Building Envelope Tolerance
Series 1 of 5 - Concrete

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Building Envelope Tolerance

Concrete

List of References:

Handbook of Construction Tolerances 2ed

by David Kent Ballast, AIA, CSI

ACI 117, Specifications for Tolerance for Concrete & Materials

CONCRETE

ACI 117-10

Specification for Tolerances for Concrete Construction and Materials (ACI 117-10) and Commentary

An ACI Standard

Reported by ACI Committee 117

American Concrete Institute®

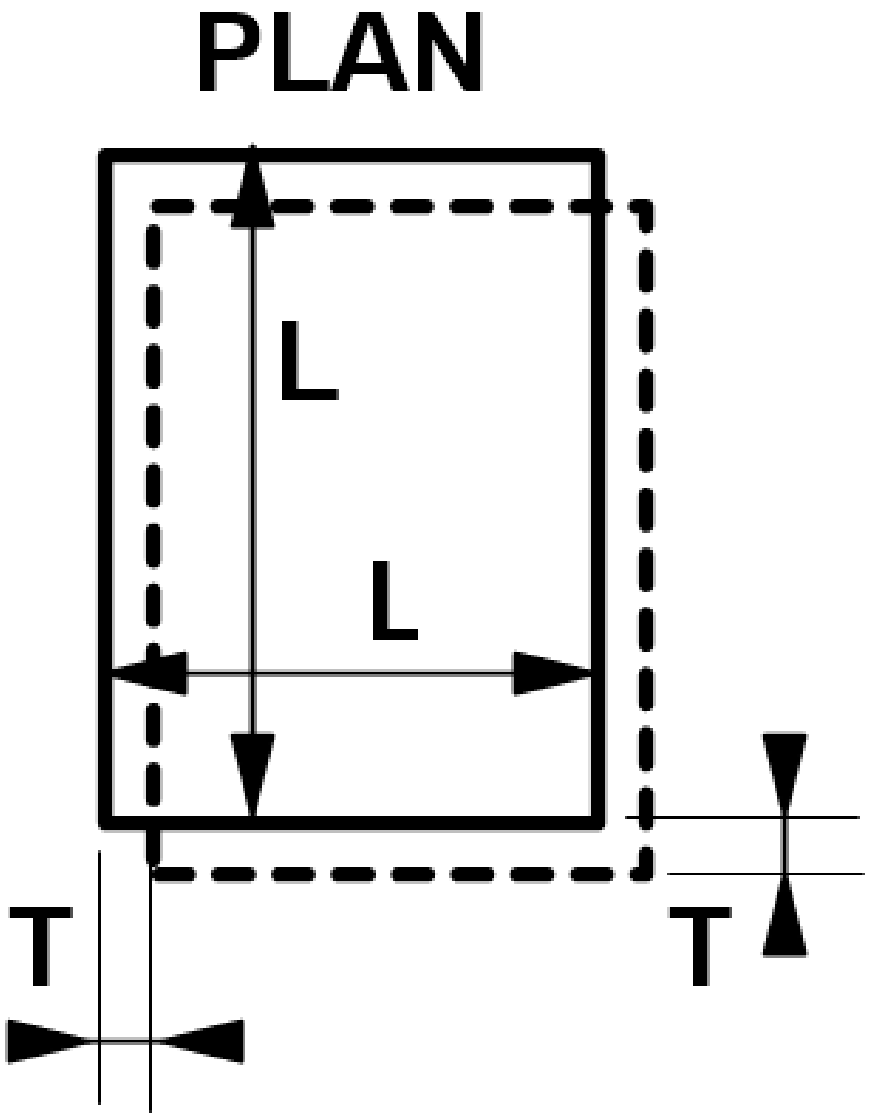
CONCRETE TOLERANCES: *FOUNDATIONS*

Deviation from plan location

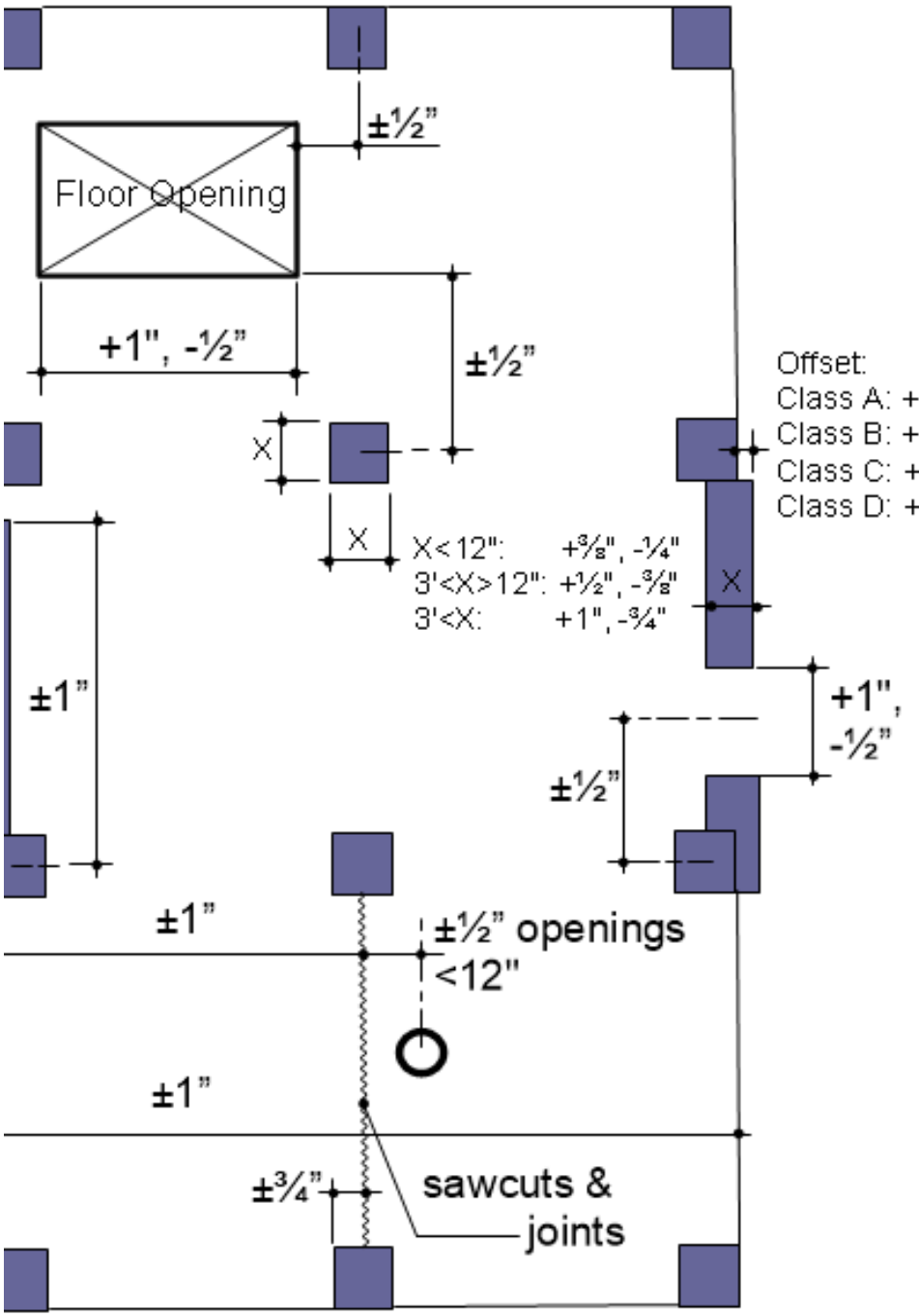
Foundations Horizonal deviation of the as-cast edge:

Dimensions is 8' < = ±½"

