Specialties not doors, or metals, or equipments.

Site Preparation: Site clearing, Removal top soil, rough grading, then finish grading.

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Environmental

Environmental impact considered site analysis: Reflection, air movement, and sun & shadow patterns. "Not" archeological finds

Development potential of parcel: Verify these issues: wetland/ endangered species/ hazardous waste. Not: acid rain has nothing be controlled.

After "sight" what other senses is important: hearing. "Not": Touch, smell, taste
To remove noise: best way increase distance to receiver

Surveying a site

Which type of survey records location of structures and improvements on a parcel to be used primarily for mortgage purposes?

- A. preliminary
- B. construction
- C. record
- D. cadastral
- E. plot plan

Answer

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TUESDAY, JANUARY 17, 2012

Contract Terms and Design Project Costs

Regardless of contract format (AIA standard or other), the contract language must provide clear description of all of the following included in the base fee except: (Select 2)

- A. major project milestone dates
- B. scope of services
- C. reimbursable expenses with respective unit billing rate.
- D. multiple review of submittals
- E. physical and virtual building models
- F. number of meetings with third parties included (authorities having jurisdiction, landlords)

[Answer](#)

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MONDAY, DECEMBER 19, 2011

Street heirarchy

Which one of the following is NOT a basic category of roads used in configuring street hierarchy, an urban design method that considers the order of allowable connections between types of links?

- A Collector streets
- B Transit streets
- C Arterial streets
- D Local streets

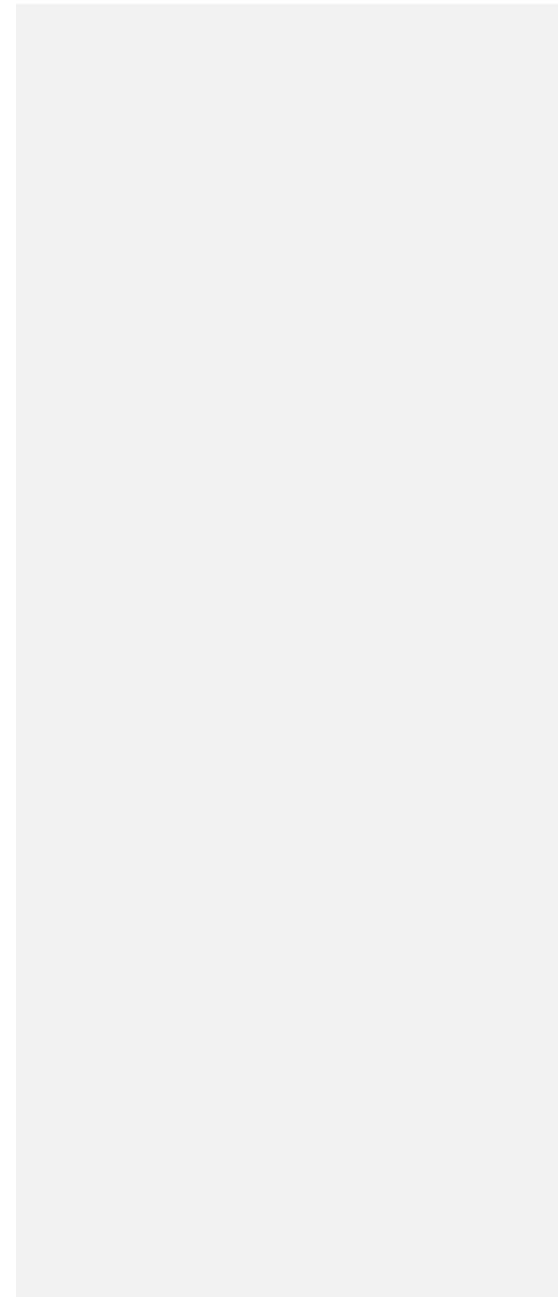
[Answer](#)

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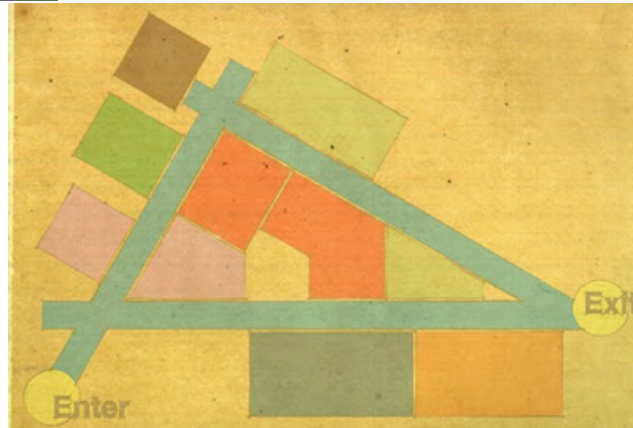
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THURSDAY, DECEMBER 8, 2011



Organizing circulation



Which of the following circulation configurations matches the illustration?

- A. organized by extending off one major central space
- B. two major anchor spaces at the ends connected with spaces flanking a straight path
- C. a full loop providing double-loaded corridor and continuous exitway
- D. a network of arteries with secondary paths connecting primary paths and indefinite direction

Answer

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MONDAY, DECEMBER 5, 2011

Architect-Contractor roles

Which of the following statements about architect-contractor relationships is true?

- A. contractor-led design-build delivery method is not usually covered by most professional insurance policies.
- B. joint venture design-build delivery method is always covered by standard professional insurance policies.
- C. the design-builder is the architect's client in a contractor-led design-build arrangement.
- D. in joint venture design-build, the architect controls the development of the initial cost proposal and total project cost.

Answer

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Resource Tip: read more about project delivery topics from this index for the AIA Best Practices series.

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WEDNESDAY, NOVEMBER 23, 2011

Shortening the construction schedule

What is likely to happen by shortening the construction schedule of a building project? (Choose 4)

- A. decreases contractor's overhead
- B. increases overtime costs
- C. decreases overtime costs
- D. increases labor by requiring additional workers
- E. shortens required time to carry insurance, utilities & project office
- F. increases contractor's overhead
- G. fewer laborers will offset the overtime cost

Answer

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MONDAY, NOVEMBER 14, 2011

Construction cost data

Which of the following is NOT a publisher of construction cost data?

- A. Engineering News Record
- B. R. S. Means Company, Inc.
- C. Dodge Reports
- D. Building Design & Construction Magazine
- E. US Environmental Protection Agency
- F. US Geological Survey

Answer

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THURSDAY, NOVEMBER 10, 2011

Cost estimating

One method of estimating costs derives from detailed actual project costs reported by contractors that are published. Other sources of data are also used as a reference. It can also be used in checking bids and controlling costs. A "measure" of an item is chosen to derive an estimated unit cost. What is this system

called?

Answer

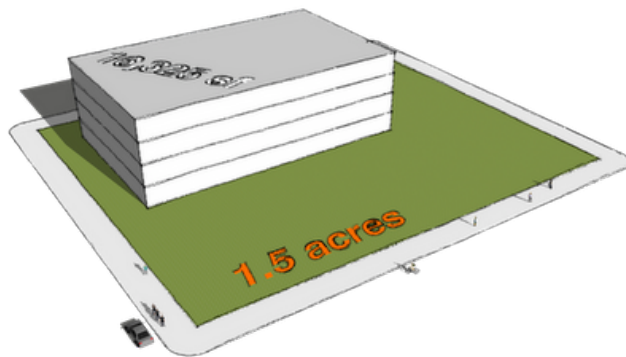
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MONDAY, NOVEMBER 7, 2011

F.A.R. calculation



On a 1.5 acre lot is a four-story building in a light manufacturing zoning district. What is the FAR (floor area ratio) of the building if the area of each floor is 16,325 sf?

- A. .85
- B. 1

C. 1.25
D. 2

Answer

ARE 4.0 exam prep: [PPP](#)

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FRIDAY, OCTOBER 28, 2011

Property rights

What power does a government exercise, under the Fifth Amendment of the Constitution, when a property owner is required to give up property ownership to a government entity for its use?

Answer

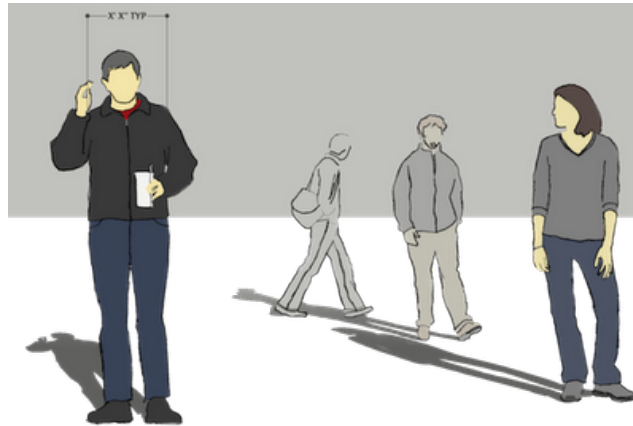
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THURSDAY, OCTOBER 27, 2011

Human scale



Typical measurements for the human form are useful to learn (in estimating width allowances, elevator capacities, space clearances...) A typical male shoulder width is which of the following?

- A. 1'-6"
- B. 1'-8"
- C. 1'-10"
- D. 2'-0"
- E. 2'-2"

Answer

ARE 4.0 exam prep: [PPP](#)

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WEDNESDAY, OCTOBER 19, 2011

Project budgets

In the total project budget of a new library, why is the FF&E a separate budget or line item from that of the structure and shell of a building? Select the best answer.

- A. Funding is impossible to obtain for both at the same time.
- B. The building can be used and serve its purpose without it.
- C. This practice makes the building budget appear to be smaller.
- D. While necessary for commercial offices, FF&E is unnecessary to this building type.

Answer

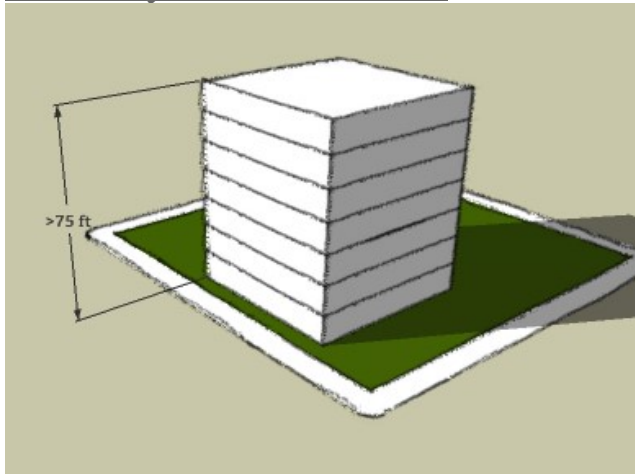
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TUESDAY, OCTOBER 11, 2011

Stairway towers in code



When a building's height is greater than or equal to 75 feet, at least one of the required exits must be:

- A. a fire tower
- B. a smoke proof tower
- C. a smoke proof enclosure
- D. A and B but not C
- E. B and C but not A
- F. A, B and C

Answer

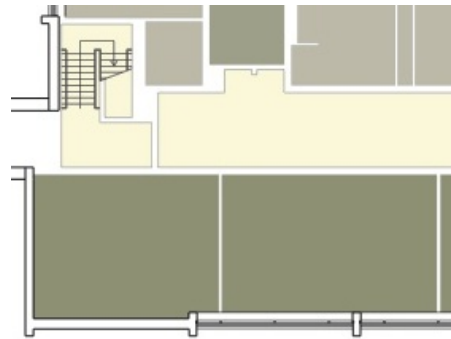
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WEDNESDAY, OCTOBER 5, 2011

Building Efficiency



Convert the usable area of classrooms planned with medium efficiency level of new construction to the gross building area given the following model factors:

Net Assignable Square Feet: 10,000

Space Factor: 1.5

Building Efficiency Ratio: 67%

updated answer

Answer

ARE 4.0 exam prep: [PPP](#)

2 comments

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Net-to-Gross

A net-to-gross building area ratio of 90% is more commonly achievable for which of these occupancy types?

- A. hospitals
- B. restaurants
- C. public libraries
- D. museums
- E. laboratories

Answer

ARE 4.0 exam prep: PPP

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TUESDAY, SEPTEMBER 27, 2011

Historical Accuracy

Of the four categories of treatments applied to historic buildings, which of the following is intended to provide the greatest historical accuracy?

- A. rehabilitation
- B. reconstruction
- C. preservation
- D. restoration

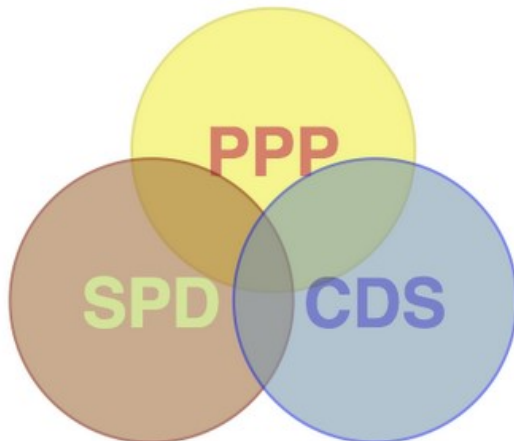
Answer

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Overlap Trifecta



Study tip >>> The ARE format has mutated several times over the years with the current format using three separate exam divisions for content previously contained in the sections called Pre-Design and Construction Documents. While the vignette programs differ, overlapping content is generally expected between these exams: PPP, CDS, SPD. One strategy is to study them at the same time and to schedule the tests very close together.

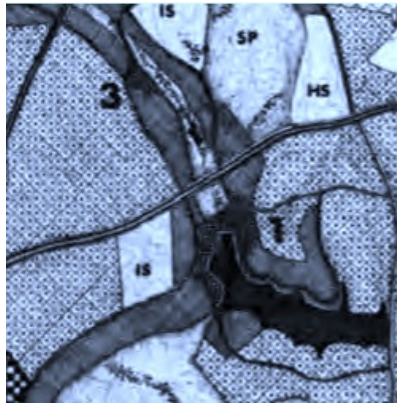
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THURSDAY, SEPTEMBER 22, 2011

New town concept



The concept of the *new town* promoted development of completely new and separate communities, independent of what were perceived as excessively dense and unappealing cities. Reston, Virginia, is an example of a new town implemented in the 1960s. Like the new towns of the 1940s in England, new towns in the U.S. never became truly separate and independent of the cities in close proximity. Why?

- A. lack of public transit
- B. lack of employment generators
- C. poor highway interchanges
- D. internal income disparity

Answer

ARE 4.0 exam prep: [PPP](#)

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TUESDAY, SEPTEMBER 13, 2011

Public Institutional Financing

How are many municipal or public building projects financed?

Answer

ARE 4.0 exam prep: [PPP](#)

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SATURDAY, SEPTEMBER 10, 2011

AIA series docs

Forms for ASIs, architects field reports, construction change directives and RFIs are found in which AIA document series?

- A. A-series
- B. B-series
- C. C-series
- D. D-series
- E. G-series

Answer

ARE 4.0 exam prep: [PPP](#)

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[ADA Appendix](#)

Architectural Registration Examination

Building Design & Construction Systems

American with Disabilities Act, ADA



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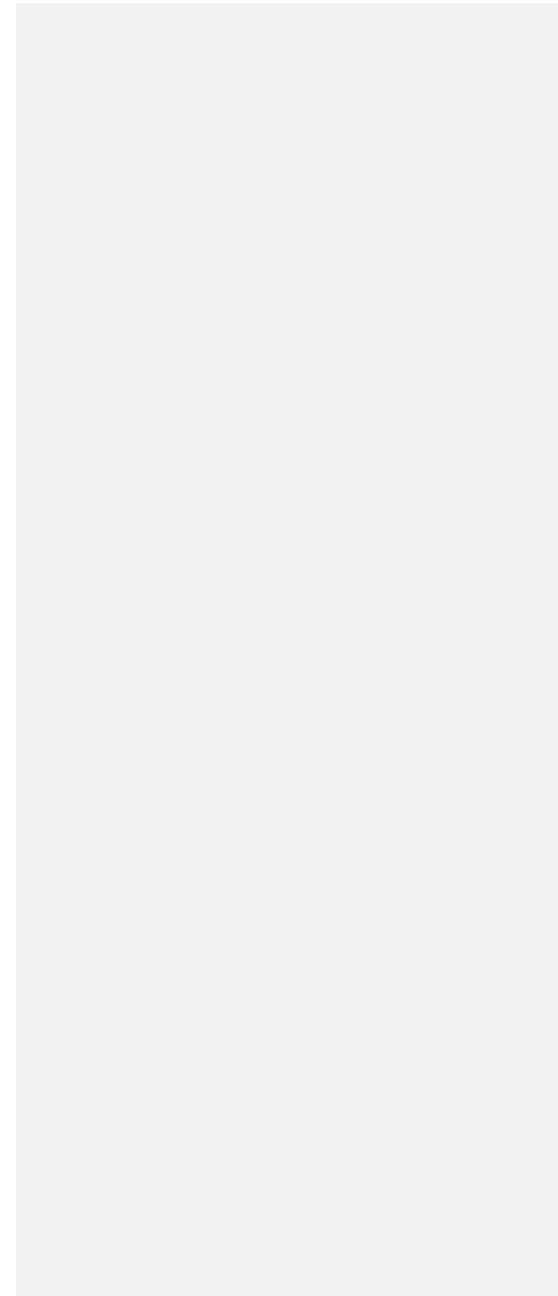
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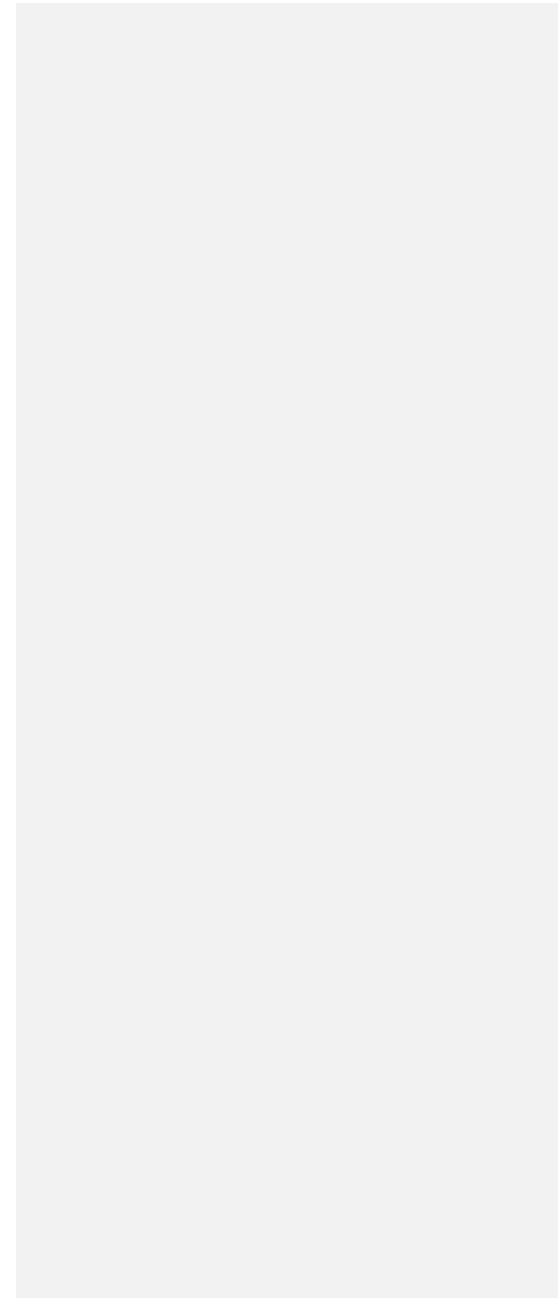


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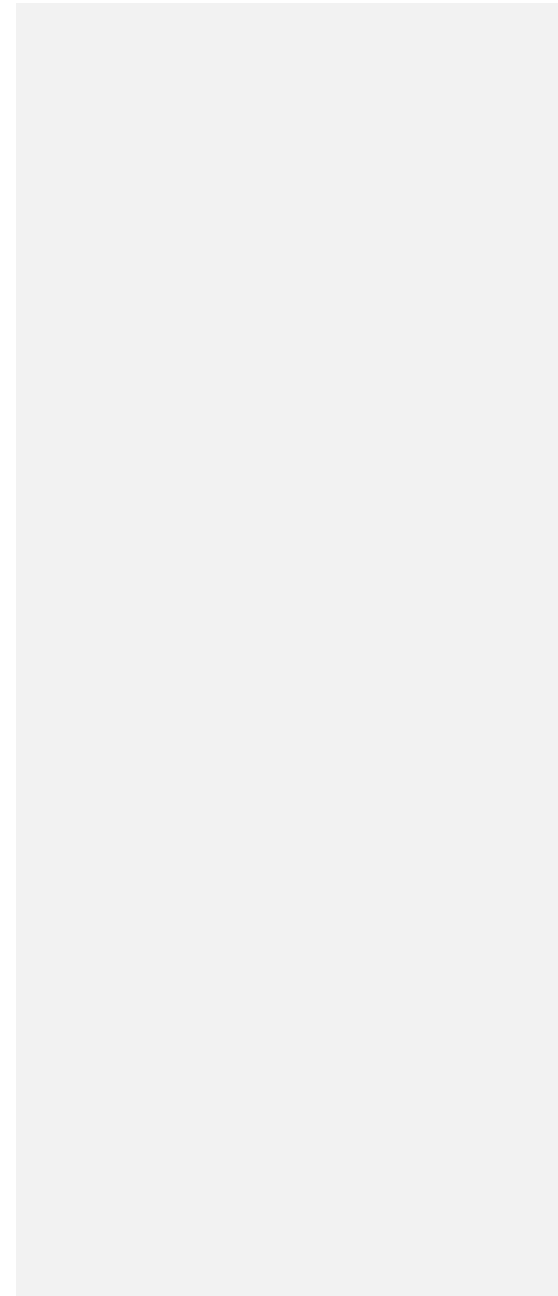


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History of ADA

President Franklin D. Roosevelt and the March of Dimes

In 1921, when Franklin D. Roosevelt was thirty-nine years old, he contracted **infantile paralysis**, more commonly known as **polio**. Initially the disease affected nearly his entire body, eventually he was unable to stand or walk without assistance.

In 1927 Roosevelt formed the **Warm Springs Georgia Foundation**. This organization later became known as the **March of Dimes** and with the help of many organizations and ordinary citizens, it raised millions of dollars to combat polio. Jonas Salk, with funding from the March of Dimes, developed a vaccine that stemmed the spread of this disease in 1955.

More from the [Franklin D. Roosevelt Presidential Library](#)

President John F. Kennedy and Programs for Intellectual Disabilities

When John F. Kennedy began his administration, **intellectual disabilities were a neglected issue**. Few scientists were researching its causes, and even fewer doctors and educators were trained to support people with intellectual disabilities and their families. The Kennedy family had a personal connection to the issue; President Kennedy's

sister Rosemary, sixteen months his junior, was born with intellectual disabilities.

At the urging of his sister, Eunice Kennedy Shriver, Kennedy made this issue a priority for his administration.

Architectural Barriers Act (ABA) of 1968



President Lyndon Johnson, who signed the ABA into law in August 1968, characterized barriers to access as a failure on the part of government that perpetuated “cruel discrimination.”

Text of the Architectural Barriers Act (ABA)

Pub. L. 94-541 (42 U.S.C. §§4151 et seq.)

§4151. "Building" defined

As used in this chapter, the term "building" means any building or facility (other than (A) a privately owned residential structure not leased by the Government for subsidized housing programs and (B) any building or facility on a military installation designed and constructed primarily for use by able bodied military personnel) the intended use for which either will require that such building or facility be accessible to the public, or may result in the employment or residence therein of physically handicapped persons, which building or facility is--

- (1) **to be constructed or altered by or** on behalf of the United States;
- (2) **to be leased** in whole or in part by the United States after August 12, 1968;¹
- (3) **to be financed** in whole or in part by a grant or a loan made by the United States after August 12, 1968, if such building or facility is subject to standards for design, construction, or alteration issued under authority of the law authorizing such grant or loan; or
- (4) **to be constructed under authority of the National Capital Transportation Act of 1960**, the **National Capital Transportation Act of 1965**, or title III of the **Washington Metropolitan Area Transit Regulation Compact**.

§4152. Standards for design, construction, and alteration of buildings; Administrator of General Services

The **Administrator of General Services**, in consultation with the Secretary of Health and Human Services, shall prescribe standards for the design, construction, and alteration of buildings (other than residential structures subject to this chapter and buildings, structures, and facilities of the Department of Defense and of the United States Postal Service subject to this chapter) to insure whenever possible that physically handicapped persons will have ready access to, and use of, such buildings.

§4153. Standards for design, construction, and alteration of buildings; Secretary of Housing and Urban Development

The Secretary of Housing and Urban Development, in consultation with the Secretary of Health and Human Services, shall prescribe standards for the design, construction, and alteration of buildings which are residential structures subject to this chapter to insure whenever possible that physically handicapped persons will have ready access to, and use of, such buildings.

§4154. Standards for design, construction, and alteration of buildings; Secretary of Defense

The Secretary of Defense, in consultation with the Secretary of Health and Human Services, shall prescribe standards for the design, construction, and alteration of buildings, structures, and facilities of the Department of Defense subject to this chapter to insure whenever possible that physically handicapped persons will have ready access to, and use of, such buildings.

§4154a. Standards for design, construction, and alteration of buildings; United States Postal Service

The United States Postal Service, in consultation with the Secretary of Health and Human Services, shall prescribe such standards for the design, construction, and alteration of its buildings to insure whenever possible that physically handicapped persons will have ready access to, and use of, such buildings.

§4155. Effective date of standards

Every building designed, constructed, or altered after the effective date of a standard issued under this chapter which is applicable to such building, shall be designed, constructed, or altered in accordance with such standard.

§4156. Waiver and modification of standards

The Administrator of General Services, with respect to standards issued under section 4152 of this title, and the Secretary of Housing and Urban Development, with respect to standards issued under section 4153 of this title, and the Secretary of Defense with respect to standards issued under section 4154 of this title, and the United States Postal Service with respect to standards issued under section 4154a of this title --

(1) is authorized to modify or waive any such standard, on a case-by-case basis, upon application made by the head of the department, agency, or instrumentality of the United States concerned, and upon a determination by the Administrator or Secretary, as the case may be, that such modification or waiver is clearly necessary, and

(2) shall establish a system of continuing surveys and investigations to insure compliance with such standards.

§4157. Reports to Congress and Congressional committees

(a) The Administrator of General Services shall report to Congress during the first week of January of each year on his activities and those of other departments, agencies, and instrumentalities of the Federal Government under this chapter during the preceding fiscal year including, but not limited to, standards issued, revised, amended, or repealed under this chapter and all case-by-case modifications, and waivers of such standards during such year.

(b) The Architectural and Transportation Barriers Compliance Board established by section 792 of Title 29 shall report to Public Works and Transportation Committee of the House of Representatives and the Environment and Public Works Committee of the Senate during the first week of January of each year on its activities and actions to insure compliance with the standards prescribed under this chapter.

¹A 1976 amendment deleted the following words from the end of paragraph (2): "after construction or alteration in accordance with plans and specifications of the United States." That amendment applied to "every lease entered into on or after January 1, 1977, including any renewal of a lease entered into before such a date which renewal is on or after such date." (Pub. L. 94-541

Americans with Disabilities Act

Signed on July 26, 1990, the ADA was the world's first comprehensive civil rights law for people with disabilities. This Act inspired other nations to pass their own civil rights laws for people with disabilities.

More about the ADA from the [George Bush Presidential Library](#)



The Americans With Disabilities Act of 1990

Passed by Congress in 1990, the [Americans with Disabilities Act](#) (ADA) is the nation's first comprehensive civil rights law addressing the needs of people with disabilities, prohibiting discrimination in employment, public services, public accommodations, and telecommunications. EEOC was given enforcement authority for Title I of the Act, the employment discrimination provisions. Congress provided that Title I would not take effect for two years in order to allow the Commission time to develop regulations and technical assistance, time to conduct comprehensive public education programs on the new disability law, and time for employers to adjust to the new requirements.

- 1 ADA Titles
 - 1.1 Title I—Employment
 - 1.2 Title II—Public entities (and public transportation)
 - 1.3 Title III—Public accommodations (and commercial facilities)
 - 1.4 Title IV—Telecommunications

- **1.5 Title V—Miscellaneous provisions**

Title I—Employment

See [42 U.S.C. §§ 12111–12117](#).



Speech cards used by President George H. W. Bush at the signing ceremony of the Americans with Disabilities Act (ADA) on July 26, 1990.^[1]

The ADA states that a *covered entity* shall not discriminate against a *qualified individual with a disability*.^[6] This applies to [job application](#) procedures, hiring, advancement and discharge of employees, [workers' compensation](#), job training, and other terms, conditions, and privileges of employment. *Covered entity* can refer to an [employment agency](#), [labor organization](#), or joint [labor-management](#) committee, and is generally an employer engaged in interstate commerce and having 15 or more workers.^[7] Discrimination may include, among other things, limiting or classifying a job applicant or employee in an adverse way, denying employment opportunities to people who truly qualify, or not making [reasonable accommodations](#) to the known physical or mental limitations of disabled employees, not advancing employees with disabilities in the business, and/or not providing needed accommodations in training materials or policies, and the provision of qualified readers or interpreters. Employers can use medical entrance examinations for applicants, after making the job offer, only if *all* applicants (regardless of disability) must take it and it is treated as a confidential [medical record](#). *Qualified individuals* do not include any employee or applicant who is currently engaging in the illegal use of drugs when that usage is the basis for the employer's actions.^[8]

Part of Title I was found unconstitutional by the [United States Supreme Court](#) as it pertains to states in the case of [Board of Trustees of the University of Alabama v. Garrett](#) as violating the [sovereign immunity](#) rights of the several states as specified by the [Eleventh Amendment to the United States Constitution](#). The provision allowing private suits against states for [money damages](#) was invalidated.

Title II—Public entities (and public transportation)

See [42 U.S.C. §§ 12131–12165](#).

Title II prohibits disability discrimination by all public entities at the local (*i.e.* school district, municipal, city, county) and state level. Public entities must comply with Title II regulations by the [U.S. Department of Justice](#). These regulations cover access to all programs and services offered by the entity. Access includes physical access described in the ADA Standards for Accessible Design and programmatic access that might be obstructed by discriminatory policies or procedures of the entity.

Title II applies to public transportation provided by public entities through regulations by the [U.S. Department of Transportation](#). It includes the [National Railroad Passenger Corporation](#), along with all other commuter authorities. This section requires the provision of paratransit services by public entities that provide fixed route services.

Title II also applies to all state and local public housing, housing assistance, and housing referrals. The [Office of Fair Housing and Equal Opportunity](#) is charged with enforcing this provision.

Title III—Public accommodations (and commercial facilities)

See [42 U.S.C. §§ 12181–12189](#).



The ADA sets standards for construction of accessible public facilities. Shown is a sign indicating an accessible fishing platform at [Drano Lake, Washington](#).

Under Title III, no individual may be discriminated against on the basis of disability with regards to the full and equal [enjoyment](#) of the goods, services, facilities, or accommodations of any place of *public accommodation* by any person who owns, leases (or leases to), or operates a place of *public accommodation*. "Public accommodations" include most places of lodging (such as inns and hotels), recreation, transportation, education, and dining, along with stores, care providers, and places of public displays, among other things.

Under Title III of the ADA, all "new construction" (construction, modification or alterations) after the effective date of the ADA (approximately July 1992) must be

fully compliant with the Americans With Disabilities Act Accessibility Guidelines (ADAAG)^[1] found in the [Code of Federal Regulations](#) at 28 C.F.R., Part 36, Appendix A.

Title III also has application to existing facilities. One of the definitions of "discrimination" under Title III of the ADA is a "failure to remove" architectural barriers in existing facilities. See [42 U.S.C. § 12182\(b\)\(2\)\(A\)\(iv\)](#). This means that even facilities that have not been modified or altered in any way after the ADA was passed still have obligations. The standard is whether "removing barriers" (typically defined as bringing a condition into compliance with the ADAAG) is *readily achievable*, defined as "...easily accomplished without much difficulty or expense."

The statutory definition of *readily achievable* calls for a [balancing test](#) between the cost of the proposed "fix" and the wherewithal of the business and/or owners of the business. Thus, what might be "readily achievable" for a sophisticated and financially capable corporation might not be readily achievable for a small or local business.

There are exceptions to this title; many private clubs and religious organizations may not be bound by Title III. With regard to historic properties (those properties that are listed or that are eligible for listing in the [National Register of Historic Places](#), or properties designated as historic under State or local law), those facilities must still comply with the provisions of Title III of the ADA to the "maximum extent feasible" but if following the usual standards would "threaten to

destroy the historic significance of a feature of the building" then alternative standards may be used.

On September 15, 2010, the Department of Justice issued revised regulations for implementation of Titles II and III, effective March 15, 2011.^[9] The rules contain many new requirements for public accommodations, as well as an "element by element safe harbor."^[10] Public [swimming pool](#) owners and operators must gear up for compliance with the 2010 Standards for Accessible Design with regard to existing swimming pools, wading pools and spas by January 31, 2013.^[11] The Department of Justice published *ADA 2010 Revised Requirements: Accessible Pools - Means of Entry and Exit* to help pool owners and operators understand the new accessibility requirements, application of the requirements, and longstanding obligations of pool owners and operators in connection with the new requirements.^[12] The ADA Revised Requirements require that newly constructed or altered swimming pools, wading pools, and spas have an accessible means of entrance and exit to pools for disabled people. However, providing accessibility is conditioned on whether providing access through a fixed lift is "readily achievable." The technical specifications for when a means of entry is accessible are available on the (DOJ website).^[13] Other requirements exist, based on pool size, include providing a certain number of accessible means of entry and exit, which are outlined in Section 242 of the Standards. However, businesses should consider the differences in application of the rules depending on whether the pool is new or altered, or whether the swimming pool was in existence before the effective date of

the new rule. Full compliance may not be required for existing facilities; Section 242 and 1009 of the 2010 Standards outline such exceptions.^[14]

Title IV—Telecommunications

Title IV of the ADA amended the landmark [Communications Act of 1934](#) primarily by adding section [47 U.S.C. § 225](#). This section requires that all telecommunications companies in the U.S. take steps to ensure functionally equivalent services for consumers with disabilities, notably those who are deaf or hard of hearing and those with speech impairments. When Title IV took effect in the early 1990s, it led to installation of public [Teletypewriter](#) (TTY) machines and other TDDs ([Telecommunications Device for the Deaf](#)). Title IV also led to creation, in all 50 States and the District of Columbia, of what were then called dual-party relay services and now are known as [Telecommunications Relay Services](#) (TRS), such as [STS Relay](#). Today, many TRS-mediated calls are made over the Internet by consumers who use broadband connections. Some are [Video Relay Service](#) (VRS) calls, while others are text calls. In either variation, communication assistants translate between the signed/typed words of a consumer and the spoken words of others. In 2006, according to the [Federal Communications Commission](#) (FCC), VRS calls averaged two million minutes a month.

Title V—Miscellaneous provisions[\[edit\]](#)

See [42 U.S.C. §§ 12201–12213](#).

Title V includes technical provisions. It discusses, for example, the fact that nothing in the ADA amends, overrides or cancels anything in [Section 504](#).^[15] Additionally, Title V includes an anti-retaliation or coercion provision. The Technical Assistance Manual for the ADA explains it: "III-3.6000 Retaliation or coercion. Individuals who exercise their rights under the ADA, or assist others in exercising their rights, are protected from retaliation. The prohibition against retaliation or coercion applies broadly to any individual or entity that seeks to prevent an individual from exercising his or her rights or to retaliate against him or her for having exercised those rights ... Any form of retaliation or coercion, including threats, intimidation, or interference, is prohibited if it is intended to interfere

The Americans with Disabilities Act of 1990 and Revised ADA Regulations Implementing Title II and Title III

THE LAW

The Americans with Disabilities Act of 1990 (ADA) prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, State and local government services, public accommodations, commercial facilities, and transportation. It also mandates the establishment of TDD/telephone relay services. The current text of the ADA includes changes made by the ADA Amendments Act of 2008 (P.L. 110-325), which became effective on January 1, 2009. The

ADA was originally enacted in public law format and later rearranged and published in the United States Code.

THE 2010 REGULATIONS

On Friday, July 23, 2010, Attorney General Eric Holder signed final regulations revising the Department's ADA regulations, including its ADA Standards for Accessible Design. The official text was published in the Federal Register on September 15, 2010 (corrections to this text were published in the Federal Register on March 11, 2011).

The revised regulations amend the Department's 1991 title II regulation (State and local governments), 28 CFR Part 35, and the 1991 title III regulation (public accommodations), 28 CFR Part 36. Appendix A to

each regulation includes a section-by-section analysis of the rule and responses to public comments on the proposed rule.

These final rules went into effect on March 15, 2011, and were published in the 2011 edition of the Code of Federal Regulations (CFR).

THE 1991 REGULATIONS

ADA Regulation for Title II, as printed in the Federal Register on July 26, 1991, and effective until March 15, 2011.

ADA Regulation for Title III, as printed in the Code of Federal Regulations July 1, 1994, and effective until March 15, 2011.

Timeline for the Americans with Disabilities Act

JULY 26, 1990: The Americans with Disabilities Act, which guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications, is signed into law by President George H.W. Bush.

JUNE 22, 1999: The U.S. Supreme Court rules in *Vaughn L. Murphy vs. United Parcel Service Inc.* and *Karen L. Sutton & Kimberly Hinton vs. United Air Lines Inc.* that plaintiffs with disabilities that can be mitigated with corrective lenses or medication cannot sue for alleged discrimination under the ADA.

JAN. 8, 2002: The Supreme Court rules in *Toyota Motor Manufacturing Kentucky Inc. vs. Ella Williams* that a worker's inability to perform a certain job activity does not necessarily mean the worker is disabled and entitled to ADA protection.

JAN. 1, 2009: The ADA Amendments Act of 2008, which expands the definition of disability under the ADA in response to the Supreme Court decisions, goes into effect.

JUNE 17, 2009: The U.S. Equal Employment Opportunity Commission votes to revise its regulations to abide by changes made by the ADA Amendments Act. To date, final regulations have not yet been issued.

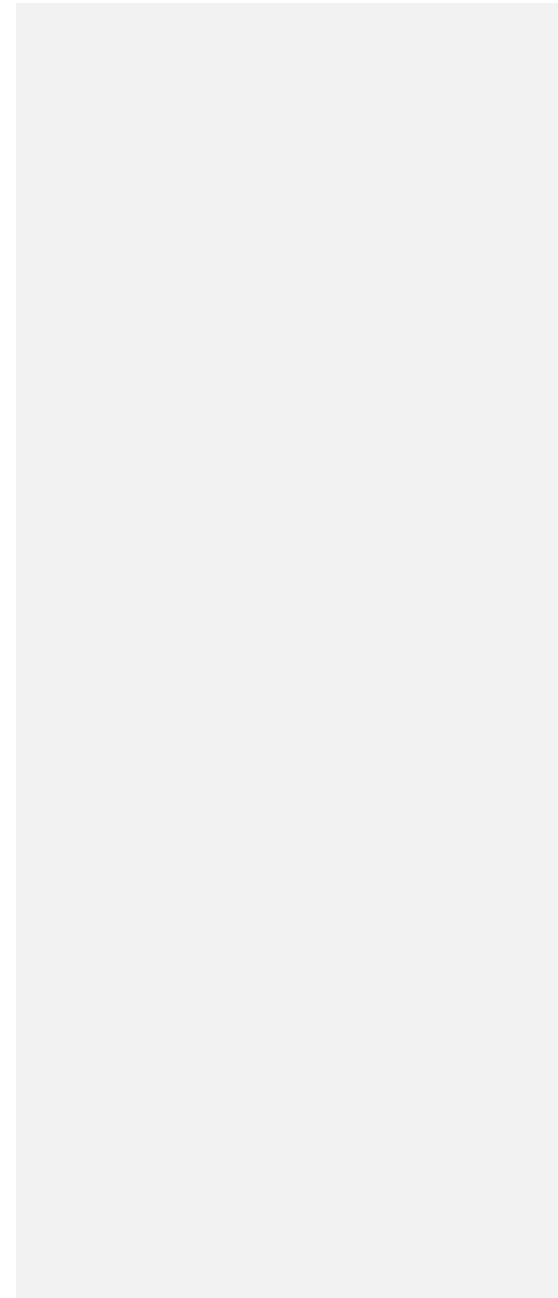
JULY 26, 2010: The U.S. Department of Justice publishes in the Federal Register a notice of proposed rulemaking regarding accessibility requirements for websites, movies, equipment and furniture, and 911 call-taking technologies. The agency says the rules will reflect technology that was unavailable 20 years ago.

