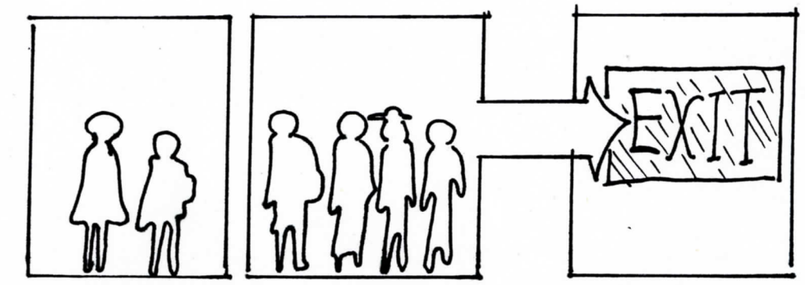
1 Stairs + Egress

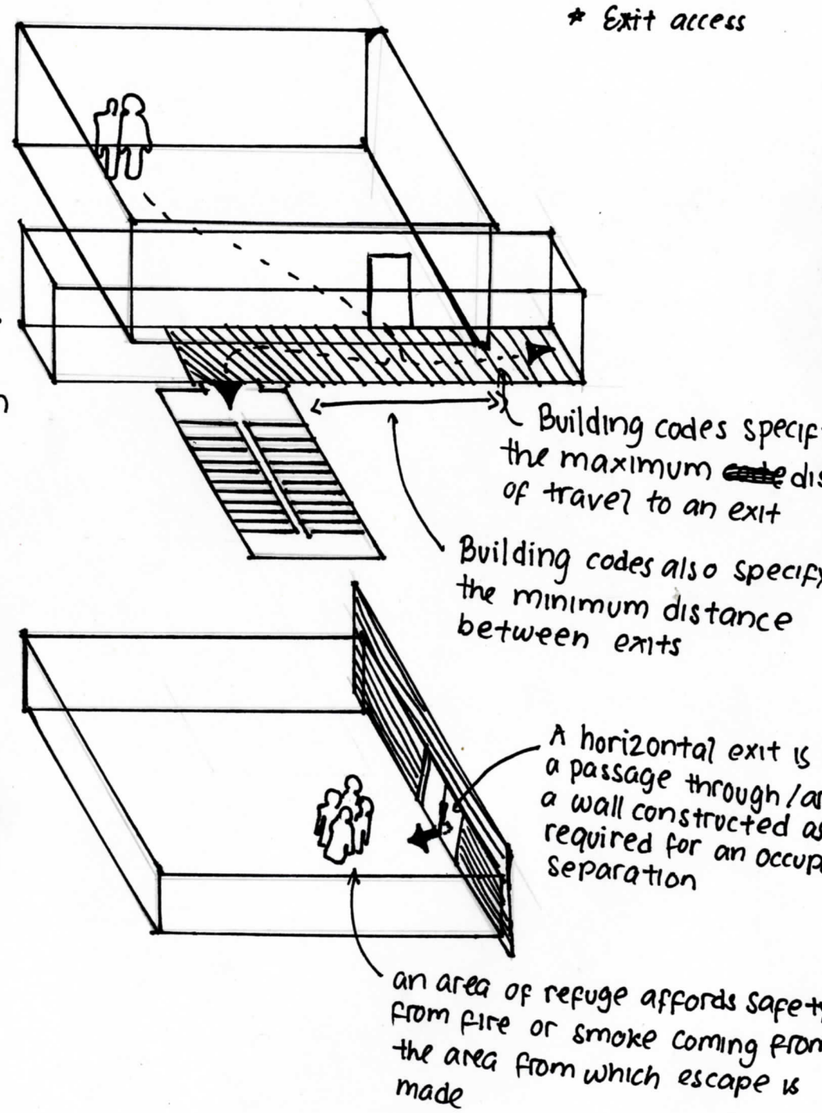
Building Construction Illustrated

A.10 Means of Egress

Questions / Main Idea	~Notes~
◦ Definition of Occupant load	= Total # of persons that may occupy a building or portion thereof at any one time, determined by dividing the floor area assigned to a particular use by the square feet
◦ Building Codes specify	• The fire resistance ratings of materials and construction required for a building, depending on its location, use and occupancy, and size (height, and area per floor) • The fire alarm, sprinkler, and other protection systems required for certain uses and occupancies • The required means of egress for the occupants of a building in case of fire
◦ Exit Access	= The pathway/passageway leading to an exit should be direct as possible