Dimension is < 8' = *the greater of ± 2% of specified dimension or ±½"*

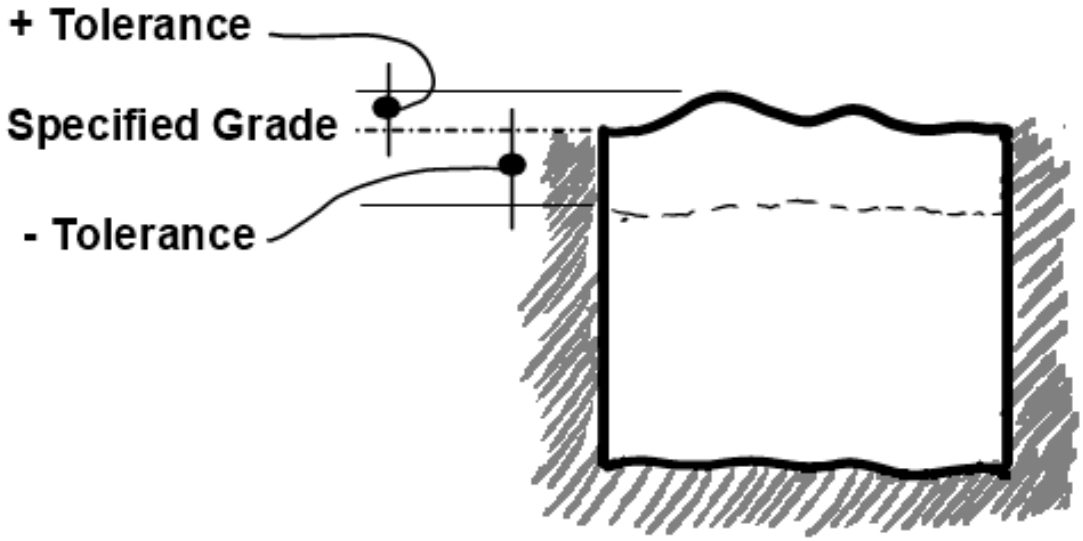


NOTE: Verify anchor bolts remain centered on column



CONCRETE TOLERANCES: *FLOOR PLAN*

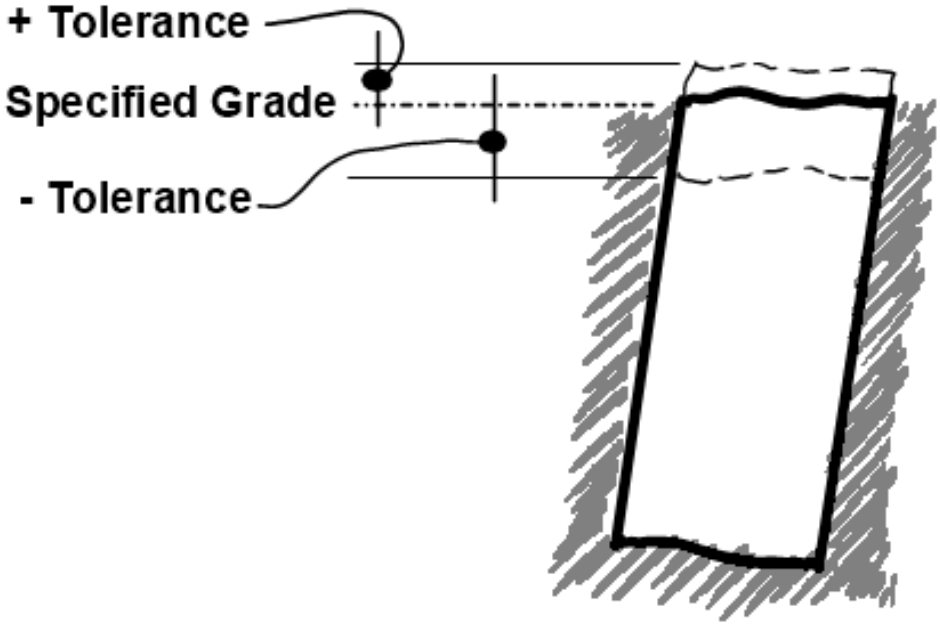
CONCRETE TOLERANCES: *FOUNDATIONS*



Deviation from elevation