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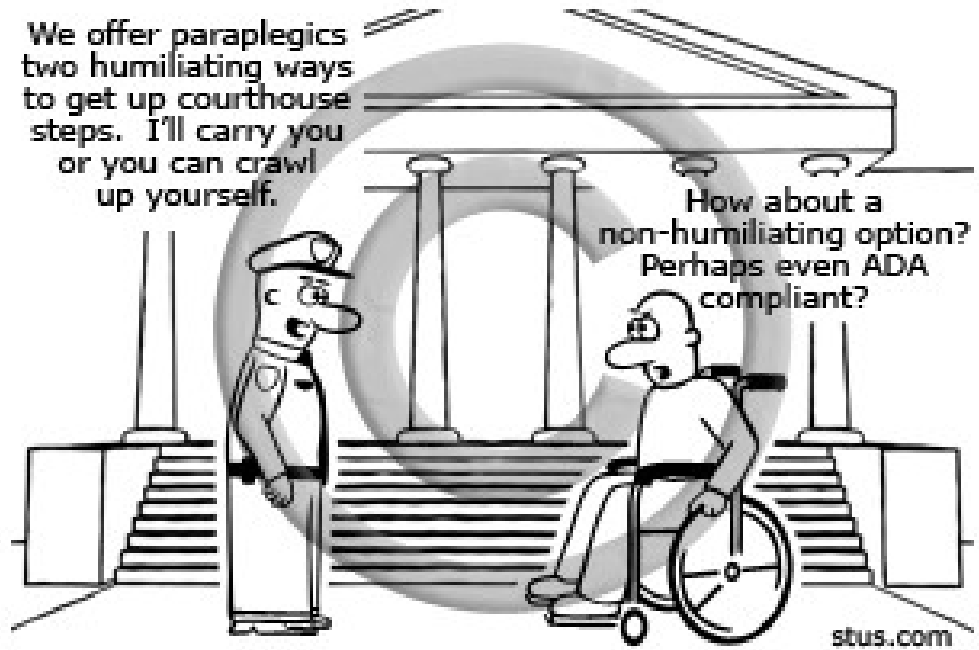
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THE DISABLED HOOSIER'S JOURNEY





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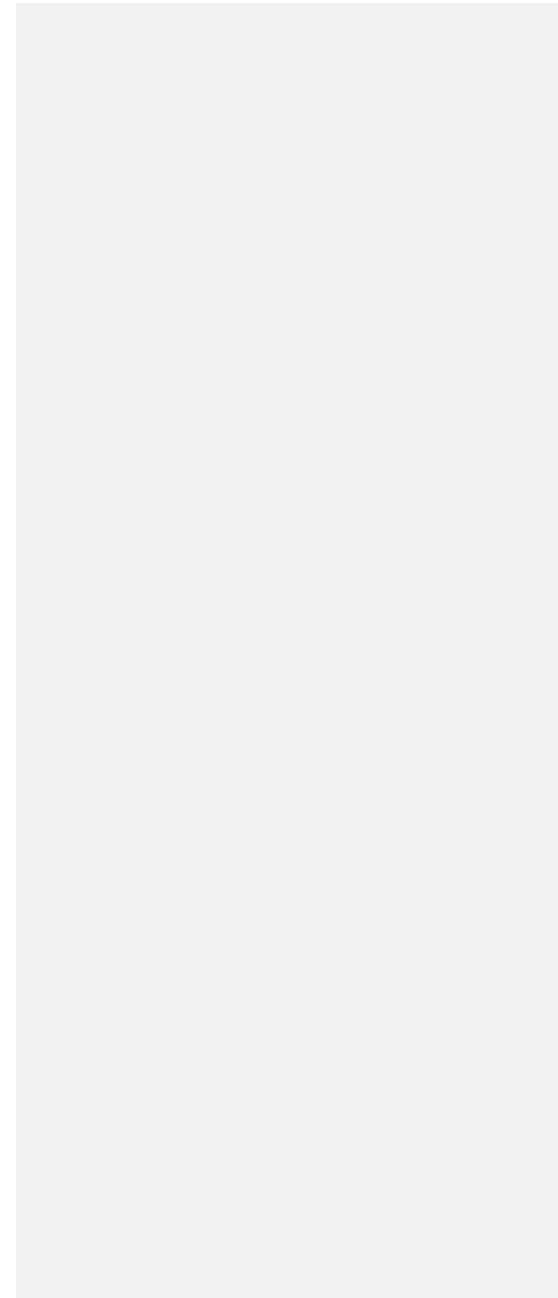
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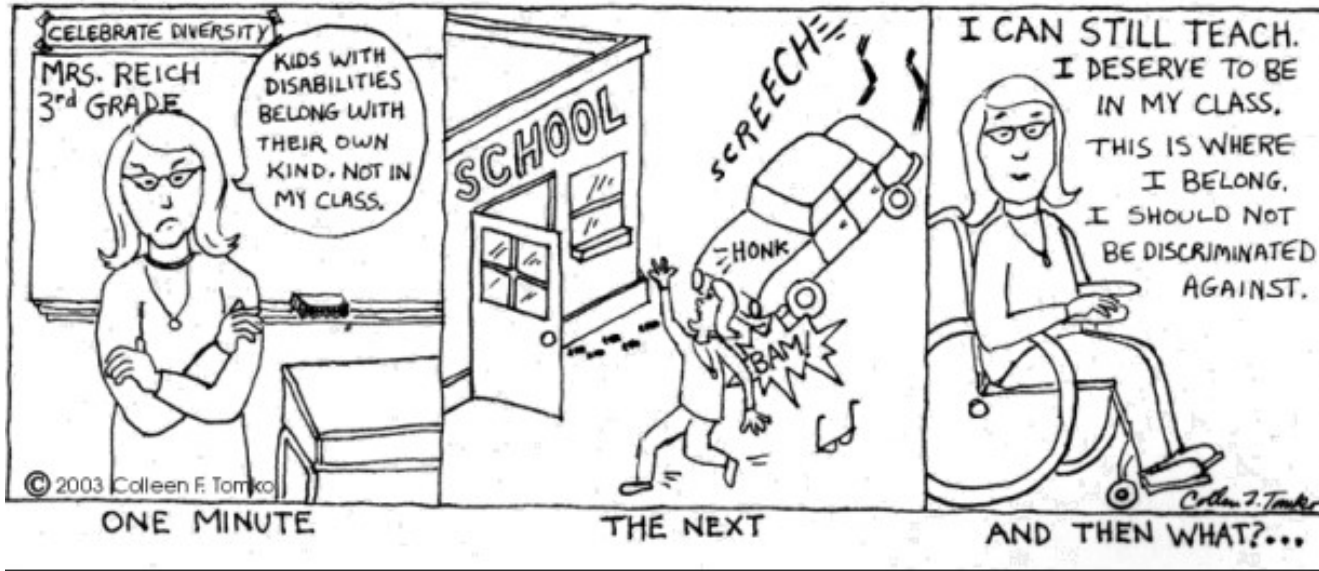






Wheelchair access...I think we only do Visa or American Express.'

THE PARENT SIDE™



What about ARE Building Design & Construction Systems with respect to ADA?

July 2013 ARE® 4.0 a

OVERVIEW

Building Design & Construction Systems

DIVISION STATEMENT

Apply knowledge and skills of building design and construction, including

- environmental,
- **social**, and
- economic issues,
- project and practice management.

Content Areas

1. PRINCIPLES (27-36%)
2. ENVIRONMENTAL ISSUES (11-17 %)
3. **CODES & REGULATIONS** (7-10 %)
4. MATERIALS & TECHNOLOGY (31-40 %)
5. PROJECT & PRACTICE MANAGEMENT (7-13 %)

Vignettes

ACCESSIBILITY/RAMP

Design a ramp and stairway connecting two levels that complies with accessibility and code requirements.

STAIR DESIGN

Design a stairway connecting multiple levels that complies with accessibility and code requirements.

ROOF PLAN

Design a sloped-roof plan for the removal of rainwater and locate accessories and equipment.

KNOWLEDGE / SKILLS

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

1. PRINCIPLES (27-36 %)

A. Consider

- the impact of human behavior,
- historic precedent, and
- design theory in the selection of systems, materials, and methods on
- Building design and construction.

1. Building Design

2. Design Principles and Design Impact on Human Behavior

3. Building Systems and their Integration

4. Implications of Design Decisions

5. Space Planning and Facility Planning/Management

6. Fixtures, Furniture, Equipment, and Finishes

7. Adaptive Reuse of Buildings and/or Materials

8. Architectural History and Theory

Commented [kn1]:

1. PRINCIPLES (27-36 %)

A. Consider the impact of human behavior, historic precedent, and design theory in the selection of systems, materials, and methods on building design and construction.

1. Building Design

- Develop tasks,
- procedures, and
- methods associated with
- **SD schematic design and DD design development** such as
- basic engineering principles,
- spatial visualization and
- modeling.

2. Design Principles and Design Impact on Human Behavior

- Assess the affect of form,
- scale,
- color,
- texture,
- **ergonomics,**
- lighting,
- universal design,
- spatial organization, and
- acoustics in building design
- to meet user needs and client requirements.

3. Building Systems and their Integration

- Determine appropriate building systems such as
 - structural,
 - mechanical,
 - **electrical**, and
 - specialties using basic engineering principles and
 - coordinate these systems into
 - a coherent design that best meets
 - the client's requirements.

4. Implications of Design Decisions

- Assess the impact of early design decisions concerning
 - building orientation,
 - area,
 - materials and
 - products selection,
 - cost,
 - code,
 - phasing,
 - future technology changes, and
 - sustainability on the later phases of detailed design,
 - construction, and
 - Building use.

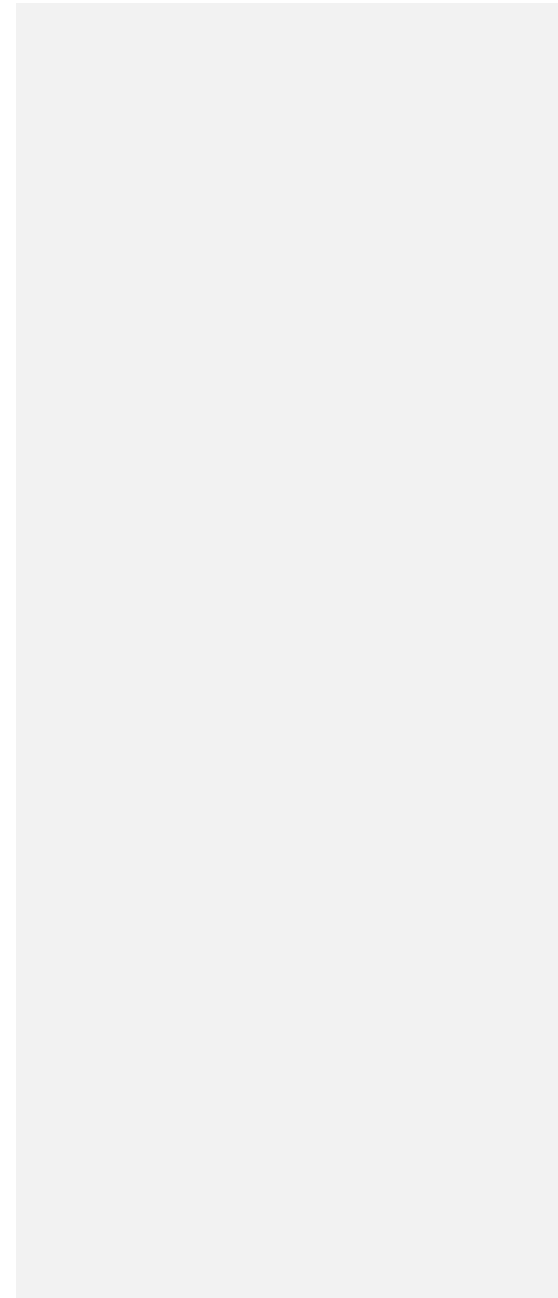
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5. Space Planning and Facility Planning/Management

- **SD Initiate schematic design and**
- **DD design development decisions including**
 - spatial visualization and
 - modeling.

6. Fixtures, Furniture, Equipment, and Finishes

Assess the selection of

- fixtures,
- furniture,
- equipment, and
- finishes made in
 - SD schematic design and
 - DD design development.

7. Adaptive Reuse of Buildings and/or Materials (LEED/Green/...)

Consider the

- constraints,
- issues,
- methods,
- programmatic implications and
- cost impact associated with
 - adaptive reuse of buildings and/or
 - materials during
 - SD schematic design and
 - DD design development phases.

8. Architectural History and Theory

Apply concepts of

- architectural history and
- Theory in decision making.

2 ENVIRONMENTAL ISSUES (11-17 %)

A. Consider the impact of applying principles of sustainable design including

- adaptive re-use,
- thermal and
- moisture protection,
- energy consumption and utilization,
- alternative energy, and
- hazardous material mitigation to proposed project.

1. Hazardous Conditions and Materials

2. Indoor Air Quality

3. Sustainable Design

4. Natural and Artificial Lighting

5. Alternative Energy Systems and New Material Technologies

2 ENVIRONMENTAL ISSUES (11-17 %)

- B. Consider the impact of applying principles of sustainable design including adaptive re-use, thermal and moisture protection, energy consumption and utilization, alternative energy, and hazardous material mitigation to proposed project.

1. Hazardous Conditions and Materials

Identify the requirements of

- regulatory agencies and
- their impact on design.

- Survey,

- evaluate, and

- document existing conditions

- related to hazardous materials.

- Develop strategies for mitigation.

2. Indoor Air Quality

Develop strategies to ensure indoor air quality.

LEED/Cal Green

Increase ventilation

Etc

3. Sustainable Design

Develop designs that

- minimize environmental impact,
- pursues recyclable and replacement strategies,
- considers life-cycle analysis,
- utilizes renewable resources, and
- Minimizes material consumption and waste.

4. Natural and Artificial Lighting

Develop strategies that utilize

- daylight,
- solar control,
- Energy consumption.

5. Alternative Energy Systems and New Material Technologies

- Investigate technological advances and
- innovative building products.

3. CODES & REGULATIONS (7-10 %)

A. Incorporate

- building and
- specialty codes,
- zoning, and
- other regulatory requirements for inclusion in
 - site design and
 - construction.

1. Government and Regulatory Requirements and Permit Processes

Conduct code analysis to determine compliance with

- government and
- regulatory requirements and
- the permitting processes.

2. Specialty Codes and Regulations including Accessibility Laws, Codes and Guidelines

Conduct analysis of codes and regulations such as

•ADAAG, ADA Access Guide

- seismic codes,
- life safety,
- Fair Housing Act, and
- historic preservation requirements to incorporate into the
 - site design and
 - Construction.

4. MATERIALS & TECHNOLOGY (31-40 %)

Consider impact of design decisions in the selection of systems, materials, and methods on building design and construction.

[Masonry, Metals, Wood, Concrete, others, Specialties]

A. MASONRY

Identify the properties and characteristics of masonry structural and finish materials.

1. Building Systems and their Integration
2. Implications of Design Decisions
3. Construction Details and Constructability
4. Construction Materials
5. Product Selection and Availability
6. Cost Estimating, Value Engineering, and Life-Cycle Costing
7. Thermal and Moisture Protection

B. METALS

Identify the properties and characteristics of structural and miscellaneous metals.

1. Building Systems and their Integration
2. Implications of Design Decisions
3. Construction Details and Constructability
4. Construction Materials
5. Product Selection and Availability
6. Cost Estimating, Value Engineering, and Life-Cycle Costing
7. Thermal and Moisture Protection

C. WOOD

Identify the properties and characteristics of wood structures, rough carpentry, finish carpentry, and millwork assemblies.

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1. Building Systems and their Integration
2. Implications of Design Decisions
3. Construction Details and Constructability
4. Construction Materials
5. Product Selection and Availability
6. Cost Estimating, Value Engineering, and Life-Cycle Costing
7. Thermal and Moisture Protection

D. CONCRETE

Identify the properties and characteristics of concrete structures and finishes.

1. Building Systems and their Integration
2. Implications of Design Decisions
3. Construction Details and Constructability
4. Construction Materials
5. Product Selection and Availability
6. Cost Estimating, Value Engineering, and Life-Cycle Costing
7. Thermal and Moisture Protection

E. OTHER

Identify the properties and characteristics of miscellaneous systems, assemblies, membranes, cladding, coatings, and finish materials (e.g., plastics, composites, glass, tensile, pneumatic, EIFS, etc.).

1. Building Systems and their Integration
2. Implications of Design Decisions
3. Construction Details and Constructability
4. Construction Materials
5. Product Selection and Availability
6. Cost Estimating, Value Engineering, and Life-Cycle Costing
7. Thermal and Moisture Protection

F. SPECIALTIES

Analyze and select accessories, equipment, and fittings.

1. Building Systems and their Integration
2. Implications of Design Decisions
3. Construction Details and Constructability
4. Construction Materials
5. Product Selection and Availability

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6. Cost Estimating, Value Engineering, and Life-Cycle Costing

7. Thermal and Moisture Protection

8 Natural and Artificial Lighting

5. PROJECT & PRACTICE MANAGEMENT (7-13 %)

Ascertain the impact of

- construction sequencing,
- scheduling,
- cost, and
- risk management on the selection of
 - systems,
 - materials, and
 - methods.

A. Determine the impact of construction

- sequencing,
- scheduling,
- cost, and
- risk management on selection of
 - systems,
 - materials, and
 - methods.

1. Construction Sequencing

Prepare **phasing plans** for building design and construction.

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

Develop and revise **cost estimates** for building design and construction through the design development phase.

3. Project Schedule Management

Manage

- the building design and
- construction schedule of professional services and document project progress

via **contract document**

- setup,
- storyboarding, and
- staffing projections.

4. Risk Management

- Assess building design and construction professional and general liability and
- risk management procedures, phasing, budget, and schedule.

Need to Know?

Vocabulary:

- **Americans with Disabilities Act (ADA):** prohibits discrimination based on disability
- **Building Owners and Managers Association (BOMA):** professional organization that for commercial real estate professionals
- **Fair Housing Act:** law that prohibits housing discrimination on the basis of race, color, religion, sex, disability, familial status, and national origin.
- **HUD:** US Department of Housing and Urban Development

Facts/Rules:

• Fair Housing Act Guidelines:

- Covers most housing (owner-occupied building with 4 or less units, single family houses sold/rented by owner, and housing run by clubs that limit occupancy to members are sometime exempt)
- Requirements for New Buildings with 4 or more units and an elevator:
 - Public common area must be accessible
 - Doors/hallways must be wide enough for a wheelchair (32"-36" min)

All units must have:

An accessible rough into and through the unit

Accessible light switches, electrical outlets, thermostats, etc

Reinforced bathroom walls to allow later installation of grab bars

Kitchens/bathrooms can be used by people in a wheelchair

These rules do not replace more stringent state/local codes

- **ADA Accessibility Guidelines:**

- All new design or new construction areas must meet accessibility requirements
- Includes all employee work area and temporary construction that is open to the public
- Some areas are **not** require to be accessible:
 1. Temporary construction facilities (e.g. Job shacks, scaffolding, trailers)
 2. Raised areas used for security/life safety (e.g. Security or life guard towers)
 3. Non- Occupiable service areas accessed infrequently for maintenance (e.g. Mechanical rooms, penthouses)
 4. Tollbooths
 5. Water slides
 6. Non-public animal containment areas

7. Raised structures for officiating/announcing sports events

• **Dimensional Standards:**

Wheelchair Passage Width = 32" clear at a point/36" clear continuous

2 Wheelchair Passing Width = 60" clear min

Headroom = 80" min

Turning Space = 5'-0" circle min

Clear floor space = 2'-6" wide x 4'-0" long min

Changes in levels = 1/4" max w/o edge treatment

Beveled Edge Ok = 1/4" – 1/2" w/ 1:2 max slope

Requires Ramp = 1/2" or more

Doors = 32" clr min when open 90 deg

Door clearance = 1'-6" clr on pull side of door

Accessible route cross slope = 1:50 max

Ramps Slope = 1:20 min to 1:12 max

Width = 3'-0" wide

Length = 30'-0" max

Landings = 5'-0" at each end (width of ramp)

2 Handrails = If rise is +6" or run is +72"

Handrail Height = 34" min - 38" max
Handrail Cross Section = 1-1/4" - 2" and 1-1/2" clr from wall
Handrail Extension = 12" top and 12"+ 1 **tread bottom**
Stairways = 48" clr between hand rails min
Walkways = 1:20 max (5%)
Curb Cuts = 3'-0" sides 1:10 max, front 1:12

Car Parking Space = 9'-0" wide min with 5'-0" wide aisle
Van Parking Space = 11'-0" wide min w/5'-0" wide aisle ????
Parking Space Location = 200'-0" max from building entrance

7 - 50 car lot = 2 accessible spaces
51 - 100 car lot = 3 accessible spaces
101 - 150 car lot = 5 accessible spaces

Concepts/Goals:

- Accessibility services scope can vary depending on the size of the client, their organization, and the project.
- Name recognition matters...large, public, visible companies are more vulnerable to lawsuits so need to be prepared for issues.

Processes:

- Identify client's potential accessibility problem areas and desired outcomes
- Identify strategies for correcting problems including a proposed implementation schedule and budget/cost analysis
- Develop prototype design details for implementation

- Prepare and administer surveys if required to assess population using building
- Prepare client training program manuals and facility monitoring documentation

- **Fair Housing Act Guidelines:**

- Landlords/Real Estate Agents/Lenders can't take any of the following actions based on race, color, national origin, religion, sex, familial status, or handicap:
 - Refusal to rent or sell
 - Refuse to provide information regarding loans
 - Refuse to negotiate for housing
 - Making Housing unavailable
 - Deny a dwelling
 - Set different terms, conditions, or privileges for sale or rental (e.g.: rates, points, fees, monthly rent)
 - Falsely deny that housing is available for inspection, sale, or rental
 - For profit, persuade owners to sell or rent

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FAQ's?

Americans with Disabilities Act Questions and Answers

Employment

Q. What employers are covered by title I of the ADA, and when is the coverage effective?

A. The title I employment provisions apply to private employers, State and local governments, employment agencies, and labor unions. Employers with 25 or more employees were covered as of July 26, 1992. Employers with 15 or more employees were covered two years later, beginning July 26, 1994.

Q. What practices and activities are covered by the employment nondiscrimination requirements?

A. The ADA prohibits discrimination in all employment practices, including job application procedures, hiring, firing, advancement, compensation, training, and other terms, conditions, and privileges of employment. It applies to recruitment, advertising, tenure, layoff, leave, fringe benefits, and all other employment-related activities.

Q. Who is protected from employment discrimination?

A. Employment discrimination is prohibited against "qualified individuals with disabilities." This includes applicants for employment and employees. An individual is considered to have a "disability" if s/he has a physical or mental impairment that substantially limits one or more major life activities, has a record of such an impairment, or is regarded as having such an impairment. Persons discriminated against because they have a known association or relationship with an individual with a disability also are protected.

The first part of the definition makes clear that the ADA applies to persons who have impairments and that these must substantially limit major life activities such as seeing, hearing, speaking, walking, breathing, performing manual tasks, learning, caring for oneself, and

working. An individual with epilepsy, paralysis, HIV infection, AIDS, a substantial hearing or visual impairment, mental retardation, or a specific learning disability is covered, but an individual with a minor, nonchronic condition of short duration, such as a sprain, broken limb, or the flu, generally would not be covered.

The second part of the definition protecting individuals with a record of a disability would cover, for example, a person who has recovered from cancer or mental illness.

The third part of the definition protects individuals who are regarded as having a substantially limiting impairment, even though they may not have such an impairment. For example, this provision would protect a qualified individual with a severe facial disfigurement from being denied employment because an employer feared the "negative reactions" of customers or co-workers.

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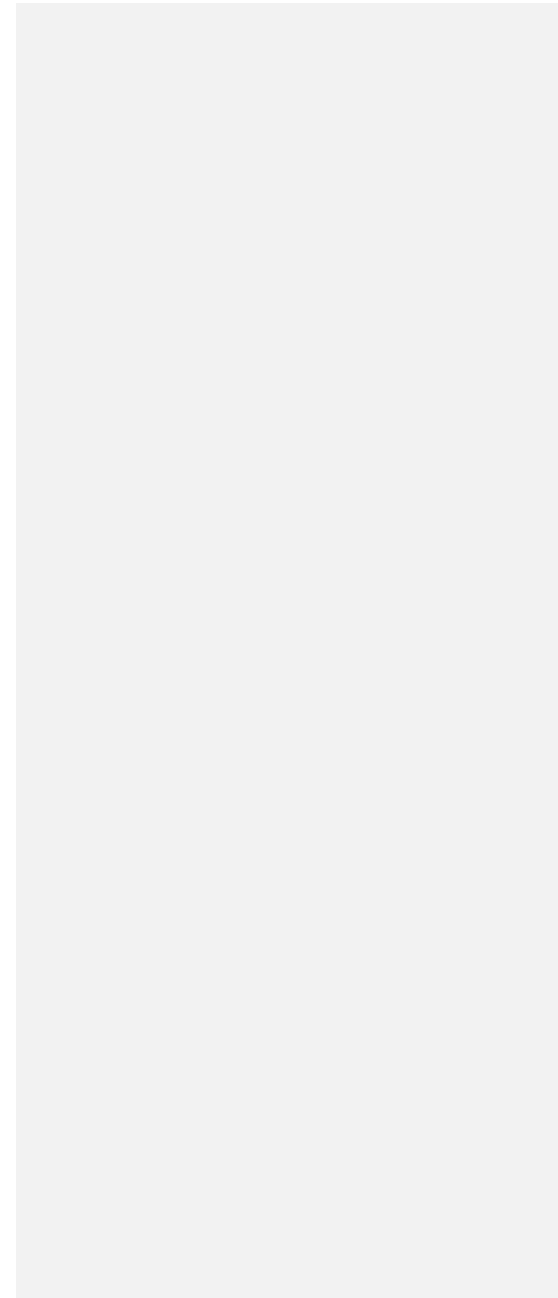
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Q. Who is a "qualified individual with a disability?"

A. A qualified individual with a disability is a person who meets legitimate skill, experience, education, or other requirements of an employment position that s/he holds or seeks, and who can perform the essential functions of the position with or without reasonable accommodation. Requiring the ability to perform "essential" functions assures that an individual with a disability will not be considered unqualified simply because of inability to perform marginal or incidental job functions. If the individual is qualified to perform essential job functions except for limitations caused by a disability, the employer must consider whether the individual could perform these functions with a reasonable accommodation. If a written job description has been prepared in advance of advertising or interviewing applicants for a job, this will be considered as evidence, although not conclusive evidence, of

the essential functions of the job.

Q. Does an employer have to give preference to a qualified applicant with a disability over other applicants?

A. No. An employer is free to select the most qualified applicant available and to make decisions based on reasons unrelated to a disability. For example, suppose two persons apply for a job as a typist and an essential function of the job is to type 75 words per minute accurately. One applicant, an individual with a disability, who is provided with a reasonable accommodation for a typing test, types 50 words per minute; the other applicant who has no disability accurately types 75 words per minute. The employer can hire the applicant with the higher typing speed, if typing speed is needed for successful performance of the job.

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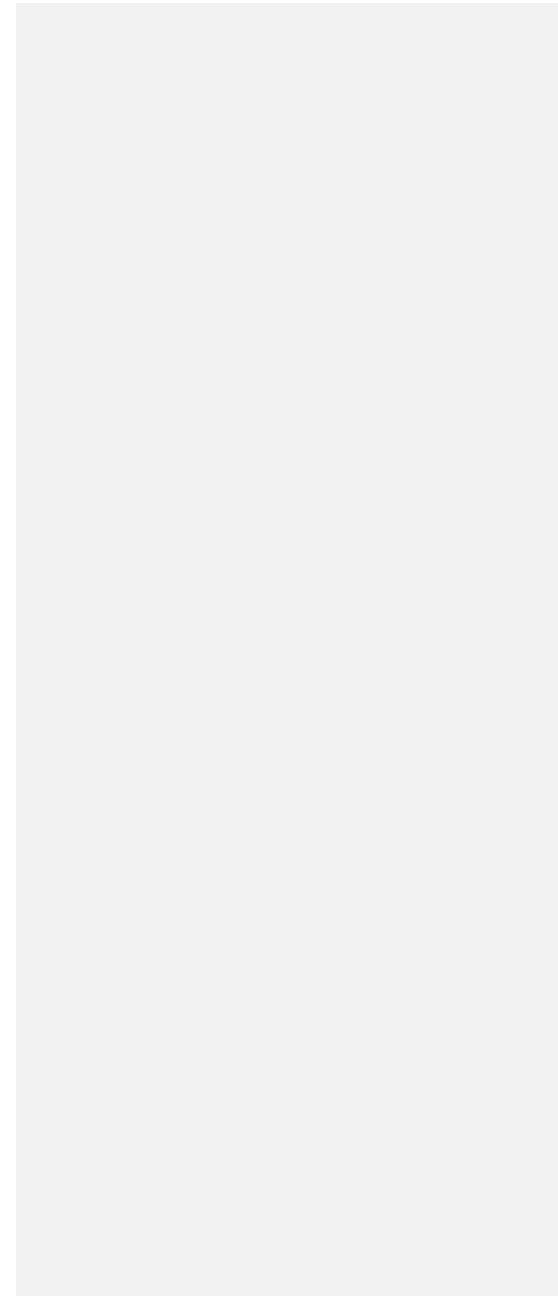
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Q. What limitations does the ADA impose on medical examinations and inquiries about disability?

A. An employer may not ask or require a job applicant to take a medical examination before making a job offer. It cannot make any pre-employment inquiry about a disability or the nature or severity of a disability. An employer may, however, ask questions about the ability to perform specific job functions and may, with certain limitations, ask an individual with a disability to describe or demonstrate how s/he would perform these functions.

An employer may condition a job offer on the satisfactory result of a post-offer medical examination or medical inquiry if this is required of all entering employees in the same job category. A post-offer examination or inquiry does not have to be job-related and consistent

with business necessity.

However, if an individual is not hired because a post-offer medical examination or inquiry reveals a disability, the reason(s) for not hiring must be job-related and consistent with business necessity. The employer also must show that no reasonable accommodation was available that would enable the individual to perform the essential job functions, or that accommodation would impose an undue hardship. A post-offer medical examination may disqualify an individual if the employer can demonstrate that the individual would pose a "direct threat" in the workplace (i.e., a significant risk of substantial harm to the health or safety of the individual or others) that cannot be eliminated or reduced below the direct threat level through reasonable accommodation. Such a disqualification is job-related and consistent with business necessity. A post-offer medical examination may not disqualify an individual with a disability who is currently able to perform essential job functions because of speculation that the disability may cause a risk of future

injury.

After a person starts work, a medical examination or inquiry of an employee must be job-related and consistent with business necessity. Employers may conduct employee medical examinations where there is evidence of a job performance or safety problem, examinations required by other Federal laws, examinations to determine current fitness to perform a particular job, and voluntary examinations that are part of employee health programs.

Information from all medical examinations and inquiries must be kept apart from general personnel files as a separate, confidential medical record, available only under limited conditions.

Tests for illegal use of drugs are not medical examinations under the ADA and are not subject to the restrictions of such examinations.

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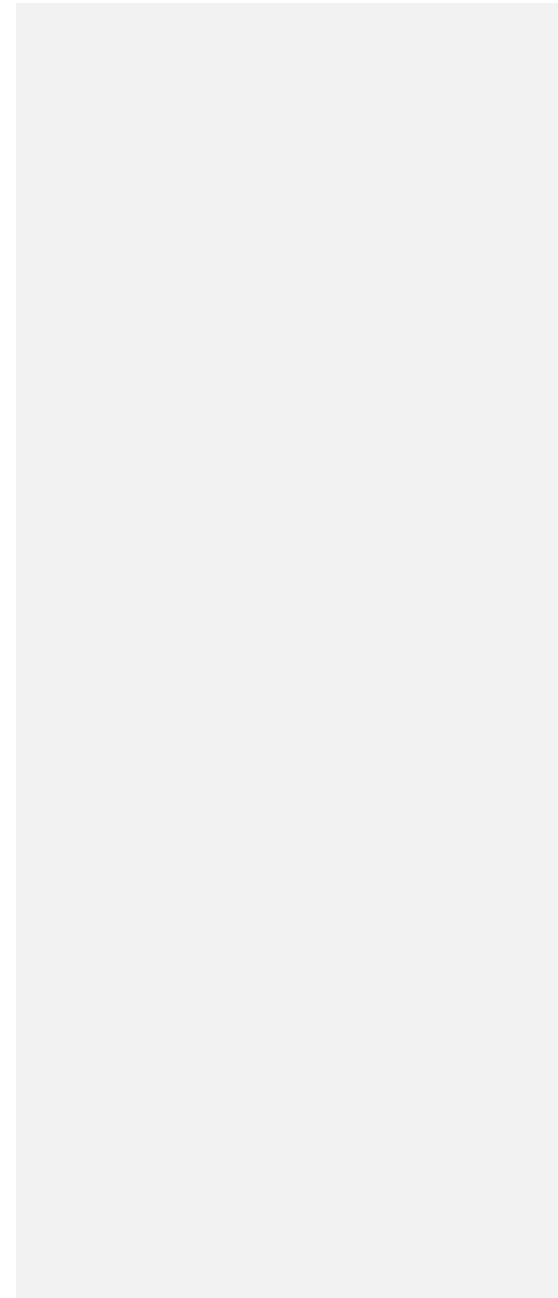
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Q. When can an employer ask an applicant to "self-identify" as having a disability?

A. Federal contractors and subcontractors who are covered by the affirmative action requirements of section 503 of the Rehabilitation Act of 1973 may invite individuals with disabilities to identify themselves on a job application form or by other pre-employment inquiry, to satisfy the section 503 affirmative action requirements. Employers who request such information must observe section 503 requirements regarding the manner in which such information is requested and used, and the procedures for maintaining such information as a separate, confidential record, apart from regular personnel records.

A pre-employment inquiry about a disability is allowed if required by another Federal law or regulation such as those applicable to disabled veterans and veterans of the Vietnam era. Pre-employment inquiries about disabilities may be necessary under such laws to identify

applicants or clients with disabilities in order to provide them with required special services.

Q. Does the ADA require employers to develop written job descriptions?

A. No. The ADA does not require employers to develop or maintain job descriptions. However, a written job description that is prepared before advertising or interviewing applicants for a job will be considered as evidence along with other relevant factors. If an employer uses job descriptions, they should be reviewed to make sure they accurately reflect the actual functions of a job. A job description will be most helpful if it focuses on the results or outcome of a job function, not solely on the way it customarily is performed. A reasonable accommodation may enable a person with a disability to accomplish a job function in a manner that is different from the way an employee who is not disabled

may accomplish the same function.

Q. What is "reasonable accommodation?"

A. Reasonable accommodation is any modification or adjustment to a job or the work environment that will enable a qualified applicant or employee with a disability to participate in the application process or to perform essential job functions. Reasonable accommodation also includes adjustments to assure that a qualified individual with a disability has rights and privileges in employment equal to those of employees without disabilities.

Q. What are some of the accommodations applicants and employees may need?

A. Examples of reasonable accommodation include making existing facilities used by employees readily accessible to and usable by an individual with a disability; restructuring a job; modifying work schedules; acquiring or modifying equipment; providing qualified readers or interpreters; or appropriately modifying examinations, training, or other programs. Reasonable accommodation also may include reassigning a current employee to a vacant position for which the individual is qualified, if the person is unable to do the original job because of a disability even with an accommodation. However, there is no obligation to find a position for an applicant who is not qualified for the position sought. Employers are not required to lower quality or quantity standards as an accommodation; nor are they obligated to

provide personal use items such as glasses or hearing aids.

The decision as to the appropriate accommodation must be based on the particular facts of each case. In selecting the particular type of reasonable accommodation to provide, the principal test is that of effectiveness, i.e., whether the accommodation will provide an opportunity for a person with a disability to achieve the same level of performance and to enjoy benefits equal to those of an average, similarly situated person without a disability. However, the accommodation does not have to ensure equal results or provide exactly the same benefits.

Q. When is an employer required to make a reasonable accommodation?

A. An employer is only required to accommodate a "known" disability of a qualified applicant or employee. The requirement generally will be triggered by a request from an individual with a disability, who frequently will be able to suggest an appropriate accommodation. Accommodations must be made on an individual basis, because the nature and extent of a disabling condition and the requirements of a job will vary in each case. If the individual does not request an accommodation, the employer is not obligated to provide one except where an individual's known disability impairs his/her ability to know of, or effectively communicate a need for, an accommodation that is obvious to the employer. If a person with a disability requests, but cannot suggest, an appropriate accommodation, the employer and the individual

should work together to identify one. There are also many public and private resources that can provide assistance without cost.

Q. What are the limitations on the obligation to make a reasonable accommodation?

A. The individual with a disability requiring the accommodation must be otherwise qualified, and the disability must be known to the employer. In addition, an employer is not required to make an accommodation if it would impose an "undue hardship" on the operation of the employer's business. "Undue hardship" is defined as an "action requiring significant difficulty or expense" when considered in light of a number of factors. These factors include the nature and cost of the accommodation in relation to the size, resources, nature, and structure of the employer's operation. Undue hardship is determined on a case-by-case basis. Where the facility making the accommodation is part of a larger entity, the structure and overall resources of the larger organization would be considered, as well as the financial and administrative relationship of the

facility to the larger organization. In general, a larger employer with greater resources would be expected to make accommodations requiring greater effort or expense than would be required of a smaller employer with fewer resources.

If a particular accommodation would be an undue hardship, the employer must try to identify another accommodation that will not pose such a hardship. Also, if the cost of an accommodation would impose an undue hardship on the employer, the individual with a disability should be given the option of paying that portion of the cost which would constitute an undue hardship or providing the accommodation.

Q. Must an employer modify existing facilities to make them accessible?

A. The employer's obligation under title I is to provide access for an *individual* applicant to participate in the job application process, and for an *individual* employee with a disability to perform the essential functions of his/her job, including access to a building, to the work site, to needed equipment, and to all facilities used by employees. For example, if an employee lounge is located in a place inaccessible to an employee using a wheelchair, the lounge might be modified or relocated, or comparable facilities might be provided in a location that would enable the individual to take a break with co-workers. The employer must provide such access unless it would cause an undue hardship.

Under title I, an employer is not required to make its existing facilities

accessible until a particular applicant or employee with a particular disability needs an accommodation, and then the modifications should meet that individual's work needs. However, employers should consider initiating changes that will provide general accessibility, particularly for job applicants, since it is likely that people with disabilities will be applying for jobs. The employer does not have to make changes to provide access in places or facilities that will not be used by that individual for employment-related activities or benefits.

Q. Can an employer be required to reallocate an essential function of a job to another employee as a reasonable accommodation?

A. No. An employer is not required to reallocate essential functions of a job as a reasonable accommodation.

Q. Can an employer be required to modify, adjust, or make other reasonable accommodations in the way a test is given to a qualified applicant or employee with a disability?

A. Yes. Accommodations may be needed to assure that tests or examinations measure the actual ability of an individual to perform job functions rather than reflect limitations caused by the disability. Tests should be given to people who have sensory, speaking, or manual impairments in a format that does not require the use of the impaired skill, unless it is a job-related skill that the test is designed to measure.

Q. Can an employer maintain existing production/performance standards for an employee with a disability?

A. An employer can hold employees with disabilities to the same standards of production/performance as other similarly situated employees without disabilities for performing essential job functions, with or without reasonable accommodation. An employer also can hold employees with disabilities to the same standards of production/performance as other employees regarding marginal functions unless the disability affects the person's ability to perform those marginal functions. If the ability to perform marginal functions is affected by the disability, the employer must provide some type of reasonable accommodation such as job restructuring but may not exclude an individual with a disability who is satisfactorily performing a jobs essential functions.

Q. Can an employer establish specific attendance and leave policies?

A. An employer can establish attendance and leave policies that are uniformly applied to all employees, regardless of disability, but may not refuse leave needed by an employee with a disability if other employees get such leave. An employer also may be required to make adjustments in leave policy as a reasonable accommodation. The employer is not obligated to provide additional paid leave, but accommodations may include leave flexibility and unpaid leave.

A uniformly applied leave policy does not violate the ADA because it has a more severe effect on an individual because of his/her disability. However, if an individual with a disability requests a modification of such a policy as a reasonable accommodation, an employer may be required to provide it, unless it would impose an undue hardship.

Q. Can an employer consider health and safety when deciding whether to hire an applicant or retain an employee with a disability?

A. Yes. The ADA permits employers to establish qualification standards that will exclude individuals who pose a direct threat -- i.e., a significant risk of substantial harm -- to the health or safety of the individual or of others, if that risk cannot be eliminated or reduced below the level of a direct threat by reasonable accommodation. However, an employer may not simply assume that a threat exists; the employer must establish through objective, medically supportable methods that there is significant risk that substantial harm could occur in the workplace. By requiring employers to make individualized judgments based on reliable medical or other objective evidence rather than on generalizations, ignorance, fear, patronizing attitudes, or stereotypes, the ADA recognizes the need to balance the interests of people with disabilities against the legitimate

interests of employers in maintaining a safe workplace.

Q. Are applicants or employees who are currently illegally using drugs covered by the ADA?

A. No. Individuals who currently engage in the illegal use of drugs are specifically excluded from the definition of a "qualified individual with a disability" protected by the ADA when the employer takes action on the basis of their drug use.

Q. Is testing for the illegal use of drugs permissible under the ADA?

A. Yes. A test for the illegal use of drugs is not considered a medical examination under the ADA; therefore, employers may conduct such testing of applicants or employees and make employment decisions based on the results. The ADA does not encourage, prohibit, or authorize drug tests.

If the results of a drug test reveal the presence of a lawfully prescribed drug or other medical information, such information must be treated as a confidential medical record.

Q. Are alcoholics covered by the ADA?

A. Yes. While a current illegal user of drugs is not protected by the ADA if an employer acts on the basis of such use, a person who currently uses alcohol is not automatically denied protection. An alcoholic is a person with a disability and is protected by the ADA if s/he is qualified to perform the essential functions of the job. An employer may be required to provide an accommodation to an alcoholic. However, an employer can discipline, discharge or deny employment to an alcoholic whose use of alcohol adversely affects job performance or conduct. An employer also may prohibit the use of alcohol in the workplace and can require that employees not be under the influence of alcohol.

Q. Does the ADA override Federal and State health and safety laws?

A. The ADA does not override health and safety requirements established under other Federal laws even if a standard adversely affects the employment of an individual with a disability. If a standard is required by another Federal law, an employer must comply with it and does not have to show that the standard is job related and consistent with business necessity. For example, employers must conform to health and safety requirements of the U.S. Occupational Safety and Health Administration. However, an employer still has the obligation under the ADA to consider whether there is a reasonable accommodation, consistent with the standards of other Federal laws, that will prevent exclusion of qualified individuals with disabilities who can perform jobs without violating the standards of those laws. If an employer can comply with both the ADA and another Federal law, then the employer must do

SO.

The ADA does not override State or local laws designed to protect public health and safety, except where such laws conflict with the ADA requirements. If there is a State or local law that would exclude an individual with a disability from a particular job or profession because of a health or safety risk, the employer still must assess whether a particular individual would pose a "direct threat" to health or safety under the ADA standard. If such a "direct threat" exists, the employer must consider whether it could be eliminated or reduced below the level of a "direct threat" by reasonable accommodation. An employer cannot rely on a State or local law that conflicts with ADA requirements as a defense to a charge of discrimination.

Q. How does the ADA affect workers' compensation programs?

A. Only injured workers who meet the ADA's definition of an "individual with a disability" will be considered disabled under the ADA, regardless of whether they satisfy criteria for receiving benefits under workers' compensation or other disability laws. A worker also must be "qualified" (with or without reasonable accommodation) to be protected by the ADA. Work-related injuries do not always cause physical or mental impairments severe enough to "substantially limit" a major life activity. Also, many on-the-job injuries cause temporary impairments which heal within a short period of time with little or no long-term or permanent impact. Therefore, many injured workers who qualify for benefits under workers' compensation or other disability benefits laws may not be protected by the ADA. An employer must consider work-related injuries on a case-by-case basis to know if a worker is protected

by the ADA.

An employer may not inquire into an applicant's workers' compensation history before making a conditional offer of employment. After making a conditional job offer, an employer may inquire about a person's workers compensation history in a medical inquiry or examination that is required of all applicants in the same job category. However, even after a conditional offer has been made, an employer cannot require a potential employee to have a medical examination because a response to a medical inquiry (as opposed to results from a medical examination) shows a previous on-the-job injury unless all applicants in the same job category are required to have an examination. Also, an employer may not base an employment decision on the speculation that an applicant may cause increased workers' compensation costs in the future. However, an employer may refuse to hire, or may discharge an individual who is not currently able to perform a job without posing a significant risk of substantial harm to the health or safety of the individual or others, if the

risk cannot be eliminated or reduced by reasonable accommodation.