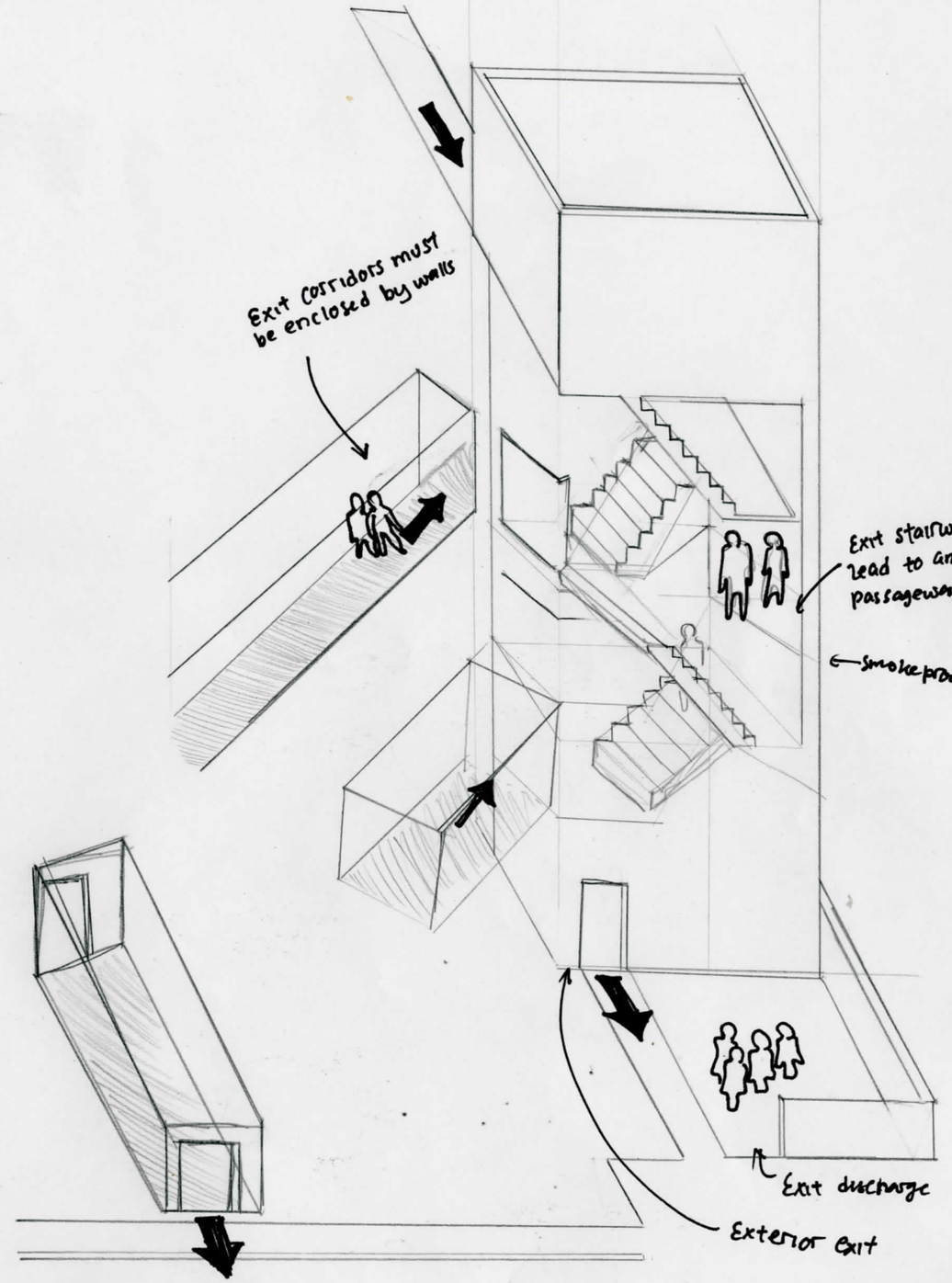


* Exit access



A.11 Means of Egress

Questions / Main Ideas	Notes
○ What does an "Exit" must provide?	= Enclosed and protected means of evacuation for the occupants of a building in the event of fire
★ Exit corridors (Purpose)	= must be enclosed by walls of fire-resistive construction in order to serve as required exits
★ Exit Stairways ~~lead to an exit~~ (purpose)	= lead to an exit passageway, an exit court, or public way enclosed by fire-resistive construction with self-closing fire doors that swing in the direction of exit travel.
★ Exit Doors (Purposes)	= Provide access to a means of egrees, swinging in the direction of exit travel, and usually equipped with a panic bar.
★ Smoke Proof (Purposes)	= Enclosure is the enclosing of an exit stairway by walls of fire-resistive construction, accessible by a vestibule or by an open exterior balcony, and ventilated by natural or mechanical means to limit the penetration of smoke and heat
★ Exterior Exit balcony (Purpose)	= landing/porch projecting from the wall of a building
★ Types of Exit Discharge	○ Exit court = yard/court providing egress to public ○ Exterior exit = Exit door opening directly to an exit court / public way ○ Public way = street/alley / similar to parcel ○ Exit passageway = means of egress connecting a required exit or exit court with a public way, having no ope