An employer may refuse to hire or may fire a person who knowingly provides a false answer to a lawful post-offer inquiry about his/her condition or worker's compensation history.

An employer also may submit medical information and records concerning employees and applicants (obtained after a conditional job offer) to state workers' compensation offices and "second injury" funds without violating ADA confidentiality requirements.

Q. What is discrimination based on "relationship or association" under the ADA?

A. The ADA prohibits discrimination based on relationship or association in order to protect individuals from actions based on **unfounded assumptions that their relationship to a person with a disability** would affect their job performance, and from actions caused by bias or misinformation concerning certain disabilities. For example, this provision would protect a person whose spouse has a disability from being denied employment because of an employer's unfounded assumption that the applicant would use excessive leave to care for the spouse. It also would protect an individual who does volunteer work for people with AIDS from a discriminatory employment action motivated by that relationship or association.

Q. How are the employment provisions enforced?

A. The employment provisions of the ADA are enforced under the same procedures now applicable to race, color, sex, national origin, and religious discrimination under title VII of the Civil Rights Act of 1964, as amended, and the Civil Rights Act of 1991. Complaints regarding actions that occurred on or after July 26, 1992, may be filed with the Equal Employment Opportunity Commission or designated State human rights agencies. Available remedies will include hiring, reinstatement, promotion, back pay, front pay, restored benefits, reasonable accommodation, attorneys' fees, expert witness fees, and court costs. Compensatory and punitive damages also may be available in cases of intentional discrimination or where an employer fails to make a good faith effort to provide a reasonable accommodation.

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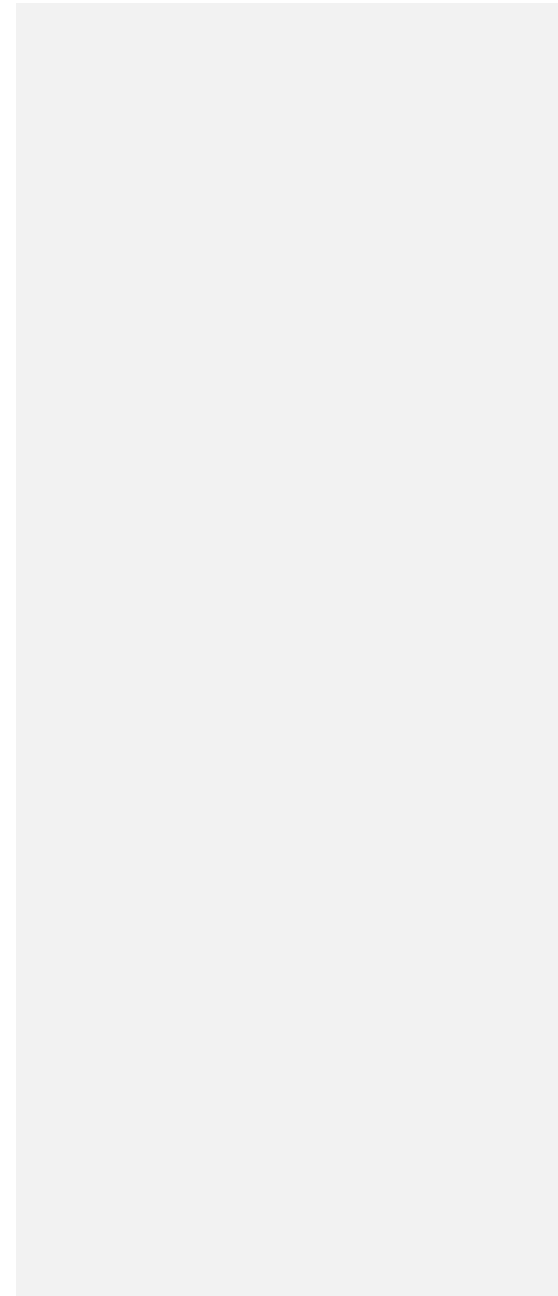
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Q. What financial assistance is available to employers to help them make reasonable accommodations and comply with the ADA?

A. A special tax credit is available to help smaller employers make accommodations required by the ADA. An eligible small business may take a tax credit of up to \$5,000 per year for accommodations made to comply with the ADA. The credit is available for one-half the cost of "eligible access expenditures" that are more than \$250 but less than \$10,250.

A full tax deduction, up to \$15,000 per year, also is available to any business for expenses of removing qualified architectural or transportation barriers. Expenses covered include costs of removing barriers created by steps, narrow doors, inaccessible parking spaces, restroom facilities, and transportation vehicles. Additional information

discussing the tax credits and deductions is contained in the Department of Justice's ADA Tax Incentive Packet for Businesses available from the ADA Information Line, see page 29. Information about the tax credit and tax deduction can also be obtained from a local IRS office, or by contacting the Office of Chief Counsel, Internal Revenue Service.

Q. What are an employer's recordkeeping requirements under the employment provisions of the ADA?

A. An employer must maintain records such as application forms submitted by applicants and other records related to hiring, requests for reasonable accommodation, promotion, demotion, transfer, lay-off or termination, rates of pay or other terms of compensation, and selection for training or apprenticeship for one year after making the record or taking the action described (whichever occurs later). If a charge of discrimination is filed or an action is brought by EEOC, an employer must save all personnel records related to the charge until final disposition of the charge.

Q. Does the ADA require that an employer post a notice explaining its requirements?

A. The ADA requires that employers post a notice describing the provisions of the ADA. It must be made accessible, as needed, to individuals with disabilities. A poster is available from EEOC summarizing the requirements of the ADA and other Federal legal requirements for nondiscrimination for which EEOC has enforcement responsibility. EEOC also provides guidance on making this information available in accessible formats for people with disabilities.

Q. What resources does the Equal Employment Opportunity Commission have available to help employers and people with disabilities understand and comply with the employment requirements of the ADA?

A. The Equal Employment Opportunity Commission has developed several resources to help employers and people with disabilities understand and comply with the employment provisions of the ADA.

Resources include:

A Technical Assistance Manual that provides "how-to" guidance on the employment provisions of the ADA as well as a resource directory to help individuals find specific information.

A variety of brochures, booklets, and fact sheets.

State and Local Governments

Q. Does the ADA apply to State and local governments?

A. Title II of the ADA prohibits discrimination against qualified individuals with disabilities in all programs, activities, and services of public entities. It applies to all State and local governments, their departments and agencies, and any other instrumentalities or special purpose districts of State or local governments. It clarifies the requirements of section 504 of the Rehabilitation Act of 1973 for public transportation systems that receive Federal financial assistance, and extends coverage to all public entities that provide public transportation,

whether or not they receive Federal financial assistance. It establishes detailed standards for the operation of public transit systems, including commuter and intercity rail (AMTRAK).

Q. When do the requirements for State and local governments become effective?

A. In general, they became effective on January 26, 1992.

Q. How does title II affect participation in a State or local government's programs, activities, and services?

A. A state or local government must eliminate any eligibility criteria for participation in programs, activities, and services that screen out or tend to screen out persons with disabilities, unless it can establish that the requirements are necessary for the provision of the service, program, or activity. The State or local government may, however, adopt legitimate safety requirements necessary for safe operation if they are based on real risks, not on stereotypes or generalizations about individuals with disabilities. Finally, a public entity must reasonably modify its policies, practices, or procedures to avoid discrimination. If the public entity can demonstrate that a particular modification would fundamentally alter the nature of its service, program, or activity, it is not required to make that modification.

Q. Does title II cover a public entity's employment policies and practices?

A. Yes. Title II prohibits all public entities, regardless of the size of their work force, from discriminating in employment against qualified individuals with disabilities. In addition to title II's employment coverage, title I of the ADA and section 504 of the Rehabilitation Act of 1973 prohibit employment discrimination against qualified individuals with disabilities by certain public entities

Q. What changes must a public entity make to its existing facilities to make them accessible?

A. A public entity must ensure that individuals with disabilities are not excluded from services, programs, and activities because existing buildings are inaccessible. A State or local government's programs, when viewed in their entirety, must be readily accessible to and usable by individuals with disabilities. This standard, known as "program accessibility," applies to facilities of a public entity that existed on January 26, 1992. Public entities do not necessarily have to make each of their existing facilities accessible. They may provide program accessibility by a number of methods including alteration of existing facilities, acquisition or construction of additional facilities, relocation of a service or program to an accessible facility, or provision of services at alternate accessible sites.

Q. When must structural changes be made to attain program accessibility?

A. Structural changes needed for program accessibility must be made as expeditiously as possible, but no later than January 26, 1995. This three-year time period is not a grace period; all alterations must be accomplished as expeditiously as possible. **A public entity that employs 50 or more persons must have developed a transition plan by July 26, 1992, setting forth the steps necessary to complete such changes.**

Q. What is a self-evaluation?

A. A self-evaluation is a public entity's assessment of its current policies and practices. The self-evaluation identifies and corrects those policies and practices that are inconsistent with title II's requirements. All public entities must complete a self-evaluation by January 26, 1993. **A public entity that employs 50 or more employees must retain its self-evaluation for three years.** Other public entities are not required to retain their self-evaluations, but are encouraged to do so because these documents evidence a public entity's good faith efforts to comply with title II's requirements.

Q. What does title II require for new construction and alterations?

A. The ADA requires that all new buildings constructed by a State or local government be accessible. In addition, when a State or local government undertakes alterations to a building, it must make the altered portions accessible.

Q. How will a State or local government know that a new building is accessible?

A. A State or local government will be in compliance with the ADA for new construction and alterations if it follows either of two accessibility standards. It can choose either the Uniform Federal Accessibility Standards or the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, which is the standard that must be used for public accommodations and commercial facilities under title III of the ADA. **If the State or local government chooses the ADA Accessibility Guidelines, it is not entitled to the elevator exemption (which permits certain private buildings under three stories or under 3,000 square feet per floor to be constructed without an elevator).**

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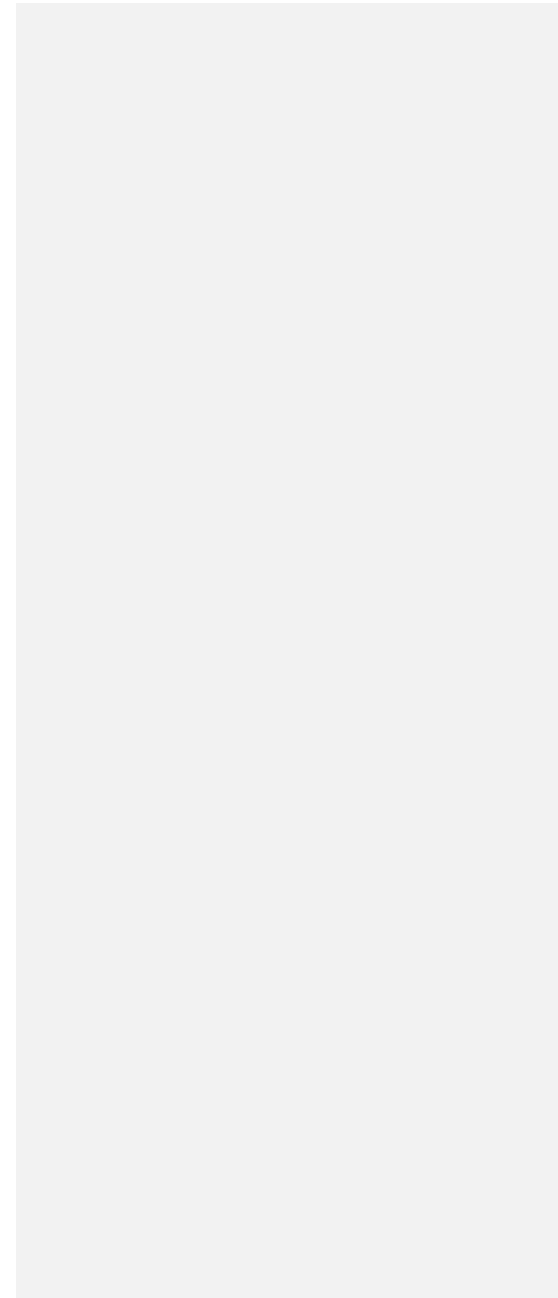
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Q. What requirements apply to a public entity's emergency telephone services, such as 911?

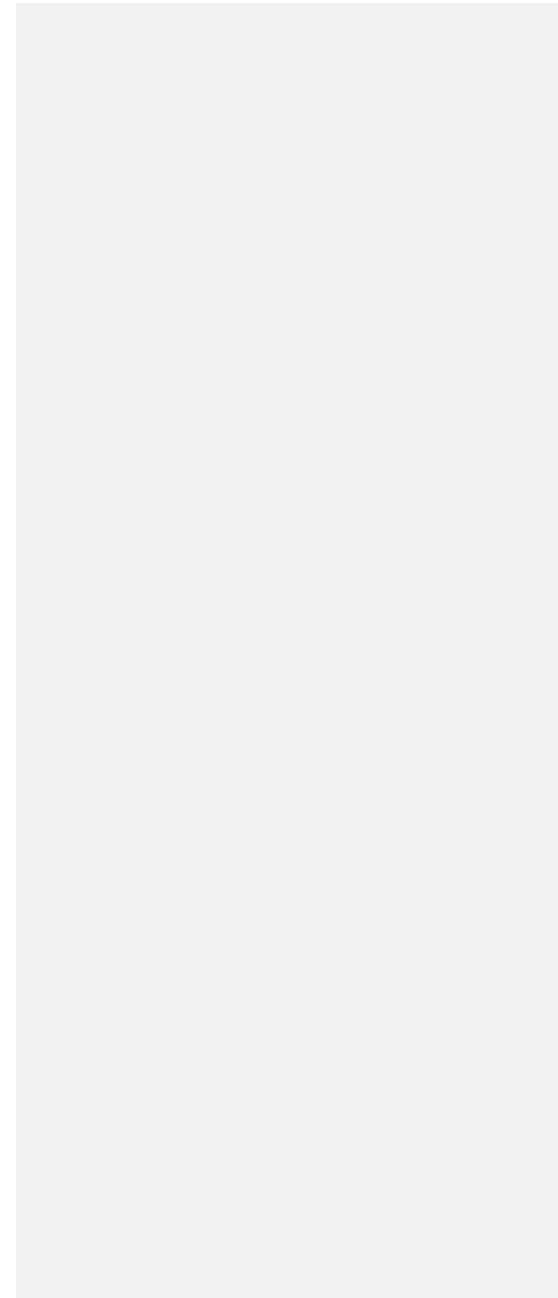
A. State and local agencies that provide emergency telephone services must provide "direct access" to individuals who rely on a TDD or computer modem for telephone communication. Telephone access through a third party or through a relay service does not satisfy the requirement for direct access. Where a public entity provides 911 telephone service, it may not substitute a separate seven-digit telephone line as the sole means for access to 911 services by nonvoice users. A public entity may, however, provide a separate seven-digit line for the exclusive use of nonvoice callers in addition to providing direct access for such calls to its 911 line.

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Q. Does title II require that telephone emergency service systems be compatible with all formats used for non voice communications?

A. No. At present, telephone emergency services must only be compatible with the Baudot format. Until it can be technically proven that communications in another format can operate in a reliable and compatible manner in a given telephone emergency environment, a public entity would not be required to provide direct access to computer modems using formats other than Baudot.

Q. How will the ADA's requirements for State and local governments be enforced?

A. Private individuals may bring lawsuits to enforce their rights under title II and may receive the same remedies as those provided under section 504 of the Rehabilitation Act of 1973, including reasonable attorney's fees. Individuals may also file complaints with eight designated Federal agencies, including the Department of Justice and the Department of Transportation.

Public Accommodations

Q. What are public accommodations?

A. A public accommodation is a private entity that owns, operates, leases, or leases to, a place of public accommodation. Places of public accommodation include a wide range of entities, such as restaurants, hotels, theaters, doctors' offices, pharmacies, retail stores, museums, libraries, parks, private schools, and day care centers. Private clubs and religious organizations are exempt from the ADA's title III requirements for public accommodations.

Q. Will the ADA have any effect on the eligibility criteria used by public accommodations to determine who may receive services?

A. Yes. If a criterion screens out or tends to screen out individuals with disabilities, it may only be used if necessary for the provision of the services. For instance, it would be a violation for a retail store to have a rule excluding all deaf persons from entering the premises, or for a movie theater to exclude all individuals with cerebral palsy. More subtle forms of discrimination are also prohibited. For example, requiring presentation of a driver's license as the sole acceptable means of identification for purposes of paying by check could constitute discrimination against individuals with vision impairments. This would be true if such individuals are ineligible to receive licenses and the use of an alternative means of identification is feasible.

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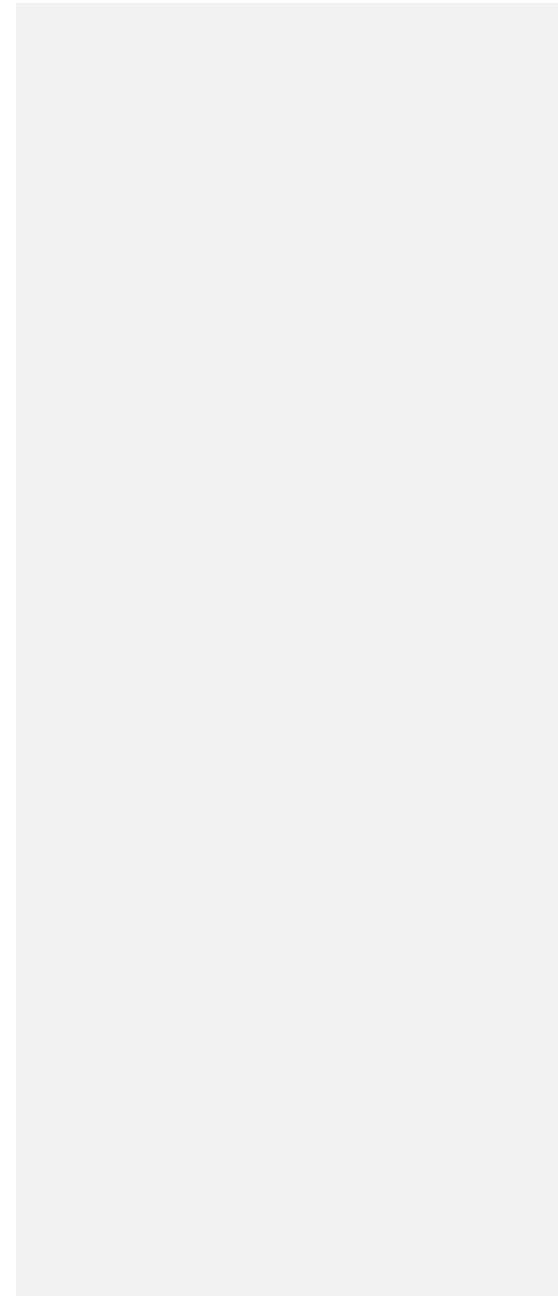
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Q. Does the ADA allow public accommodations to take safety factors into consideration in providing services to individuals with disabilities?

A. The ADA expressly provides that a public accommodation may **exclude an individual, if that individual poses a direct threat to the health or safety of others that cannot be mitigated by appropriate modifications in the public accommodation's policies or procedures, or by the provision of auxiliary aids.** A public accommodation will be permitted to establish objective safety criteria for the operation of its business; however, any safety standard must be based on objective requirements rather than stereotypes or generalizations about the ability of persons with disabilities to participate in an activity.

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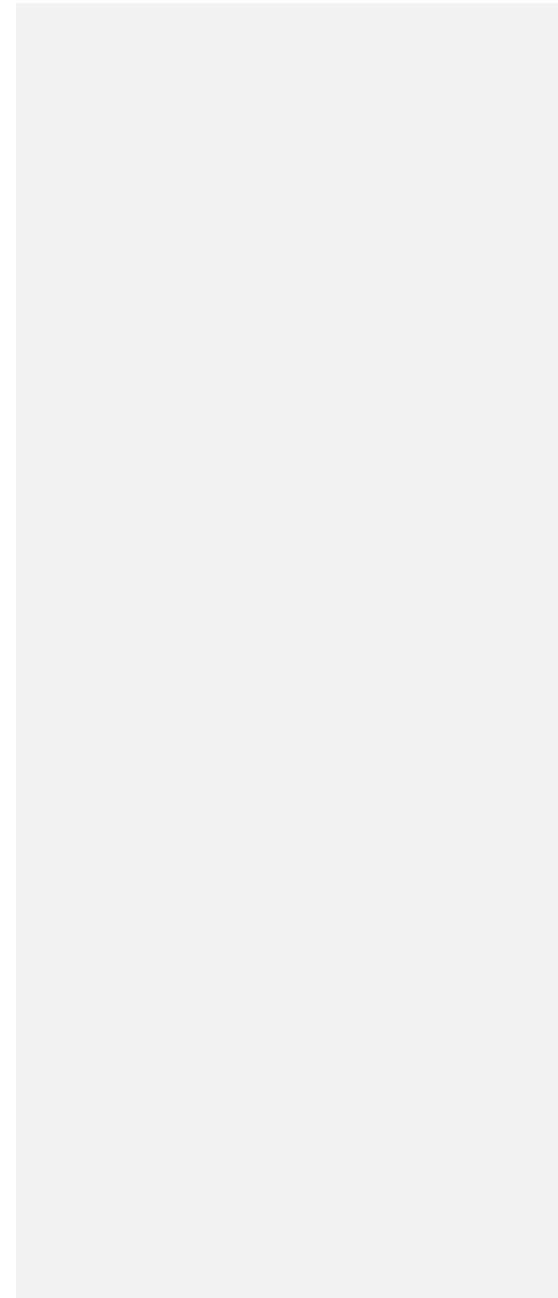
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Q. Are there any limits on the kinds of modifications in policies, practices, and procedures required by the ADA?

A. Yes. The ADA does not require modifications that would fundamentally alter the nature of the services provided by the public accommodation. For example, it would not be discriminatory for a physician specialist who treats only burn patients to refer a deaf individual to another physician for treatment of a broken limb or respiratory ailment. To require a physician to accept patients outside of his or her specialty would fundamentally alter the nature of the medical practice.

Q. What kinds of auxiliary aids and services are required by the ADA to ensure effective communication with individuals with hearing or vision impairments?

A. Appropriate auxiliary aids and services may include services and devices such as qualified interpreters, assistive listening devices, notetakers, and written materials for individuals with hearing impairments; and qualified readers, taped texts, and Brailled or large print materials for individuals with vision impairments.

Q. Are there any limitations on the ADA's auxiliary aids requirements?

A. Yes. The ADA does not require the provision of any auxiliary aid that would result in an undue burden or in a fundamental alteration in the nature of the goods or services provided by a public accommodation. However, the public accommodation is not relieved from the duty to furnish an alternative auxiliary aid, if available, that would not result in a fundamental alteration or undue burden. Both of these limitations are derived from existing regulations and caselaw under section 504 of the Rehabilitation Act and are to be determined on a case-by-case basis.

Q. Will restaurants be required to have brailled menus?

A. No, not if waiters or other employees are made available to read the menu to a blind customer.

Q. Will a clothing store be required to have brailled price tags?

A. No, not if sales personnel could provide price information orally upon request.

Q. Will a bookstore be required to maintain a sign language interpreter on its staff in order to communicate with deaf customers?

A. No, not if employees communicate by pen and notepad when necessary.

Q. Are there any limitations on the ADA's barrier removal requirements for existing facilities?

A. Yes. Barrier removal need be accomplished only when it is "readily achievable" to do so.

Q. What does the term "readily achievable" mean?

A. It means "easily accomplishable and able to be carried out without much difficulty or expense."

Q. What are examples of the types of modifications that would be readily achievable in most cases?

A. Examples include the simple ramping of a few steps, the installation of grab bars where only routine reinforcement of the wall is required, the lowering of telephones, and similar modest adjustments.

Q. Will businesses need to rearrange furniture and display racks?

A. Possibly. For example, restaurants may need to rearrange tables and department stores may need to adjust their layout of racks and shelves in order to permit access to wheelchair users.

Q. Will businesses need to install elevators?

A. Businesses are not required to retrofit their facilities to install elevators unless such installation is readily achievable, which is unlikely in most cases.

Q. When barrier removal is not readily achievable, what kinds of alternative steps are required by the ADA?

A. Alternatives may include such measures as in-store assistance for removing articles from inaccessible shelves, home delivery of groceries, or coming to the door to receive or return dry cleaning.

Q. Must alternative steps be taken without regard to cost?

A. No, only readily achievable alternative steps must be undertaken.

Q. How is "readily achievable" determined in a multisite business?

A. In determining whether an action to make a public accommodation accessible would be "readily achievable," the overall size of the parent corporation or entity is only one factor to be considered. The ADA also permits consideration of the financial resources of the particular facility or facilities involved and the administrative or fiscal relationship of the facility or facilities to the parent entity.

Q. Who has responsibility for ADA compliance in leased places of public accommodation, the landlord or the tenant?

A. The ADA places the legal obligation to remove barriers or provide auxiliary aids and services **on both the landlord and the tenant**. The landlord and the tenant may decide by lease who will actually make the changes and provide the aids and services, but both remain legally responsible.

Q. What does the ADA require in new construction?

A. The ADA requires that all new construction of places of public accommodation, as well as of "commercial facilities" such as office buildings, be accessible. Elevators are generally not required in facilities under three stories or with fewer than 3,000 square feet per floor, unless the building is a shopping center or mall; the professional office of a health care provider; a terminal, depot, or other public transit station; or an airport passenger terminal.

Q. Is it expensive to make all newly constructed places of public accommodation and commercial facilities accessible?

A. The cost of incorporating accessibility features in new construction is less than one percent of construction costs. This is a small price in relation to the economic benefits to be derived from full accessibility in the future, such as increased employment and consumer spending and decreased welfare dependency.

Q. Must every feature of a new facility be accessible?

A. No, only a specified number of elements such as parking spaces and drinking fountains must be made accessible in order for a facility to be "readily accessible." Certain nonoccupiable spaces such as elevator pits, elevator penthouses, and piping or equipment catwalks need not be accessible.

Q. What are the ADA requirements for altering facilities?

A. All alterations that could affect the usability of a facility must be made in an accessible manner to the maximum extent feasible. For example, if during renovations a doorway is being relocated, the new doorway must be wide enough to meet the new construction standard for accessibility. When alterations are made to a primary function area, such as the lobby of a bank or the dining area of a cafeteria, an accessible path of travel to the altered area must also be provided. The bathrooms, telephones, and drinking fountains serving that area must also be made accessible. These additional accessibility alterations are only required to the extent that the added accessibility costs do not exceed 20% of the cost of the original alteration. Elevators are generally not required in facilities under three stories or with fewer than 3,000 square feet per floor, unless the building is a shopping center or mall; the professional

office of a health care provider; a terminal, depot, or other public transit station; or an airport passenger terminal.

Q. Does the ADA permit an individual with a disability to sue a business when that individual believes that discrimination is about to occur, or must the individual wait for the discrimination to occur?

A. The ADA public accommodations provisions permit an individual to allege discrimination based on a reasonable belief that discrimination is about to occur. This provision, for example, allows a person who uses a wheelchair to challenge the planned construction of a new place of public accommodation, such as a shopping mall, that would not be accessible to individuals who use wheelchairs. The resolution of such challenges prior to the construction of an inaccessible facility would enable any necessary remedial measures to be incorporated in the building at the planning stage, when such changes would be relatively inexpensive.

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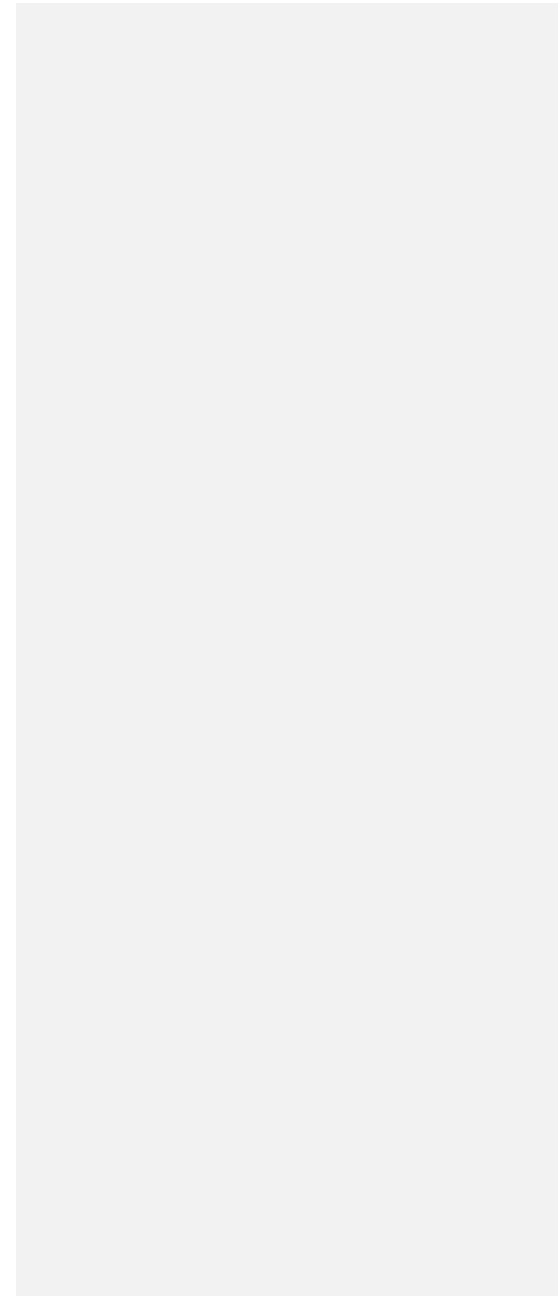
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Q. How does the ADA affect existing State and local building codes?

A. Existing codes remain in effect. The ADA allows the Attorney General to certify that a State law, local building code, or similar ordinance that establishes accessibility requirements meets or exceeds the minimum accessibility requirements for public accommodations and commercial facilities. Any State or local government may apply for certification of its code or ordinance. The Attorney General can certify a code or ordinance only after prior notice and a public hearing at which interested people, including individuals with disabilities, are provided an opportunity to testify against the certification.

Q. What is the effect of certification of a State or local code or ordinance?

A. Certification can be advantageous if an entity has constructed or altered a facility according to a certified code or ordinance. If someone later brings an enforcement proceeding against the entity, the certification is considered "rebuttable evidence" that the State law or local ordinance meets or exceeds the minimum requirements of the ADA. In other words, the entity can argue that the construction or alteration met the requirements of the ADA because it was done in compliance with the State or local code that had been certified.

Q. How will the public accommodations provisions be enforced?

A. Private individuals may bring lawsuits in which they can obtain court orders to stop discrimination. Individuals may also file complaints with the Attorney General, who is authorized to bring lawsuits in cases of general public importance or where a oepattern o practiceî of discrimination is alleged. In these cases, the Attorney General may seek monetary damages and civil penalties. Civil penalties may not exceed \$55,000 for a first violation or \$110,000 for any subsequent violation.

Miscellaneous

Q. Is the Federal government covered by the ADA?

A. The ADA does not cover the executive branch of the Federal government. The executive branch continues to be covered by title V of the Rehabilitation Act of 1973, which prohibits discrimination in services and employment on the basis of handicap and which is a model for the requirements of the ADA. The ADA, however, does cover Congress and other entities in the legislative branch of the Federal government.

Q. Does the ADA cover private apartments and private homes?

A. The ADA does not cover strictly residential private apartments and homes. If, however, a place of public accommodation, such as a doctor's office or day care center, is located in a private residence, those portions of the residence used for that purpose are subject to the ADA's requirements.

Q. Does the ADA cover air transportation?

A. Discrimination by air carriers in areas other than employment is not covered by the ADA but rather by the Air Carrier Access Act (49 U.S.C. 1374 (c)).

Q. What are the ADA's requirements for public transit buses?

A. The Department of Transportation has issued regulations mandating accessible public transit vehicles and facilities. The regulations include requirements that all new fixed-route, public transit buses be accessible and that supplementary paratransit services be provided for those individuals with disabilities who cannot use fixed-route bus service. For information on how to contact the Department of Transportation, see page 29.

Q. How will the ADA make telecommunications accessible?

A. The ADA requires the establishment of telephone relay services for individuals who use telecommunications devices for deaf persons (TDD's) or similar devices. The Federal Communications Commission has issued regulations specifying standards for the operation of these services.

Q. Are businesses entitled to any tax benefit to help pay for the cost of compliance?

A. As amended in 1990, the Internal Revenue Code allows a deduction of up to \$15,000 per year for expenses associated with the removal of qualified architectural and transportation barriers. The 1990 amendment also permits eligible small businesses to receive a tax credit for certain costs of compliance with the ADA. An eligible small business is one whose gross receipts do not exceed \$1,000,000 or whose workforce does not consist of more than 30 full-time workers. Qualifying businesses may claim a credit of up to 50 percent of eligible access expenditures that exceed \$250 but do not exceed \$10,250. Examples of eligible access expenditures include the necessary and reasonable costs of removing architectural, physical, communications, and transportation barriers;

providing readers, interpreters, and other auxiliary aids; and acquiring or modifying equipment or devices.

ADA Standards



- [About the ADA Standards](#)
- [DOJ's 2010 ADA Standards](#)
- [Chapter 1: Application and Administration](#)
- [Chapter 2: Scoping Requirements](#)
- [Chapter 3: Building Blocks](#)
- [Chapter 4: Accessible Routes](#)
- [Chapter 5: General Site and Building Elements](#)
- [Chapter 6: Plumbing Elements and Facilities](#)
- [Chapter 7: Communication Elements and Features](#)
- [Chapter 8: Special Rooms, Spaces, and Elements](#)
- [Chapter 9: Built-In Elements](#)
- [Chapter 10: Recreation Facilities](#)



- **CAD Figures** (zipped DWG and DXF files)

About the ADA Standards

The ADA standards are issued by the Department of Justice (DOJ) and the Department of Transportation (DOT) and apply to facilities covered by the ADA in new construction and alterations. DOJ's standards apply to all facilities covered by the ADA, except public transportation facilities, which are subject to DOT's standards.

Both standards are very similar and are closely based on the Board's ADA Accessibility Guidelines (ADAAG). However, each contains a few unique provisions, which are included in this edition of the standards.

DOJ's ADA standards (2010) became mandatory on March 15, 2012. They include provisions that modify certain portions of Chapters 1-10, including provisions addressing the following areas:

- Assembly Areas ([221](#))
- Medical Care Facilities (section [223](#))
- Places of Lodging (sections [224](#))
- Housing at Places of Education ([224](#) and [233](#))
- Detention and Correctional Facilities (section [232](#))
- Social Service Center Establishments ([233](#))
- Residential Dwelling Units (section [233](#))

See also on DOJ's website at www.ada.gov:

- The full text of DOJ's [2010 ADA Standards](#)
- DOJ's [ADA regulations](#) implementing the 2010 ADA Standards

Department of Transportation ADA Standards for Transportation Facilities (2006)

DOT's ADA standards (2006) apply to facilities used by state and local governments to provide designated public transportation services, including bus stops and stations, and rail stations. They include unique provisions concerning:

- Location of Accessible Routes ([206.3](#))
- Detectable Warnings on Curb Ramps ([406.8](#))
- Bus Boarding and Alighting Areas ([810.2.2](#))
- Rail Station Platforms ([810.5.3](#))

See also on DOT's website:

- [DOT Regulation for Transportation Services](#)
- [DOT rule](#) adopting the 2006 ADA Standards for Transportation Facilities

DOJ's 2010 ADA Standards

- **Introduction**
- **2010 Standards for State and Local Government Facilities: Title II**
- **2010 Standards for Public Accommodations and Commercial Facilities: Title III**

Introduction

The Department of Justice published revised regulations for Titles II and III of the Americans with Disabilities Act of 1990 “ADA” in the Federal Register on September 15, 2010. These regulations adopted revised, enforceable accessibility standards called the 2010 ADA Standards for Accessible Design “2010 Standards” or “Standards”. The 2010 Standards set minimum requirements – both scoping and technical -- for newly

designed and constructed or altered State and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities.

Adoption of the 2010 Standards also establishes a revised reference point for Title II entities that choose to make structural changes to existing facilities to meet their program accessibility requirements; and it establishes a similar reference for Title III entities undertaking readily achievable barrier removal.

The Department has assembled this online version of the official 2010 Standards to increase its ease of use. This version includes:

- 2010 Standards for State and Local Government Facilities Title II
- 2010 Standards for Public Accommodations and Commercial Facilities Title III

2010 STANDARDS FOR STATE AND LOCAL GOVERNMENT FACILITIES: TITLE II

State and local government facilities must follow the requirements of the 2010 Standards, including both the Title II regulations at 28 CFR 35.151; and the 2004 ADAAG at 36 CFR part 1191, appendices B and D.

In the few places where requirements between the two differ, the requirements of 28 CFR 35.151 prevail.

Compliance Date for Title II

If the start date for construction is on or after March 15, 2012, all newly constructed or altered State and local government facilities must comply with the 2010 Standards. Before that date, the 1991 Standards (without the elevator exemption), the UFAS, or the 2010 Standards may be used for such projects when the start of construction commences on or after September 15, 2010.

28 CFR 35.151 New construction and alterations

(a) Design and construction.

(1) Each facility or part of a facility constructed by, on behalf of, or for the use of a public entity shall be designed and constructed in such manner that the facility or part of the facility is readily accessible to and usable by individuals with disabilities, if the construction was commenced after January 26, 1992.

(2) Exception for structural impracticability.

(i) Full compliance with the requirements of this section is not required where a public entity can demonstrate that it is structurally impracticable to meet the requirements. Full compliance will be considered structurally impracticable only in those rare circumstances when the unique characteristics of terrain prevent the incorporation of accessibility features.

(ii) If full compliance with this section would be structurally impracticable, compliance with this section is required to the extent that it is not structurally impracticable. In that case, any portion of the facility that can be made accessible shall be made accessible to the extent that it is not structurally impracticable.

(iii) If providing accessibility in conformance with this section to individuals with certain disabilities (e.g., those who use wheelchairs) would be structurally impracticable, accessibility shall nonetheless be ensured to persons with other types of disabilities, (e.g., those who use crutches or who have sight, hearing, or mental impairments) in accordance with this section.

(b) Alterations.

(1) Each facility or part of a facility altered by, on behalf of, or for the use of a public entity in a manner that affects or could affect the usability of the facility or part of the facility shall, to the maximum extent feasible, be altered in such manner that the altered portion of

the facility is readily accessible to and usable by individuals with disabilities, if the alteration was commenced after January 26, 1992.

(2) The path of travel requirements of § 35.151(b)(4) shall apply only to alterations undertaken solely for purposes other than to meet the program accessibility requirements of § 35.150.

(3)

(i) Alterations to historic properties shall comply, to the maximum extent feasible, with the provisions applicable to historic properties in the design standards specified in § 35.151(c).

(ii) If it is not feasible to provide physical access to an historic property in a manner that will not threaten or destroy the historic significance of the building or facility, alternative methods of access shall be provided pursuant to the requirements of § 35.150.

(4) Path of travel. An alteration that affects or could affect the usability of or access to an area of a facility that contains a primary

function shall be made so as to ensure that, to the maximum extent feasible, the path of travel to the altered area and the restrooms, telephones, and drinking fountains serving the altered area are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, unless the cost and scope of such alterations is disproportionate to the cost of the overall alteration.

(i) Primary function. A “primary function” is a major activity for which the facility is intended. Areas that contain a primary function include, but are not limited to, the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other work areas in which the activities of the public entity using the facility are carried out.

(A) Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, and corridors are not areas containing a primary function.

Restrooms are not areas containing a primary function unless the

provision of restrooms is a primary purpose of the area, e.g., in highway rest stops.

(B) For the purposes of this section, alterations to windows, hardware, controls, electrical outlets, and signage shall not be deemed to be alterations that affect the usability of or access to an area containing a primary function.

(ii) A “**path of travel**” includes a continuous, unobstructed way of pedestrian passage by means of which the altered area may be approached, entered, and exited, and which connects the altered area with an exterior approach (including sidewalks, streets, and parking areas), an entrance to the facility, and other parts of the facility.

(A) An accessible path of travel may consist of walks and sidewalks, curb ramps and other interior or exterior pedestrian ramps; clear floor paths through lobbies, corridors, rooms, and

other improved areas; parking access aisles; elevators and lifts; or a combination of these elements.

(B) For the purposes of this section, the term “path of travel” also includes the restrooms, telephones, and drinking fountains serving the altered area.

(C) Safe harbor. If a public entity has constructed or altered required elements of a path of travel in accordance with the specifications in either the 1991 Standards or the Uniform Federal Accessibility Standards before March 15, 2012, the public entity is not required to retrofit such elements to reflect incremental changes in the 2010 Standards solely because of an alteration to a primary function area served by that path of travel.

(iii) Disproportionality.

(A) Alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall

alteration when the cost exceeds 20 % of the cost of the alteration to the primary function area.

(B) Costs that may be counted as expenditures required to provide an accessible path of travel may include:

- (1) Costs associated with providing an accessible entrance and an accessible route to the altered area, for example, the cost of widening doorways or installing ramps;
- (2) Costs associated with making restrooms accessible, such as installing grab bars, enlarging toilet stalls, insulating pipes, or installing accessible faucet controls;
- (3) Costs associated with providing accessible telephones, such as relocating the telephone to an accessible height, installing amplification devices, or installing a text telephone (TTY); and
- (4) Costs associated with relocating an inaccessible drinking fountain.

(iv) Duty to provide accessible features in the event of disproportionality.

(A) When the cost of alterations necessary to make the path of travel to the altered area fully accessible is disproportionate to the cost of the overall alteration, the path of travel shall be made accessible to the extent that it can be made accessible without incurring disproportionate costs.

(B) In choosing which accessible elements to provide, priority should be given to those elements that will provide the greatest access, in the following order—

- (1) An accessible entrance;
- (2) An accessible route to the altered area;
- (3) At least one accessible restroom for each sex or a single unisex restroom;
- (4) Accessible telephones;
- (5) Accessible drinking fountains; and

(6) When possible, additional accessible elements such as parking, storage, and alarms.

(v) Series of smaller alterations.

(A) The obligation to provide an accessible path of travel may not be evaded by performing a series of small alterations to the area served by a single path of travel if those alterations could have been performed as a single undertaking.

(B)

(1) If an area containing a primary function has been altered without providing an accessible path of travel to that area, and subsequent alterations of that area, or a different area on the same path of travel, are undertaken within three years of the original alteration, the total cost of alterations to the primary function areas on that path of travel during the preceding three-

year period shall be considered in determining whether the cost of making that path of travel accessible is disproportionate.