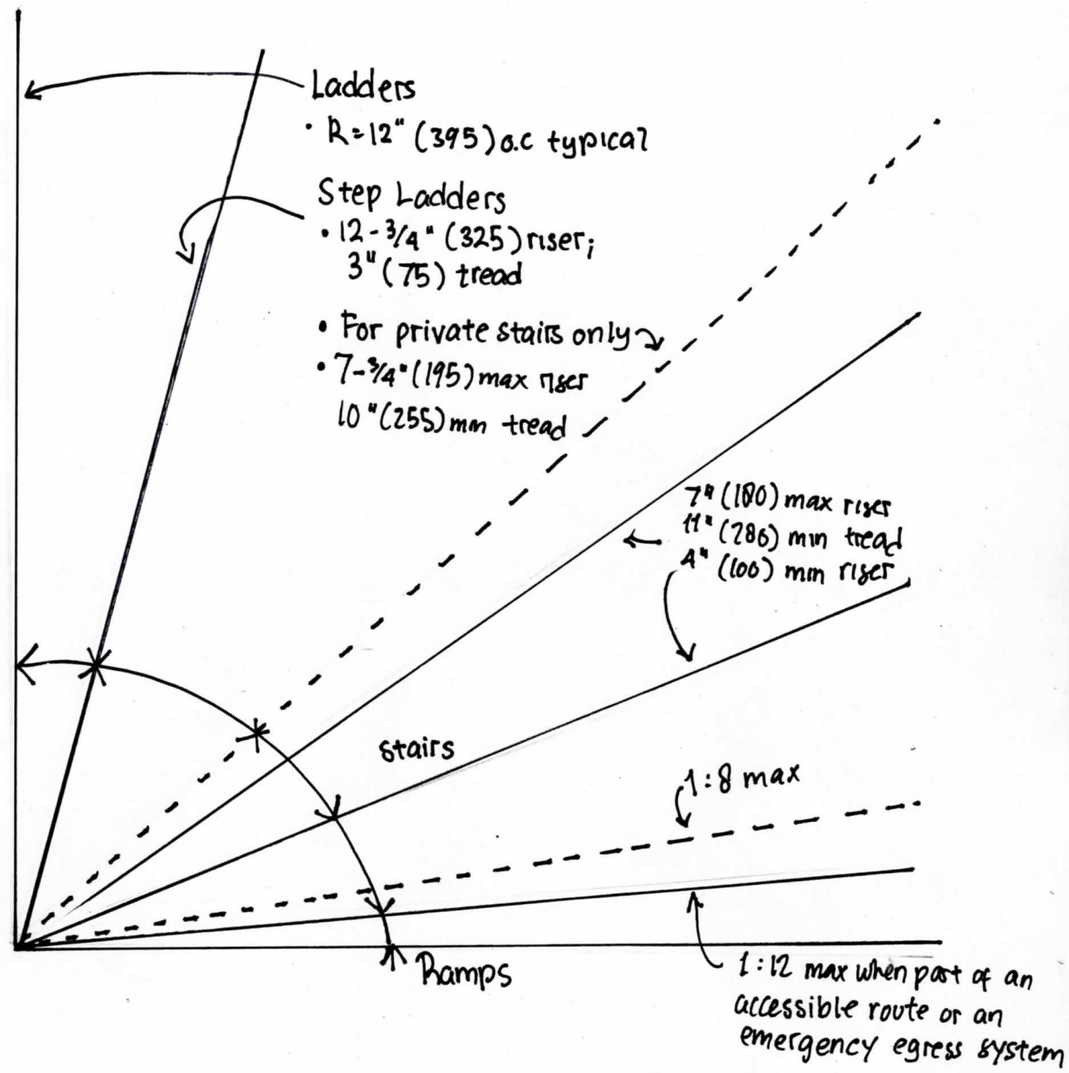


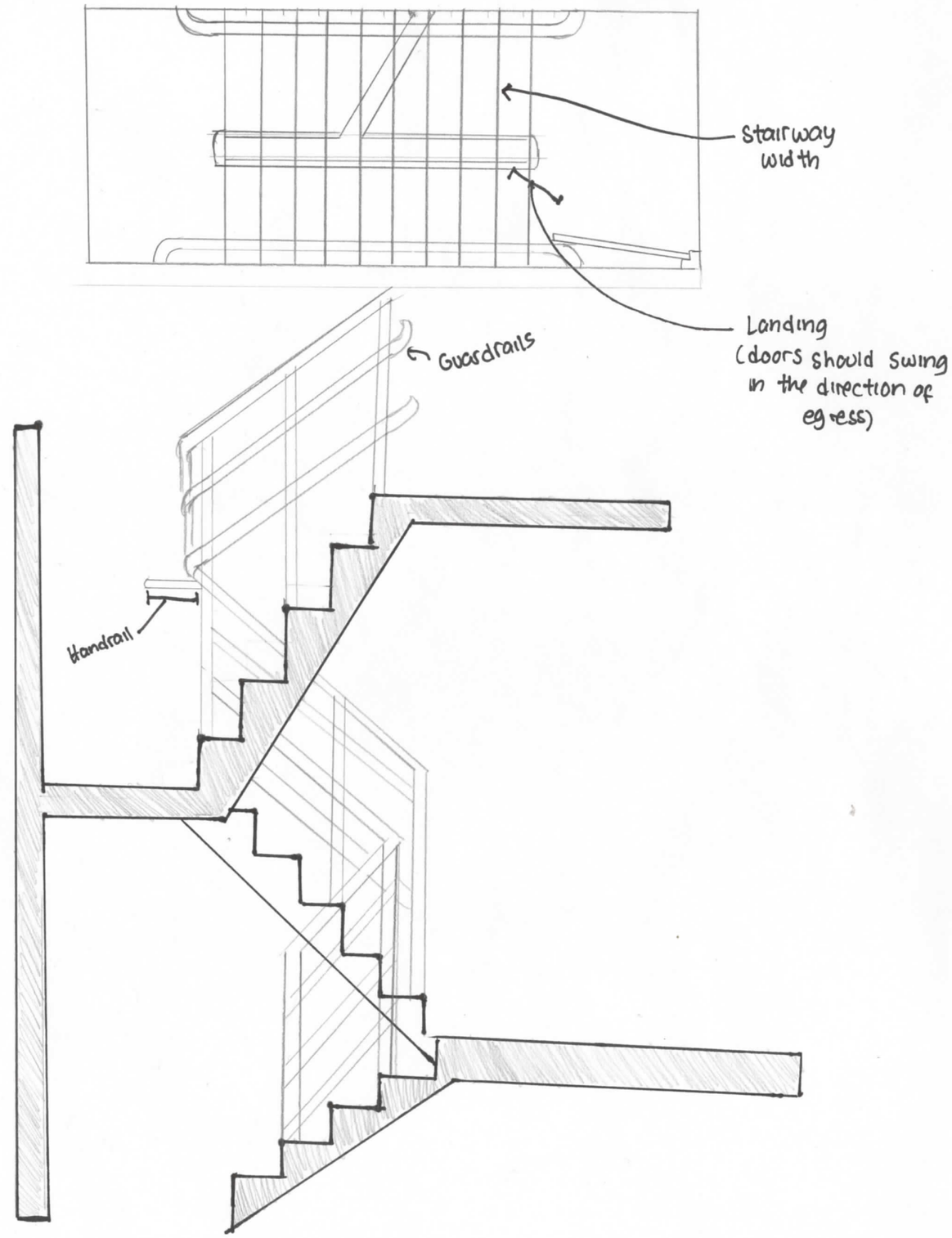
9.03 Stair Design

Questions / Main Ideas	Note
★ How should the stairway be proportioned?	= The dimensions of risers and treads in a stairway should be proportioned to accomodate our body movement. If the pitch of a stairway is shallow, its treads should be deep enough to fit our stride
★ What are the formulas for the riser and tread dimensions	• Tread (inches) + 2x riser (inches) = 24 to 25 • Riser (inches) x tread (inches) = 72 to 75
★ How to determine the actual riser and tread dimension for a set of stairs	= Dividing the total rise or floor-to-floor height by the desired riser height

Riser and Tread Dimensions

Riser inches (mm)	Tread inches (mm)	
5 (125)	15 (380)	
5-1/4 (135)	14-1/2 (370)	
5-1/2 (140)	14 (355)	
5-3/4 (145)	13-1/2 (340)	
6 (150)	13 (330)	
6-1/4 (160)	12-1/2 (320)	
6-1/2 (165)	12- (305)	
6-3/4 (170)	11-1/2 (290)	
7 (180)	11 (280)	→ maximum riser height; minimum tread depth for accessible stairs and emergency egress.
7-1/4 (185)	10-1/2 (265)	
7-1/2 (190)	10 (255)	




Stairway width
Landing (doors should swing in the direction of egress)
Guardrails
Handrail

9.04 Stair Requirements

Guardrails :
Stairway width :
Landings :
Handrails:
Treads, Risers, and Nosings :

Questions / Main Idea	~ Notes ~
★ Why are guard rails are required?	★ To protect the open/glazed sides of stairways, ramps, porches, and unenclosed floor and roof openings
★ What is the minimum height for Guardrails?	★ At least 42" (1070) high; guardlines in dwellings may be 36" (915) high
★ What opening a 4" 100 sphere must not be able to pass through?	★ Must not be able to pass through any opening in the railing from the floor up to 34" (865); from 34" to 42" (865 to 1070), the pattern may allow a sphere up to 8" (205) in diameter to pass
★ What should a guardrails be able to withstand?	★ Concentrated load applied nonconcurrently to their top rails in both vertical and horizontal directions.
★ The Stairway Width is based on...	★ The use group and the floor area served, determines the required width of an exit stairway
★ What is the minimum width for Stairway width?	★ 44" (1120) minimum width; 36" (918) minimum for stairways serving an occupant load of 49 or less
★ What is the maximum Handrails may project?	★ 4-½" (115) into the required width; stringers and trim may project a maximum of 1-½" (38)
★ How wide should the landings be at least?	★ Should be as least as wide as the stairway they serve and have a minimum length equal to the stairwidth measured in the direction of travel

Questions / Main Idea	~ Notes ~
★ Which direction should the door swing?	★ Swing in the direction of egress
★ When does the door must not intrude into required width by more than 7" (180)	★ When fully open
★ Why Handrails are required on both sides of the stairs?	★ The building codes allows exceptions for stairs in individual dwelling units.
★ What is the height of above the leading edge of the stair treads or nosings?	★ 34" to 38" (865 to 965)
★ What handrails should be?	★ Continuous without interruption by a newel post or other obstruction
★ How long Handrails should extend?	★ At least 12" (305) horizontally beyond the top riser of a stair flight and extend at the slope of the stair run for a horizontal distance of at least one tread dept beyond the last riser nosing of the flight.
★ Why a minimum of three risers per flight is reccomended?	★ To prevent tripping and may be required by the building code.

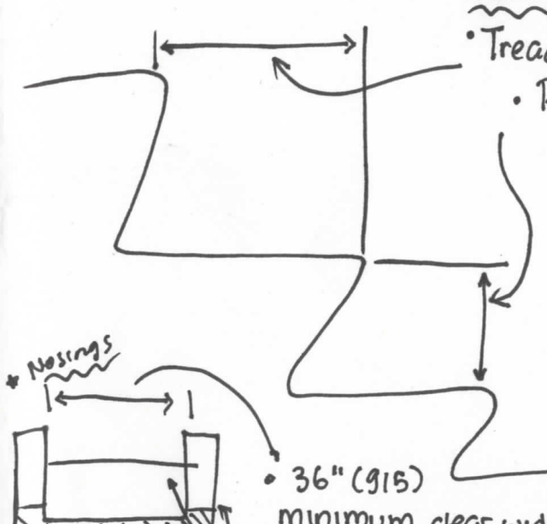
9.05 Stair Requirements

- ADA Accessibility Guidelines :
- Risers & Treads :
- Ramps :
- Handrails :
- Nosings :
- Landings :

Questions / Main Ideas	~ Notes ~
★ Function of accessible stairs	◦ Should serve as a means of egress during an emergency / lead to an accessible area of refuge where people who are unable to use stairs may remain temporarily in safety to await assistance during an emergency evacuation.
★ What does ramps provide?	◦ Smooth transitions between the floor levels of a building.
★ How to acquire a comfortable low slopes?	◦ They required relatively long runs.
★ Function of Straight ramps	◦ Act as beams & may be constructed as wood, steel or concrete floor systems.
★ Long / Curvilinear ramps	◦ Usually of steel / reinforced concrete
★ Risers & Treads	◦ Uniform riser & tread dimensions are required ◦ Open risers are not permitted
★ Handrails	◦ 1-½" (38) minimum clearance between handrail & wall
★ Landings	◦ Landing should be wide as the widest ramp leading to it ◦ 60" x 60" (1525 x 1525) minimum landing where ramp changes directions

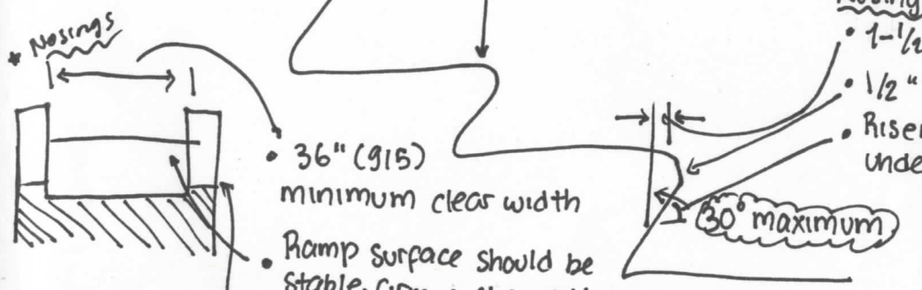
Risers & Treads

- Tread depth : 11" (280) minimum
- Riser height : 4" (100) minimum; 7" (180) maximum



Nosings

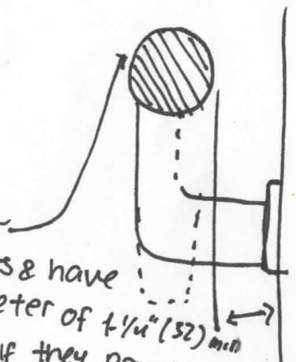
- 1-½" (38) maximum protrusion
- ½" (13) maximum radius
- Risers should be sloped / the undersides of the nosings should have a 60° angle minimum from the horizontal