(2) Only alterations undertaken on or after March 15, 2011, shall be considered in determining if the cost of providing an accessible path of travel is disproportionate to the overall cost of the alterations.

(c) Accessibility standards and compliance date.

(1) If physical construction or alterations commence after July 26, 1992, but prior to the September 15, 2010, then new construction and alterations subject to this section must comply with either the UFAS or the 1991 Standards except that the elevator exemption contained at section 4.1.3(5) and section 4.1.6(1)(k) of the 1991 Standards shall not apply. Departures from particular requirements of either standard by the use of other methods shall be permitted when it is clearly evident that equivalent access to the facility or part of the facility is thereby provided.

(2) If physical construction or alterations commence on or after September 15, 2010, and before March 15, 2012, then new construction and alterations subject to this section may comply with one of the following: the 2010 Standards, UFAS, or the 1991 Standards except that the elevator exemption contained at section

4.1.3(5) and section 4.1.6(1)(k) of the 1991 Standards shall not apply. Departures from particular requirements of either standard by the use of other methods shall be permitted when it is clearly evident that equivalent access to the facility or part of the facility is thereby provided.

(3) If physical construction or alterations commence on or after March 15, 2012, then new construction and alterations subject to this section shall comply with the 2010 Standards.

(4) For the purposes of this section, ceremonial groundbreaking or razing of structures prior to site preparation do not commence physical construction or alterations.

(5) Noncomplying new construction and alterations.

(i) Newly constructed or altered facilities or elements covered by §§ 35.151(a) or (b) that were constructed or altered before March 15, 2012, and that do not comply with the 1991 Standards or with UFAS shall before March 15, 2012, be made accessible in

accordance with either the 1991 Standards, UFAS, or the 2010 Standards.

(ii) Newly constructed or altered facilities or elements covered by §§ 35.151(a) or (b) that were constructed or altered before March 15, 2012 and that do not comply with the 1991 Standards or with UFAS shall, on or after March 15, 2012, be made accessible in accordance with the 2010 Standards.

Appendix to 35.151(c)

Compliance Date for New Construction or Alterations	Applicable Standards
Before September 15, 2010	1991 Standards or UFAS
On or after September 15, 2010, and before March 15, 2012	1991 Standards, UFAS, or 2010 Standards
On or after March 15, 2012	2010 Standards

Uniform Federal Accessibility Standards (UFAS)

<http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/ufas>

(d) Scope of coverage. The 1991 Standards and the 2010 Standards apply to fixed or built-in elements of buildings, structures, site improvements, and pedestrian routes or vehicular ways located on a site. Unless specifically stated otherwise, the advisory notes, appendix notes, and figures contained in the 1991 Standards and the 2010 Standards explain or illustrate the requirements of the rule; they do not establish enforceable requirements.

(e) Social service center establishments. Group homes, halfway houses, shelters, or similar social service center establishments that provide either temporary sleeping accommodations or residential dwelling units that are subject to this section shall comply with the provisions of the 2010 Standards applicable to residential facilities, including, but not limited to, the provisions in sections 233 and 809.

(1) In sleeping rooms with more than 25 beds covered by this section, a minimum of 5% of the beds shall have clear floor space complying with section 806.2.3 of the 2010 Standards.

(2) Facilities with more than 50 beds covered by this section that provide common use bathing facilities, shall provide at least one roll-in shower with a seat that complies with the relevant provisions of section 608 of the 2010 Standards. Transfer-type showers are not permitted in lieu of a roll-in shower with a seat, and the exceptions in sections 608.3 and 608.4 for residential dwelling units are not

permitted. When separate shower facilities are provided for men and for women, at least one roll-in shower shall be provided for each group.

(f) Housing at a place of education. Housing at a place of education that is subject to this section shall comply with the provisions of the 2010 Standards applicable to transient lodging, including, but not limited to, the requirements for transient lodging guest rooms in sections 224 and 806 subject to the following exceptions. For the purposes of the application of this section, the term "sleeping room" is intended to be used interchangeably with the term "guest room" as it is used in the transient lodging standards.

(1) Kitchens within housing units containing accessible sleeping rooms with mobility features (including suites and clustered sleeping rooms) or on floors containing accessible sleeping rooms with mobility features shall provide turning spaces that comply with section 809.2.2 of the 2010 Standards and kitchen work surfaces that comply with section 804.3 of the 2010 Standards.

(2) Multi-bedroom housing units containing accessible sleeping rooms with mobility features shall have an accessible route throughout the unit in accordance with section 809.2 of the 2010 Standards.

(3) Apartments or townhouse facilities that are provided by or on behalf of a place of education, which are leased on a year-round basis exclusively to graduate students or faculty, and do not contain any public use or common use areas available for educational programming, are not subject to the transient lodging standards and shall comply with the requirements for residential facilities in sections 233 and 809 of the 2010 Standards.

(g) Assembly areas. Assembly areas subject to this section shall comply with the provisions of the 2010 Standards applicable to assembly areas, including, but not limited to, sections 221 and 802. In addition, assembly areas shall ensure that—

- (1) In stadiums, arenas, and grandstands, wheelchair spaces and companion seats are dispersed to all levels that include seating served by an accessible route;
- (2) Assembly areas that are required to horizontally disperse wheelchair spaces and companion seats by section 221.2.3.1 of the 2010 Standards and have seating encircling, in whole or in part, a field of play or performance area shall disperse wheelchair spaces and companion seats around that field of play or performance area;
- (3) Wheelchair spaces and companion seats are not located on (or obstructed by) temporary platforms or other movable structures, except that when an entire seating section is placed on temporary

platforms or other movable structures in an area where fixed seating is not provided, in order to increase seating for an event, wheelchair spaces and companion seats may be placed in that section. When wheelchair spaces and companion seats are not required to accommodate persons eligible for those spaces and seats, individual, removable seats may be placed in those spaces and seats;

(4) Stadium-style movie theaters shall locate wheelchair spaces and companion seats on a riser or cross-aisle in the stadium section that satisfies at least one of the following criteria—

(i) It is located within the rear 60% of the seats provided in an auditorium; or

(ii) It is located within the area of an auditorium in which the vertical viewing angles (as measured to the top of the screen) are from the 40th to the 100th percentile of vertical viewing angles for all seats as ranked from the seats in the first row (1st percentile) to seats in the back row (100th percentile).

(h) Medical care facilities. Medical care facilities that are subject to this section shall comply with the provisions of the 2010 Standards applicable to medical care facilities, including, but not limited to, sections 223 and 805. In addition, medical care facilities that do not specialize in the treatment of conditions that affect mobility shall disperse the accessible patient bedrooms required by section 223.2.1 of the 2010 Standards in a manner that is proportionate by type of medical specialty.

(i) Curb ramps.

(1) Newly constructed or altered streets, roads, and highways must contain curb ramps or other sloped areas at any intersection having curbs or other barriers to entry from a street level pedestrian walkway.

(2) Newly constructed or altered street level pedestrian walkways must contain curb ramps or other sloped areas at intersections to streets, roads, or highways.

(j) Facilities with residential dwelling units for sale to individual owners.

(1) Residential dwelling units designed and constructed or altered by public entities that will be offered for sale to individuals shall comply with the requirements for residential facilities in the 2010 Standards including sections 233 and 809.

(2) The requirements of paragraph (1) also apply to housing programs that are operated by public entities where design and construction of particular residential dwelling units take place only after a specific buyer has been identified. In such programs, the covered entity must provide the units that comply with the requirements for accessible features to those pre-identified buyers with disabilities who have requested such a unit.

(k) Detention and correctional facilities.

(1) New construction of jails, prisons, and other detention and correctional facilities shall comply with the 2010 Standards except that public entities shall provide accessible mobility features complying with section 807.2 of the 2010 Standards for a minimum of 3%, but no fewer than one, of the total number of cells in a facility. Cells with mobility features shall be provided in each classification level.

(2) Alterations to detention and correctional facilities. Alterations to jails, prisons, and other detention and correctional facilities shall comply with the 2010 Standards except that public entities shall provide accessible mobility features complying with section 807.2 of the 2010 Standards for a minimum of 3%, but no fewer than one, of the total number of cells being altered until at least 3%, but no fewer than one, of the total number of cells in a facility shall provide mobility features complying with section 807.2. Altered cells with

mobility features shall be provided in each classification level. However, when alterations are made to specific cells, detention and correctional facility operators may satisfy their obligation to provide the required number of cells with mobility features by providing the required mobility features in substitute cells (cells other than those where alterations are originally planned), provided that each substitute cell—

- (i) Is located within the same prison site;
- (ii) Is integrated with other cells to the maximum extent feasible;
- (iii) Has, at a minimum, equal physical access as the altered cells to areas used by inmates or detainees for visitation, dining, recreation, educational programs, medical services, work programs, religious services, and participation in other programs that the facility offers to inmates or detainees; and,

(iv) If it is technically infeasible to locate a substitute cell within the same prison site, a substitute cell must be provided at another prison site within the corrections system.

(3) With respect to medical and long-term care facilities in jails, prisons, and other detention and correctional facilities, public entities shall apply the 2010 Standards technical and scoping requirements for those facilities irrespective of whether those facilities are licensed.

2010 STANDARDS FOR PUBLIC ACCOMMODATIONS AND COMMERCIAL FACILITIES: TITLE III

Public accommodations and commercial facilities must follow the requirements of the 2010 Standards, including both the Title III regulations at 28 CFR part 36, subpart D; and the 2004 ADAAG at 36 CFR part 1191, appendices B and D.

In the few places where requirements between the two differ, the requirements of 28 CFR part 36, subpart D prevail.

Compliance Date for Title III

The compliance date for the 2010 Standards for new construction and alterations is determined by:

- the date the last application for a building permit or permit extension is certified to be complete by a State, county, or local government;
- the date the last application for a building permit or permit extension is received by a State, county, or local government, where the government does not certify the completion of applications; or
- the start of physical construction or alteration, if no permit is required.

If that date is on or after March 15, 2012, then new construction and alterations must comply with the 2010 Standards. If that date is on or after September 15, 2010, and before

March 15, 2012, then new construction and alterations must comply with either the 1991 or the 2010 Standards.

28 CFR part 36, subpart D – New Construction and Alterations

§36.401 New construction.

(a) General.

(1) Except as provided in paragraphs (b) and (c) of this section, discrimination for purposes of this part includes a failure to design and construct facilities for first occupancy after January 26, 1993, that are readily accessible to and usable by individuals with disabilities.

(2) For purposes of this section, a facility is designed and constructed for first occupancy after January 26, 1993, only –

(i) If the last application for a building permit or permit extension for the facility is certified to be complete, by a State, County, or local government after January 26, 1992 (or, in those jurisdictions where the government does not certify completion of applications, if the last application for a building permit or permit extension for the facility is received by the State, County, or local government after January 26, 1992); and

(ii) If the first certificate of occupancy for the facility is issued after January 26, 1993.

(b) Commercial facilities located in private residences.

(1) When a commercial facility is located in a private residence, the portion of the residence used exclusively as a residence is not covered by this subpart, but that portion used exclusively in the operation of the commercial facility or that portion used both for the commercial facility and for residential purposes is covered by the new construction and alterations requirements of this subpart.

(2) The portion of the residence covered under paragraph (b)(1) of this section extends to those elements used to enter the commercial facility, including the homeowner's front sidewalk, if any, the door or entryway, and hallways; and those portions of the residence, interior or exterior, available to or used by employees or visitors of the commercial facility, including restrooms.

(c) Exception for structural impracticability.

(1) Full compliance with the requirements of this section is not required where an entity can demonstrate that it is structurally impracticable to meet the requirements. Full compliance will be considered structurally impracticable only in those rare circumstances when the unique characteristics of terrain prevent the incorporation of accessibility features.

(2) If full compliance with this section would be structurally impracticable, compliance with this section is required to the extent that it is not structurally impracticable. In

that case, any portion of the facility that can be made accessible shall be made accessible to the extent that it is not structurally impracticable.

(3) If providing accessibility in conformance with this section to individuals with certain disabilities (e.g., those who use wheelchairs) would be structurally impracticable, accessibility shall nonetheless be ensured to persons with other types of disabilities (e.g., those who use crutches or who have sight, hearing, or mental impairments) in accordance with this section.

(d) Elevator exemption.

(1) For purposes of this paragraph (d) –

(i) Professional office of a health care provider means a location where a person or entity regulated by a State to provide professional services related to the physical or mental health of an individual makes such services available to the public. The facility housing the "professional office of a health care provider" only includes floor levels housing at least one health care provider, or any floor level designed or intended for use by at least one health care provider.

(ii) Shopping center or shopping mall means –

(A) A building housing five or more sales or rental establishments; or

(B) A series of buildings on a common site, either under common ownership or common control or developed either as one project or as a series of related projects, housing five or more sales or rental establishments. For purposes of this section, places of public accommodation of the types listed in paragraph (5) of the definition of "place of public accommodation" in section § 36.104 are considered sales or rental establishments. The facility housing a "shopping center or shopping mall" only includes floor levels housing at least one sales or rental establishment, or any floor level designed or intended for use by at least one sales or rental establishment.

(2) This section does not require the installation of an elevator in a facility that is less than three stories or has less than 3000 square feet per story, except with respect to any facility that houses one or more of the following:

(i) A shopping center or shopping mall, or a professional office of a health care provider.

(ii) A terminal, depot, or other station used for specified public transportation, or an airport passenger terminal. In such a facility, any area housing passenger services, including boarding and debarking, loading and unloading, baggage claim, dining facilities, and other common areas open to the public, must be on an accessible route from an accessible entrance.

(3) The elevator exemption set forth in this paragraph (d) does not obviate or limit, in any way the obligation to comply with the other accessibility requirements established in paragraph (a) of this section. For example, in a facility that houses a shopping center or shopping mall, or a professional office of a health care provider, the floors that are above or below an accessible ground floor and that do not house sales or rental establishments or a professional office of a health care provider, must meet the requirements of this section but for the elevator.

§36.402 Alterations.

(a) General.

(1) Any alteration to a place of public accommodation or a commercial facility, after January 26, 1992, shall be made so as to ensure that, to the maximum extent feasible, the altered portions of the facility are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs.

(2) An alteration is deemed to be undertaken after January 26, 1992, if the physical alteration of the property begins after that date.

(b) Alteration. For the purposes of this part, an alteration is a change to a place of public accommodation or a commercial facility that affects or could affect the usability of the building or facility or any part thereof.

(1) Alterations include, but are not limited to, remodeling, renovation, rehabilitation, reconstruction, historic restoration, changes or rearrangement in structural parts or elements, and changes or rearrangement in the plan configuration of walls and full-height partitions. Normal maintenance, reroofing, painting or wallpapering, asbestos removal, or changes to mechanical and electrical systems are not alterations unless they affect the usability of the building or facility.

(2) If existing elements, spaces, or common areas are altered, then each such altered element, space, or area shall comply with the applicable provisions of appendix A to this part.

(c) To the maximum extent feasible. The phrase "to the maximum extent feasible," as used in this section, applies to the occasional case where the nature of an existing facility makes it virtually impossible to comply fully with applicable accessibility standards through a planned alteration. In these circumstances, the alteration shall provide the maximum physical accessibility feasible. Any altered features of the facility that can be made accessible shall be made accessible. If providing accessibility in conformance with this section to individuals with certain disabilities (e.g., those who use wheelchairs) would not be feasible, the facility shall be made accessible to persons with other types of disabilities (e.g., those who use crutches, those who have impaired vision or hearing, or those who have other impairments).

§36.403 Alterations: Path of travel.

(a) General.

(1) An alteration that affects or could affect the usability of or access to an area of a facility that contains a primary function shall be made so as to ensure that, to the maximum extent feasible, the path of travel to the altered area and the restrooms, telephones, and drinking fountains serving the altered area, are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, unless the cost and scope of such alterations is disproportionate to the cost of the overall alteration.

(2) If a private entity has constructed or altered required elements of a path of travel at a place of public accommodation or commercial facility in accordance with the specifications in the 1991 Standards, the private entity is not required to retrofit such elements to reflect the incremental changes in the 2010 Standards solely because of an alteration to a primary function area served by that path of travel.

(b) Primary function. A "primary function" is a major activity for which the facility is intended. Areas that contain a primary function include, but are not limited to, the customer services lobby of a bank, the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other work areas in which the activities of the public accommodation or other private entity using the facility are carried out. Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker

rooms, janitorial closets, entrances, corridors, and restrooms are not areas containing a primary function.

(c) Alterations to an area containing a primary function.

(1) Alterations that affect the usability of or access to an area containing a primary function include, but are not limited to –

(i) Remodeling merchandise display areas or employee work areas in a department store;

(ii) Replacing an inaccessible floor surface in the customer service or employee work areas of a bank;

(iii) Redesigning the assembly line area of a factory; or

(iv) Installing a computer center in an accounting firm.

(2) For the purposes of this section, alterations to windows, hardware, controls, electrical outlets, and signage shall not be deemed to be alterations that affect the usability of or access to an area containing a primary function.

(d) Landlord/tenant: If a tenant is making alterations as defined in § 36.402 that would trigger the requirements of this section, those alterations by the tenant in areas that only the tenant occupies do not trigger a path of travel obligation upon the landlord with respect to areas of the facility under the landlord's authority, if those areas are not otherwise being altered.

(e) Path of travel.

(1) A "path of travel" includes a continuous, unobstructed way of pedestrian passage by means of which the altered area may be approached, entered, and exited, and which connects the altered area with an exterior approach (including sidewalks, streets, and parking areas), an entrance to the facility, and other parts of the facility.

(2) An accessible path of travel may consist of walks and sidewalks, curb ramps and other interior or exterior pedestrian ramps; clear floor paths through lobbies, corridors, rooms, and other improved areas; parking access aisles; elevators and lifts; or a combination of these elements.

(3) For the purposes of this part, the term "path of travel" also includes the restrooms, telephones, and drinking fountains serving the altered area.

(f) Disproportionality.

(1) Alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall alteration when the cost exceeds 20% of the cost of the alteration to the primary function area.

(2) Costs that may be counted as expenditures required to provide an accessible path of travel may include:

(i) Costs associated with providing an accessible entrance and an accessible route to the altered area, for example, the cost of widening doorways or installing ramps;

(ii) Costs associated with making restrooms accessible, such as installing grab bars, enlarging toilet stalls, insulating pipes, or installing accessible faucet controls;

(iii) Costs associated with providing accessible telephones, such as relocating the telephone to an accessible height, installing amplification devices, or installing a text telephone (TTY);

(iv) Costs associated with relocating an inaccessible drinking fountain.

(g) Duty to provide accessible features in the event of disproportionality.

(1) When the cost of alterations necessary to make the path of travel to the altered area fully accessible is disproportionate to the cost of the overall alteration, the path of travel shall be made accessible to the extent that it can be made accessible without incurring disproportionate costs.

(2) In choosing which accessible elements to provide, priority should be given to those elements that will provide the greatest access, in the following order:

(i) An accessible entrance;

(ii) An accessible route to the altered area;

(iii) At least one accessible restroom for each sex or a single unisex restroom;

(iv) Accessible telephones;

(v) Accessible drinking fountains; and

(vi) When possible, additional accessible elements such as parking, storage, and alarms.

(h) Series of smaller alterations.

(1) The obligation to provide an accessible path of travel may not be evaded by performing a series of small alterations to the area served by a single path of travel if those alterations could have been performed as a single undertaking.

(2)

(i) If an area containing a primary function has been altered without providing an accessible path of travel to that area, and subsequent alterations of that area, or a different area on the same path of travel, are undertaken within three years of the original alteration, the total cost of alterations to the primary function areas on that path of travel during the preceding three year period shall be considered in determining whether the cost of making that path of travel accessible is disproportionate.

(ii) Only alterations undertaken after January 26, 1992, shall be considered in determining if the cost of providing an accessible path of travel is disproportionate to the overall cost of the alterations.

§36.404 Alterations: Elevator exemption.

(a) This section does not require the installation of an elevator in an altered facility that is less than three stories or has less than 3,000 square feet per story, except with respect to any facility that houses a shopping center, a shopping mall, the professional office of a health care provider, a terminal, depot, or other station used for specified public transportation, or an airport passenger terminal.

(1) For the purposes of this section, professional office of a health care provider means a location where a person or entity regulated by a State to provide professional services related to the physical or mental health of an individual makes such services available to the public. The facility that houses a professional office of a health care provider only includes floor levels housing by at least one health care provider, or any floor level designed or intended for use by at least one health care provider.

(2) For the purposes of this section, shopping center or shopping mall means –

(i) A building housing five or more sales or rental establishments; or

(ii) A series of buildings on a common site, connected by a common pedestrian access route above or below the ground floor, that is either under common ownership or common control or developed either as one project or as a series of related projects, housing five or more sales or rental establishments. For purposes of this section, places of public accommodation of the types listed in

paragraph (5) of the definition of place of public accommodation in § 36.104 are considered sales or rental establishments. The facility housing a "shopping center or shopping mall" only includes floor levels housing at least one sales or rental establishment, or any floor level designed or intended for use by at least one sales or rental establishment.

(b) The exemption provided in paragraph (a) of this section does not obviate or limit in any way the obligation to comply with the other accessibility requirements established in this subpart. For example, alterations to floors above or below the accessible ground floor must be accessible regardless of whether the altered facility has an elevator.

§36.405 Alterations: Historic preservation.

(a) Alterations to buildings or facilities that are eligible for listing in the National Register of Historic Places under the National Historic Preservation Act (16 U.S.C. 470 et seq.) or are designated as historic under State or local law, shall comply to the maximum extent feasible with this part.

(b) If it is determined that it is not feasible to provide physical access to an historic property that is a place of public accommodation in a manner that will not threaten or destroy the historic significance of the building or the facility, alternative methods of access shall be provided pursuant to the requirements of subpart C of this part.

§36.406 Standards for new construction and alterations.

(a) Accessibility standards and compliance date.

(1) New construction and alterations subject to §§ 36.401 or 36.402 shall comply with the 1991 Standards if the date when the last application for a building permit or permit extension is certified to be complete by a State, county, or local government (or, in those jurisdictions where the government does not certify completion of applications, if the date when the last application for a building permit or permit extension is received by the State, county, or local government) is before September 15, 2010, or if no permit is required, if the start of physical construction or alterations occurs before September 15, 2010.

(2) New construction and alterations subject to §§ 36.401 or 36.402 shall comply either with the 1991 Standards or with the 2010 Standards if the date when the last application for a building permit or permit extension is certified to be complete by a State, county, or local government (or, in those jurisdictions where the government does not certify completion of applications, if the date when the last application for a building permit or permit extension is received by the State, county, or local government) is on or after September 15, 2010, and before March 15, 2012, or if no permit is required, if the start of physical construction or alterations occurs on or after September 15, 2010, and before March 15, 2012.

(3) New construction and alterations subject to §§ 36.401 or 36.402 shall comply with the 2010 Standards if the date when the last application for a building permit or

permit extension is certified to be complete by a State, county, or local government (or, in those jurisdictions where the government does not certify completion of applications, if the date when the last application for a building permit or permit extension is received by the State, county, or local government) is on or after March 15, 2012, or if no permit is required, if the start of physical construction or alterations occurs on or after March 15, 2012.

(4) For the purposes of this section, "start of physical construction or alterations" does not mean ceremonial groundbreaking or razing of structures prior to site preparation.

(5) Noncomplying new construction and alterations.

(i) Newly constructed or altered facilities or elements covered by §§ 36.401 or 36.402 that were constructed or altered before March 15, 2012 and that do not comply with the 1991 Standards shall, before March 15, 2012, be made accessible in accordance with either the 1991 Standards or the 2010 Standards.

(ii) Newly constructed or altered facilities or elements covered by §§ 36.401 or 36.402 that were constructed or altered before March 15, 2012 and that do not comply with the 1991 Standards shall, on or after March 15, 2012, be made accessible in accordance with the 2010 Standards.

Appendix to 36.406(a)

Compliance Dates for New Construction and Alterations	Applicable Standards
On or after January 26, 1993 and before September 15, 2010	1991 Standards
On or after September 15, 2010, and before March 15, 2012	1991 Standards or 2010 Standards
On or after March 15, 2012	2010 Standards

(b) Scope of coverage. The 1991 Standards and the 2010 Standards apply to fixed or built-in elements of buildings, structures, site improvements, and pedestrian routes or vehicular ways located on a site. Unless specifically stated otherwise, advisory notes, appendix notes, and figures contained in the 1991 Standards and 2010 Standards explain or illustrate the requirements of the rule; they do not establish enforceable requirements.

(c) Places of lodging. Places of lodging subject to this part shall comply with the provisions of the 2010 Standards applicable to transient lodging, including, but not limited to, the requirements for transient lodging guest rooms in sections 224 and 806 of the 2010 Standards.

(1) Guest rooms. Guest rooms with mobility features in places of lodging subject to the transient lodging requirements of 2010 Standards shall be provided as follows –

(i) Facilities that are subject to the same permit application on a common site that each have 50 or fewer guest rooms may be combined for the purposes of determining the required number of accessible rooms and type of accessible bathing facility in accordance with table 224.2 to section 224.2 of the 2010 Standards.

(ii) Facilities with more than 50 guest rooms shall be treated separately for the purposes of determining the required number of accessible rooms and type of accessible bathing facility in accordance with table 224.2 to section 224.2 of the 2010 Standards.

(2) Exception. Alterations to guest rooms in places of lodging where the guest rooms are not owned or substantially controlled by the entity that owns, leases, or operates the overall facility and the physical features of the guest room interiors are controlled by their individual owners are not required to comply with § 36.402 or the alterations requirements in section 224.1.1 of the 2010 Standards.

(3) Facilities with residential units and transient lodging units. Residential dwelling units that are designed and constructed for residential use exclusively are not subject to the transient lodging standards.

(d) Social service center establishments. Group homes, halfway houses, shelters, or similar social service center establishments that provide either temporary sleeping

accommodations or residential dwelling units that are subject to this part shall comply with the provisions of the 2010 Standards applicable to residential facilities, including, but not limited to, the provisions in sections 233 and 809.

(1) In sleeping rooms with more than 25 beds covered by this part, a minimum of 5% of the beds shall have clear floor space complying with section 806.2.3 of the 2010 Standards.

(2) Facilities with more than 50 beds covered by this part that provide common use bathing facilities shall provide at least one roll-in shower with a seat that complies with the relevant provisions of section 608 of the 2010 Standards. Transfer-type showers are not permitted in lieu of a roll-in shower with a seat, and the exceptions in sections 608.3 and 608.4 for residential dwelling units are not permitted. When separate shower facilities are provided for men and for women, at least one roll-in shower shall be provided for each group.

(e) Housing at a place of education. Housing at a place of education that is subject to this part shall comply with the provisions of the 2010 Standards applicable to transient lodging, including, but not limited to, the requirements for transient lodging guest rooms in sections 224 and 806, subject to the following exceptions. For the purposes of the application of this section, the term "sleeping room" is intended to be used interchangeably with the term "guest room" as it is used in the transient lodging standards.

(1) Kitchens within housing units containing accessible sleeping rooms with mobility features (including suites and clustered sleeping rooms) or on floors containing

accessible sleeping rooms with mobility features shall provide turning spaces that comply with section 809.2.2 of the 2010 Standards and kitchen work surfaces that comply with section 804.3 of the 2010 Standards.

(2) Multi-bedroom housing units containing accessible sleeping rooms with mobility features shall have an accessible route throughout the unit in accordance with section 809.2 of the 2010 Standards.

(3) Apartments or townhouse facilities that are provided by or on behalf of a place of education, which are leased on a year-round basis exclusively to graduate students or faculty and do not contain any public use or common use areas available for educational programming, are not subject to the transient lodging standards and shall comply with the requirements for residential facilities in sections 233 and 809 of the 2010 Standards.

(f) Assembly areas. Assembly areas that are subject to this part shall comply with the provisions of the 2010 Standards applicable to assembly areas, including, but not limited to, sections 221 and 802. In addition, assembly areas shall ensure that –

(1) In stadiums, arenas, and grandstands, wheelchair spaces and companion seats are dispersed to all levels that include seating served by an accessible route;

(2) In assembly areas that are required to horizontally disperse wheelchair spaces and companion seats by section 221.2.3.1 of the 2010 Standards and that have seating encircling, in whole or in part, a field of play or performance, wheelchair

spaces and companion seats are dispersed around that field of play or performance area;

(3) Wheelchair spaces and companion seats are not located on (or obstructed by) temporary platforms or other movable structures, except that when an entire seating section is placed on temporary platforms or other movable structures in an area where fixed seating is not provided, in order to increase seating for an event, wheelchair spaces and companion seats may be placed in that section. When wheelchair spaces and companion seats are not required to accommodate persons eligible for those spaces and seats, individual, removable seats may be placed in those spaces and seats;

(4) In stadium-style movie theaters, wheelchair spaces and companion seats are located on a riser or cross-aisle in the stadium section that satisfies at least one of the following criteria –

(i) It is located within the rear 60% of the seats provided in an auditorium; or

(ii) It is located within the area of an auditorium in which the vertical viewing angles (as measured to the top of the screen) are from the 40th to the 100th percentile of vertical viewing angles for all seats as ranked from the seats in the first row (1st percentile) to seats in the back row (100th percentile).

(g) Medical care facilities. Medical care facilities that are subject to this part shall comply with the provisions of the 2010 Standards applicable to medical care facilities, including, but not limited to, sections 223 and 805. In addition, medical care facilities that do not

specialize in the treatment of conditions that affect mobility shall disperse the accessible patient bedrooms required by section 223.2.1 of the 2010 Standards in a manner that is proportionate by type of medical specialty.

§36.407 – 36.499 [Reserved]

The remaining text of the 2010 Standards for Title II – the 2004 ADAAG – can be found at 2010 Standards for Titles II and III: 2004 ADAAG

2010 STANDARDS FOR TITLES II AND III FACILITIES: 2004 ADAAG

The following section applies to both State and local government facilities (Title II) and public accommodations and commercial facilities (Title III). The section consists of (ADA) Chapters 1 and 2 and Chapters 3 through 10, of the 2004 ADAAG (36 CFR part 1191, appendices B and D, adopted as part of both the Title II and Title III 2010 Standards).

State and local government facilities must follow the requirements of the 2010 Standards, including both the

Title II regulations at 28 CFR 35.151; and the 2004 ADAAG at 36 CFR part 1191, appendices B and D.

Public accommodations and commercial facilities must follow the requirements of the 2010 Standards, including both the Title III regulations at 28 CFR part 36, subpart D; and the 2004 ADAAG at 36 CFR part 1191, appendices B and D.

In the few places where requirements between the regulation and the 2004 ADAAG differ, the requirements of 28 CFR 35.151 or 28 CFR part 36, subpart D, prevail.

Chapter 1: Application and Administration

- **101 Purpose**
- **102 Dimensions for Adults and Children**
- **103 Equivalent Facilitation**
- **104 Conventions**
- **105 Referenced Standards**
- **106 Definitions**

101 Purpose

101.1 General. This document contains scoping and technical requirements for accessibility to sites, facilities, buildings, and elements by individuals with disabilities. The requirements are to be applied during the design, construction, additions to, and alteration of sites, facilities, buildings, and elements to the extent required by regulations issued by Federal agencies under the Americans with Disabilities Act of 1990 (ADA).

Advisory 101.1 General. In addition to these requirements, covered entities must comply with the regulations issued by the Department of Justice and the Department of Transportation under the Americans with Disabilities Act. There are issues affecting individuals with disabilities which are not addressed by these requirements, but which are covered by the Department of Justice and the Department of Transportation regulations.

101.2 Effect on Removal of Barriers in Existing Facilities. This document does not address existing facilities unless altered at the discretion of a covered entity. The Department of Justice has authority over existing facilities that are subject to the requirement for removal of barriers under title III of the ADA. Any determination that this document applies to existing facilities subject to the barrier removal requirement is

solely within the discretion of the Department of Justice and is effective only to the extent required by regulations issued by the Department of Justice.

102 Dimensions for Adults and Children

The technical requirements are based on adult dimensions and anthropometrics. In addition, this document includes technical requirements based on children's dimensions and anthropometrics for drinking fountains, water closets, toilet compartments, lavatories and sinks, dining surfaces, and work surfaces.

103 Equivalent Facilitation

Nothing in these requirements prevents the use of designs, products, or technologies as alternatives to those prescribed, provided they result in substantially equivalent or greater accessibility and usability.

Advisory 103 Equivalent Facilitation. The responsibility for demonstrating equivalent facilitation in the event of a challenge rests with the covered entity. With the exception of transit facilities, which are covered by regulations issued by the Department of Transportation, there is no process for certifying that an alternative design provides equivalent facilitation.

104 Conventions

104.1 Dimensions. Dimensions that are not stated as “maximum” or “minimum” are absolute.

104.1.1 Construction and Manufacturing Tolerances. All dimensions are subject to conventional industry tolerances except where the requirement is stated as a range with specific minimum and maximum end points.

Advisory 104.1.1 Construction and Manufacturing Tolerances. Conventional industry tolerances recognized by this provision include those for field conditions and those that may be a necessary consequence of a particular manufacturing process. Recognized tolerances are not intended to apply to design work.

It is good practice when specifying dimensions to avoid specifying a tolerance where dimensions are absolute. For example, if this document requires “1 inches,” avoid specifying “1 inches plus or minus X inches.”

Where the requirement states a specified range, such as in Section 609.4 where grab bars must be installed between 33 inches and 36 inches above the floor, the range provides an adequate tolerance and therefore no tolerance outside of the range at either end point is permitted.

Where a requirement is a minimum or a maximum dimension that does not have two specific minimum and maximum end points, tolerances may apply. Where an element is to be installed at the minimum or maximum permitted dimension, such as “15 inches minimum” or “5 pounds maximum”, it would not be good practice to specify “5 pounds (plus X pounds) or 15 inches (minus X inches).” Rather, it would be good practice to specify a dimension less than the required maximum (or more than the required minimum) by the amount of the expected field or manufacturing tolerance and not to state any tolerance in conjunction with the specified dimension.

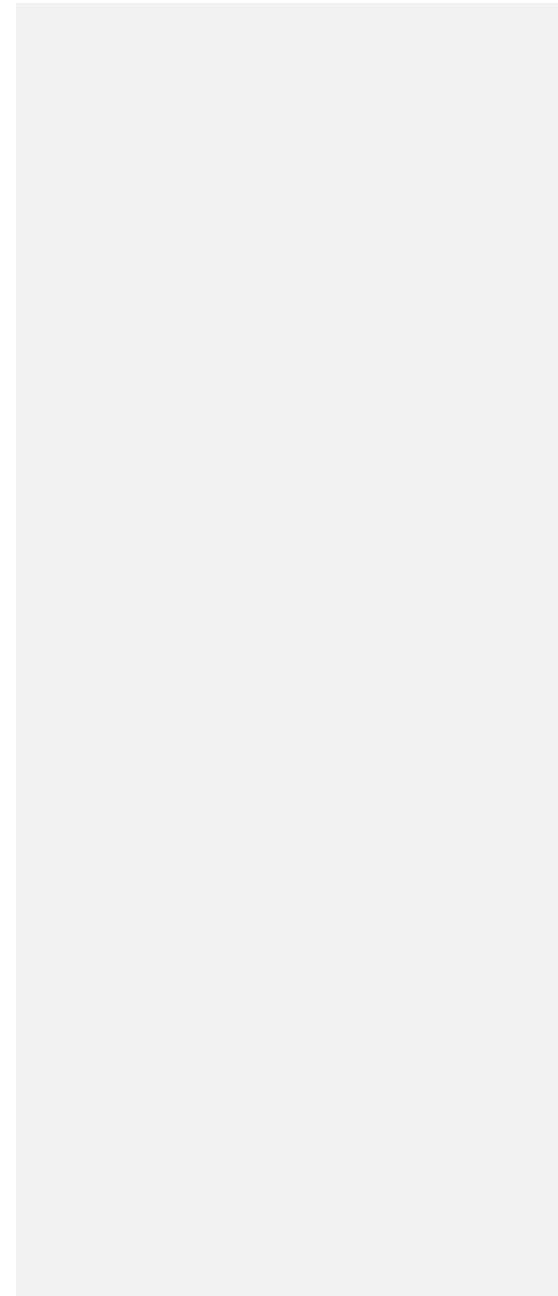
Specifying dimensions in design in the manner described above will better ensure that facilities and elements accomplish the level of accessibility intended by these requirements. It will also more often produce an end result of strict and literal compliance with the stated requirements and eliminate enforcement difficulties and issues that might otherwise arise. Information on specific tolerances may be available from industry or trade organizations, code groups and building officials, and published references.

104.2 Calculation of Percentages. Where the required number of elements or facilities to be provided is determined by calculations of ratios or percentages and remainders or fractions result, the next greater whole number of such elements or facilities shall be provided. Where the determination of the required size or dimension of an element or facility involves ratios or percentages, rounding down for values less than one half shall be permitted.

104.3 Figures. Unless specifically stated otherwise, figures are provided for informational purposes only.

Convention	Description
	dimension showing English units (in inches unless otherwise specified) above the line and SI units (in millimeters unless otherwise specified) below the line
	dimension for small measurements
	dimension showing a range with minimum - maximum
min	minimum
max	maximum
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
-----	boundary of clear floor space or maneuvering clearance
-----Ⓞ	centerline
-----	a permitted element or its extension
→	direction of travel or approach
▬	a wall, floor, ceiling or other element cut in section or plan
▨	a highlighted element in elevation or plan
▩	location zone of element, control or feature

Figure 104



Graphic Convention for Figures

105 Referenced Standards

105.1 General. The standards listed in 105.2 are incorporated by reference in this document and are part of the requirements to the prescribed extent of each such reference. The Director of the Federal Register has approved these standards for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the referenced standards may be inspected at the Architectural and Transportation Barriers Compliance Board, 1331 F Street, NW, Suite 1000, Washington, DC 20004; at the Department of Justice, Civil Rights Division, Disability Rights Section, 1425 New York Avenue, NW, Washington, DC; at the Department of Transportation, 400 Seventh Street, SW, Room 10424, Washington DC; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to <http://www.archives.gov/federal register/code of federal regulations/ibr locations.html>.

105.2 Referenced Standards. The specific edition of the standards listed below are referenced in this document. Where differences occur between this document and the referenced standards, this document applies.

105.2.1 ANSI/BHMA. Copies of the referenced standards may be obtained from the Builders Hardware Manufacturers Association, 355 Lexington Avenue, 17th floor, New York, NY 10017 (<http://www.buildershardware.com>).

ANSI/BHMA A156.10-1999 American National Standard for Power Operated Pedestrian Doors (see 404.3).

ANSI/BHMA A156.19-1997 American National Standard for Power Assist and Low Energy Power Operated Doors (see 404.3, 408.3.2.1, and 409.3.1).

ANSI/BHMA A156.19-2002 American National Standard for Power Assist and Low Energy Power Operated Doors (see 404.3, 408.3.2.1, and 409.3.1).

Advisory 105.2.1 ANSI/BHMA. ANSI/BHMA A156.10-1999 applies to power operated doors for pedestrian use which open automatically when approached by pedestrians. Included are provisions intended to reduce the chance of user injury or entrapment. ANSI/BHMA A156.19-1997 and A156.19-2002 applies to power assist doors, low energy power operated doors or low energy power open doors for pedestrian use not

provided for in ANSI/BHMA A156.10 for Power Operated Pedestrian Doors. Included are provisions intended to reduce the chance of user injury or entrapment.

105.2.2 ASME. Copies of the referenced standards may be obtained from the American Society of Mechanical Engineers, Three Park Avenue, New York, New York 10016 (<http://www.asme.org>).

ASME A17.1-2000 Safety Code for Elevators and Escalators, including ASME A17.1a-2002 Addenda and ASME A17.1b-2003 Addenda (see 407.1, 408.1, 409.1, and 810.9).

ASME A18.1-1999 Safety Standard for Platform Lifts and Stairway Chairlifts, including ASME A18.1a-2001 Addenda and ASME A18.1b-2001 Addenda (see 410.1).

ASME A18.1-2003 Safety Standard for Platform Lifts and Stairway Chairlifts, (see 410.1).

Advisory 105.2.2 ASME. ASME A17.1-2000 is used by local jurisdictions throughout the United States for the design, construction, installation, operation, inspection, testing, maintenance, alteration, and repair of elevators and escalators. The majority of the requirements apply to the operational machinery not seen or used by elevator passengers. ASME A17.1 requires a two-way means of emergency communications in passenger elevators. This means of communication must connect with emergency or authorized personnel and not an automated answering system. The communication system must be push button activated. The activation button must be permanently identified with the

word “HELP.” A visual indication acknowledging the establishment of a communications link to authorized personnel must be provided. The visual indication must remain on until the call is terminated by authorized personnel. The building location, the elevator car number, and the need for assistance must be provided to authorized personnel answering the emergency call. The use of a handset by the communications system is prohibited. Only the authorized personnel answering the call can terminate the call. Operating instructions for the communications system must be provided in the elevator car.

The provisions for escalators require that at least two flat steps be provided at the entrance and exit of every escalator and that steps on escalators be demarcated by yellow lines 2 inches wide maximum along the back and sides of steps.

ASME A18.1-1999 and ASME A18.1-2003 address the design, construction, installation, operation, inspection, testing, maintenance and repair of lifts that are intended for transportation of persons with disabilities. Lifts are classified as: vertical platform lifts, inclined platform lifts, inclined stairway chairlifts, private residence vertical platform lifts, private residence inclined platform lifts, and private residence inclined stairway chairlifts.

This document does not permit the use of inclined stairway chairlifts which do not provide platforms because such lifts require the user to transfer to a seat.

ASME A18.1 contains requirements for runways, which are the spaces in which platforms or seats move. The standard includes additional provisions for runway enclosures, electrical equipment and wiring, structural support, headroom clearance (which is 80 inches minimum), lower level access ramps and pits. The enclosure walls not used for entry or exit are required to have a grab bar the full length of the wall on platform lifts. Access ramps are required to meet requirements similar to those for ramps in Chapter 4 of this document.

Each of the lift types addressed in ASME A18.1 must meet requirements for capacity, load, speed, travel, operating devices, and control equipment. The maximum permitted height for operable parts is consistent with Section 308 of this document. The standard also addresses attendant operation. However, Section 410.1 of this document does not permit attendant operation.

105.2.3 ASTM. Copies of the referenced standards may be obtained from the American Society for Testing and Materials, 100 Bar Harbor Drive, West Conshohocken, Pennsylvania 19428 (<http://www.astm.org>).

ASTM F 1292-99 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment (see 1008.2.6.2).

ASTM F 1292-04 Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment (see 1008.2.6.2).