- 36" (915) minimum clear width
- Ramp surface should be stable, firm, & slip resistant
- Curbs, guardrails, or walls are required to prevent people from slipping off the ramp, 4" (100) minimum curb

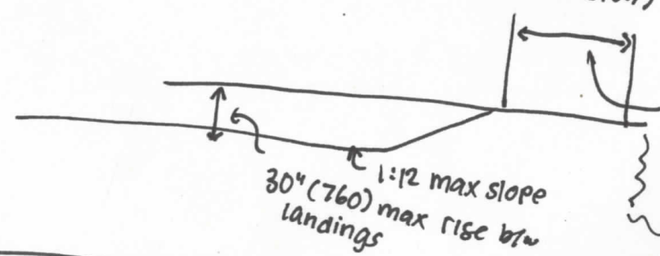
Handrails

- Should be free of sharp / abrasive elements & have a circular cross section w/ an outside diameter of 1-¼" (32) min and 2" (51) max; other shapes are allowable if they provide equivalent graspability (2-¼" (57) cross sectional dimension)

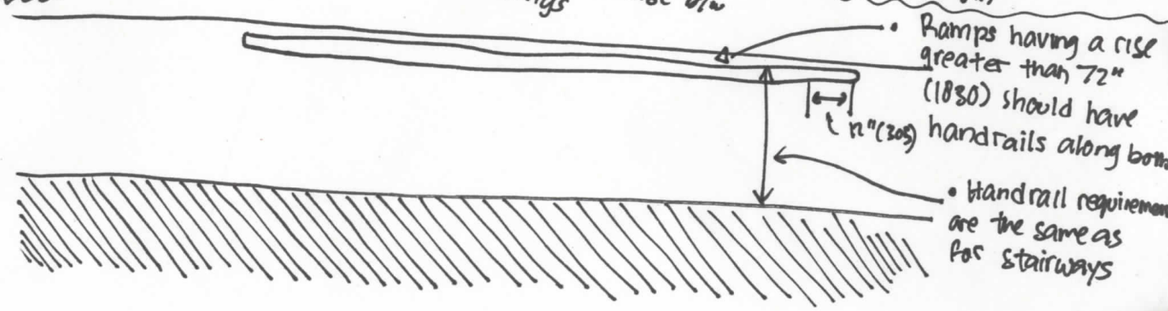


Landings

- Ramps should have level landings at each end with a 60" (1525) min length



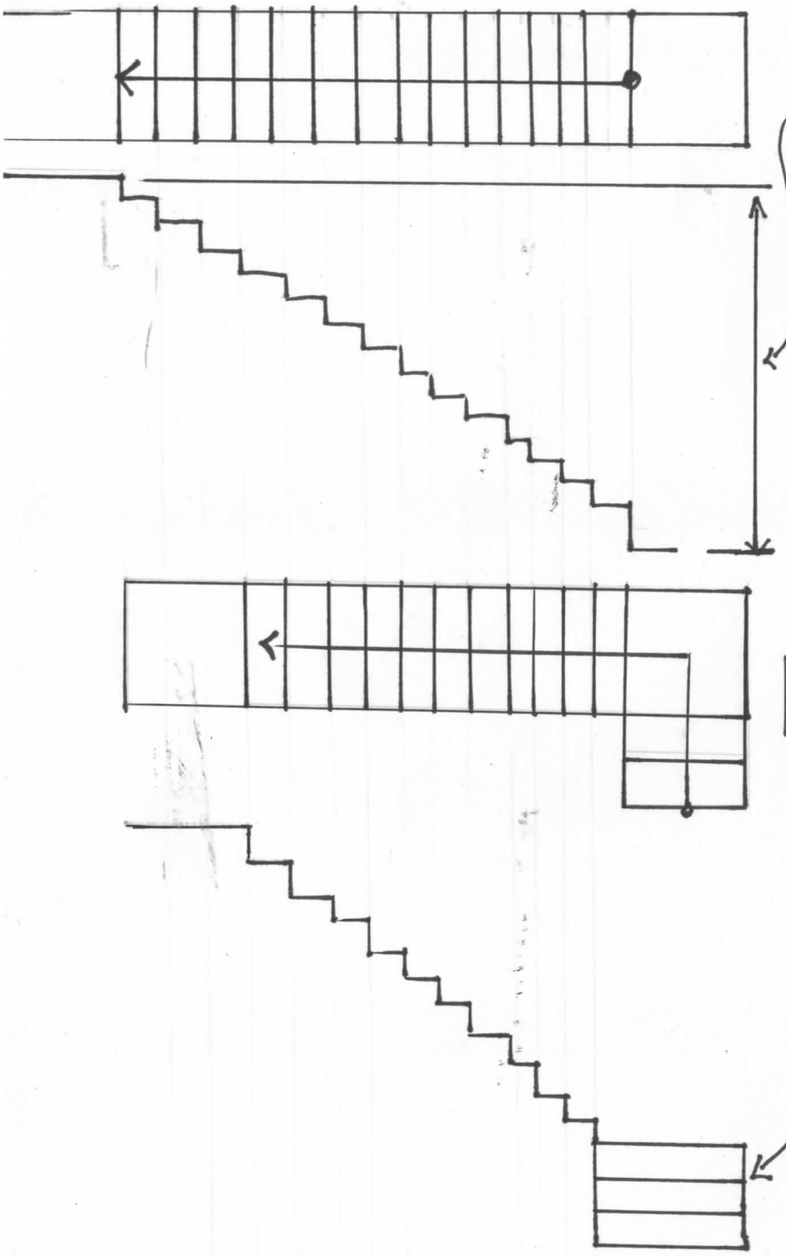
- Ramps having a rise greater than 72" (1830) should have handrails along both
- Handrail requirements are the same as for stairways