ASTM F 1487-01 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use (see 106.5).

ASTM F 1951-99 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment (see 1008.2.6.1).

Advisory 105.2.3 ASTM. ASTM F 1292-99 and ASTM F 1292-04 establish a uniform means to measure and compare characteristics of surfacing materials to determine whether materials provide a safe surface under and around playground equipment. These standards are referenced in the play areas requirements of this document when an accessible surface is required inside a play area use zone where a fall attenuating surface is also required. The standards cover the minimum impact attenuation requirements, when tested in accordance with Test Method F 355, for surface systems to be used under and around any piece of playground equipment from which a person may fall.

ASTM F 1487-01 establishes a nationally recognized safety standard for public playground equipment to address injuries identified by the U.S. Consumer Product Safety Commission. It defines the use zone, which is the ground area beneath and immediately adjacent to a play structure or play equipment designed for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting a play structure or equipment. The play areas requirements in this document reference the ASTM F 1487 standard when defining accessible routes that overlap use zones requiring fall attenuating surfaces. If the use zone of a playground is

not entirely surfaced with an accessible material, at least one accessible route within the use zone must be provided from the perimeter to all accessible play structures or components within the playground.

ASTM F 1951-99 establishes a uniform means to measure the characteristics of surface systems in order to provide performance specifications to select materials for use as an accessible surface under and around playground equipment. Surface materials that comply with this standard and are located in the use zone must also comply with ASTM F 1292. The test methods in this standard address access for children and adults who may traverse the surfacing to aid children who are playing. When a surface is tested it must have an average work per foot value for straight propulsion and for turning less than the average work per foot values for straight propulsion and for turning, respectively, on a hard, smooth surface with a grade of 7% (1:14).

105.2.4 ICC/IBC. Copies of the referenced standard may be obtained from the International Code Council, 5203 Leesburg Pike, Suite 600, Falls Church, Virginia 22041 (www.iccsafe.org).

International Building Code, 2000 Edition (see 207.1, 207.2, 216.4.2, 216.4.3, and 1005.2.1).

International Building Code, 2001 Supplement (see 207.1 and 207.2).

International Building Code, 2003 Edition (see 207.1, 207.2, 216.4.2, 216.4.3, and 1005.2.1).

Advisory 105.2.4 ICC/IBC. International Building Code (IBC)-2000 (including 2001 Supplement to the International Codes) and IBC-2003 are referenced for means of egress, areas of refuge, and railings provided on fishing piers and platforms. At least one accessible means of egress is required for every accessible space and at least two accessible means of egress are required where more than one means of egress is required. The technical criteria for accessible means of egress allow the use of exit stairways and evacuation elevators when provided in conjunction with horizontal exits or areas of refuge. While typical elevators are not designed to be used during an emergency evacuation, evacuation elevators are designed with standby power and other features according to the elevator safety standard and can be used for the evacuation of individuals with disabilities. The IBC also provides requirements for areas of refuge, which are fire-rated spaces on levels above or below the exit discharge levels where people unable to use stairs can go to register a call for assistance and wait for evacuation.

The recreation facilities requirements of this document references two sections in the IBC for fishing piers and platforms. An exception addresses the height of the railings, guards, or handrails where a fishing pier or platform is required to

include a guard, railing, or handrail higher than 34 inches (865 mm) above the ground or deck surface.

105.2.5 NFPA. Copies of the referenced standards may be obtained from the National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02169-7471, (<http://www.nfpa.org>).

NFPA 72 National Fire Alarm Code, 1999 Edition (see 702.1 and 809.5.2).

NFPA 72 National Fire Alarm Code, 2002 Edition (see 702.1 and 809.5.2).

Advisory 105.2.5 NFPA. NFPA 72-1999 and NFPA 72-2002 address the application, installation, performance, and maintenance of protective signaling systems and their components. The NFPA 72 incorporates Underwriters Laboratory (UL) 1971 by reference. The standard specifies the characteristics of audible alarms, such as placement and sound levels. **However, Section 702 of these requirements limits the volume of an audible alarm to 110 dBA, rather than the maximum 120 dBA permitted by NFPA 72-1999.**

NFPA 72 specifies characteristics for visible alarms, such as flash frequency, color, intensity, placement, and synchronization. However, Section 702 of this document requires that visual alarm appliances be permanently installed. UL 1971 specifies intensity dispersion requirements for visible alarms. In particular, NFPA 72 requires visible alarms to have a light source that is clear or white and has polar dispersion complying with UL 1971.

106 Definitions

106.1 General. For the purpose of this document, the terms defined in 106.5 have the indicated meaning.

Advisory 106.1 General. Terms defined in Section 106.5 are italicized in the text of this document.

106.2 Terms Defined in Referenced Standards. Terms not defined in 106.5 or in regulations issued by the Department of Justice and the Department of Transportation to implement the Americans with Disabilities Act, but specifically defined in a referenced standard, shall have the specified meaning from the referenced standard unless otherwise stated.

106.3 Undefined Terms. The meaning of terms not specifically defined in 106.5 or in regulations issued by the Department of Justice and the Department of Transportation to implement the Americans with Disabilities Act or in referenced standards shall be as defined by collegiate dictionaries in the sense that the context implies.

106.4 Interchangeability. Words, terms and phrases used in the singular include the plural and those used in the plural include the singular.

106.5 Defined Terms.

Accessible. A site, building, facility, or portion thereof that complies with this part.

Accessible Means of Egress. A continuous and unobstructed way of egress travel from any point in a building or facility that provides an accessible route to an area of refuge, a horizontal exit, or a public way.

Addition. An expansion, extension, or increase in the gross floor area or height of a building or facility.

Administrative Authority. A governmental agency that adopts or enforces regulations and guidelines for the design, construction, or alteration of buildings and facilities.

Alteration. A change to a building or facility that affects or could affect the usability of the building or facility or portion thereof. Alterations include, but are not limited to, remodeling, renovation, rehabilitation, reconstruction, historic restoration, resurfacing of circulation paths or vehicular ways, changes or rearrangement of the structural parts or elements, and changes or rearrangement in the plan configuration of walls and full-height partitions. Normal maintenance, reroofing, painting or wallpapering, or changes to mechanical and electrical systems are not alterations unless they affect the usability of the building or facility.

Amusement Attraction. Any facility, or portion of a facility, located within an amusement park or theme park which provides amusement without the use of an amusement device. Amusement attractions include, but are not limited to, fun houses, barrels, and other attractions without seats.

Amusement Ride. A system that moves persons through a fixed course within a defined area for the purpose of amusement.

Amusement Ride Seat. A seat that is built-in or mechanically fastened to an amusement ride intended to be occupied by one or more passengers.

Area of Sport Activity. That portion of a room or space where the play or practice of a sport occurs.

Assembly Area. A building or facility, or portion thereof, used for the purpose of entertainment, educational or civic gatherings, or similar purposes. For the purposes of these requirements, assembly areas include, but are not limited to, classrooms, lecture halls, courtrooms, public meeting rooms, public hearing rooms, legislative chambers, motion picture houses, auditoria, theaters, playhouses, dinner theaters, concert halls, centers for the performing arts, amphitheaters, arenas, stadiums, grandstands, or convention centers.

Assistive Listening System (ALS). An amplification system utilizing transmitters, receivers, and coupling devices to bypass the acoustical space between a sound source

and a listener by means of induction loop, radio frequency, infrared, or direct-wired equipment.

Boarding Pier. A portion of a pier where a boat is temporarily secured for the purpose of embarking or disembarking.

Boat Launch Ramp. A sloped surface designed for launching and retrieving trailered boats and other water craft to and from a body of water.

Boat Slip. That portion of a pier, main pier, finger pier, or float where a boat is moored for the purpose of berthing, embarking, or disembarking.

Building. Any structure used or intended for supporting or sheltering any use or occupancy.

Catch Pool. A pool or designated section of a pool used as a terminus for water slide flumes.

Characters. Letters, numbers, punctuation marks and typographic symbols.

Children's Use. Describes spaces and elements specifically designed for use primarily by people 12 years old and younger.

Circulation Path. An exterior or interior way of passage provided for pedestrian travel, including but not limited to, walks, hallways, courtyards, elevators, platform lifts, ramps, stairways, and landings.

Closed-Circuit Telephone. A telephone with a dedicated line such as a house phone, courtesy phone or phone that must be used to gain entry to a facility.

Common Use. Interior or exterior circulation paths, rooms, spaces, or elements that are not for public use and are made available for the shared use of two or more people.

Cross Slope. The slope that is perpendicular to the direction of travel (see running slope).

Curb Ramp. A short ramp cutting through a curb or built up to it.

Detectable Warning. A standardized surface feature built in or applied to walking surfaces or other elements to warn of hazards on a circulation path.

Element. An architectural or mechanical component of a building, facility, space, or site.

Elevated Play Component. A play component that is approached above or below grade and that is part of a composite play structure consisting of two or more play components attached or functionally linked to create an integrated unit providing more than one play activity.

Employee Work Area. All or any portion of a space used only by employees and used only for work. Corridors, toilet rooms, kitchenettes and break rooms are not employee work areas.

Entrance. Any access point to a building or portion of a building or facility used for the purpose of entering. An entrance includes the approach walk, the vertical access leading

to the entrance platform, the entrance platform itself, vestibule if provided, the entry door or gate, and the hardware of the entry door or gate.

Facility. All or any portion of buildings, structures, site improvements, elements, and pedestrian routes or vehicular ways located on a site.

Gangway. A variable-sloped pedestrian walkway that links a fixed structure or land with a floating structure. Gangways that connect to vessels are not addressed by this document.

Golf Car Passage. A continuous passage on which a motorized golf car can operate.

Ground Level Play Component. A play component that is approached and exited at the ground level.

Key Station. Rapid and light rail stations, and commuter rail stations, as defined under criteria established by the Department of Transportation in 49 CFR 37.47 and 49 CFR 37.51, respectively.

Mail Boxes. Receptacles for the receipt of documents, packages, or other deliverable matter. Mail boxes include, but are not limited to, post office boxes and receptacles provided by commercial mail-receiving agencies, apartment facilities, or schools.

Marked Crossing. A crosswalk or other identified path intended for pedestrian use in crossing a vehicular way.

Mezzanine. An intermediate level or levels between the floor and ceiling of any story with an aggregate floor area of not more than one-third of the area of the room or space in which the level or levels are located. Mezzanines have sufficient elevation that space for human occupancy can be provided on the floor below.

Occupant Load. The number of persons for which the means of egress of a building or portion of a building is designed.

Operable Part. A component of an element used to insert or withdraw objects, or to activate, deactivate, or adjust the element.

Pictogram. A pictorial symbol that represents activities, facilities, or concepts.

Play Area. A portion of a site containing play components designed and constructed for children.

Play Component. An element intended to generate specific opportunities for play, socialization, or learning. Play components are manufactured or natural; and are stand-alone or part of a composite play structure.

Private Building or Facility. A place of public accommodation or a commercial building or facility subject to title III of the ADA and 28 CFR part 36 or a transportation building or facility subject to title III of the ADA and 49 CFR 37.45.

Public Building or Facility. A building or facility or portion of a building or facility designed, constructed, or altered by, on behalf of, or for the use of a public entity subject to title II of the ADA and 28 CFR part 35 or to title II of the ADA and 49 CFR 37.41 or 37.43.

Public Entrance. An entrance that is not a service entrance or a restricted entrance.

Public Use. Interior or exterior rooms, spaces, or elements that are made available to the public. Public use may be provided at a building or facility that is privately or publicly owned.

Public Way. Any street, alley or other parcel of land open to the outside air leading to a public street, which has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet (3050 mm).

Qualified Historic Building or Facility. A building or facility that is listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate State or local law.

Ramp. A walking surface that has a running slope steeper than 1:20.

Residential Dwelling Unit. A unit intended to be used as a residence, that is primarily long-term in nature. Residential dwelling units do not include transient lodging, inpatient medical care, licensed long-term care, and detention or correctional facilities.

Restricted Entrance. An entrance that is made available for common use on a controlled basis but not public use and that is not a service entrance.

Running Slope. The slope that is parallel to the direction of travel (see cross slope).

Self-Service Storage. Building or facility designed and used for the purpose of renting or leasing individual storage spaces to customers for the purpose of storing and removing personal property on a self-service basis.

Service Entrance. An entrance intended primarily for delivery of goods or services.

Site. A parcel of land bounded by a property line or a designated portion of a public right-of-way.

Soft Contained Play Structure. A play structure made up of one or more play components where the user enters a fully enclosed play environment that utilizes pliable materials, such as plastic, netting, or fabric.

Space. A definable area, such as a room, toilet room, hall, assembly area, entrance, storage room, alcove, courtyard, or lobby.

Story. That portion of a building or facility designed for human occupancy included between the upper surface of a floor and upper surface of the floor or roof next above. A story containing one or more mezzanines has more than one floor level.

Structural Frame. The columns and the girders, beams, and trusses having direct connections to the columns and all other members that are essential to the stability of the building or facility as a whole.

Tactile. An object that can be perceived using the sense of touch.

Technically Infeasible. With respect to an alteration of a building or a facility, something that has little likelihood of being accomplished because existing structural conditions would require removing or altering a load-bearing member that is an essential part of the structural frame; or because other existing physical or site constraints prohibit modification or addition of elements, spaces, or features that are in full and strict compliance with the minimum requirements.

Teeing Ground. In golf, the starting place for the hole to be played.

Transfer Device. Equipment designed to facilitate the transfer of a person from a wheelchair or other mobility aid to and from an amusement ride seat.

Transient Lodging. A building or facility containing one or more guest room(s) for sleeping that provides accommodations that are primarily short-term in nature. Transient lodging does not include residential dwelling units intended to be used as a residence, inpatient medical care facilities, licensed long-term care facilities, detention or correctional facilities, or private buildings or facilities that contain not more than five

rooms for rent or hire and that are actually occupied by the proprietor as the residence of such proprietor.

Transition Plate. A sloping pedestrian walking surface located at the end(s) of a gangway.

TTY. An abbreviation for teletypewriter. Machinery that employs interactive text-based communication through the transmission of coded signals across the telephone network. TTYs may include, for example, devices known as TDDs (telecommunication display devices or telecommunication devices for deaf persons) or computers with special modems. TTYs are also called text telephones.

Use Zone. The ground level area beneath and immediately adjacent to a play structure or play equipment that is designated by ASTM F 1487 (incorporated by reference, see “Referenced Standards” in Chapter 1) for unrestricted circulation around the play equipment and where it is predicted that a user would land when falling from or exiting the play equipment.

Vehicular Way. A route provided for vehicular traffic, such as in a street, driveway, or parking facility.

Walk. An exterior prepared surface for pedestrian use, including pedestrian areas such as plazas and courts.

Wheelchair Space. Space for a single wheelchair and its occupant.

Work Area Equipment. Any machine, instrument, engine, motor, pump, conveyor, or other apparatus used to perform work. As used in this document, this term shall apply only to equipment that is permanently installed or built-in in employee work areas. Work area equipment does not include passenger elevators and other accessible means of vertical transportation.

Chapter 2: Scoping Requirements

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201 Application

201.1 Scope. All areas of newly designed and newly constructed buildings and facilities and altered portions of existing buildings and facilities shall comply with these requirements.

Advisory 201.1 Scope. These requirements are to be applied to all areas of a facility unless exempted, or where scoping limits the number of multiple elements required to be accessible. For example, not all medical care patient rooms are required to be accessible; those that are not required to be accessible are not required to comply with these requirements. However, common use and public use spaces such as recovery rooms, examination rooms, and cafeterias are not exempt from these requirements and must be accessible.

201.2 Application Based on Building or Facility Use. Where a site, building, facility, room, or space contains more than one use, each portion shall comply with the applicable requirements for that use.

201.3 Temporary and Permanent Structures. These requirements shall apply to temporary and permanent buildings and facilities.

Advisory 201.3 Temporary and Permanent Structures. Temporary buildings or facilities covered by these requirements include, but are not limited to, reviewing stands, temporary classrooms, bleacher areas, stages, platforms and daises, fixed furniture systems, wall systems, and exhibit areas, temporary banking facilities, and temporary health screening facilities. Structures and equipment directly associated with the actual processes of construction are not required to be accessible as permitted in 203.2.

202 Existing Buildings and Facilities

202.1 General. Additions and alterations to existing buildings or facilities shall comply with 202.

202.2 Additions. Each addition to an existing building or facility shall comply with the requirements for new construction. Each addition that affects or could affect the usability of or access to an area containing a primary function shall comply with 202.4.

202.3 Alterations. Where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Chapter 2.

EXCEPTIONS: 1. Unless required by 202.4, where elements or spaces are altered and the circulation path to the altered element or space is not altered, an accessible route shall not be required.

2. In alterations, where compliance with applicable requirements is technically infeasible, the alteration shall comply with the requirements to the maximum extent feasible.
3. Residential dwelling units not required to be accessible in compliance with a standard issued pursuant to the Americans with Disabilities Act or Section 504 of the Rehabilitation Act of 1973, as amended, shall not be required to comply with 202.3.

Advisory 202.3 Alterations. Although covered entities are permitted to limit the scope of an alteration to individual elements, the alteration of multiple elements within a room or space may provide a cost-effective opportunity to make the entire room or space accessible. Any elements or spaces of the building or facility that are required to comply with these requirements must be made accessible within the scope of the alteration, to the maximum extent feasible. If providing accessibility in compliance with these requirements for people with one type of disability (e.g., people who use wheelchairs) is not feasible, accessibility must still be provided in compliance with the requirements for people with other types of disabilities (e.g., people who have hearing impairments or who have vision impairments) to the extent that such accessibility is feasible.

202.3.1 Prohibited Reduction in Access. An alteration that decreases or has the effect of decreasing the accessibility of a building or facility below the requirements for new construction at the time of the alteration is prohibited.

202.3.2 Extent of Application. An alteration of an existing element, space, or area of a building or facility shall not impose a requirement for accessibility greater than required for new construction.

202.4 Alterations Affecting Primary Function Areas. In addition to the requirements of 202.3, an alteration that affects or could affect the usability of or access to an area containing a primary function shall be made so as to ensure that, to the maximum extent feasible, the path of travel to the altered area, including the rest rooms, telephones, and drinking fountains serving the altered area, are readily accessible to and usable by individuals with disabilities, unless such alterations are disproportionate to the overall alterations in terms of cost and scope as determined under criteria established by the Attorney General. In existing transportation facilities, an area of primary function shall be as defined under regulations published by the Secretary of the Department of Transportation or the Attorney General.

EXCEPTION: Residential dwelling units shall not be required to comply with 202.4.

Advisory 202.4 Alterations Affecting Primary Function Areas. An area of a building or facility containing a major activity for which the building or facility is intended is a

primary function area. Department of Justice ADA regulations state, “Alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall alteration when the cost exceeds 20% of the cost of the alteration to the primary function area.” (28 CFR 36.403 (f)(1)). See also Department of Transportation ADA regulations, which use similar concepts in the context of public sector transportation facilities (49 CFR 37.43 (e)(1)).

There can be multiple areas containing a primary function in a single building. Primary function areas are not limited to public use areas. For example, both a bank lobby and the bank’s employee areas such as the teller areas and walk-in safe are primary function areas.

Also, mixed use facilities may include numerous primary function areas for each use. Areas containing a primary function do not include: mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, corridors, or restrooms.

202.5 Alterations to Qualified Historic Buildings and Facilities. Alterations to a qualified historic building or facility shall comply with 202.3 and 202.4.

EXCEPTION: Where the State Historic Preservation Officer or Advisory Council on Historic Preservation determines that compliance with the requirements for accessible routes, entrances, or toilet facilities would threaten or destroy the historic significance of

the building or facility, the exceptions for alterations to qualified historic buildings or facilities for that element shall be permitted to apply.

Advisory 202.5 Alterations to Qualified Historic Buildings and Facilities Exception. State Historic Preservation Officers are State appointed officials who carry out certain responsibilities under the National Historic Preservation Act. State Historic Preservation Officers consult with Federal and State agencies, local governments, and private entities on providing access and protecting significant elements of qualified historic buildings and facilities. There are exceptions for alterations to qualified historic buildings and facilities for accessible routes (206.2.1 Exception 1 and 206.2.3 Exception 7); entrances (206.4 Exception 2); and toilet facilities (213.2 Exception 2). When an entity believes that compliance with the requirements for any of these elements would threaten or destroy the historic significance of the building or facility, the entity should consult with the State Historic Preservation Officer. If the State Historic Preservation Officer agrees that compliance with the requirements for a specific element would threaten or destroy the historic significance of the building or facility, use of the exception is permitted. Public entities have an additional obligation to achieve program accessibility under the Department of Justice ADA regulations. See 28 CFR 35.150. These regulations require public entities that operate historic preservation programs to give priority to methods that provide physical access to individuals with disabilities. If alterations to a qualified historic building or facility to achieve program accessibility would threaten or destroy the

historic significance of the building or facility, fundamentally alter the program, or result in undue financial or administrative burdens, the Department of Justice ADA regulations allow alternative methods to be used to achieve program accessibility. In the case of historic preservation programs, such as an historic house museum, alternative methods include using audio-visual materials to depict portions of the house that cannot otherwise be made accessible. In the case of other qualified historic properties, such as an historic government office building, alternative methods include relocating programs and services to accessible locations. The Department of Justice ADA regulations also allow public entities to use alternative methods when altering qualified historic buildings or facilities in the rare situations where the State Historic Preservation Officer determines that it is not feasible to provide physical access using the exceptions permitted in Section 202.5 without threatening or destroying the historic significance of the building or facility. See 28 CFR 35.151(d).

The Accessibility Office at the National Endowment for the Arts (NEA) provides a variety of resources for museum operators and historic properties including: the Design for Accessibility Guide and the Disability Symbols. Contact NEA about these and other resources at 202-682-5532 or www.arts.gov.

203 General Exceptions

203.1 General. Sites, buildings, facilities, and elements are exempt from these requirements to the extent specified by 203.

203.2 Construction Sites. Structures and sites directly associated with the actual processes of construction, including but not limited to, scaffolding, bridging, materials hoists, materials storage, and construction trailers shall not be required to comply with these requirements or to be on an accessible route. Portable toilet units provided for use exclusively by construction personnel on a construction site shall not be required to comply with 213 or to be on an accessible route.

203.3 Raised Areas. Areas raised primarily for purposes of security, life safety, or fire safety, including but not limited to, observation or lookout galleries, prison guard towers, fire towers, or life guard stands shall not be required to comply with these requirements or to be on an accessible route.

203.4 Limited Access Spaces. Spaces accessed only by ladders, catwalks, crawl spaces, or very narrow passageways shall not be required to comply with these requirements or to be on an accessible route.

203.5 Machinery Spaces. Spaces frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment shall not be required to comply with these requirements or to be on an accessible route. Machinery spaces include, but are not limited to, elevator pits or elevator penthouses; mechanical, electrical or communications

equipment rooms; piping or equipment catwalks; water or sewage treatment pump rooms and stations; electric substations and transformer vaults; and highway and tunnel utility facilities.

203.6 Single Occupant Structures. Single occupant structures accessed only by passageways below grade or elevated above standard curb height, including but not limited to, toll booths that are accessed only by underground tunnels, shall not be required to comply with these requirements or to be on an accessible route.

203.7 Detention and Correctional Facilities. In detention and correctional facilities, common use areas that are used only by inmates or detainees and security personnel and that do not serve holding cells or housing cells required to comply with 232, shall not be required to comply with these requirements or to be on an accessible route.

203.8 Residential Facilities. In residential facilities, common use areas that do not serve residential dwelling units required to provide mobility features complying with 809.2 through 809.4 shall not be required to comply with these requirements or to be on an accessible route.

203.9 Employee Work Areas. Spaces and elements within employee work areas shall only be required to comply with 206.2.8, 207.1, and 215.3 and shall be designed and constructed so that individuals with disabilities can approach, enter, and exit the employee work area. Employee work areas, or portions of employee work areas, other

than raised courtroom stations, that are less than 300 square feet (28 m²) and elevated 7 inches (180 mm) or more above the finish floor or ground where the elevation is essential to the function of the space shall not be required to comply with these requirements or to be on an accessible route.

Advisory 203.9 Employee Work Areas. Although areas used exclusively by employees for work are not required to be fully accessible, consider designing such areas to include non-required turning spaces, and provide accessible elements whenever possible. Under the ADA, employees with disabilities are entitled to reasonable accommodations in the workplace; accommodations can include alterations to spaces within the facility. Designing employee work areas to be more accessible at the outset will avoid more costly retrofits when current employees become temporarily or permanently disabled, or when new employees with disabilities are hired. Contact the Equal Employment Opportunity Commission (EEOC) at www.eeoc.gov for information about title I of the ADA prohibiting discrimination against people with disabilities in the workplace.

203.10 Raised Refereeing, Judging, and Scoring Areas. Raised structures used solely for refereeing, judging, or scoring a sport shall not be required to comply with these requirements or to be on an accessible route.

203.11 Water Slides. Water slides shall not be required to comply with these requirements or to be on an accessible route.

203.12 Animal Containment Areas. Animal containment areas that are not for public use shall not be required to comply with these requirements or to be on an accessible route.

Advisory 203.12 Animal Containment Areas. Public circulation routes where animals may travel, such as in petting zoos and passageways alongside animal pens in State fairs, are not eligible for the exception.

203.13 Raised Boxing or Wrestling Rings. Raised boxing or wrestling rings shall not be required to comply with these requirements or to be on an accessible route.

203.14 Raised Diving Boards and Diving Platforms. Raised diving boards and diving platforms shall not be required to comply with these requirements or to be on an accessible route.

204 Protruding Objects

204.1 General. Protruding objects on circulation paths shall comply with 307.

EXCEPTIONS: 1. Within areas of sport activity, protruding objects on circulation paths shall not be required to comply with 307.

2. Within play areas, protruding objects on circulation paths shall not be required to comply with 307 provided that ground level accessible routes provide vertical clearance in compliance with 1008.2.

205 Operable Parts

205.1 General. Operable parts on accessible elements, accessible routes, and in accessible rooms and spaces shall comply with 309.

EXCEPTIONS: 1. Operable parts that are intended for use only by service or maintenance personnel shall not be required to comply with 309.

2. Electrical or communication receptacles serving a dedicated use shall not be required to comply with 309.

3. Where two or more outlets are provided in a kitchen above a length of counter top that is uninterrupted by a sink or appliance, one outlet shall not be required to comply with 309.

4. Floor electrical receptacles shall not be required to comply with 309.

5. HVAC diffusers shall not be required to comply with 309.

6. Except for light switches, where redundant controls are provided for a single element, one control in each space shall not be required to comply with 309.

7. Cleats and other boat securement devices shall not be required to comply with 309.3.
8. Exercise machines and exercise equipment shall not be required to comply with 309.

Advisory 205.1 General. Controls covered by 205.1 include, but are not limited to, light switches, circuit breakers, duplexes and other convenience receptacles, environmental and appliance controls, plumbing fixture controls, and security and intercom systems.

206 Accessible Routes

206.1 General. accessible routes shall be provided in accordance with 206 and shall comply with Chapter 4.

206.2 Where Required. accessible routes shall be provided where required by 206.2.

206.2.1 Site Arrival Points. At least one accessible route shall be provided within the site from accessible parking spaces and accessible passenger loading zones; public streets and sidewalks; and public transportation stops to the accessible building or facility entrance they serve.

EXCEPTIONS: 1. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, no more than one accessible route from a site arrival point to an accessible entrance shall be required.

2. An accessible route shall not be required between site arrival points and the building or facility entrance if the only means of access between them is a vehicular way not providing pedestrian access.

Advisory 206.2.1 Site Arrival Points. Each site arrival point must be connected by an accessible route to the accessible building entrance or entrances served. Where two or more similar site arrival points, such as bus stops, serve the same accessible entrance or entrances, both bus stops must be on accessible routes. In addition, the accessible routes must serve all of the accessible entrances on the site.

Advisory 206.2.1 Site Arrival Points Exception 2. Access from site arrival points may include vehicular ways. Where a vehicular way, or a portion of a vehicular way, is provided for pedestrian travel, such as within a shopping center or shopping mall parking lot, this exception does not apply.

206.2.2 Within a Site. At least one accessible route shall connect accessible buildings, accessible facilities, accessible elements, and accessible spaces that are on the same site.

EXCEPTION: An accessible route shall not be required between accessible buildings, accessible facilities, accessible elements, and accessible spaces if the only means of access between them is a vehicular way not providing pedestrian access.

Advisory 206.2.2 Within a Site. An accessible route is required to connect to the boundary of each area of sport activity. Examples of areas of sport activity

include: soccer fields, basketball courts, baseball fields, running tracks, skating rinks, and the area surrounding a piece of gymnastic equipment. While the size of an area of sport activity may vary from sport to sport, each includes only the space needed to play. Where multiple sports fields or courts are provided, an accessible route is required to each field or area of sport activity.

206.2.3 Multi-Story Buildings and Facilities. At least one accessible route shall connect each story and mezzanine in multi-story buildings and facilities.

EXCEPTIONS: 1. In private buildings or facilities that are less than three stories or that have less than 3000 square feet (279 m²) per story, an accessible route shall not be required to connect stories provided that the building or facility is not a shopping center, a shopping mall, the professional office of a health care provider, a terminal, depot or other station used for specified public transportation, an airport passenger terminal, or another type of facility as determined by the Attorney General.

2. Where a two story public building or facility has one story with an occupant load of five or fewer persons that does not contain public use space, that story shall not be required to be connected to the story above or below.

3. In detention and correctional facilities, an accessible route shall not be required to connect stories where cells with mobility features required to comply with 807.2, all

common use areas serving cells with mobility features required to comply with 807.2, and all public use areas are on an accessible route.

4. In residential facilities, an accessible route shall not be required to connect stories where residential dwelling units with mobility features required to comply with 809.2 through 809.4, all common use areas serving residential dwelling units with mobility features required to comply with 809.2 through 809.4, and public use areas serving residential dwelling units are on an accessible route.

5. Within multi-story transient lodging guest rooms with mobility features required to comply with 806.2, an accessible route shall not be required to connect stories provided that spaces complying with 806.2 are on an accessible route and sleeping accommodations for two persons minimum are provided on a story served by an accessible route.

6. In air traffic control towers, an accessible route shall not be required to serve the cab and the floor immediately below the cab.

7. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, an accessible route shall not be required to stories located above or below the accessible story.

Advisory 206.2.3 Multi-Story Buildings and Facilities. Spaces and elements located on a level not required to be served by an accessible route must fully comply with this

document. While a mezzanine may be a change in level, it is not a story. If an accessible route is required to connect stories within a building or facility, the accessible route must serve all mezzanines.

Advisory 206.2.3 Multi-Story Buildings and Facilities Exception 4. Where common use areas are provided for the use of residents, it is presumed that all such common use areas “serve” accessible dwelling units unless use is restricted to residents occupying certain dwelling units. For example, if all residents are permitted to use all laundry rooms, then all laundry rooms “serve” accessible dwelling units. However, if the laundry room on the first floor is restricted to use by residents on the first floor, and the second floor laundry room is for use by occupants of the second floor, then first floor accessible units are “served” only by laundry rooms on the first floor. In this example, an accessible route is not required to the second floor provided that all accessible units and all common use areas serving them are on the first floor.

206.2.3.1 Stairs and Escalators in Existing Buildings. In alterations and additions, where an escalator or stair is provided where none existed previously and major structural modifications are necessary for the installation, an accessible route shall be provided between the levels served by the escalator or stair unless exempted by 206.2.3 Exceptions 1 through 7.

206.2.4 Spaces and Elements. At least one accessible route shall connect accessible building or facility entrances with all accessible spaces and elements within the building

or facility which are otherwise connected by a circulation path unless exempted by 206.2.3 Exceptions 1 through 7.

EXCEPTIONS: 1. Raised courtroom stations, including judges' benches, clerks' stations, bailiffs' stations, deputy clerks' stations, and court reporters' stations shall not be required to provide vertical access provided that the required clear floor space, maneuvering space, and, if appropriate, electrical service are installed at the time of initial construction to allow future installation of a means of vertical access complying with 405, 407, 408, or 410 without requiring substantial reconstruction of the space.

2. In assembly areas with fixed seating required to comply with 221, an accessible route shall not be required to serve fixed seating where wheelchair spaces required to be on an accessible route are not provided.

3. accessible routes shall not be required to connect mezzanines where buildings or facilities have no more than one story. In addition, accessible routes shall not be required to connect stories or mezzanines where multi-story buildings or facilities are exempted by 206.2.3 Exceptions 1 through 7.

Advisory 206.2.4 Spaces and Elements. accessible routes must connect all spaces and elements required to be accessible including, but not limited to, raised areas and speaker platforms.

Advisory 206.2.4 Spaces and Elements Exception 1. The exception does not apply to areas that are likely to be used by members of the public who are not employees of the court such as jury areas, attorney areas, or witness stands.

206.2.5 Restaurants and Cafeterias. In restaurants and cafeterias, an accessible route shall be provided to all dining areas, including raised or sunken dining areas, and outdoor dining areas.

EXCEPTIONS: 1. In buildings or facilities not required to provide an accessible route between stories, an accessible route shall not be required to a mezzanine dining area where the mezzanine contains less than 25 percent of the total combined area for seating and dining and where the same decor and services are provided in the accessible area.

2. In alterations, an accessible route shall not be required to existing raised or sunken dining areas, or to all parts of existing outdoor dining areas where the same services and decor are provided in an accessible space usable by the public and not restricted to use by people with disabilities.

3. In sports facilities, tiered dining areas providing seating required to comply with 221 shall be required to have accessible routes serving at least 25 percent of the dining area provided that accessible routes serve seating complying with 221 and each tier is provided with the same services.

Advisory 206.2.5 Restaurants and Cafeterias Exception 2. Examples of “same services” include, but are not limited to, bar service, rooms having smoking and non-smoking sections, lotto and other table games, carry-out, and buffet service. Examples of “same decor” include, but are not limited to, seating at or near windows and railings with views, areas designed with a certain theme, party and banquet rooms, and rooms where entertainment is provided.

206.2.6 Performance Areas. Where a circulation path directly connects a performance area to an assembly seating area, an accessible route shall directly connect the assembly seating area with the performance area. An accessible route shall be provided from performance areas to ancillary areas or facilities used by performers unless exempted by 206.2.3 Exceptions 1 through 7.

206.2.7 Press Boxes. Press boxes in assembly areas shall be on an accessible route.

EXCEPTIONS: 1. An accessible route shall not be required to press boxes in bleachers that have points of entry at only one level provided that the aggregate area of all press boxes is 500 square feet (46 m²) maximum.

2. An accessible route shall not be required to free-standing press boxes that are elevated above grade 12 feet (3660 mm) minimum provided that the aggregate area of all press boxes is 500 square feet (46 m²) maximum.

Advisory 206.2.7 Press Boxes Exception 2. Where a facility contains multiple assembly areas, the aggregate area of the press boxes in each assembly area is to be calculated separately. For example, if a university has a soccer stadium with three press boxes elevated 12 feet (3660 mm) or more above grade and each press box is 150 square feet (14 m²), then the aggregate area of the soccer stadium press boxes is less than 500 square feet (46 m²) and Exception 2 applies to the soccer stadium. If that same university also has a football stadium with two press boxes elevated 12 feet (3660 mm) or more above grade and one press box is 250 square feet (23 m²), and the second is 275 square feet (26 m²), then the aggregate area of the football stadium press boxes is more than 500 square feet (46 m²) and Exception 2 does not apply to the football stadium.

206.2.8 Employee Work Areas. Common use circulation paths within employee work areas shall comply with 402.

EXCEPTIONS: 1. Common use circulation paths located within employee work areas that are less than 1000 square feet (93 m²) and defined by permanently installed partitions, counters, casework, or furnishings shall not be required to comply with 402.

2. Common use circulation paths located within employee work areas that are an integral component of work area equipment shall not be required to comply with 402.

3. Common use circulation paths located within exterior employee work areas that are fully exposed to the weather shall not be required to comply with 402.

Advisory 206.2.8 Employee Work Areas Exception 1. Modular furniture that is not permanently installed is not directly subject to these requirements. The Department of Justice ADA regulations provide additional guidance regarding the relationship between these requirements and elements that are not part of the built environment. Additionally, the Equal Employment Opportunity Commission (EEOC) implements title I of the ADA which requires non-discrimination in the workplace. EEOC can provide guidance regarding employers' obligations to provide reasonable accommodations for employees with disabilities.

Advisory 206.2.8 Employee Work Areas Exception 2. Large pieces of equipment, such as electric turbines or water pumping apparatus, may have stairs and elevated walkways used for overseeing or monitoring purposes which are physically part of the turbine or pump. However, passenger elevators used for vertical transportation between stories are not considered "work area equipment" as defined in Section 106.5.

206.2.9 Amusement Rides. Amusement rides required to comply with 234 shall provide accessible routes in accordance with 206.2.9. accessible routes serving amusement rides shall comply with Chapter 4 except as modified by 1002.2.

206.2.9.1 Load and Unload Areas. Load and unload areas shall be on an accessible route. Where load and unload areas have more than one loading or unloading position, at least one loading and unloading position shall be on an accessible route.

206.2.9.2 Wheelchair Spaces, Ride Seats Designed for Transfer, and Transfer Devices. When amusement rides are in the load and unload position, wheelchair spaces complying with 1002.4, amusement ride seats designed for transfer complying with 1002.5, and transfer devices complying with 1002.6 shall be on an accessible route.

206.2.10 Recreational Boating Facilities. Boat slips required to comply with 235.2 and boarding piers at boat launch ramps required to comply with 235.3 shall be on an accessible route. accessible routes serving recreational boating facilities shall comply with Chapter 4, except as modified by 1003.2.

206.2.11 Bowling Lanes. Where bowling lanes are provided, at least 5 percent, but no fewer than one of each type of bowling lane, shall be on an accessible route.

206.2.12 Court Sports. In court sports, at least one accessible route shall directly connect both sides of the court.

206.2.13 Exercise Machines and Equipment. Exercise machines and equipment required to comply with 236 shall be on an accessible route.

206.2.14 Fishing Piers and Platforms. Fishing piers and platforms shall be on an accessible route. accessible routes serving fishing piers and platforms shall comply with Chapter 4 except as modified by 1005.1.

206.2.15 Golf Facilities. At least one accessible route shall connect accessible elements and spaces within the boundary of the golf course. In addition, accessible routes serving golf car rental areas; bag drop areas; course weather shelters complying with 238.2.3; course toilet rooms; and practice putting greens, practice teeing grounds, and teeing stations at driving ranges complying with 238.3 shall comply with Chapter 4 except as modified by 1006.2.

EXCEPTION: Golf car passages complying with 1006.3 shall be permitted to be used for all or part of accessible routes required by 206.2.15.

206.2.16 Miniature Golf Facilities. Holes required to comply with 239.2, including the start of play, shall be on an accessible route. accessible routes serving miniature golf facilities shall comply with Chapter 4 except as modified by 1007.2.

206.2.17 Play Areas. Play areas shall provide accessible routes in accordance with 206.2.17. accessible routes serving play areas shall comply with Chapter 4 except as modified by 1008.2.

206.2.17.1 Ground Level and Elevated Play Components. At least one accessible route shall be provided within the play area. The accessible route shall connect ground level

play components required to comply with 240.2.1 and elevated play components required to comply with 240.2.2, including entry and exit points of the play components.

206.2.17.2 Soft Contained Play Structures. Where three or fewer entry points are provided for soft contained play structures, at least one entry point shall be on an accessible route. Where four or more entry points are provided for soft contained play structures, at least two entry points shall be on an accessible route.

206.3 Location. accessible routes shall coincide with or be located in the same area as general circulation paths. Where circulation paths are interior, required accessible routes shall also be interior.

Note to Reader: The Department of Transportation's ADA standards include additional requirements for the location of accessible routes:

206.3 Location. Accessible routes shall coincide with, or be located in the same area as general circulation paths. Where circulation paths are interior, required accessible routes shall also be interior. *Elements such as ramps, elevators, or other circulation devices, fare vending or other ticketing areas, and fare collection areas shall be placed to minimize the distance which wheelchair users and other persons who cannot negotiate steps may have to travel compared to the general public.*

Advisory 206.3 Location. The accessible route must be in the same area as the general circulation path. This means that circulation paths, such as vehicular ways designed for pedestrian traffic, walks, and unpaved paths that are designed to be routinely used by pedestrians must be accessible or have an accessible route nearby. Additionally, accessible vertical interior circulation must be in the same area as stairs and escalators, not isolated in the back of the facility.

206.4 Entrances. Entrances shall be provided in accordance with 206.4. Entrance doors, doorways, and gates shall comply with 404 and shall be on an accessible route complying with 402.

EXCEPTIONS: 1. Where an alteration includes alterations to an entrance, and the building or facility has another entrance complying with 404 that is on an accessible route, the altered entrance shall not be required to comply with 206.4 unless required by 202.4.

2. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, no more than one public entrance shall be required to comply with 206.4. Where no public entrance can comply with 206.4 under criteria established in 202.5 Exception, then either an unlocked entrance not used by the public shall comply

with 206.4; or a locked entrance complying with 206.4 with a notification system or remote monitoring shall be provided.

206.4.1 Public Entrances. In addition to entrances required by 206.4.2 through 206.4.9, at least 60 percent of all public entrances shall comply with 404.

206.4.2 Parking Structure Entrances. Where direct access is provided for pedestrians from a parking structure to a building or facility entrance, each direct access to the building or facility entrance shall comply with 404.

206.4.3 Entrances from Tunnels or Elevated Walkways. Where direct access is provided for pedestrians from a pedestrian tunnel or elevated walkway to a building or facility, at least one direct entrance to the building or facility from each tunnel or walkway shall comply with 404.

206.4.4 Transportation Facilities. In addition to the requirements of 206.4.2, 206.4.3, and 206.4.5 through 206.4.9, transportation facilities shall provide entrances in accordance with 206.4.4.

206.4.4.1 Location. In transportation facilities, where different entrances serve different transportation fixed routes or groups of fixed routes, at least one public entrance serving each fixed route or group of fixed routes shall comply with 404.

EXCEPTION: Entrances to key stations and existing intercity rail stations retrofitted in accordance with 49 CFR 37.49 or 49 CFR 37.51 shall not be required to comply with 206.4.4.1.

206.4.4.2 Direct Connections. Direct connections to other facilities shall provide an accessible route complying with 404 from the point of connection to boarding platforms and all transportation system elements required to be accessible. Any elements provided to facilitate future direct connections shall be on an accessible route connecting boarding platforms and all transportation system elements required to be accessible.

EXCEPTION: In key stations and existing intercity rail stations, existing direct connections shall not be required to comply with 404.

206.4.4.3 Key Stations and Intercity Rail Stations. Key stations and existing intercity rail stations required by Subpart C of 49 CFR part 37 to be altered, shall have at least one entrance complying with 404.

206.4.5 Tenant Spaces. At least one accessible entrance to each tenancy in a facility shall comply with 404.

EXCEPTION: Self-service storage facilities not required to comply with 225.3 shall not be required to be on an accessible route.

206.4.6 Residential Dwelling Unit Primary Entrance. In residential dwelling units, at least one primary entrance shall comply with 404. The primary entrance to a residential dwelling unit shall not be to a bedroom.

206.4.7 Restricted Entrances. Where restricted entrances are provided to a building or facility, at least one restricted entrance to the building or facility shall comply with 404.

206.4.8 Service Entrances. If a service entrance is the only entrance to a building or to a tenancy in a facility, that entrance shall comply with 404.

206.4.9 Entrances for Inmates or Detainees. Where entrances used only by inmates or detainees and security personnel are provided at judicial facilities, detention facilities, or correctional facilities, at least one such entrance shall comply with 404.

206.5 Doors, Doorways, and Gates. Doors, doorways, and gates providing user passage shall be provided in accordance with 206.5.

206.5.1 Entrances. Each entrance to a building or facility required to comply with 206.4 shall have at least one door, doorway, or gate complying with 404.

206.5.2 Rooms and Spaces. Within a building or facility, at least one door, doorway, or gate serving each room or space complying with these requirements shall comply with 404.

206.5.3 Transient Lodging Facilities. In transient lodging facilities, entrances, doors, and doorways providing user passage into and within guest rooms that are not required to provide mobility features complying with 806.2 shall comply with 404.2.3.

EXCEPTION: Shower and sauna doors in guest rooms that are not required to provide mobility features complying with 806.2 shall not be required to comply with 404.2.3.

206.5.4 Residential Dwelling Units. In residential dwelling units required to provide mobility features complying with 809.2 through 809.4, all doors and doorways providing user passage shall comply with 404.

206.6 Elevators. Elevators provided for passengers shall comply with 407. Where multiple elevators are provided, each elevator shall comply with 407.

EXCEPTIONS: 1. In a building or facility permitted to use the exceptions to 206.2.3 or permitted by 206.7 to use a platform lift, elevators complying with 408 shall be permitted.

2. Elevators complying with 408 or 409 shall be permitted in multi-story residential dwelling units.

206.6.1 Existing Elevators. Where elements of existing elevators are altered, the same element shall also be altered in all elevators that are programmed to respond to the same hall call control as the altered elevator and shall comply with the requirements of 407 for the altered element.

206.7 Platform Lifts. Platform lifts shall comply with 410. Platform lifts shall be permitted as a component of an accessible route in new construction in accordance with 206.7. Platform lifts shall be permitted as a component of an accessible route in an existing building or facility.

206.7.1 Performance Areas and Speakers' Platforms. Platform lifts shall be permitted to provide accessible routes to performance areas and speakers' platforms.

206.7.2 Wheelchair Spaces. Platform lifts shall be permitted to provide an accessible route to comply with the wheelchair space dispersion and line-of-sight requirements of 221 and 802.

206.7.3 Incidental Spaces. Platform lifts shall be permitted to provide an accessible route to incidental spaces which are not public use spaces and which are occupied by five persons maximum.

206.7.4 Judicial Spaces. Platform lifts shall be permitted to provide an accessible route to: jury boxes and witness stands; raised courtroom stations including, judges' benches, clerks' stations, bailiffs' stations, deputy clerks' stations, and court reporters' stations; and to depressed areas such as the well of a court.

206.7.5 Existing Site Constraints. Platform lifts shall be permitted where existing exterior site constraints make use of a ramp or elevator infeasible.

Advisory 206.7.5 Existing Site Constraints. This exception applies where topography or other similar existing site constraints necessitate the use of a platform lift as the only feasible alternative. While the site constraint must reflect exterior conditions, the lift can be installed in the interior of a building. For example, a new building constructed between and connected to two existing buildings may have insufficient space to coordinate floor levels and also to provide ramped entry from the public way. In this example, an exterior or interior platform lift could be used to provide an accessible entrance or to coordinate one or more interior floor levels.

206.7.6 Guest Rooms and Residential Dwelling Units. Platform lifts shall be permitted to connect levels within transient lodging guest rooms required to provide mobility features complying with 806.2 or residential dwelling units required to provide mobility features complying with 809.2 through 809.4.

206.7.7 Amusement Rides. Platform lifts shall be permitted to provide accessible routes to load and unload areas serving amusement rides.

206.7.8 Play Areas. Platform lifts shall be permitted to provide accessible routes to play components or soft contained play structures.

206.7.9 Team or Player Seating. Platform lifts shall be permitted to provide accessible routes to team or player seating areas serving areas of sport activity.

Advisory 206.7.9 Team or Player Seating. While the use of platform lifts is allowed, ramps are recommended to provide access to player seating areas serving an area of sport activity.

206.7.10 Recreational Boating Facilities and Fishing Piers and Platforms. Platform lifts shall be permitted to be used instead of gangways that are part of accessible routes serving recreational boating facilities and fishing piers and platforms.

206.8 Security Barriers. Security barriers, including but not limited to, security bollards and security check points, shall not obstruct a required accessible route or accessible means of egress.

EXCEPTION: Where security barriers incorporate elements that cannot comply with these requirements such as certain metal detectors, fluoroscopes, or other similar devices, the accessible route shall be permitted to be located adjacent to security screening devices. The accessible route shall permit persons with disabilities passing around security barriers to maintain visual contact with their personal items to the same extent provided others passing through the security barrier.

207 Accessible Means of Egress

207.1 General. Of course now is CBC 2013.

Means of egress shall comply with section 1003.2.13 of the International Building Code (2000 edition and 2001 Supplement) or section 1007 of the International Building Code (2003 edition) (incorporated by reference, see “Referenced Standards” in Chapter 1).

EXCEPTIONS: 1. Where means of egress are permitted by local building or life safety codes to share a common path of egress travel, accessible means of egress shall be permitted to share a common path of egress travel.

2. Areas of refuge shall not be required in detention and correctional facilities.

207.2 Platform Lifts. Standby power shall be provided for platform lifts permitted by section 1003.2.13.4 of the International Building Code (2000 edition and 2001 Supplement) or section 1007.5 of the International Building Code (2003 edition) (incorporated by reference, see “Referenced Standards” in Chapter 1) to serve as a part of an accessible means of egress.

208 Parking Spaces

208.1 General. Where parking spaces are provided, parking spaces shall be provided in accordance with 208.

EXCEPTION: Parking spaces used exclusively for buses, trucks, other delivery vehicles, law enforcement vehicles, or vehicular impound shall not be required to comply with 208 provided that lots accessed by the public are provided with a passenger loading zone complying with 503.

208.2 Minimum Number. Parking spaces complying with 502 shall be provided in accordance with Table 208.2 except as required by 208.2.1, 208.2.2, and 208.2.3. Where more than one parking facility is provided on a site, the number of accessible spaces provided on the site shall be calculated according to the number of spaces required for each parking facility.

Total Number of Parking Spaces Provided in Parking Facility	Minimum Number of Required accessible Parking Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2 percent of total
1001 and over	20, plus 1 for each 100, or fraction thereof, over 1000

Table 208.2 Parking Spaces

Advisory 208.2 Minimum Number. The term “parking facility” is used Section 208.2 instead of the term “parking lot” so that it is clear that both parking lots and parking structures are required to comply with this section. The number of parking spaces required to be accessible is to be calculated separately for each parking facility; the required number is not to be based on the total number of parking spaces provided in all of the parking facilities provided on the site.

208.2.1 Hospital Outpatient Facilities. Ten percent of patient and visitor parking spaces provided to serve hospital outpatient facilities shall comply with 502.

Advisory 208.2.1 Hospital Outpatient Facilities. The term “outpatient facility” is not defined in this document but is intended to cover facilities or units that are located in hospitals and that provide regular and continuing medical treatment without an overnight stay. Doctors’ offices, independent clinics, or other facilities not located in hospitals are not considered hospital outpatient facilities for purposes of this document.

208.2.2 Rehabilitation Facilities and Outpatient Physical Therapy Facilities. Twenty percent of patient and visitor parking spaces provided to serve rehabilitation facilities specializing in treating conditions that affect mobility and outpatient physical therapy facilities shall comply with 502.

Advisory 208.2.2 Rehabilitation Facilities and Outpatient Physical Therapy Facilities. Conditions that affect mobility include conditions requiring the use or assistance of a brace, cane, crutch, prosthetic device, wheelchair, or powered mobility aid; arthritic, neurological, or orthopedic conditions that severely limit one’s ability to walk; respiratory diseases and other conditions which may require the use of portable oxygen; and cardiac conditions that impose significant functional limitations.

208.2.3 Residential Facilities. Parking spaces provided to serve residential facilities shall comply with 208.2.3.

208.2.3.1 Parking for Residents. Where at least one parking space is provided for each residential dwelling unit, at least one parking space complying with 502 shall be provided for each residential dwelling unit required to provide mobility features complying with 809.2 through 809.4.

208.2.3.2 Additional Parking Spaces for Residents. Where the total number of parking spaces provided for each residential dwelling unit exceeds one parking space per residential dwelling unit, 2 percent, but no fewer than one space, of all the parking spaces not covered by 208.2.3.1 shall comply with 502.

208.2.3.3 Parking for Guests, Employees, and Other Non-Residents. Where parking spaces are provided for persons other than residents, parking shall be provided in accordance with Table 208.2.

208.2.4 Van Parking Spaces. For every six or fraction of six parking spaces required by 208.2 to comply with 502, at least one shall be a van parking space complying with 502.

208.3 Location. Parking facilities shall comply with 208.3

208.3.1 General. Parking spaces complying with 502 that serve a particular building or facility shall be located on the shortest accessible route from parking to an entrance complying with 206.4. Where parking serves more than one accessible entrance, parking

spaces complying with 502 shall be dispersed and located on the shortest accessible route to the accessible entrances. In parking facilities that do not serve a particular building or facility, parking spaces complying with 502 shall be located on the shortest accessible route to an accessible pedestrian entrance of the parking facility.

EXCEPTIONS: 1. All van parking spaces shall be permitted to be grouped on one level within a multi-story parking facility.

2. Parking spaces shall be permitted to be located in different parking facilities if substantially equivalent or greater accessibility is provided in terms of distance from an accessible entrance or entrances, parking fee, and user convenience.

Advisory 208.3.1 General Exception 2. Factors that could affect “user convenience” include, but are not limited to, protection from the weather, security, lighting, and comparative maintenance of the alternative parking site.

208.3.2 Residential Facilities. In residential facilities containing residential dwelling units required to provide mobility features complying with 809.2 through 809.4, parking spaces provided in accordance with 208.2.3.1 shall be located on the shortest accessible route to the residential dwelling unit entrance they serve. Spaces provided in accordance with 208.2.3.2 shall be dispersed throughout all types of parking provided for the residential dwelling units.

EXCEPTION: Parking spaces provided in accordance with 208.2.3.2 shall not be required to be dispersed throughout all types of parking if substantially equivalent or greater accessibility is provided in terms of distance from an accessible entrance, parking fee, and user convenience.

Advisory 208.3.2 Residential Facilities Exception. Factors that could affect “user convenience” include, but are not limited to, protection from the weather, security, lighting, and comparative maintenance of the alternative parking site.

209 Passenger Loading Zones and Bus Stops

209.1 General. Passenger loading zones shall be provided in accordance with 209.

209.2 Type. Where provided, passenger loading zones shall comply with 209.2.

209.2.1 Passenger Loading Zones. Passenger loading zones, except those required to comply with 209.2.2 and 209.2.3, shall provide at least one passenger loading zone complying with 503 in every continuous 100 linear feet (30 m) of loading zone space, or fraction thereof.

209.2.2 Bus Loading Zones. In bus loading zones restricted to use by designated or specified public transportation vehicles, each bus bay, bus stop, or other area designated for lift or ramp deployment shall comply with 810.2.

Advisory 209.2.2 Bus Loading Zones. The terms “designated public transportation” and “specified public transportation” are defined by the Department of Transportation at 49 CFR 37.3 in regulations implementing the Americans with Disabilities Act. These terms refer to public transportation services provided by public or private entities, respectively. For example, designated public transportation vehicles include buses and vans operated by public transit agencies, while specified public transportation vehicles include

tour and charter buses, taxis and limousines, and hotel shuttles operated by private entities.

209.2.3 On-Street Bus Stops. On-street bus stops shall comply with 810.2 to the maximum extent practicable.

209.3 Medical Care and Long-Term Care Facilities. At least one passenger loading zone complying with 503 shall be provided at an accessible entrance to licensed medical care and licensed long-term care facilities where the period of stay exceeds twenty-four hours.

209.4 Valet Parking. Parking facilities that provide valet parking services shall provide at least one passenger loading zone complying with 503.

209.5 Mechanical Access Parking Garages. Mechanical access parking garages shall provide at least one passenger loading zone complying with 503 at vehicle drop-off and vehicle pick-up areas.

210 Stairways

210.1 General. Interior and exterior stairs that are part of a means of egress shall comply with 504.

EXCEPTIONS: 1. In detention and correctional facilities, stairs that are not located in public use areas shall not be required to comply with 504.

2. In alterations, stairs between levels that are connected by an accessible route shall not be required to comply with 504, except that handrails complying with 505 shall be provided when the stairs are altered.

3. In assembly areas, aisle stairs shall not be required to comply with 504.

4. Stairs that connect play components shall not be required to comply with 504.

Advisory 210.1 General. Although these requirements do not mandate handrails on stairs that are not part of a means of egress, State or local building codes may require handrails or guards.

211 Drinking Fountains

211.1 General. Where drinking fountains are provided on an exterior site, on a floor, or within a secured area they shall be provided in accordance with 211.

EXCEPTION: In detention or correctional facilities, drinking fountains only serving holding or housing cells not required to comply with 232 shall not be required to comply with 211.

211.2 Minimum Number. No fewer than two drinking fountains shall be provided. One drinking fountain shall comply with 602.1 through 602.6 and one drinking fountain shall comply with 602.7.

EXCEPTION: Where a single drinking fountain complies with 602.1 through 602.6 and 602.7, it shall be permitted to be substituted for two separate drinking fountains.

211.3 More Than Minimum Number. Where more than the minimum number of drinking fountains specified in 211.2 are provided, 50 percent of the total number of drinking fountains provided shall comply with 602.1 through 602.6, and 50 percent of the total number of drinking fountains provided shall comply with 602.7.

EXCEPTION: Where 50 percent of the drinking fountains yields a fraction, 50 percent shall be permitted to be rounded up or down provided that the total number of drinking fountains complying with 211 equals 100 percent of drinking fountains.

212 Kitchens, Kitchenettes, and Sinks

212.1 General. Where provided, kitchens, kitchenettes, and sinks shall comply with 212.

212.2 Kitchens and Kitchenettes. Kitchens and kitchenettes shall comply with 804.

212.3 Sinks. Where sinks are provided, at least 5 percent, but no fewer than one, of each type provided in each accessible room or space shall comply with 606.

EXCEPTION: Mop or service sinks shall not be required to comply with 212.3.

213 Toilet Facilities and Bathing Facilities

213.1 General. Where toilet facilities and bathing facilities are provided, they shall comply with 213. Where toilet facilities and bathing facilities are provided in facilities permitted by 206.2.3 Exceptions 1 and 2 not to connect stories by an accessible route, toilet facilities and bathing facilities shall be provided on a story connected by an accessible route to an accessible entrance.

213.2 Toilet Rooms and Bathing Rooms. Where toilet rooms are provided, each toilet room shall comply with 603. Where bathing rooms are provided, each bathing room shall comply with 603.

EXCEPTIONS: 1. In alterations where it is technically infeasible to comply with 603, altering existing toilet or bathing rooms shall not be required where a single unisex toilet room or bathing room complying with 213.2.1 is provided and located in the same area and on the same floor as existing inaccessible toilet or bathing rooms.

2. Where exceptions for alterations to qualified historic buildings or facilities are permitted by 202.5, no fewer than one toilet room for each sex complying with 603 or one unisex toilet room complying with 213.2.1 shall be provided.

3. Where multiple single user portable toilet or bathing units are clustered at a single location, no more than 5 percent of the toilet units and bathing units at each cluster shall be required to comply with 603. Portable toilet units and bathing units complying with 603 shall be identified by the International Symbol of Accessibility complying with 703.7.2.1.

4. Where multiple single user toilet rooms are clustered at a single location, no more than 50 percent of the single user toilet rooms for each use at each cluster shall be required to comply with 603.

Advisory 213.2 Toilet Rooms and Bathing Rooms. These requirements allow the use of unisex (or single-user) toilet rooms in alterations when technical infeasibility can be demonstrated. Unisex toilet rooms benefit people who use opposite sex personal care

assistants. For this reason, it is advantageous to install unisex toilet rooms in addition to accessible single-sex toilet rooms in new facilities.

Advisory 213.2 Toilet Rooms and Bathing Rooms Exceptions 3 and 4. A “cluster” is a group of toilet rooms proximate to one another. Generally, toilet rooms in a cluster are within sight of, or adjacent to, one another.

213.2.1 Unisex (Single-Use or Family) Toilet and Unisex Bathing Rooms. Unisex toilet rooms shall contain not more than one lavatory, and two water closets without urinals or one water closet and one urinal. Unisex bathing rooms shall contain one shower or one shower and one bathtub, one lavatory, and one water closet. Doors to unisex toilet rooms and unisex bathing rooms shall have privacy latches.

213.3 Plumbing Fixtures and Accessories. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with 213.2 shall comply with 213.3.

213.3.1 Toilet Compartments. Where toilet compartments are provided, at least one toilet compartment shall comply with 604.8.1. In addition to the compartment required to comply with 604.8.1, at least one compartment shall comply with 604.8.2 where six or more toilet compartments are provided, or where the combination of urinals and water closets totals six or more fixtures.

Advisory 213.3.1 Toilet Compartments. A toilet compartment is a partitioned space that is located within a toilet room, and that normally contains no more

than one water closet. A toilet compartment may also contain a lavatory. A lavatory is a sink provided for hand washing. Full-height partitions and door assemblies can comprise toilet compartments where the minimum required spaces are provided within the compartment.

213.3.2 Water Closets. Where water closets are provided, at least one shall comply with 604.

213.3.3 Urinals. Where more than one urinal is provided, at least one shall comply with 605.

213.3.4 Lavatories. Where lavatories are provided, at least one shall comply with 606 and shall not be located in a toilet compartment.

213.3.5 Mirrors. Where mirrors are provided, at least one shall comply with 603.3.

213.3.6 Bathing Facilities. Where bathtubs or showers are provided, at least one bathtub complying with 607 or at least one shower complying with 608 shall be provided.

213.3.7 Coat Hooks and Shelves. Where coat hooks or shelves are provided in toilet rooms without toilet compartments, at least one of each type shall comply with 603.4. Where coat hooks or shelves are provided in toilet compartments, at least one of each type complying with 604.8.3 shall be provided in toilet compartments required to comply

with 213.3.1. Where coat hooks or shelves are provided in bathing facilities, at least one of each type complying with 603.4 shall serve fixtures required to comply with 213.3.6.

214 Washing Machines and Clothes Dryers

214.1 General. Where provided, washing machines and clothes dryers shall comply with 214.

214.2 Washing Machines. Where three or fewer washing machines are provided, at least one shall comply with 611. Where more than three washing machines are provided, at least two shall comply with 611.

214.3 Clothes Dryers. Where three or fewer clothes dryers are provided, at least one shall comply with 611. Where more than three clothes dryers are provided, at least two shall comply with 611.

215 Fire Alarm Systems

215.1 General. Where fire alarm systems provide audible alarm coverage, alarms shall comply with 215.

EXCEPTION: In existing facilities, visible alarms shall not be required except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.

Advisory 215.1 General. Unlike audible alarms, visible alarms must be located within the space they serve so that the signal is visible. Facility alarm systems (other than fire alarm systems) such as those used for tornado warnings and other emergencies are not required to comply with the technical criteria for alarms in Section 702. Every effort should be made to ensure that such alarms can be differentiated in their signal from fire alarms systems and that people who need to be notified of emergencies are adequately safeguarded. Consult local fire departments and prepare evacuation plans taking into consideration the needs of every building occupant, including people with disabilities.

215.2 Public and Common Use Areas. Alarms in public use areas and common use areas shall comply with 702.

215.3 Employee Work Areas. Where employee work areas have audible alarm coverage, the wiring system shall be designed so that visible alarms complying with 702 can be integrated into the alarm system.

215.4 Transient Lodging. Guest rooms required to comply with 224.4 shall provide alarms complying with 702.

215.5 Residential Facilities. Where provided in residential dwelling units required to comply with 809.5, alarms shall comply with 702.

216 Signs

216.1 General. Signs shall be provided in accordance with 216 and shall comply with 703.

EXCEPTIONS: 1. Building directories, menus, seat and row designations in assembly areas, occupant names, building addresses, and company names and logos shall not be required to comply with 216.

2. In parking facilities, signs shall not be required to comply with 216.2, 216.3, and 216.6 through 216.12.

3. Temporary, 7 days or less, signs shall not be required to comply with 216.

4. In detention and correctional facilities, signs not located in public use areas shall not be required to comply with 216.

216.2 Designations. Interior and exterior signs identifying permanent rooms and spaces shall comply with 703.1, 703.2, and 703.5. Where pictograms are provided as designations of permanent interior rooms and spaces, the pictograms shall comply with 703.6 and shall have text descriptors complying with 703.2 and 703.5.

EXCEPTION: Exterior signs that are not located at the door to the space they serve shall not be required to comply with 703.2.

Advisory 216.2 Designations. Section 216.2 applies to signs that provide designations, labels, or names for interior rooms or spaces where the sign is not likely to change over time. Examples include interior signs labeling restrooms, room and floor numbers or letters, and room names. Tactile text descriptors are required for pictograms that are provided to label or identify a permanent room or space. Pictograms that provide information about a room or space, such as “no smoking,” occupant logos, and the International Symbol of Accessibility, are not required to have text descriptors.

216.3 Directional and Informational Signs. Signs that provide direction to or information about interior spaces and facilities of the site shall comply with 703.5.

Advisory 216.3 Directional and Informational Signs. Information about interior spaces and facilities includes rules of conduct, occupant load, and similar signs. Signs providing direction to rooms or spaces include those that identify egress routes.

216.4 Means of Egress. Signs for means of egress shall comply with 216.4.

216.4.1 Exit Doors. Doors at exit passageways, exit discharge, and exit stairways shall be identified by tactile signs complying with 703.1, 703.2, and 703.5.

Advisory 216.4.1 Exit Doors. An exit passageway is a horizontal exit component that is separated from the interior spaces of the building by fire-resistance-rated construction and that leads to the exit discharge or public way. The exit discharge is that portion of an egress system between the termination of an exit and a public way.

216.4.2 Areas of Refuge. Signs required by section 1003.2.13.5.4 of the International Building Code (2000 edition) or section 1007.6.4 of the International Building Code (2003 edition) (incorporated by reference, see “Referenced Standards” in Chapter 1) to provide instructions in areas of refuge shall comply with 703.5.

216.4.3 Directional Signs. Signs required by section 1003.2.13.6 of the International Building Code (2000 edition) or section 1007.7 of the International Building Code (2003 edition) (incorporated by reference, see “Referenced Standards” in Chapter 1) to provide directions to accessible means of egress shall comply with 703.5.

216.5 Parking. Parking spaces complying with 502 shall be identified by signs complying with 502.6.

EXCEPTIONS: 1. Where a total of four or fewer parking spaces, including accessible parking spaces, are provided on a site, identification of accessible parking spaces shall not be required.

2. In residential facilities, where parking spaces are assigned to specific residential dwelling units, identification of accessible parking spaces shall not be required.

216.6 Entrances. Where not all entrances comply with 404, entrances complying with 404 shall be identified by the International Symbol of Accessibility complying with 703.7.2.1. Directional signs complying with 703.5 that indicate the location of the nearest entrance complying with 404 shall be provided at entrances that do not comply with 404.

Advisory 216.6 Entrances. Where a directional sign is required, it should be located to minimize backtracking. In some cases, this could mean locating a sign at the beginning of a route, not just at the inaccessible entrances to a building.

216.7 Elevators. Where existing elevators do not comply with 407, elevators complying with 407 shall be clearly identified with the International Symbol of Accessibility complying with 703.7.2.1.

216.8 Toilet Rooms and Bathing Rooms. Where existing toilet rooms or bathing rooms do not comply with 603, directional signs indicating the location of the nearest toilet room or bathing room complying with 603 within the facility shall be provided. Signs shall comply with 703.5 and shall include the International Symbol of Accessibility complying with 703.7.2.1. Where existing toilet rooms or bathing rooms do not comply

with 603, the toilet rooms or bathing rooms complying with 603 shall be identified by the International Symbol of Accessibility complying with 703.7.2.1. Where clustered single user toilet rooms or bathing facilities are permitted to use exceptions to 213.2, toilet rooms or bathing facilities complying with 603 shall be identified by the International Symbol of Accessibility complying with 703.7.2.1 unless all toilet rooms and bathing facilities comply with 603.

216.9 TTYs. Identification and directional signs for public TTYs shall be provided in accordance with 216.9.

216.9.1 Identification Signs. Public TTYs shall be identified by the International Symbol of TTY complying with 703.7.2.2.

216.9.2 Directional Signs. Directional signs indicating the location of the nearest public TTY shall be provided at all banks of public pay telephones not containing a public TTY. In addition, where signs provide direction to public pay telephones, they shall also provide direction to public TTYs. Directional signs shall comply with 703.5 and shall include the International Symbol of TTY complying with 703.7.2.2.

216.10 Assistive Listening Systems. Each assembly area required by 219 to provide assistive listening systems shall provide signs informing patrons of the availability of the assistive listening system. Assistive listening signs shall comply with 703.5 and shall include the International Symbol of Access for Hearing Loss complying with 703.7.2.4.

EXCEPTION: Where ticket offices or windows are provided, signs shall not be required at each assembly area provided that signs are displayed at each ticket office or window informing patrons of the availability of assistive listening systems.

216.11 Check-Out Aisles. Where more than one check-out aisle is provided, check-out aisles complying with 904.3 shall be identified by the International Symbol of Accessibility complying with 703.7.2.1. Where check-out aisles are identified by numbers, letters, or functions, signs identifying check-out aisles complying with 904.3 shall be located in the same location as the check-out aisle identification.

EXCEPTION: Where all check-out aisles serving a single function comply with 904.3, signs complying with 703.7.2.1 shall not be required.

216.12 Amusement Rides. Signs identifying the type of access provided on amusement rides shall be provided at entries to queues and waiting lines. In addition, where accessible unload areas also serve as accessible load areas, signs indicating the location of the accessible load and unload areas shall be provided at entries to queues and waiting lines.

Advisory 216.12 Amusement Rides. Amusement rides designed primarily for children, amusement rides that are controlled or operated by the rider, and amusement rides without seats, are not required to provide wheelchair spaces, transfer seats, or transfer systems, and need not meet the sign requirements in

216.12. The load and unload areas of these rides must, however, be on an accessible route and must provide turning space.

217 Telephones

217.1 General. Where coin-operated public pay telephones, coinless public pay telephones, public closed-circuit telephones, public courtesy phones, or other types of public telephones are provided, public telephones shall be provided in accordance with 217 for each type of public telephone provided. For purposes of this section, a bank of telephones shall be considered to be two or more adjacent telephones.

Advisory 217.1 General. These requirements apply to all types of public telephones including courtesy phones at airports and rail stations that provide a free direct connection to hotels, transportation services, and tourist attractions.

217.2 Wheelchair accessible Telephones. Where public telephones are provided, wheelchair accessible telephones complying with 704.2 shall be provided in accordance with Table 217.2.

EXCEPTION: Drive-up only public telephones shall not be required to comply with 217.2.

Number of Telephones Provided Minimum Number of Required on a Floor, Level, or Exterior Site Wheelchair accessible Telephones

1 or more single units	1 per floor, level, and exterior site
1 bank	1 per floor, level, and exterior site
2 or more banks	1 per bank

Table 217.2 Wheelchair accessible Telephones

217.3 Volume Controls. All public telephones shall have volume controls complying with 704.3.

217.4 TTYs. TTYs complying with 704.4 shall be provided in accordance with 217.4.

Advisory 217.4 TTYs. Separate requirements are provided based on the number of public pay telephones provided at a bank of telephones, within a floor, a building, or on a site. In some instances one TTY can be used to satisfy more than one of these requirements. For example, a TTY required for a bank can satisfy the requirements for a building. However, the requirement for at least one TTY on an exterior site cannot be met by installing a TTY in a bank inside a building. Consideration should be given to phone systems that can accommodate both digital and analog transmissions for compatibility with digital and analog TTYs.

217.4.1 Bank Requirement. Where four or more public pay telephones are provided at a bank of telephones, at least one public TTY complying with 704.4 shall be provided at that bank.

EXCEPTION: TTYs shall not be required at banks of telephones located within 200 feet (61 m) of, and on the same floor as, a bank containing a public TTY.

217.4.2 Floor Requirement. TTYs in public buildings shall be provided in accordance with 217.4.2.1. TTYs in private buildings shall be provided in accordance with 217.4.2.2.

217.4.2.1 Public Buildings. Where at least one public pay telephone is provided on a floor of a public building, at least one public TTY shall be provided on that floor.

217.4.2.2 Private Buildings. Where four or more public pay telephones are provided on a floor of a private building, at least one public TTY shall be provided on that floor.

217.4.3 Building Requirement. TTYs in public buildings shall be provided in accordance with 217.4.3.1. TTYs in private buildings shall be provided in accordance with 217.4.3.2.

217.4.3.1 Public Buildings. Where at least one public pay telephone is provided in a public building, at least one public TTY shall be provided in the building. Where at least one public pay telephone is provided in a public use area of a public building, at least one public TTY shall be provided in the public building in a public use area.

217.4.3.2 Private Buildings. Where four or more public pay telephones are provided in a private building, at least one public TTY shall be provided in the building.

217.4.4 Exterior Site Requirement. Where four or more public pay telephones are provided on an exterior site, at least one public TTY shall be provided on the site.

217.4.5 Rest Stops, Emergency Roadside Stops, and Service Plazas. Where at least one public pay telephone is provided at a public rest stop, emergency roadside stop, or service plaza, at least one public TTY shall be provided.

217.4.6 Hospitals. Where at least one public pay telephone is provided serving a hospital emergency room, hospital recovery room, or hospital waiting room, at least one public TTY shall be provided at each location.

217.4.7 Transportation Facilities. In transportation facilities, in addition to the requirements of 217.4.1 through 217.4.4, where at least one public pay telephone serves a particular entrance to a bus or rail facility, at least one public TTY shall be provided to serve that entrance. In airports, in addition to the requirements of 217.4.1 through 217.4.4, where four or more public pay telephones are located in a terminal outside the security areas, a concourse within the security areas, or a baggage claim area in a terminal, at least one public TTY shall be provided in each location.

217.4.8 Detention and Correctional Facilities. In detention and correctional facilities, where at least one pay telephone is provided in a secured area used only by detainees or

inmates and security personnel, at least one TTY shall be provided in at least one secured area.

217.5 Shelves for Portable TTYs. Where a bank of telephones in the interior of a building consists of three or more public pay telephones, at least one public pay telephone at the bank shall be provided with a shelf and an electrical outlet in accordance with 704.5.

EXCEPTIONS: 1. Secured areas of detention and correctional facilities where shelves and outlets are prohibited for purposes of security or safety shall not be required to comply with 217.5.

2. The shelf and electrical outlet shall not be required at a bank of telephones with a TTY.

218 Transportation Facilities

218.1 General. Transportation facilities shall comply with 218.

218.2 New and Altered Fixed Guideway Stations. New and altered stations in rapid rail, light rail, commuter rail, intercity rail, high speed rail, and other fixed guideway systems shall comply with 810.5 through 810.10.

218.3 Key Stations and Existing Intercity Rail Stations. Key stations and existing intercity rail stations shall comply with 810.5 through 810.10.

218.4 Bus Shelters. Where provided, bus shelters shall comply with 810.3.

218.5 Other Transportation Facilities. In other transportation facilities, public address systems shall comply with 810.7 and clocks shall comply with 810.8.

219 Assistive Listening Systems

219.1 General. Assistive listening systems shall be provided in accordance with 219 and shall comply with 706.

219.2 Required Systems. In each assembly area where audible communication is integral to the use of the space, an assistive listening system shall be provided.

EXCEPTION: Other than in courtrooms, assistive listening systems shall not be required where audio amplification is not provided.

219.3 Receivers. Receivers complying with 706.2 shall be provided for assistive listening systems in each assembly area in accordance with Table 219.3. Twenty-five percent minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with 706.3.

EXCEPTIONS: 1. Where a building contains more than one assembly area and the assembly areas required to provide assistive listening systems are under one management, the total number of required receivers shall be permitted to be calculated according to the total number of seats in the assembly areas in the building provided that all receivers are usable with all systems.

2. Where all seats in an assembly area are served by an induction loop assistive listening system, the minimum number of receivers required by Table 219.3 to be hearing-aid compatible shall not be required to be provided.

Capacity of Seating in Assembly Area	Minimum Number of Required Receivers	Minimum Number of Required Receivers Required to be Hearing-aid Compatible
1. Or fraction thereof.		
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats ¹	2
201 to 500	2, plus 1 per 25 seats over 50 seats ¹	1 per 4 receivers ¹
501 to 1000	20, plus 1 per 33 seats over 500 seats ¹	1 per 4 receivers ¹
1001 to 2000	35, plus 1 per 50 seats over 1000 seats ¹	1 per 4 receivers ¹
2001 and over	55 plus 1 per 100 seats over 2000 seats ¹	1 per 4 receivers ¹

Table 219.3 Receivers for Assistive Listening Systems

Absoluteco.com

Greenerade.com

Saum Greenerade @facebook

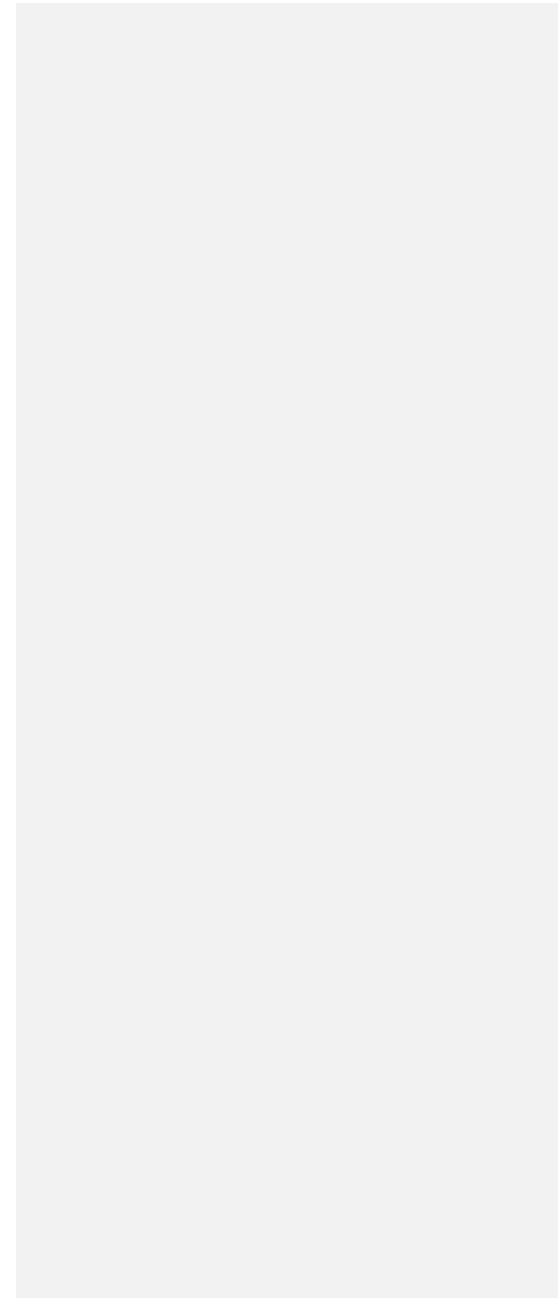
Endlesschool.com

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ARE 5 Programming & Analysis
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220 Automatic Teller Machines and Fare Machines

220.1 General. Where automatic teller machines or self-service fare vending, collection, or adjustment machines are provided, at least one of each type provided at each location shall comply with 707. Where bins are provided for envelopes, waste paper, or other purposes, at least one of each type shall comply with 811.

Advisory 220.1 General. If a bank provides both interior and exterior ATMs, each such installation is considered a separate location. accessible ATMs, including those with speech and those that are within reach of people who use wheelchairs, must provide all the functions provided to customers at that location at all times. For example, it is unacceptable for the accessible ATM only to provide cash withdrawals while inaccessible ATMs also sell theater tickets.

221 Assembly Areas

221.1 General. Assembly areas shall provide wheelchair spaces, companion seats, and designated aisle seats complying with 221 and 802. In addition, lawn seating shall comply with 221.5.

221.2 Wheelchair Spaces. Wheelchair spaces complying with 221.2 shall be provided in assembly areas with fixed seating.

221.2.1 Number and Location. Wheelchair spaces shall be provided complying with 221.2.1.

221.2.1.1 General Seating. Wheelchair spaces complying with 802.1 shall be provided in accordance with Table 221.2.1.1.

Number of Seats Minimum Number of Required Wheelchair Spaces

4 to 25	1
26 to 50	2
51 to 150	4
151 to 300	5
301 to 500	6
501 to 5000	6, plus 1 for each 150,

Number of Seats Minimum Number of Required Wheelchair Spaces

	or fraction thereof, between 501 through 5000
5001 and over	36, plus 1 for each 200, or fraction thereof, over 5000

Table 221.2.1.1 Number of Wheelchair Spaces in Assembly Areas

221.2.1.2 Luxury Boxes, Club Boxes, and Suites in Arenas, Stadiums, and Grandstands. In each luxury box, club box, and suite within arenas, stadiums, and grandstands, wheelchair spaces complying with 802.1 shall be provided in accordance with Table 221.2.1.1.

Advisory 221.2.1.2 Luxury Boxes, Club Boxes, and Suites in Arenas, Stadiums, and Grandstands. The number of wheelchair spaces required in luxury boxes, club boxes, and suites within an arena, stadium, or grandstand is to be calculated box by box and suite by suite.

221.2.1.3 Other Boxes. In boxes other than those required to comply with 221.2.1.2, the total number of wheelchair spaces required shall be determined in accordance with Table 221.2.1.1. Wheelchair spaces shall be located in not less than 20 percent of all boxes provided. Wheelchair spaces shall comply with 802.1.

Advisory 221.2.1.3 Other Boxes. The provision for seating in “other boxes” includes box seating provided in facilities such as performing arts auditoria where tiered boxes are designed for spatial and acoustical purposes. The number of wheelchair spaces required in boxes covered by 221.2.1.3 is calculated based on the total number of seats provided in these other boxes. The resulting number of wheelchair spaces must be located in no fewer than 20% of the boxes covered by this section. For example, a concert hall has 20 boxes, each of which contains 10 seats, totaling 200 seats. In this example, 5 wheelchair spaces would be required, and they must be placed in at least 4 of the boxes. Additionally, because the wheelchair spaces must also meet the dispersion requirements of 221.2.3, the boxes containing these wheelchair spaces cannot all be located in one area unless an exception to the dispersion requirements applies.

221.2.1.4 Team or Player Seating. At least one wheelchair space complying with 802.1 shall be provided in team or player seating areas serving areas of sport activity.

EXCEPTION: Wheelchair spaces shall not be required in team or player seating areas serving bowling lanes not required to comply with 206.2.11.

221.2.2 Integration. Wheelchair spaces shall be an integral part of the seating plan.

Advisory 221.2.2 Integration. The requirement that wheelchair spaces be an “integral part of the seating plan” means that wheelchair spaces must be placed within the footprint of the seating area. Wheelchair spaces cannot be segregated from seating areas. For example, it would be unacceptable to place only the wheelchair spaces, or only the wheelchair spaces and their associated companion seats, outside the seating areas defined by risers in an assembly area.

221.2.3 Lines of Sight and Dispersion. Wheelchair spaces shall provide lines of sight complying with 802.2 and shall comply with 221.2.3. In providing lines of sight, wheelchair spaces shall be dispersed. Wheelchair spaces shall provide spectators with choices of seating locations and viewing angles that are substantially equivalent to, or better than, the choices of seating locations and viewing angles available to all other spectators. When the number of wheelchair spaces required by 221.2.1 has been met, further dispersion shall not be required.

EXCEPTION: Wheelchair spaces in team or player seating areas serving areas of sport activity shall not be required to comply with 221.2.3.

Advisory 221.2.3 Lines of Sight and Dispersion. Consistent with the overall intent of the ADA, individuals who use wheelchairs must be provided equal access so that their experience is substantially equivalent to that of other

members of the audience. Thus, while individuals who use wheelchairs need not be provided with the best seats in the house, neither may they be relegated to the worst.

221.2.3.1 Horizontal Dispersion. Wheelchair spaces shall be dispersed horizontally.

EXCEPTIONS: 1. Horizontal dispersion shall not be required in assembly areas with 300 or fewer seats if the companion seats required by 221.3 and wheelchair spaces are located within the 2nd or 3rd quartile of the total row length. Intermediate aisles shall be included in determining the total row length. If the row length in the 2nd and 3rd quartile of a row is insufficient to accommodate the required number of companion seats and wheelchair spaces, the additional companion seats and wheelchair spaces shall be permitted to be located in the 1st and 4th quartile of the row.

2. In row seating, two wheelchair spaces shall be permitted to be located side-by-side.

Advisory 221.2.3.1 Horizontal Dispersion. Horizontal dispersion of wheelchair spaces is the placement of spaces in an assembly facility seating area from side-to-side or, in the case of an arena or stadium, around the field of play or performance area.

221.2.3.2 Vertical Dispersion. Wheelchair spaces shall be dispersed vertically at varying distances from the screen, performance area, or playing field. In addition, wheelchair

spaces shall be located in each balcony or mezzanine that is located on an accessible route.

EXCEPTIONS: 1. Vertical dispersion shall not be required in assembly areas with 300 or fewer seats if the wheelchair spaces provide viewing angles that are equivalent to, or better than, the average viewing angle provided in the facility.

2. In bleachers, wheelchair spaces shall not be required to be provided in rows other than rows at points of entry to bleacher seating.

Advisory 221.2.3.2 Vertical Dispersion. When wheelchair spaces are dispersed vertically in an assembly facility they are placed at different locations within the seating area from front-to-back so that the distance from the screen, stage, playing field, area of sports activity, or other focal point is varied among wheelchair spaces.