9.06 Stair Plans

Straight-Run Stair

- Extends from 1 level to another w/o turns or winders
- Building codes generally limit the vertical rise between landings to 12 (3660)



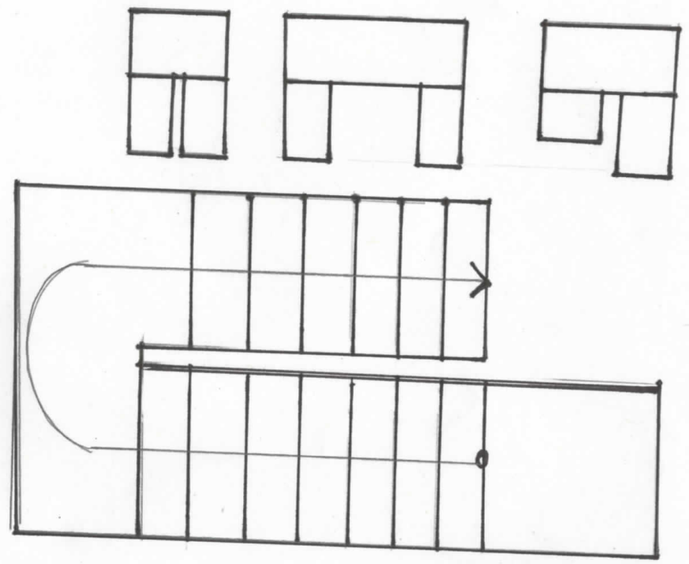
Quarter-Turn Stair

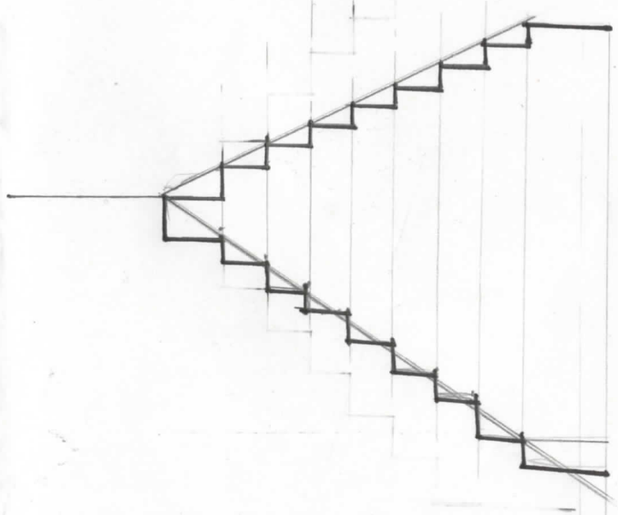
- A quarter turn or L-shaped stair makes a right-angled turn in the path of travel.
- The two flights connected by an intervening landing may be equal or unequal, depending on the desired proportion of the

Landings that are below normal eye level and provide a place to rest

Half-Turn Stair

- A ½-turn stair turns 180°/ through 2 ∟ angles at an intervening landing
- A ½-return stairs is more compact than a single straight-run stair
- The 2 flights connected by the landing my be = /≠, depending on the desired proportion of the stairway opening