Advisory 221.2.3.2 Vertical Dispersion Exception 2. Points of entry to bleacher seating may include, but are not limited to, cross aisles, concourses, vomitories, and entrance ramps and stairs. Vertical, center, or side aisles adjoining bleacher seating that are stepped or tiered are not considered entry points.

Note to Reader: The Department of Justice's ADA standards also require the following:

Assembly areas. Assembly areas that are subject to this part [of the title III regulation or to this section of the title II regulation] shall comply with the provisions of the 2010 Standards applicable to

assembly areas, including, but not limited to, sections 221 and 802. In addition, assembly areas shall ensure that —

- (1) In stadiums, arenas, and grandstands, wheelchair spaces and companion seats are dispersed to all levels that include seating served by an accessible route;
- (2) Assembly areas that are required to horizontally disperse wheelchair spaces and companion seats by section 221.2.3.1 of the 2010 Standards and have seating encircling, in whole or in part, a field of play or performance area shall disperse wheelchair spaces and companion seats around that field of play or performance area;
- (3) Wheelchair spaces and companion seats are not located on (or obstructed by) temporary platforms or other movable structures, except that when an entire seating section is placed on temporary platforms or other movable structures in an area where fixed seating is not provided, in order to increase seating for an event, wheelchair spaces and companion seats may be placed in that section. When wheelchair spaces and companion seats are not required to accommodate persons eligible for those spaces and seats, individual, removable seats may be placed in those spaces and

seats;

(4) Stadium-style movie theaters shall locate wheelchair spaces and companion seats on a riser or cross-aisle in the stadium section that satisfies at least one of the following criteria —

(i) It is located within the rear 60% of the seats provided in an auditorium; or

(ii) It is located within the area of an auditorium in which the vertical viewing angles (as measured to the top of the screen) are from the 40th to the 100th percentile of vertical viewing angles for all seats as ranked from the seats in the first row (1st percentile) to seats in the back row (100th percentile).

221.3 Companion Seats. At least one companion seat complying with 802.3 shall be provided for each wheelchair space required by 221.2.1.

221.4 Designated Aisle Seats. At least 5 percent of the total number of aisle seats provided shall comply with 802.4 and shall be the aisle seats located closest to accessible routes.

EXCEPTION: Team or player seating areas serving areas of sport activity shall not be required to comply with 221.4.

Advisory 221.4 Designated Aisle Seats. When selecting which aisle seats will meet the requirements of 802.4, those aisle seats which are closest to, not necessarily on, accessible routes must be selected first. For example, an assembly area has two aisles (A and B) serving seating areas with an accessible route connecting to the top and bottom of Aisle A only. The aisle seats chosen to meet 802.4 must be those at the top and bottom of Aisle A, working toward the middle. Only when all seats on Aisle A would not meet the five percent minimum would seats on Aisle B be designated.

221.5 Lawn Seating. Lawn seating areas and exterior overflow seating areas, where fixed seats are not provided, shall connect to an accessible route.

222 Dressing, Fitting, and Locker Rooms

222.1 General. Where dressing rooms, fitting rooms, or locker rooms are provided, at least 5 percent, but no fewer than one, of each type of use in each cluster provided shall comply with 803.

EXCEPTION: In alterations, where it is technically infeasible to provide rooms in accordance with 222.1, one room for each sex on each level shall comply with 803. Where only unisex rooms are provided, unisex rooms shall be permitted.

Advisory 222.1 General. A “cluster” is a group of rooms proximate to one another. Generally, rooms in a cluster are within sight of, or adjacent to, one another. Different styles of design provide users varying levels of privacy and convenience. Some designs include private changing facilities that are close to core areas of the facility, while other designs use space more economically and provide only group dressing facilities. Regardless of the type of facility, dressing, fitting, and locker rooms should provide people with disabilities rooms that are equally private and convenient to those provided others. For example, in a physician’s office, if people without disabilities must traverse the

full length of the office suite in clothing other than their street clothes, it is acceptable for people with disabilities to be asked to do the same.

222.2 Coat Hooks and Shelves. Where coat hooks or shelves are provided in dressing, fitting or locker rooms without individual compartments, at least one of each type shall comply with 803.5. Where coat hooks or shelves are provided in individual compartments at least one of each type complying with 803.5 shall be provided in individual compartments in dressing, fitting, or locker rooms required to comply with 222.1.

223 Medical Care and Long-Term Care Facilities

223.1 General. In licensed medical care facilities and licensed long-term care facilities where the period of stay exceeds twenty-four hours, patient or resident sleeping rooms shall be provided in accordance with 223.

EXCEPTION: Toilet rooms that are part of critical or intensive care patient sleeping rooms shall not be required to comply with 603.

Advisory 223.1 General. Because medical facilities frequently reconfigure spaces to reflect changes in medical specialties, Section 223.1 does not include a provision for dispersion of accessible patient or resident sleeping rooms. The lack of a design requirement does not mean that covered entities are not required to provide services to people with disabilities where accessible rooms are not dispersed in specialty areas. Locate accessible rooms near core areas that are less likely to change over time. While dispersion is not required, the flexibility it provides can be a critical factor in ensuring cost effective compliance with applicable civil rights laws, including titles II and III of the ADA and Section 504 of the Rehabilitation Act of 1973, as amended. Additionally, all types of features and amenities should be dispersed among

accessible sleeping rooms to ensure equal access to and a variety of choices for all patients and residents.

223.1.1 Alterations. Where sleeping rooms are altered or added, the requirements of 223 shall apply only to the sleeping rooms being altered or added until the number of sleeping rooms complies with the minimum number required for new construction.

Advisory 223.1.1 Alterations. In alterations and additions, the minimum required number is based on the total number of sleeping rooms altered or added instead of on the total number of sleeping rooms provided in a facility. As a facility is altered over time, every effort should be made to disperse accessible sleeping rooms among patient care areas such as pediatrics, cardiac care, maternity, and other units. In this way, people with disabilities can have access to the full-range of services provided by a medical care facility.

223.2 Hospitals, Rehabilitation Facilities, Psychiatric Facilities and Detoxification Facilities. Hospitals, rehabilitation facilities, psychiatric facilities and detoxification facilities shall comply with 223.2.

223.2.1 Facilities Not Specializing in Treating Conditions That Affect Mobility. In facilities not specializing in treating conditions that affect mobility, at least 10 percent, but no fewer than one, of the patient sleeping rooms shall provide mobility features complying with 805.

Note to Reader: The Department of Justice’s ADA standards also require the following:

Medical care facilities. Medical care facilities that are subject to this part [of the title III regulation or to this section of the title II regulation] shall comply with the provisions of the 2010 Standards applicable to medical care facilities, including, but not limited to, sections 223 and 805. In addition, medical care facilities that do not specialize in the treatment of conditions that affect mobility shall disperse the accessible patient bedrooms required by section 223.2.1 of the 2010 Standards in a manner that is proportionate by type of medical specialty.

223.2.2 Facilities Specializing in Treating Conditions That Affect Mobility. In facilities specializing in treating conditions that affect mobility, 100 percent of the patient sleeping rooms shall provide mobility features complying with 805.

Advisory 223.2.2 Facilities Specializing in Treating Conditions That Affect Mobility. Conditions that affect mobility include conditions requiring the use or assistance of a brace, cane, crutch, prosthetic device, wheelchair, or powered mobility aid; arthritic, neurological, or orthopedic conditions that severely limit one’s ability to walk; respiratory diseases and other conditions which may

require the use of portable oxygen; and cardiac conditions that impose significant functional limitations. Facilities that may provide treatment for, but that do not specialize in treatment of such conditions, such as general rehabilitation hospitals, are not subject to this requirement but are subject to Section 223.2.1.

223.3 Long-Term Care Facilities. In licensed long-term care facilities, at least 50 percent, but no fewer than one, of each type of resident sleeping room shall provide mobility features complying with 805.

224 Transient Lodging Guest Rooms

224.1 General. Transient lodging facilities shall provide guest rooms in accordance with 224.

Advisory 224.1 General. Certain facilities used for transient lodging, including time shares, dormitories, and town homes may be covered by both these requirements and the Fair Housing Amendments Act. The Fair Housing Amendments Act requires that certain residential structures having four or more multi-family dwelling units, regardless of whether they are privately owned or federally assisted, include certain features of accessible and adaptable design according to guidelines established by the U.S. Department of Housing

and Urban Development (HUD). This law and the appropriate regulations should be consulted before proceeding with the design and construction of residential housing.

224.1.1 Alterations. Where guest rooms are altered or added, the requirements of 224 shall apply only to the guest rooms being altered or added until the number of guest rooms complies with the minimum number required for new construction.

Advisory 224.1.1 Alterations. In alterations and additions, the minimum required number of accessible guest rooms is based on the total number of guest rooms altered or added instead of the total number of guest rooms provided in a facility. Typically, each alteration of a facility is limited to a particular portion of the facility. When accessible guest rooms are added as a result of subsequent alterations, compliance with 224.5 (Dispersion) is more likely to be achieved if all of the accessible guest rooms are not provided in the same area of the facility.

224.1.2 Guest Room Doors and Doorways. Entrances, doors, and doorways providing user passage into and within guest rooms that are not required to provide mobility features complying with 806.2 shall comply with 404.2.3.

EXCEPTION: Shower and sauna doors in guest rooms that are not required to provide mobility features complying with 806.2 shall not be required to comply with 404.2.3.

Advisory 224.1.2 Guest Room Doors and Doorways. Because of the social interaction that often occurs in lodging facilities, an accessible clear opening width is required for doors and doorways to and within all guest rooms, including those not required to be accessible. This applies to all doors, including bathroom doors, that allow full user passage. Other requirements for doors and doorways in Section 404 do not apply to guest rooms not required to provide mobility features.

224.2 Guest Rooms with Mobility Features. In transient lodging facilities, guest rooms with mobility features complying with 806.2 shall be provided in accordance with Table 224.2.

Total Number of Guest Rooms Provided **Minimum Number of Required Rooms without Roll-In Showers** **Minimum Number of Required Rooms with Roll-In Showers** **Total Number of Required Rooms**

1 to 25	1	0	1
26 to 50	2	0	2
51 to 75	3	1	4
76 to 100	4	1	5
101 to 150	5	2	7

Total Number of Guest Rooms Provided	Minimum Number of Required Rooms without Roll-In Showers	Minimum Number of Required Rooms with Roll-In Showers	Total Number of Required Rooms
151 to 200	6	2	8
201 to 300	7	3	10
301 to 400	8	4	12
401 to 500	9	4	13
501 to 1000	2 percent of total	1 percent of total	3 percent of total
1001 and over	20, plus 1 for each 100, or fraction thereof, over 1000	10, plus 1 for each 100, or fraction thereof, over 1000	30, plus 2 for each 100, or fraction thereof, over 1000

Table 224.2 Guest Rooms with Mobility Features

224.3 Beds. In guest rooms having more than 25 beds, 5 percent minimum of the beds shall have clear floor space complying with 806.2.3.

224.4 Guest Rooms with Communication Features. In transient lodging facilities, guest rooms with communication features complying with 806.3 shall be provided in accordance with Table 224.4.

Total Number of Guest Rooms Provided **Minimum Number of Required Guest Rooms with Communication Features**

2 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1000	5 percent of total
1001 and over	50, plus 3 for each 100 over 1000

Table 224.4 Guest Rooms with Communication Features

224.5 Dispersion. Guest rooms required to provide mobility features complying with 806.2 and guest rooms required to provide communication features complying with 806.3 shall be dispersed among the various classes of guest rooms, and shall provide choices of types of guest rooms, number of beds, and other amenities comparable to the choices provided to other guests. Where the minimum number of guest rooms required to comply with 806 is not sufficient to allow for complete dispersion, guest rooms shall be

dispersed in the following priority: guest room type, number of beds, and amenities. At least one guest room required to provide mobility features complying with 806.2 shall also provide communication features complying with 806.3. Not more than 10 percent of guest rooms required to provide mobility features complying with 806.2 shall be used to satisfy the minimum number of guest rooms required to provide communication features complying with 806.3.

Advisory 224.5 Dispersion. Factors to be considered in providing an equivalent range of options may include, but are not limited to, room size, bed size, cost, view, bathroom fixtures such as hot tubs and spas, smoking and nonsmoking, and the number of rooms provided.

Note to Reader: The Department of Justice's ADA standards also require the following:

Places of lodging. Places of lodging subject to this part [of the title III regulation] shall comply with the provisions of the 2010 Standards applicable to transient lodging, including, but not limited to, the requirements for transient lodging guest rooms in sections 224 and 806.

(1) Guest rooms. Guest rooms with mobility features in places of lodging subject to the transient lodging requirements of 2010

Standards shall be provided as follows--

- (i) Facilities that are subject to the same permit application on a common site that each have 50 or fewer guest rooms may be combined for the purposes of determining the required number of accessible rooms and type of accessible bathing facility in accordance with table 224.2 to section 224.2 of the 2010 Standards.
- (ii) Facilities with more than 50 guest rooms shall be treated separately for the purposes of determining the required number of accessible rooms and type of accessible bathing facility in accordance with table 224.2 to section 224.2 of the 2010 Standards.
- (2) Exception. Alterations to guest rooms in places of lodging where the guest rooms are not owned or substantially controlled by the entity that owns, leases, or operates the overall facility and the physical features of the guest room interiors are controlled by their individual owners are not required to comply with § 36.402 or the alterations requirements in section 224.1.1 of the 2010 Standards.
- (3) Facilities with residential units and transient lodging units. Residential dwelling units that are designed and constructed for residential use exclusively are not subject to the transient lodging

standards.

The Department of Justice’s ADA standards also require the following:

Housing at a place of education. Housing at a place of education that is subject to this part [of the title III regulation or to this section of the title II regulation] shall comply with the provisions of the 2010 Standards applicable to transient lodging, including, but not limited to, the requirements for transient lodging guest rooms in sections 224 and 806, subject to the following exceptions. For the purposes of the application of this section, the term “sleeping room” is intended to be used interchangeably with the term “guest room” as it is used in the transient lodging standards.

(1) Kitchens within housing units containing accessible sleeping rooms with mobility features (including suites and clustered sleeping rooms) or on floors containing accessible sleeping rooms with mobility features shall provide turning spaces that comply with section 809.2.2 of the 2010 Standards and kitchen work surfaces that comply with section 804.3 of the 2010 Standards.

(2) Multi-bedroom housing units containing accessible sleeping rooms with mobility features shall have an accessible route throughout the unit in accordance with section 809.2 of the 2010 Standards.

(3) Apartments or townhouse facilities that are provided by or on behalf of a place of education, which are leased on a year-round basis exclusively to graduate students or faculty and do not contain any public use or common use areas available for educational programming, are not subject to the transient lodging standards and shall comply with the requirements for residential facilities in sections 233 and 809 of the 2010 Standards.

The Department of Justice's title II and title III regulations include requirements for social service center establishments which are noted in section 233 (Residential Facilities).

225 Storage

225.1 General. Storage facilities shall comply with 225.

225.2 Storage. Where storage is provided in accessible spaces, at least one of each type shall comply with 811.

Advisory 225.2 Storage. Types of storage include, but are not limited to, closets, cabinets, shelves, clothes rods, hooks, and drawers. Where provided, at least one of each type of storage must be within the reach ranges specified in 308; however, it is permissible to install additional storage outside the reach ranges.

225.2.1 Lockers. Where lockers are provided, at least 5 percent, but no fewer than one of each type, shall comply with 811.

Advisory 225.2.1 Lockers. Different types of lockers may include full-size and half-size lockers, as well as those specifically designed for storage of various sports equipment.

225.2.2 Self-Service Shelving. Self-service shelves shall be located on an accessible route complying with 402. Self-service shelving shall not be required to comply with 308.

Advisory 225.2.2 Self-Service Shelving. Self-service shelves include, but are not limited to, library, store, or post office shelves.

225.3 Self-Service Storage Facilities. Self-service storage facilities shall provide individual self-service storage spaces complying with these requirements in accordance with Table 225.3.

Total Spaces in Facility	Minimum Number of Spaces Required to be accessible
1 to 200	5 percent, but no fewer than 1
201 and over	10, plus 2 percent of total number of units over 200

Table 225.3 Self-Service Storage Facilities

Advisory 225.3 Self-Service Storage Facilities. Although there are no technical requirements that are unique to self-service storage facilities, elements and spaces provided in facilities containing self-service storage spaces required to comply with these requirements must comply with this document where applicable. For example: the number of storage spaces required to comply with these requirements must provide accessible Routes complying with Section 206; accessible means of egress complying with Section 207; Parking Spaces complying with Section 208; and, where provided, other public use or common use elements and facilities such as toilet rooms, drinking fountains, and telephones must comply with the applicable requirements of this document.

225.3.1 Dispersion. Individual self-service storage spaces shall be dispersed throughout the various classes of spaces provided. Where more classes of spaces are provided than the number required to be accessible, the number of spaces shall not be required to exceed that required by Table 225.3. Self-service storage spaces complying with Table 225.3 shall not be required to be dispersed among buildings in a multi-building facility.

226 Dining Surfaces and Work Surfaces

226.1 General. Where dining surfaces are provided for the consumption of food or drink, at least 5 percent of the seating spaces and standing spaces at the dining surfaces shall comply with 902. In addition, where work surfaces are provided for use by other than employees, at least 5 percent shall comply with 902.

EXCEPTIONS: 1. Sales counters and service counters shall not be required to comply with 902.

2. Check writing surfaces provided at check-out aisles not required to comply with 904.3 shall not be required to comply with 902.

Advisory 226.1 General. In facilities covered by the ADA, this requirement does not apply to work surfaces used only by employees. However, the ADA and, where applicable, Section 504 of the Rehabilitation Act of 1973, as amended, provide that employees are entitled to “reasonable

accommodations.” With respect to work surfaces, this means that employers may need to procure or adjust work stations such as desks, laboratory and work benches, fume hoods, reception counters, teller windows, study carrels, commercial kitchen counters, and conference tables to accommodate the individual needs of employees with disabilities on an “as needed” basis. Consider work surfaces that are flexible and permit installation at variable heights and clearances.

226.2 Dispersion. Dining surfaces and work surfaces required to comply with 902 shall be dispersed throughout the space or facility containing dining surfaces and work surfaces.

227 Sales and Service

227.1 General. Where provided, check-out aisles, sales counters, service counters, food service lines, queues, and waiting lines shall comply with 227 and 904.

227.2 Check-Out Aisles. Where check-out aisles are provided, check-out aisles complying with 904.3 shall be provided in accordance with Table 227.2. Where check-out aisles serve different functions, check-out aisles complying with 904.3 shall be provided in accordance with Table 227.2 for each function. Where check-out aisles are

dispersed throughout the building or facility, check-out aisles complying with 904.3 shall be dispersed.

EXCEPTION: Where the selling space is under 5000 square feet (465 m2) no more than one check-out aisle complying with 904.3 shall be required.

Minimum Number of Check-Out Aisles of Each Function Required to Comply with 904.3

1 to 4	1
5 to 8	2
9 to 15	3
16 and over	3, plus 20 percent of additional aisles

Table 227.2 Check-Out Aisles

227.2.1 Altered Check-Out Aisles. Where check-out aisles are altered, at least one of each check-out aisle serving each function shall comply with 904.3 until the number of check-out aisles complies with 227.2.

227.3 Counters. Where provided, at least one of each type of sales counter and service counter shall comply with 904.4. Where counters are dispersed throughout the building or facility, counters complying with 904.4 also shall be dispersed.

Advisory 227.3 Counters. Types of counters that provide different services in the same facility include, but are not limited to, order, pick-up, express, and returns. One continuous counter can be used to provide different types of service. For example, order and pick-up are different services. It would not be acceptable to provide access only to the part of the counter where orders are taken when orders are picked-up at a different location on the same counter. Both the order and pick-up section of the counter must be accessible.

227.4 Food Service Lines. Food service lines shall comply with 904.5. Where self-service shelves are provided, at least 50 percent, but no fewer than one, of each type provided shall comply with 308.

227.5 Queues and Waiting Lines. Queues and waiting lines servicing counters or check-out aisles required to comply with 904.3 or 904.4 shall comply with 403.

228 Depositories, Vending Machines, Change Machines, Mail Boxes, and Fuel Dispensers

228.1 General. Where provided, at least one of each type of depository, vending machine, change machine, and fuel dispenser shall comply with 309.

EXCEPTION: Drive-up only depositories shall not be required to comply with 309.

Advisory 228.1 General. Depositories include, but are not limited to, night receptacles in banks, post offices, video stores, and libraries.

228.2 Mail Boxes. Where mail boxes are provided in an interior location, at least 5 percent, but no fewer than one, of each type shall comply with 309. In residential facilities, where mail boxes are provided for each residential dwelling unit, mail boxes complying with 309 shall be provided for each residential dwelling unit required to provide mobility features complying with 809.2 through 809.4.

229 Windows

229.1 General. Where glazed openings are provided in accessible rooms or spaces for operation by occupants, at least one opening shall comply with 309. Each glazed opening required by an administrative authority to be operable shall comply with 309.

EXCEPTION: 1. Glazed openings in residential dwelling units required to comply with 809 shall not be required to comply with 229.

2. Glazed openings in guest rooms required to provide communication features and in guest rooms required to comply with 206.5.3 shall not be required to comply with 229.

230 Two-Way Communication Systems

230.1 General. Where a two-way communication system is provided to gain admittance to a building or facility or to restricted areas within a building or facility, the system shall comply with 708.

Advisory 230.1 General. This requirement applies to facilities such as office buildings, courthouses, and other facilities where admittance to the building or restricted spaces is dependent on two-way communication systems.

231 Judicial Facilities

231.1 General. Judicial facilities shall comply with 231.

231.2 Courtrooms. Each courtroom shall comply with 808.

231.3 Holding Cells. Where provided, central holding cells and court-floor holding cells shall comply with 231.3.

231.3.1 Central Holding Cells. Where separate central holding cells are provided for adult male, juvenile male, adult female, or juvenile female, one of each type shall comply with 807.2. Where central holding cells are provided and are not separated by age or sex, at least one cell complying with 807.2 shall be provided.

231.3.2 Court-Floor Holding Cells. Where separate court-floor holding cells are provided for adult male, juvenile male, adult female, or juvenile female, each courtroom

shall be served by one cell of each type complying with 807.2. Where court-floor holding cells are provided and are not separated by age or sex, courtrooms shall be served by at least one cell complying with 807.2. Cells may serve more than one courtroom.

231.4 Visiting Areas. Visiting areas shall comply with 231.4.

231.4.1 Cubicles and Counters. At least 5 percent, but no fewer than one, of cubicles shall comply with 902 on both the visitor and detainee sides. Where counters are provided, at least one shall comply with 904.4.2 on both the visitor and detainee sides.

EXCEPTION: The detainee side of cubicles or counters at non-contact visiting areas not serving holding cells required to comply with 231 shall not be required to comply with 902 or 904.4.2.

231.4.2 Partitions. Where solid partitions or security glazing separate visitors from detainees at least one of each type of cubicle or counter partition shall comply with 904.6.

232 Detention Facilities and Correctional Facilities

232.1 General. Buildings, facilities, or portions thereof, in which people are detained for penal or correction purposes, or in which the liberty of the inmates is restricted for security reasons shall comply with 232.

Advisory 232.1 General. Detention facilities include, but are not limited to, jails, detention centers, and holding cells in police stations. Correctional facilities include, but are not limited to, prisons, reformatories, and correctional centers.

Note to Reader: The Department of Justice's ADA standards also require the following:

Detention and correctional facilities. (1) New construction of jails, prisons, and other detention and correctional facilities shall comply with the 2010 Standards except that public entities shall provide accessible mobility features complying with section 807.2 of the 2010 Standards for a minimum of 3%, but no fewer than one, of the total number of cells in a facility. Cells with mobility features shall be provided in each classification level.

(2) Alterations to detention and correctional facilities. Alterations to jails, prisons, and other detention and correctional facilities shall comply with the 2010 Standards except that public entities shall provide accessible mobility features complying with section 807.2 of the 2010 Standards for a minimum of 3%, but no fewer than one, of the total number of cells being altered until at least 3%, but no fewer than one, of the total number of cells in a facility shall

provide mobility features complying with section 807.2. Altered cells with mobility features shall be provided in each classification level. However, when alterations are made to specific cells, detention and correctional facility operators may satisfy their obligation to provide the required number of cells with mobility features by providing the required mobility features in substitute cells (cells other than those where alterations are originally planned), provided that each substitute cell—

- (i) Is located within the same prison site;
 - (ii) Is integrated with other cells to the maximum extent feasible;
 - (iii) Has, at a minimum, equal physical access as the altered cells to areas used by inmates or detainees for visitation, dining, recreation, educational programs, medical services, work programs, religious services, and participation in other programs that the facility offers to inmates or detainees; and,
 - (iv) If it is technically infeasible to locate a substitute cell within the same prison site, a substitute cell must be provided at another prison site within the corrections system.
- (3) With respect to medical and long-term care facilities in jails,

prisons, and other detention and correctional facilities, public entities shall apply the 2010 Standards technical and scoping requirements for those facilities irrespective of whether those facilities are licensed.

232.2 General Holding Cells and General Housing Cells. General holding cells and general housing cells shall be provided in accordance with 232.2.

EXCEPTION: Alterations to cells shall not be required to comply except to the extent determined by the Attorney General.

Advisory 232.2 General Holding Cells and General Housing Cells. accessible cells or rooms should be dispersed among different levels of security, housing categories, and holding classifications (e.g., male/female and adult/juvenile) to facilitate access. Many detention and correctional facilities are designed so that certain areas (e.g., “shift” areas) can be adapted to serve as different types of housing according to need. For example, a shift area serving as a medium-security housing unit might be redesignated for a period of time as a high-security housing unit to meet capacity needs. Placement of accessible cells or rooms in shift areas may allow additional flexibility in meeting requirements for dispersion of accessible cells or rooms.

Advisory 232.2 General Holding Cells and General Housing Cells Exception. Although these requirements do not specify that cells be accessible as a consequence of an

alteration, title II of the ADA requires that each service, program, or activity conducted by a public entity, when viewed in its entirety, be readily accessible to and usable by individuals with disabilities. This requirement must be met unless doing so would fundamentally alter the nature of a service, program, or activity or would result in undue financial and administrative burdens.

232.2.1 Cells with Mobility Features. At least 2 percent, but no fewer than one, of the total number of cells in a facility shall provide mobility features complying with 807.2.

232.2.1.1 Beds. In cells having more than 25 beds, at least 5 percent of the beds shall have clear floor space complying with 807.2.3.

232.2.2 Cells with Communication Features. At least 2 percent, but no fewer than one, of the total number of general holding cells and general housing cells equipped with audible emergency alarm systems and permanently installed telephones within the cell shall provide communication features complying with 807.3.

232.3 Special Holding Cells and Special Housing Cells. Where special holding cells or special housing cells are provided, at least one cell serving each purpose shall provide mobility features complying with 807.2. Cells subject to this requirement include, but are not limited to, those used for purposes of orientation, protective custody, administrative or disciplinary detention or segregation, detoxification, and medical isolation.

EXCEPTION: Alterations to cells shall not be required to comply except to the extent determined by the Attorney General.

232.4 Medical Care Facilities. Patient bedrooms or cells required to comply with 223 shall be provided in addition to any medical isolation cells required to comply with 232.3.

232.5 Visiting Areas. Visiting areas shall comply with 232.5.

232.5.1 Cubicles and Counters. At least 5 percent, but no fewer than one, of cubicles shall comply with 902 on both the visitor and detainee sides. Where counters are provided, at least one shall comply with 904.4.2 on both the visitor and detainee or inmate sides.

EXCEPTION: The inmate or detainee side of cubicles or counters at non-contact visiting areas not serving holding cells or housing cells required to comply with 232 shall not be required to comply with 902 or 904.4.2.

232.5.2 Partitions. Where solid partitions or security glazing separate visitors from detainees or inmates at least one of each type of cubicle or counter partition shall comply with 904.6.

233 Residential Facilities

233.1 General. Facilities with residential dwelling units shall comply with 233.

Advisory 233.1 General. Section 233 outlines the requirements for residential facilities subject to the Americans with Disabilities Act of 1990. The facilities covered by Section 233, as well as other facilities not covered by this section, may still be subject to other Federal laws such as the Fair Housing Act and Section 504 of the Rehabilitation Act of 1973, as amended. For example, the Fair Housing Act requires that certain residential structures having four or more multi-family dwelling units, regardless of whether they are privately owned or federally assisted, include certain features of accessible and adaptable design according to guidelines established by the U.S. Department of Housing and Urban Development (HUD). These laws and the appropriate regulations should be consulted before proceeding with the design and construction of residential facilities.

Residential facilities containing residential dwelling units provided by entities subject to HUD's Section 504 regulations and residential dwelling units covered by Section 233.3 must comply with the technical and scoping requirements in Chapters 1 through 10 included in this document. Section 233 is not a stand-alone section; this section only addresses the minimum number of residential dwelling units within a facility required to comply with Chapter 8. However, residential facilities must also comply with the

requirements of this document. For example: Section 206.5.4 requires all doors and doorways providing user passage in residential dwelling units providing mobility features to comply with Section 404; Section 206.7.6 permits platform lifts to be used to connect levels within residential dwelling units providing mobility features; Section 208 provides general scoping for accessible parking and Section 208.2.3.1 specifies the required number of accessible parking spaces for each residential dwelling unit providing mobility features; Section 228.2 requires mail boxes to be within reach ranges when they serve residential dwelling units providing mobility features; play areas are addressed in Section 240; and swimming pools are addressed in Section 242. There are special provisions applicable to facilities containing residential dwelling units at: Exception 3 to 202.3; Exception to 202.4; 203.8; and Exception 4 to 206.2.3.

233.2 Residential Dwelling Units Provided by Entities Subject to HUD Section 504 Regulations. Where facilities with residential dwelling units are provided by entities subject to regulations issued by the Department of Housing and Urban Development (HUD) under Section 504 of the Rehabilitation Act of 1973, as amended, such entities shall provide residential dwelling units with mobility features complying with 809.2 through 809.4 in a number required by the applicable HUD regulations. Residential dwelling units required to provide mobility features complying with 809.2 through 809.4 shall be on an accessible route as required by 206. In addition, such entities shall provide residential dwelling units with communication features complying with 809.5 in a

number required by the applicable HUD regulations. Entities subject to 233.2 shall not be required to comply with 233.3.

Advisory 233.2 Residential Dwelling Units Provided by Entities Subject to HUD Section 504 Regulations. Section 233.2 requires that entities subject to HUD's regulations implementing Section 504 of the Rehabilitation Act of 1973, as amended, provide residential dwelling units containing mobility features and residential dwelling units containing communication features complying with these regulations in a number specified in HUD's Section 504 regulations. Further, the residential dwelling units provided must be dispersed according to HUD's Section 504 criteria. In addition, Section 233.2 defers to HUD the specification of criteria by which the technical requirements of this document will apply to alterations of existing facilities subject to HUD's Section 504 regulations.

233.3 Residential Dwelling Units Provided by Entities Not Subject to HUD Section 504 Regulations. Facilities with residential dwelling units provided by entities not subject to regulations issued by the Department of Housing and Urban Development (HUD) under Section 504 of the Rehabilitation Act of 1973, as amended, shall comply with 233.3.

233.3.1 Minimum Number: New Construction. Newly constructed facilities with residential dwelling units shall comply with 233.3.1.

EXCEPTION: Where facilities contain 15 or fewer residential dwelling units, the requirements of 233.3.1.1 and 233.3.1.2 shall apply to the total number of residential dwelling units that are constructed under a single contract, or are developed as a whole, whether or not located on a common site.

233.3.1.1 Residential Dwelling Units with Mobility Features. In facilities with residential dwelling units, at least 5 percent, but no fewer than one unit, of the total number of residential dwelling units shall provide mobility features complying with 809.2 through 809.4 and shall be on an accessible route as required by 206.

233.3.1.2 Residential Dwelling Units with Communication Features. In facilities with residential dwelling units, at least 2 percent, but no fewer than one unit, of the total number of residential dwelling units shall provide communication features complying with 809.5.

233.3.2 Residential Dwelling Units for Sale. Residential dwelling units offered for sale shall provide accessible features to the extent required by regulations issued by Federal agencies under the Americans with Disabilities Act or Section 504 of the Rehabilitation Act of 1973, as amended.

Advisory 233.3.2 Residential Dwelling Units for Sale. A public entity that conducts a program to build housing for purchase by individual home buyers must provide access according to the requirements of the ADA regulations and

a program receiving Federal financial assistance must comply with the applicable Section 504 regulation.

Note to Reader: The Department of Justice's ADA standards also require the following:

Facilities with residential dwelling units for sale to individual owners.

(1) Residential dwelling units designed and constructed or altered by public entities that will be offered for sale to individuals shall comply with the requirements for residential facilities in the 2010 Standards including sections 233 and 809.

(2) The requirements of paragraph (1) also apply to housing programs that are operated by public entities where design and construction of particular residential dwelling units takes place only after a specific buyer has been identified. In such programs, the covered entity must provide the units that comply with the requirements for accessible features to those pre-identified buyers with disabilities who have requested such a unit.

233.3.3 Additions. Where an addition to an existing building results in an increase in the number of residential dwelling units, the requirements of 233.3.1 shall apply only to the

residential dwelling units that are added until the total number of residential dwelling units complies with the minimum number required by 233.3.1. Residential dwelling units required to comply with 233.3.1.1 shall be on an accessible route as required by 206.

233.3.4 Alterations. Alterations shall comply with 233.3.4.

EXCEPTION: Where compliance with 809.2, 809.3, or 809.4 is technically infeasible, or where it is technically infeasible to provide an accessible route to a residential dwelling unit, the entity shall be permitted to alter or construct a comparable residential dwelling unit to comply with 809.2 through 809.4 provided that the minimum number of residential dwelling units required by 233.3.1.1 and 233.3.1.2, as applicable, is satisfied.

Advisory 233.3.4 Alterations Exception. A substituted dwelling unit must be comparable to the dwelling unit that is not made accessible. Factors to be considered in comparing one dwelling unit to another should include the number of bedrooms; amenities provided within the dwelling unit; types of common spaces provided within the facility; and location with respect to community resources and services, such as public transportation and civic, recreational, and mercantile facilities.

233.3.4.1 Alterations to Vacated Buildings. Where a building is vacated for the purposes of alteration, and the altered building contains more than 15 residential dwelling units, at

least 5 percent of the residential dwelling units shall comply with 809.2 through 809.4 and shall be on an accessible route as required by 206. In addition, at least 2 percent of the residential dwelling units shall comply with 809.5.

Advisory 233.3.4.1 Alterations to Vacated Buildings. This provision is intended to apply where a building is vacated with the intent to alter the building. Buildings that are vacated solely for pest control or asbestos removal are not subject to the requirements to provide residential dwelling units with mobility features or communication features.

233.3.4.2 Alterations to Individual Residential Dwelling Units. In individual residential dwelling units, where a bathroom or a kitchen is substantially altered, and at least one other room is altered, the requirements of 233.3.1 shall apply to the altered residential dwelling units until the total number of residential dwelling units complies with the minimum number required by 233.3.1.1 and 233.3.1.2. Residential dwelling units required to comply with 233.3.1.1 shall be on an accessible route as required by 206.

EXCEPTION: Where facilities contain 15 or fewer residential dwelling units, the requirements of 233.3.1.1 and 233.3.1.2 shall apply to the total number of residential dwelling units that are altered under a single contract, or are developed as a whole, whether or not located on a common site.

Advisory 233.3.4.2 Alterations to Individual Residential Dwelling Units. Section 233.3.4.2 uses the terms “substantially altered” and “altered.” A substantial alteration to a kitchen or bathroom includes, but is not limited to, alterations that are changes to or rearrangements in the plan configuration, or replacement of cabinetry. Substantial alterations do not include normal maintenance or appliance and fixture replacement, unless such maintenance or replacement requires changes to or rearrangements in the plan configuration, or replacement of cabinetry. The term “alteration” is defined both in Section 106 of these requirements and in the Department of Justice ADA regulations.

233.3.5 Dispersion. Residential dwelling units required to provide mobility features complying with 809.2 through 809.4 and residential dwelling units required to provide communication features complying with 809.5 shall be dispersed among the various types of residential dwelling units in the facility and shall provide choices of residential dwelling units comparable to, and integrated with, those available to other residents.

EXCEPTION: Where multi-story residential dwelling units are one of the types of residential dwelling units provided, one-story residential dwelling units shall be permitted as a substitute for multi-story residential dwelling units where equivalent spaces and amenities are provided in the one-story residential dwelling unit.

Note to Reader: The Department of Justice’s ADA standards also

require the following:

Social service center establishments. Group homes, halfway houses, shelters, or similar social service center establishments that provide either temporary sleeping accommodations or residential dwelling units that are subject to this part [of the title III regulation or to this section of the title II regulation] shall comply with the provisions of the 2010 Standards applicable to residential facilities, including, but not limited to, the provisions in sections 233 and 809.

(1) In sleeping rooms with more than 25 beds covered by this part [of the title III regulation or to this section of the title II regulation], a minimum of 5% of the beds shall have clear floor space complying with section 806.2.3 of the 2010 Standards.

(2) Facilities with more than 50 beds covered by this part [of the title III regulation or to this section of the title II regulation] that provide common use bathing facilities shall provide at least one roll-in shower with a seat that complies with the relevant provisions of section 608 of the 2010 Standards. Transfer-type showers are not permitted in lieu of a roll-in shower with a seat, and the exceptions in sections 608.3 and 608.4 for residential dwelling units are not permitted. When separate shower facilities are provided for

men and for women, at least one roll-in shower shall be provided for each group.

The Department of Justice's ADA standards also require the following:

Housing at a place of education. Housing at a place of education that is subject to this part [of the title III regulation or to this section of the title II regulation] shall comply with the provisions of the 2010 Standards applicable to transient lodging, including, but not limited to, the requirements for transient lodging guest rooms in sections 224 and 806, subject to the following exceptions. For the purposes of the application of this section, the term "sleeping room" is intended to be used interchangeably with the term "guest room" as it is used in the transient lodging standards.

(1) Kitchens within housing units containing accessible sleeping rooms with mobility features (including suites and clustered sleeping rooms) or on floors containing accessible sleeping rooms with mobility features shall provide turning spaces that comply with section 809.2.2 of the 2010 Standards and kitchen work surfaces that comply with section 804.3 of the 2010 Standards.

(2) Multi-bedroom housing units containing accessible sleeping rooms with mobility features shall have an accessible route throughout the unit in accordance with section 809.2 of the 2010 Standards.

(3) Apartments or townhouse facilities that are provided by or on behalf of a place of education, which are leased on a year-round basis exclusively to graduate students or faculty and do not contain any public use or common use areas available for educational programming, are not subject to the transient lodging standards and shall comply with the requirements for residential facilities in sections 233 and 809 of the 2010 Standards.

234 Amusement Rides

234.1 General. Amusement rides shall comply with 234.

EXCEPTION: Mobile or portable amusement rides shall not be required to comply with 234.

Advisory 234.1 General. These requirements apply generally to newly designed and constructed amusement rides and attractions. A custom designed and constructed ride is new upon its first use, which is the first time amusement park patrons take the ride. With respect to amusement rides purchased from other entities, new refers to the first permanent installation of the ride, whether it is used off the shelf or modified before it is installed. Where amusement rides are moved after several seasons to another area of the park or to another park, the ride would not be considered newly designed or newly constructed.

Some amusement rides and attractions that have unique designs and features are not addressed by these requirements. In those situations, these requirements are to be applied to the extent possible. An example of an amusement ride not specifically addressed by these requirements includes “virtual reality” rides where the device does not move through a fixed course within a defined area. An accessible route must be provided to these rides. Where an attraction or ride has unique features for which there are no

applicable scoping provisions, then a reasonable number, but at least one, of the features must be located on an accessible route. Where there are appropriate technical provisions, they must be applied to the elements that are covered by the scoping provisions.

Advisory 234.1 General Exception. Mobile or temporary rides are those set up for short periods of time such as traveling carnivals, State and county fairs, and festivals. The amusement rides that are covered by 234.1 are ones that are not regularly assembled and disassembled.

234.2 Load and Unload Areas. Load and unload areas serving amusement rides shall comply with 1002.3.

234.3 Minimum Number. Amusement rides shall provide at least one wheelchair space complying with 1002.4, or at least one amusement ride seat designed for transfer complying with 1002.5, or at least one transfer device complying with 1002.6.

EXCEPTIONS: 1. Amusement rides that are controlled or operated by the rider shall not be required to comply with 234.3.

2. Amusement rides designed primarily for children, where children are assisted on and off the ride by an adult, shall not be required to comply with 234.3.

3. Amusement rides that do not provide amusement ride seats shall not be required to comply with 234.3.

Advisory 234.3 Minimum Number Exceptions 1 through 3. Amusement rides controlled or operated by the rider, designed for children, or rides without ride seats are not required to comply with 234.3. These rides are not exempt from the other provisions in 234 requiring an accessible route to the load and unload areas and to the ride. The exception does not apply to those rides where patrons may cause the ride to make incidental movements, but where the patron otherwise has no control over the ride.

Advisory 234.3 Minimum Number Exception 2. The exception is limited to those rides designed “primarily” for children, where children are assisted on and off the ride by an adult. This exception is limited to those rides designed for children and not for the occasional adult user. An accessible route to and turning space in the load and unload area will provide access for adults and family members assisting children on and off these rides.

234.4 Existing Amusement Rides. Where existing amusement rides are altered, the alteration shall comply with 234.4.

Advisory 234.4 Existing Amusement Rides. Routine maintenance, painting, and changing of theme boards are examples of activities that do not constitute an alteration subject to this section.

234.4.1 Load and Unload Areas. Where load and unload areas serving existing amusement rides are newly designed and constructed, the load and unload areas shall comply with 1002.3.

234.4.2 Minimum Number. Where the structural or operational characteristics of an amusement ride are altered to the extent that the amusement ride’s performance differs from that specified by the manufacturer or the original design, the amusement ride shall comply with 234.3.

235 Recreational Boating Facilities

235.1 General. Recreational boating facilities shall comply with 235.

235.2 Boat Slips. Boat slips complying with 1003.3.1 shall be provided in accordance with Table 235.2. Where the number of boat slips is not identified, each 40 feet (12 m) of boat slip edge provided along the perimeter of the pier shall be counted as one boat slip for the purpose of this section.

Total Number of Boat Slips Provided in Facility	Minimum Number of Required accessible Boat Slips
1 to 25	1
26 to 50	2
51 to 100	3

Total Number of Boat Slips Provided in Facility	Minimum Number of Required accessible Boat Slips
101 to 150	4
151 to 300	5
301 to 400	6
401 to 500	7
501 to 600	8
601 to 700	9
701 to 800	10
801 to 900	11
901 to 1000	12
1001 and over	12, plus 1 for every 100, or fraction thereof, over 1000

Table 235.2 Boat Slips

Advisory 235.2 Boat Slips. The requirement for boat slips also applies to piers where boat slips are not demarcated. For example, a single pier 25 feet (7620 mm) long and 5 feet (1525 mm) wide (the minimum width specified by Section 1003.3) allows boats to moor on three sides. Because the number of boat slips is not demarcated, the total length of boat slip edge (55 feet, 17 m) must be used to determine the number of boat slips provided (two). This number is

based on the specification in Section 235.2 that each 40 feet (12 m) of boat slip edge, or fraction thereof, counts as one boat slip. In this example, Table 235.2 would require one boat slip to be accessible.

235.2.1 Dispersion. Boat slips complying with 1003.3.1 shall be dispersed throughout the various types of boat slips provided. Where the minimum number of boat slips required to comply with 1003.3.1 has been met, no further dispersion shall be required.

Advisory 235.2.1 Dispersion. Types of boat slips are based on the size of the boat slips; whether single berths or double berths, shallow water or deep water, transient or longer-term lease, covered or uncovered; and whether slips are equipped with features such as telephone, water, electricity or cable connections. The term “boat slip” is intended to cover any pier area other than launch ramp boarding piers where recreational boats are moored for purposes of berthing, embarking, or disembarking. For example, a fuel pier may contain boat slips, and this type of short term slip would be included in determining compliance with 235.2.

235.3 Boarding Piers at Boat Launch Ramps. Where boarding piers are provided at boat launch ramps, at least 5 percent, but no fewer than one, of the boarding piers shall comply with 1003.3.2.

236 Exercise Machines and Equipment

236.1 General. At least one of each type of exercise machine and equipment shall comply with 1004.

Advisory 236.1 General. Most strength training equipment and machines are considered different types. Where operators provide a biceps curl machine and cable-cross-over machine, both machines are required to meet the provisions in this section, even though an individual may be able to work on their biceps through both types of equipment. Similarly, there are many types of cardiovascular exercise machines, such as stationary bicycles, rowing machines, stair climbers, and treadmills. Each machine provides a cardiovascular exercise and is considered a different type for purposes of these requirements.

237 Fishing Piers and Platforms

237.1 General. Fishing piers and platforms shall comply with 1005.

238 Golf Facilities

238.1 General. Golf facilities shall comply with 238.

238.2 Golf Courses. Golf courses shall comply with 238.2.

238.2.1 Teeing Grounds. Where one teeing ground is provided for a hole, the teeing ground shall be designed and constructed so that a golf car can enter and exit the teeing ground. Where two teeing grounds are provided for a hole, the forward teeing ground shall be designed and constructed so that a golf car can enter and exit the teeing ground. Where three or more teeing grounds are provided for a hole, at least two teeing grounds, including the forward teeing ground, shall be designed and constructed so that a golf car can enter and exit each teeing ground.

EXCEPTION: In existing golf courses, the forward teeing ground shall not be required to be one of the teeing grounds on a hole designed and constructed so that a golf car can enter and exit the teeing ground where compliance is not feasible due to terrain.

238.2.2 Putting Greens. Putting greens shall be designed and constructed so that a golf car can enter and exit the putting green.

238.2.3 Weather Shelters. Where provided, weather shelters shall be designed and constructed so that a golf car can enter and exit the weather shelter and shall comply with 1006.4.

238.3 Practice Putting Greens, Practice Teeing Grounds, and Teeing Stations at Driving Ranges. At least 5 percent, but no fewer than one, of practice putting greens, practice teeing grounds, and teeing stations at driving ranges shall be designed and constructed so

that a golf car can enter and exit the practice putting greens, practice teeing grounds, and teeing stations at driving ranges.

239 Miniature Golf Facilities

239.1 General. Miniature golf facilities shall comply with 239.

239.2 Minimum Number. At least 50 percent of holes on miniature golf courses shall comply with 1007.3.

Advisory 239.2 Minimum Number. Where possible, providing access to all holes on a miniature golf course is recommended. If a course is designed with the minimum 50 percent accessible holes, designers or operators are encouraged to select holes which provide for an equivalent experience to the maximum extent possible.

239.3 Miniature Golf Course Configuration. Miniature golf courses shall be configured so that the holes complying with 1007.3 are consecutive. Miniature golf courses shall provide an accessible route from the last hole complying with 1007.3 to the course entrance or exit without requiring travel through any other holes on the course.

EXCEPTION: One break in the sequence of consecutive holes shall be permitted provided that the last hole on the miniature golf course is the last hole in the sequence.

Advisory 239.3 Miniature Golf Course Configuration. Where only the minimum 50 percent of the holes are accessible, an accessible route from the last accessible hole to the course exit or entrance must not require travel back through other holes. In some cases, this may require an additional accessible route. Other options include increasing the number of accessible holes in a way that limits the distance needed to connect the last accessible hole with the course exit or entrance.

240 Play Areas

240.1 General. Play areas for children ages 2 and over shall comply with 240. Where separate play areas are provided within a site for specific age groups, each play area shall comply with 240.

EXCEPTIONS: 1. Play areas located in family child care facilities where the proprietor actually resides shall not be required to comply with 240.

2. In existing play areas, where play components are relocated for the purposes of creating safe use zones and the ground surface is not altered or extended for more than one use zone, the play area shall not be required to comply with 240.

3. Amusement attractions shall not be required to comply with 240.

4. Where play components are altered and the ground surface is not altered, the ground surface shall not be required to comply with 1008.2.6 unless required by 202.4.

Advisory 240.1 General. Play areas may be located on exterior sites or within a building. Where separate play areas are provided within a site for children in specified age groups (e.g., preschool (ages 2 to 5) and school age (ages 5 to 12)), each play area must comply with this section. Where play areas are provided for the same age group on a site but are geographically separated (e.g., one is located next to a picnic area and another is located next to a softball field), they are considered separate play areas and each play area must comply with this section.

240.1.1 Additions. Where play areas are designed and constructed in phases, the requirements of 240 shall apply to each successive addition so that when the addition is completed, the entire play area complies with all the applicable requirements of 240.

Advisory 240.1.1 Additions. These requirements are to be applied so that when each successive addition is completed, the entire play area complies with all applicable provisions. For example, a play area is built in two phases. In the first phase, there are 10 elevated play components and 10 elevated play components are added in the second phase for a total of 20 elevated play components in the play area. When the first phase was completed, at least 5

elevated play components, including at least 3 different types, were to be provided on an accessible route. When the second phase is completed, at least 10 elevated play components must be located on an accessible route, and at least 7 ground level play components, including 4 different types, must be provided on an accessible route. At the time the second phase is complete, ramps must be used to connect at least 5 of the elevated play components and transfer systems are permitted to be used to connect the rest of the elevated play components required to be located on an accessible route.

240.2 Play Components. Where provided, play components shall comply with 240.2.

240.2.1 Ground Level Play Components. Ground level play components shall be provided in the number and types required by 240.2.1. Ground level play components that are provided to comply with 240.2.1.1 shall be permitted to satisfy the additional number required by 240.2.1.2 if the minimum required types of play components are satisfied. Where two or more required ground level play components are provided, they shall be dispersed throughout the play area and integrated with other play components.

Advisory 240.2.1 Ground Level Play Components. Examples of ground level play components may include spring rockers, swings, diggers, and stand-alone slides. When distinguishing between the different types of ground level play components, consider the general experience provided by the play component. Examples of different types of

experiences include, but are not limited to, rocking, swinging, climbing, spinning, and sliding. A spiral slide may provide a slightly different experience from a straight slide, but sliding is the general experience and therefore a spiral slide is not considered a different type of play component from a straight slide.

Ground level play components accessed by children with disabilities must be integrated into the play area. Designers should consider the optimal layout of ground level play components accessed by children with disabilities to foster interaction and socialization among all children. Grouping all ground level play components accessed by children with disabilities in one location is not considered integrated.

Where a stand-alone slide is provided, an accessible route must connect the base of the stairs at the entry point to the exit point of the slide. A ramp or transfer system to the top of the slide is not required. Where a sand box is provided, an accessible route must connect to the border of the sand box. Accessibility to the sand box would be enhanced by providing a transfer system into the sand or by providing a raised sand table with knee clearance complying with 1008.4.3.

Ramps are preferred over transfer systems since not all children who use wheelchairs or other mobility devices may be able to use, or may choose not to use, transfer systems. Where ramps connect elevated play components, the maximum rise of any ramp run is limited to 12 inches (305 mm). Where possible, designers and operators are encouraged to provide ramps with a slope less than the 1:12 maximum. Berms or sculpted dirt may

be used to provide elevation and may be part of an accessible route to composite play structures.

Platform lifts are permitted as a part of an accessible route. Because lifts must be independently operable, operators should carefully consider the appropriateness of their use in unsupervised settings.

240.2.1.1 Minimum Number and Types. Where ground level play components are provided, at least one of each type shall be on an accessible route and shall comply with 1008.4.

240.2.1.2 Additional Number and Types. Where elevated play components are provided, ground level play components shall be provided in accordance with Table 240.2.1.2 and shall comply with 1008.4.

EXCEPTION: If at least 50 percent of the elevated play components are connected by a ramp and at least 3 of the elevated play components connected by the ramp are different types of play components, the play area shall not be required to comply with 240.2.1.2.

Number of Elevated Play Components Provided	Minimum Number of Ground Level Play Components Required to be on an accessible Route	Minimum Number of Different Types of Ground Level Play Components Required to be on an accessible Route
1	Not applicable	Not applicable

Number of Elevated Play Components Provided	Minimum Number of Ground Level Play Components Required to be on an accessible Route	Minimum Number of Different Types of Ground Level Play Components Required to be on an accessible Route
2 to 4	1	1
5 to 7	2	2
8 to 10	3	3
11 to 13	4	3
14 to 16	5	3
17 to 19	6	3
20 to 22	7	4
23 to 25	8	4
26 and over	8, plus 1 for each additional 3, or fraction thereof, over 25	5

Table 240.2.1.2 Number and Types of Ground Level Play Components Required to be on accessible Routes

Advisory 240.2.1.2 Additional Number and Types. Where a large play area includes two or more composite play structures designed for the same age group, the total number of elevated play components on all the composite play

structures must be added to determine the additional number and types of ground level play components that must be provided on an accessible route.

240.2.2 Elevated Play Components. Where elevated play components are provided, at least 50 percent shall be on an accessible route and shall comply with 1008.4.

Advisory 240.2.2 Elevated Play Components. A double or triple slide that is part of a composite play structure is one elevated play component. For purposes of this section, ramps, transfer systems, steps, decks, and roofs are not considered elevated play components. Although socialization and pretend play can occur on these elements, they are not primarily intended for play.

Some play components that are attached to a composite play structure can be approached or exited at the ground level or above grade from a platform or deck. For example, a climber attached to a composite play structure can be approached or exited at the ground level or above grade from a platform or deck on a composite play structure. Play components that are attached to a composite play structure and can be approached from a platform or deck (e.g., climbers and overhead play components) are considered elevated play components. These play components are not considered ground level play components and do not count toward the requirements in 240.2.1.2 regarding the number of ground level play components that must be located on an accessible route.

241 Saunas and Steam Rooms

241 General. Where provided, saunas and steam rooms shall comply with 612.

EXCEPTION: Where saunas or steam rooms are clustered at a single location, no more than 5 percent of the saunas and steam rooms, but no fewer than one, of each type in each cluster shall be required to comply with 612.

242 Swimming Pools, Wading Pools, and Spas

242.1 General. Swimming pools, wading pools, and spas shall comply with 242.

242.2 Swimming Pools. At least two accessible means of entry shall be provided for swimming pools. accessible means of entry shall be swimming pool lifts complying with 1009.2; sloped entries complying with 1009.3; transfer walls complying with 1009.4; transfer systems complying with 1009.5; and pool stairs complying with 1009.6. At least one accessible means of entry provided shall comply with 1009.2 or 1009.3.

EXCEPTIONS: 1. Where a swimming pool has less than 300 linear feet (91 m) of swimming pool wall, no more than one accessible means of entry shall be required provided that the accessible means of entry is a swimming pool lift complying with 1009.2 or sloped entry complying with 1009.3.

2. Wave action pools, leisure rivers, sand bottom pools, and other pools where user access is limited to one area shall not be required to provide more than one accessible means of entry provided that the accessible means of entry is a swimming pool lift complying with 1009.2, a sloped entry complying with 1009.3, or a transfer system complying with 1009.5.

3. Catch pools shall not be required to provide an accessible means of entry provided that the catch pool edge is on an accessible route.

Advisory 242.2 Swimming Pools. Where more than one means of access is provided into the water, it is recommended that the means be different. Providing different means of access will better serve the varying needs of people with disabilities in getting into and out of a swimming pool. It is also recommended that where two or more means of access are provided, they not be provided in the same location in the pool. Different locations will provide increased options for entry and exit, especially in larger pools.

Advisory 242.2 Swimming Pools Exception 1. Pool walls at diving areas and areas along pool walls where there is no pool entry because of landscaping or adjacent structures are to be counted when determining the number of accessible means of entry required.

242.3 Wading Pools. At least one accessible means of entry shall be provided for wading pools. Accessible means of entry shall comply with sloped entries complying with 1009.3.

242.4 Spas. At least one accessible means of entry shall be provided for spas. accessible means of entry shall comply with swimming pool lifts complying with 1009.2; transfer walls complying with 1009.4; or transfer systems complying with 1009.5.

EXCEPTION: Where spas are provided in a cluster, no more than 5 percent, but no fewer than one, spa in each cluster shall be required to comply with 242.4.

243 Shooting Facilities with Firing Positions

243.1 General. Where shooting facilities with firing positions are designed and constructed at a site, at least 5 percent, but no fewer than one, of each type of firing position shall comply with 1010.

Chapter 3: Building Blocks

- **301 General**
- **302 Floor or Ground Surfaces**
- **303 Changes in Level**
- **304 Turning Space**
- **305 Clear Floor or Ground Space**
- **306 Knee and Toe Clearance**
- **307 Protruding Objects**
- **308 Reach Ranges**
- **309 Operable Parts**

301 General

301.1 Scope. The provisions of Chapter 3 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

302 Floor or Ground Surfaces

302.1 General. Floor and ground surfaces shall be stable, firm, and slip resistant and shall comply with 302.

EXCEPTIONS: 1. Within animal containment areas, floor and ground surfaces shall not be required to be stable, firm, and slip resistant.

2. Areas of sport activity shall not be required to comply with 302.

Advisory 302.1 General. A stable surface is one that remains unchanged by contaminants or applied force, so that when the contaminant or force is removed, the surface returns to its original condition. A firm surface resists deformation by either indentations or particles moving on its surface. A slip-resistant surface provides sufficient frictional counterforce to the forces exerted in walking to permit safe ambulation.

302.2 Carpet. Carpet or carpet tile shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. Carpet or carpet tile shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be 1/2 inch (13 mm) maximum. Exposed edges of carpet shall be fastened to floor surfaces and shall have trim on the entire length of the exposed edge. Carpet edge trim shall comply with 303.

Advisory 302.2 Carpet. Carpets and permanently affixed mats can significantly increase the amount of force (roll resistance) needed to propel a wheelchair over a surface. The firmer the carpeting and backing, the lower the roll resistance. A pile thickness up to 1/2 inch (13 mm) (measured to the backing, cushion, or pad) is allowed, although a lower pile provides easier wheelchair maneuvering. If a backing, cushion or pad is used, it must be firm. Preferably, carpet pad should not be used because the soft padding increases roll resistance.

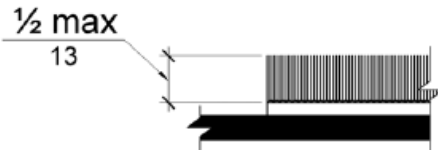


Figure 302.2 Carpet Pile Height

302.3 Openings. Openings in floor or ground surfaces shall not allow passage of a sphere more than ½ inch (13 mm) diameter except as allowed in 407.4.3, 409.4.3, 410.4, 810.5.3 and 810.10. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

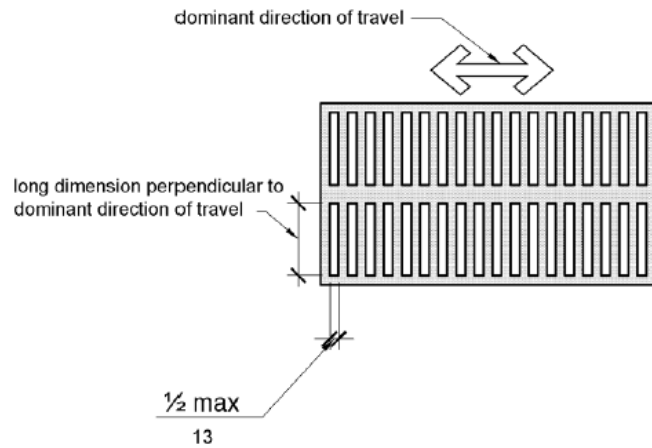


Figure 302.3 Elongated Openings in Floor or Ground Surfaces

303 Changes in Level

303.1 General. Where changes in level are permitted in floor or ground surfaces, they shall comply with 303.

EXCEPTIONS: 1. Animal containment areas shall not be required to comply with 303.

2. Areas of sport activity shall not be required to comply with 303.

303.2 Vertical. Changes in level of ¼ inch (6.4 mm) high maximum shall be permitted to be vertical.

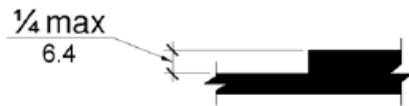


Figure 303.2 Vertical Change in Level

303.3 Beveled. Changes in level between 1/4 inch (6.4 mm) high minimum and 1/2 inch (13 mm) high maximum shall be beveled with a slope not steeper than 1:2.

Advisory 303.3 Beveled. A change in level of 1/2 inch (13 mm) is permitted to be 1/4 inch (6.4 mm) vertical plus 1/4 inch (6.4 mm) beveled. However, in no case may the combined change in level exceed 1/2 inch (13 mm). Changes in level exceeding 1/2 inch (13 mm) must comply with 405 (Ramps) or 406 (Curb Ramps).

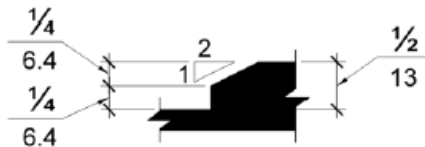


Figure 303.3 Beveled Change in Level

303.4 Ramps. Changes in level greater than 1/2 inch (13 mm) high shall be ramped, and shall comply with 405 or 406.

304 Turning Space

304.1 General. Turning space shall comply with 304.

304.2 Floor or Ground Surfaces. Floor or ground surfaces of a turning space shall comply with 302. Changes in level are not permitted.

EXCEPTION: Slopes not steeper than 1:48 shall be permitted.

Advisory 304.2 Floor or Ground Surface Exception. As used in this section, the phrase “changes in level” refers to surfaces with slopes and to surfaces with abrupt rise exceeding that permitted in Section 303.3. Such changes in level are prohibited in required clear floor and ground spaces, turning spaces, and in similar spaces where people using wheelchairs and other mobility devices must park their mobility aids such as in wheelchair spaces, or maneuver to use elements such as at doors, fixtures, and telephones. The exception permits slopes not steeper than 1:48.

304.3 Size. Turning space shall comply with 304.3.1 or 304.3.2.

304.3.1 Circular Space. The turning space shall be a space of 60 inches (1525 mm) diameter minimum. The space shall be permitted to include knee and toe clearance complying with 306.

304.3.2 T-Shaped Space. The turning space shall be a T-shaped space within a 60 inch (1525 mm) square minimum with arms and base 36 inches (915 mm) wide minimum. Each arm of the T shall be clear of obstructions 12 inches (305 mm) minimum in each direction and the base shall be clear of obstructions 24 inches (610 mm) minimum. The space shall be permitted to include knee and toe clearance complying with 306 only at the end of either the base or one arm.

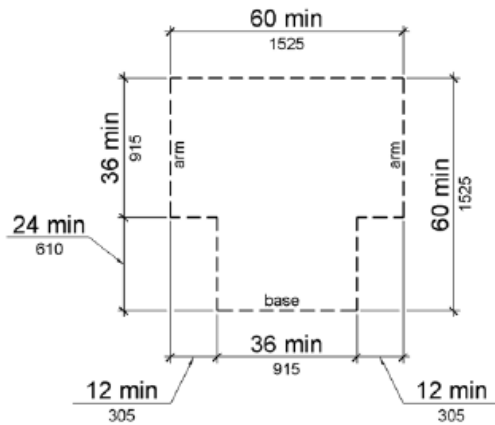


Figure 304.3.2 T-Shaped Turning Space

304.4 Door Swing. Doors shall be permitted to swing into turning spaces.

305 Clear Floor or Ground Space

305.1 General. Clear floor or ground space shall comply with 305.

305.2 Floor or Ground Surfaces. Floor or ground surfaces of a clear floor or ground space shall comply with 302. Changes in level are not permitted.

EXCEPTION: Slopes not steeper than 1:48 shall be permitted.

305.3 Size. The clear floor or ground space shall be 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum.

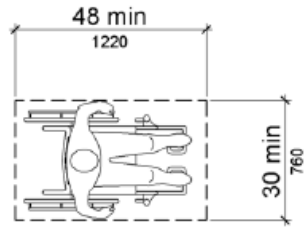


Figure 305.3 Clear Floor or Ground Space

305.4 Knee and Toe Clearance. Unless otherwise specified, clear floor or ground space shall be permitted to include knee and toe clearance complying with 306.

305.5 Position. Unless otherwise specified, clear floor or ground space shall be positioned for either forward or parallel approach to an element.

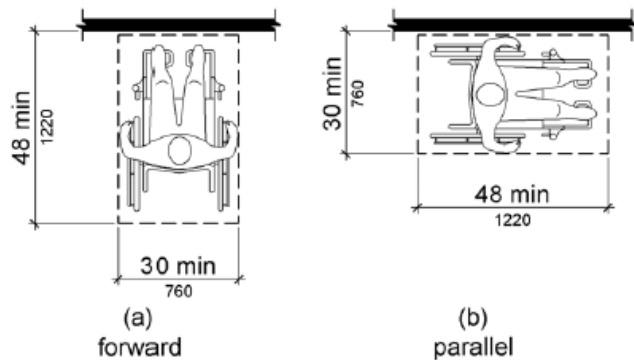


Figure 305.5 Position of Clear Floor or Ground Space

305.6 Approach. One full unobstructed side of the clear floor or ground space shall adjoin an accessible route or adjoin another clear floor or ground space.

305.7 Maneuvering Clearance. Where a clear floor or ground space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearance shall be provided in accordance with 305.7.1 and 305.7.2.

305.7.1 Forward Approach. Alcoves shall be 36 inches (915 mm) wide minimum where the depth exceeds 24 inches (610 mm).

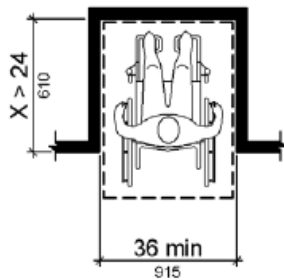


Figure 305.7.1 Maneuvering Clearance in an Alcove, Forward Approach

305.7.2 Parallel Approach. Alcoves shall be 60 inches (1525 mm) wide minimum where the depth exceeds 15 inches (380 mm).

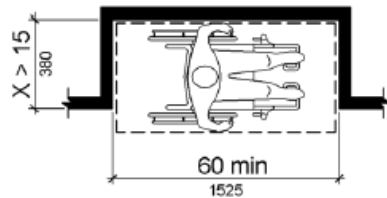


Figure 305.7.2 Maneuvering Clearance in an Alcove, Parallel Approach

306 Knee and Toe Clearance

306.1 General. Where space beneath an element is included as part of clear floor or ground space or turning space, the space shall comply with 306. Additional space shall not be prohibited beneath an element but shall not be considered as part of the clear floor or ground space or turning space.

Advisory 306.1 General. Clearances are measured in relation to the usable clear floor space, not necessarily to the vertical support for an element. When determining clearance under an object for required turning or maneuvering space, care should be taken to ensure the space is clear of any obstructions.

306.2 Toe Clearance.

306.2.1 General. Space under an element between the finish floor or ground and 9 inches (230 mm) above the finish floor or ground shall be considered toe clearance and shall comply with 306.2.

306.2.2 Maximum Depth. Toe clearance shall extend 25 inches (635 mm) maximum under an element.

306.2.3 Minimum Required Depth. Where toe clearance is required at an element as part of a clear floor space, the toe clearance shall extend 17 inches (430 mm) minimum under the element.

306.2.4 Additional Clearance. Space extending greater than 6 inches (150 mm) beyond the available knee clearance at 9 inches (230 mm) above the finish floor or ground shall not be considered toe clearance.

306.2.5 Width. Toe clearance shall be 30 inches (760 mm) wide minimum.

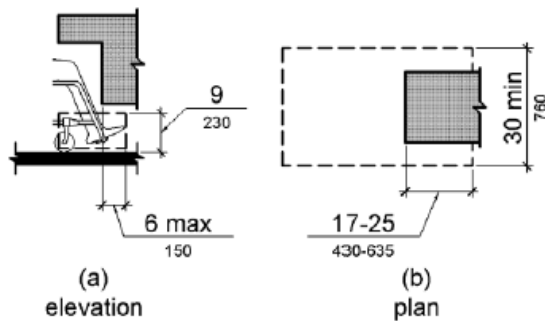


Figure 306.2 Toe Clearance

306.3 Knee Clearance.

306.3.1 General. Space under an element between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground shall be considered knee clearance and shall comply with 306.3.

306.3.2 Maximum Depth. Knee clearance shall extend 25 inches (635 mm) maximum under an element at 9 inches (230 mm) above the finish floor or ground.

306.3.3 Minimum Required Depth. Where knee clearance is required under an element as part of a clear floor space, the knee clearance shall be 11 inches (280 mm) deep minimum at 9 inches (230 mm) above the finish floor or ground, and 8 inches (205 mm) deep minimum at 27 inches (685 mm) above the finish floor or ground.

306.3.4 Clearance Reduction. Between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground, the knee clearance shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for each 6 inches (150 mm) in height.

306.3.5 Width. Knee clearance shall be 30 inches (760 mm) wide minimum.

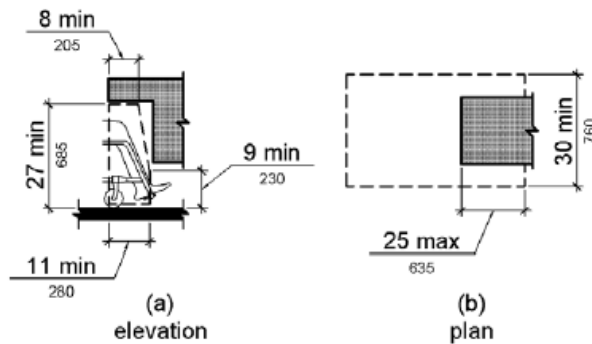


Figure 306.3 Knee Clearance

307 Protruding Objects

307.1 General. Protruding objects shall comply with 307.

307.2 Protrusion Limits. Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finish floor or ground shall protrude 4 inches (100 mm) maximum horizontally into the circulation path.

EXCEPTION: Handrails shall be permitted to protrude 4½ inches (115 mm) maximum.

Advisory 307.2 Protrusion Limits. When a cane is used and the element is in the detectable range, it gives a person sufficient time to detect the element with the cane before there is body contact. Elements located on circulation paths, including operable elements, must comply with requirements for protruding objects. For example, awnings and their supporting structures cannot reduce the minimum required vertical clearance. Similarly, casement windows, when open, cannot encroach more than 4 inches (100 mm) into circulation paths above 27 inches (685 mm).

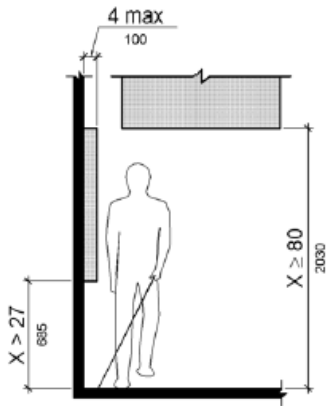


Figure 307.2 Limits of Protruding Objects

307.3 Post-Mounted Objects. Free-standing objects mounted on posts or pylons shall overhang circulation paths 12 inches (305 mm) maximum when located 27 inches (685 mm) minimum and 80 inches (2030 mm) maximum above the finish floor or ground. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of such sign or obstruction shall be 27 inches (685 mm) maximum or 80 inches (2030 mm) minimum above the finish floor or ground.

EXCEPTION: The sloping portions of handrails serving stairs and ramps shall not be required to comply with 307.3.

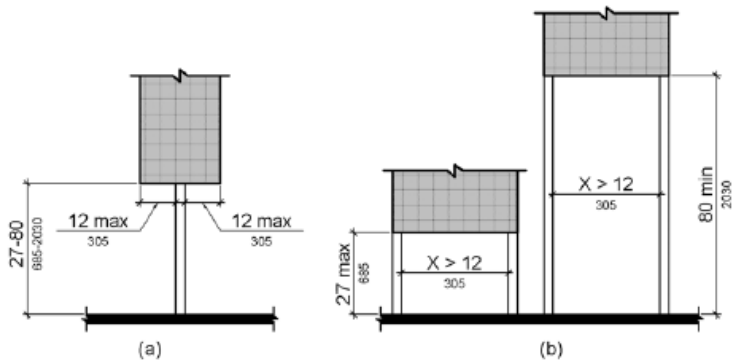


Figure 307.3 Post-Mounted Protruding Objects

307.4 Vertical Clearance. Vertical clearance shall be 80 inches (2030 mm) high minimum. Guardrails or other barriers shall be provided where the vertical clearance is less than 80 inches (2030 mm) high. The leading edge of such guardrail or barrier shall be located 27 inches (685 mm) maximum above the finish floor or ground.

EXCEPTION: Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the finish floor or ground.

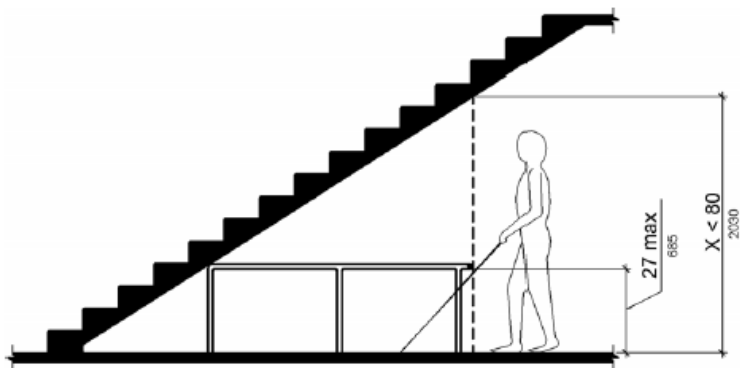


Figure 307.4 Vertical Clearance

307.5 Required Clear Width. Protruding objects shall not reduce the clear width required for accessible routes.

308 Reach Ranges

308.1 General. Reach ranges shall comply with 308.

Advisory 308.1 General. The following table provides guidance on reach ranges for children according to age where building elements such as coat hooks, lockers, or operable parts are designed for use primarily by children. These dimensions apply to either forward or side reaches. Accessible elements and operable parts designed for adult use or children over age 12 can be located outside these ranges but must be within the adult reach ranges required by 308.

Forward or Side Reach **Ages 3 and 4** **Ages 5 through 8** **Ages 9 through 12**

High (maximum)	36 in (915 mm)	40 in (1015 mm)	44 in (1120 mm)
Low (minimum)	20 in (510 mm)	18 in (455 mm)	16 in (405 mm)

Children’s Reach Ranges

308.2 Forward Reach.

308.2.1 Unobstructed. Where a forward reach is unobstructed, the high forward reach shall be 48 inches (1220 mm) maximum and the low forward reach shall be 15 inches (380 mm) minimum above the finish floor or ground.

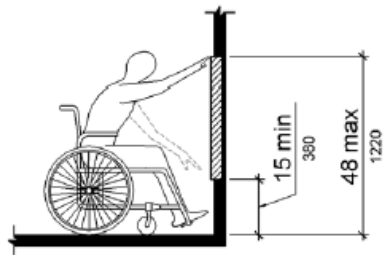


Figure 308.2.1 Unobstructed Forward Reach

308.2.2 Obstructed High Reach. Where a high forward reach is over an obstruction, the clear floor space shall extend beneath the element for a distance not less than the required reach depth over the obstruction. The high forward reach shall be 48 inches (1220 mm) maximum where the reach depth is 20 inches (510 mm) maximum. Where the reach depth exceeds 20 inches (510 mm), the high forward reach shall be 44 inches (1120 mm) maximum and the reach depth shall be 25 inches (635 mm) maximum.

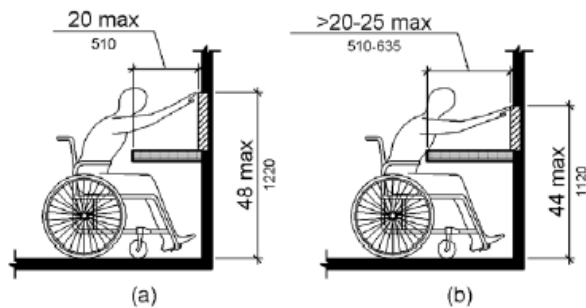


Figure 308.2.2 Obstructed High Forward Reach

308.3 Side Reach.

308.3.1 Unobstructed. Where a clear floor or ground space allows a parallel approach to an element and the side reach is unobstructed, the high side reach shall be 48 inches (1220 mm) maximum and the low side reach shall be 15 inches (380 mm) minimum above the finish floor or ground.

- EXCEPTIONS:
1. An obstruction shall be permitted between the clear floor or ground space and the element where the depth of the obstruction is 10 inches (255 mm) maximum.
 2. Operable parts of fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum measured from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

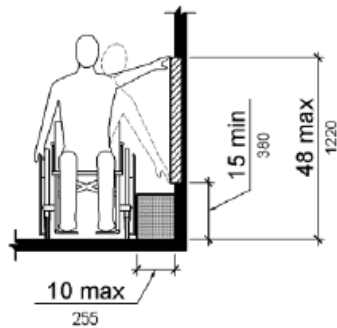


Figure 308.3.1 Unobstructed Side Reach

308.3.2 Obstructed High Reach. Where a clear floor or ground space allows a parallel approach to an element and the high side reach is over an obstruction, the height of the obstruction shall be 34 inches (865 mm) maximum and the depth of the obstruction shall be 24 inches (610 mm) maximum. The high side reach shall be 48 inches (1220 mm) maximum for a reach depth of 10 inches (255 mm) maximum. Where the reach depth exceeds 10 inches (255 mm), the high side reach shall be 46 inches (1170 mm) maximum for a reach depth of 24 inches (610 mm) maximum.

- EXCEPTIONS:
1. The top of washing machines and clothes dryers shall be permitted to be 36 inches (915 mm) maximum above the finish floor.
 2. Operable parts of fuel dispensers shall be permitted to be 54 inches (1370 mm) maximum measured from the surface of the vehicular way where fuel dispensers are installed on existing curbs.

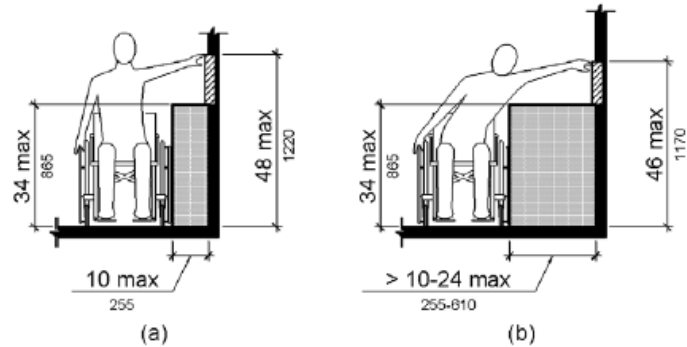


Figure 308.3.2 Obstructed High Side Reach

309 Operable Parts

309.1 General. Operable parts shall comply with 309.

309.2 Clear Floor Space. A clear floor or ground space complying with 305 shall be provided.

309.3 Height. Operable parts shall be placed within one or more of the reach ranges specified in 308.

309.4 Operation. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N) maximum.

EXCEPTION: Gas pump nozzles shall not be required to provide operable parts that have an activating force of 5 pounds (22.2 N) maximum.

Chapter 4: Accessible Routes

- **401 General**
- **402 Accessible Routes**
- **403 Walking Surfaces**
- **404 Doors, Doorways, and Gates**
- **405 Ramps**
- **406 Curb Ramps**
- **407 Elevators**
- **408 Limited Use / Limited Application Elevators**
- **409 Private Residence Elevators**
- **410 Platform Lifts**

401 General

401.1 Scope. The provisions of Chapter 4 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

402 Accessible Routes

402.1 General. Accessible routes shall comply with 402.

402.2 Components. Accessible routes shall consist of one or more of the following components: walking surfaces with a running slope not steeper than 1:20, doorways, ramps, curb ramps excluding the flared sides, elevators, and platform lifts. All components of an accessible route shall comply with the applicable requirements of Chapter 4.

Advisory 402.2 Components. Walking surfaces must have running slopes not steeper than 1:20, see 403.3. Other components of accessible routes, such as ramps (405) and curb ramps (406), are permitted to be more steeply sloped.

403 Walking Surfaces

403.1 General. Walking surfaces that are a part of an accessible route shall comply with 403.

403.2 Floor or Ground Surface. Floor or ground surfaces shall comply with 302.

403.3 Slope. The running slope of walking surfaces shall not be steeper than 1:20. The cross slope of walking surfaces shall not be steeper than 1:48.

403.4 Changes in Level. Changes in level shall comply with 303.

403.5 Clearances. Walking surfaces shall provide clearances complying with 403.5.

EXCEPTION: Within employee work areas, clearances on common use circulation paths shall be permitted to be decreased by work area equipment provided that the decrease is essential to the function of the work being performed.

403.5.1 Clear Width. Except as provided in 403.5.2 and 403.5.3, the clear width of walking surfaces shall be 36 inches (915 mm) minimum.

EXCEPTION: The clear width shall be permitted to be reduced to 32 inches (815 mm) minimum for a length of 24 inches (610 mm) maximum provided that

reduced width segments are separated by segments that are 48 inches (1220 mm) long minimum and 36 inches (915 mm) wide minimum.

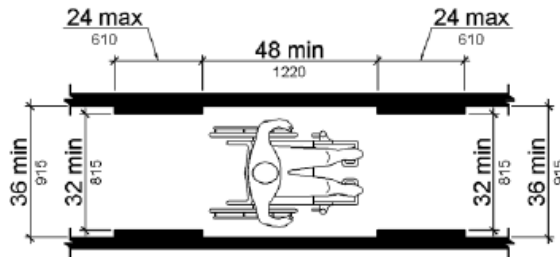


Figure 403.5.1 Clear Width of an Accessible Route

403.5.2 Clear Width at Turn. Where the accessible route makes a 180 degree turn around an element which is less than 48 inches (1220 mm) wide, clear width shall be 42 inches (1065 mm) minimum approaching the turn, 48 inches (1220 mm) minimum at the turn and 42 inches (1065 mm) minimum leaving the turn.

EXCEPTION: Where the clear width at the turn is 60 inches (1525 mm) minimum compliance with 403.5.2 shall not be required.

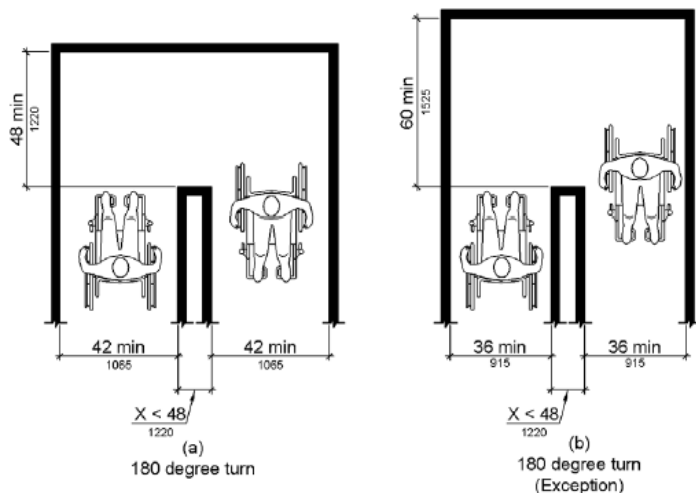


Figure 403.5.2 Clear Width at Turn

403.5.3 Passing Spaces. An accessible route with a clear width less than 60 inches (1525 mm) shall provide passing spaces at intervals of 200 feet (61 m) maximum. Passing spaces shall be either: a space 60 inches (1525 mm) minimum by 60 inches (1525 mm) minimum; or, an intersection of two walking surfaces providing a T-shaped space complying with 304.3.2 where the base and

arms of the T-shaped space extend 48 inches (1220 mm) minimum beyond the intersection.

403.6 Handrails. Where handrails are provided along walking surfaces with running slopes not steeper than 1:20 they shall comply with 505.

Advisory 403.6 Handrails. Handrails provided in elevator cabs and platform lifts are not required to comply with the requirements for handrails on walking surfaces.

404 Doors, Doorways, and Gates

404.1 General. Doors, doorways, and gates that are part of an accessible route shall comply with 404.

EXCEPTION: Doors, doorways, and gates designed to be operated only by security personnel shall not be required to comply with 404.2.7, 404.2.8, 404.2.9, 404.3.2 and 404.3.4 through 404.3.7.

Advisory 404.1 General Exception. Security personnel must have sole control of doors that are eligible for the Exception at 404.1. It would

not be acceptable for security personnel to operate the doors for people with disabilities while allowing others to have independent access.

404.2 Manual Doors, Doorways, and Manual Gates. Manual doors and doorways and manual gates intended for user passage shall comply with 404.2.

404.2.1 Revolving Doors, Gates, and Turnstiles. Revolving doors, revolving gates, and turnstiles shall not be part of an accessible route.

404.2.2 Double-Leaf Doors and Gates. At least one of the active leaves of doorways with two leaves shall comply with 404.2.3 and 404.2.4.

404.2.3 Clear Width. Door openings shall provide a clear width of 32 inches (815 mm) minimum. Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees. Openings more than 24 inches (610 mm) deep shall provide a clear opening of 36 inches (915 mm) minimum. There shall be no projections into the required clear opening width lower than 34 inches (865 mm) above the finish floor or ground. Projections into the clear opening width between 34 inches (865 mm) and 80 inches (2030 mm) above the finish floor or ground shall not exceed 4 inches (100 mm).