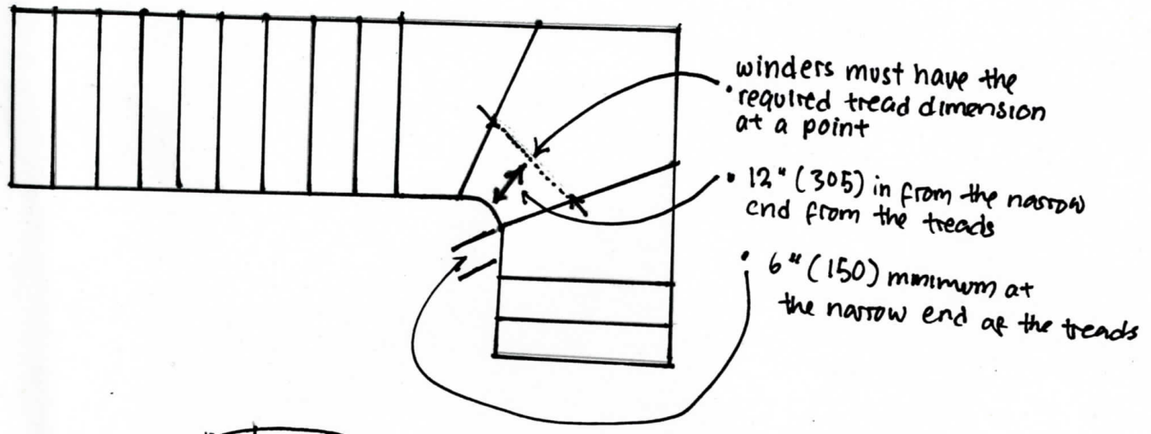


9.07 Stair Plans

Winding Stair

↳ any stairway constructed with winders, as a circular / spiral stair. Quarter-turn & half turn stairs may also use winders rather than a landing.

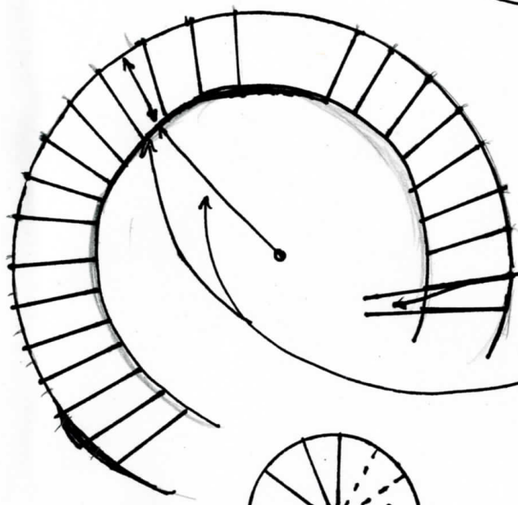
↳ Winders can be dangerous because they offer little foothold at their interior corners. Building codes generally restrict the use of winders to private stairs within individual dwelling units



Circular stair

↳ has a circular plan configuration

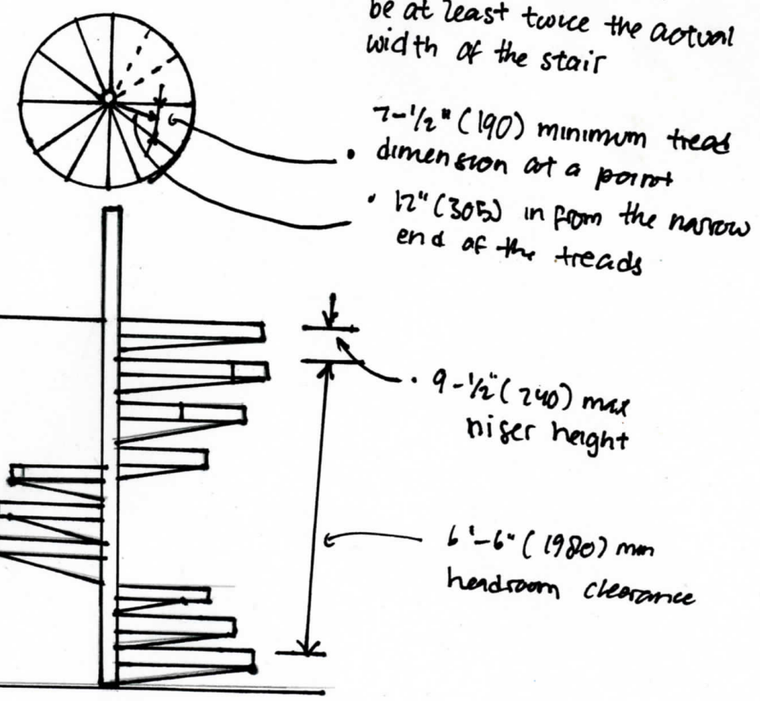
↳ Although constructed with winders, the building code may allow its use as part of the means of egress from a building if its inner radius is at least twice the actual width of the stairway.



Spiral Stair

↳ consits of wedge-shaped treads winding around & supported by a central post

↳ occupy a minimum amount of floor space, but building codes permit their use only as private stairs in individual dwelling units.



Summary

=> I believe that staircase has been one of the most important elements in the architecture world. Thanks to its function, which is connecting one space to another, we individuals always manage to access and exit a "place". The Ching book had introduces me about the building codes of an exit pathway and stairways.

As I am more aware now about the aspect of stairs, I'm planning to get a better understanding by drawing the plan and the Section of a stairway.