Top surface of foundation vertical deviation = *+½" to -2"*

Top surface of drilled piers vertical deviation = *+1" to -3"*



ANCHOR BOLT TOLERANCE

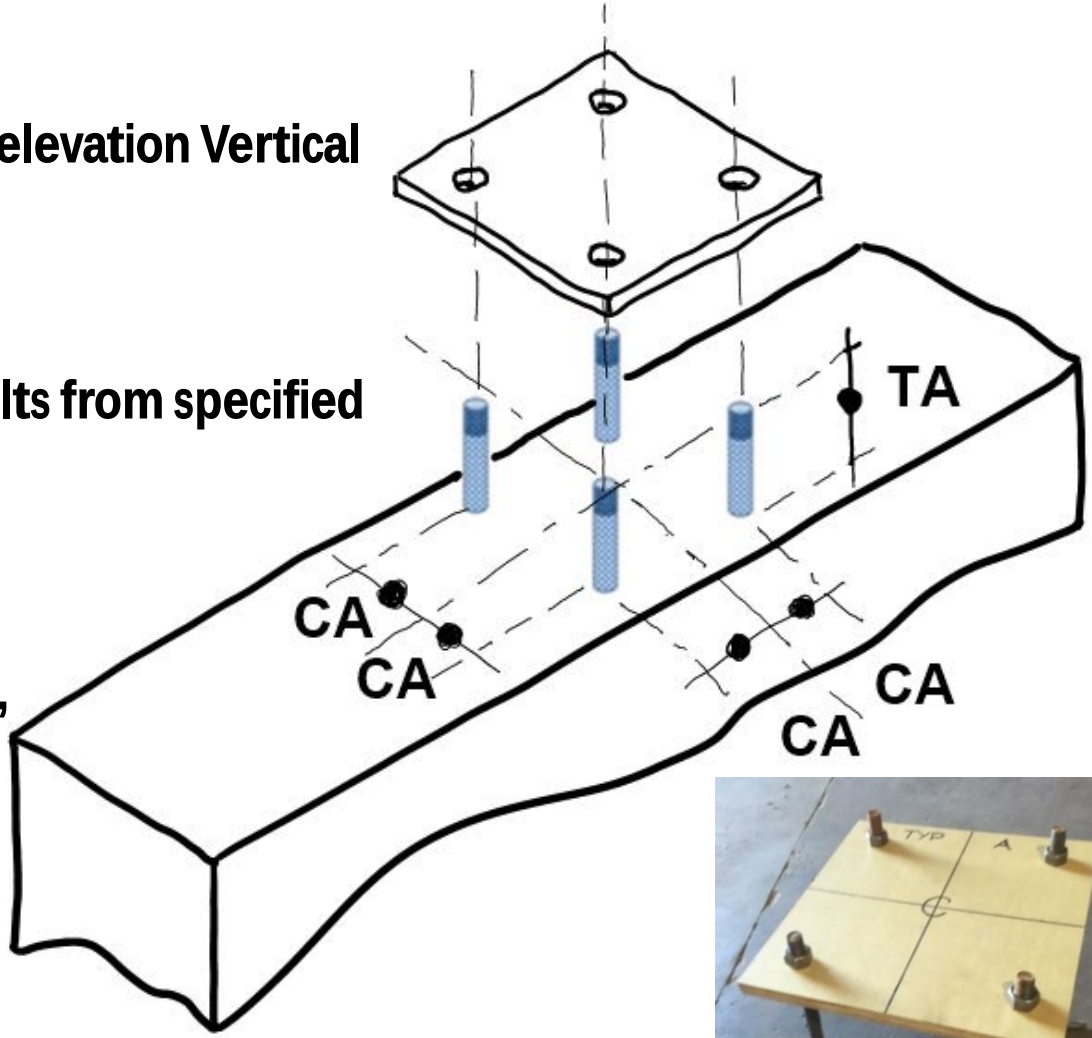
Top of anchor bolt from specified elevation Vertical deviation = ±½”

Centerline of individual anchor bolts from specified horizontal location:

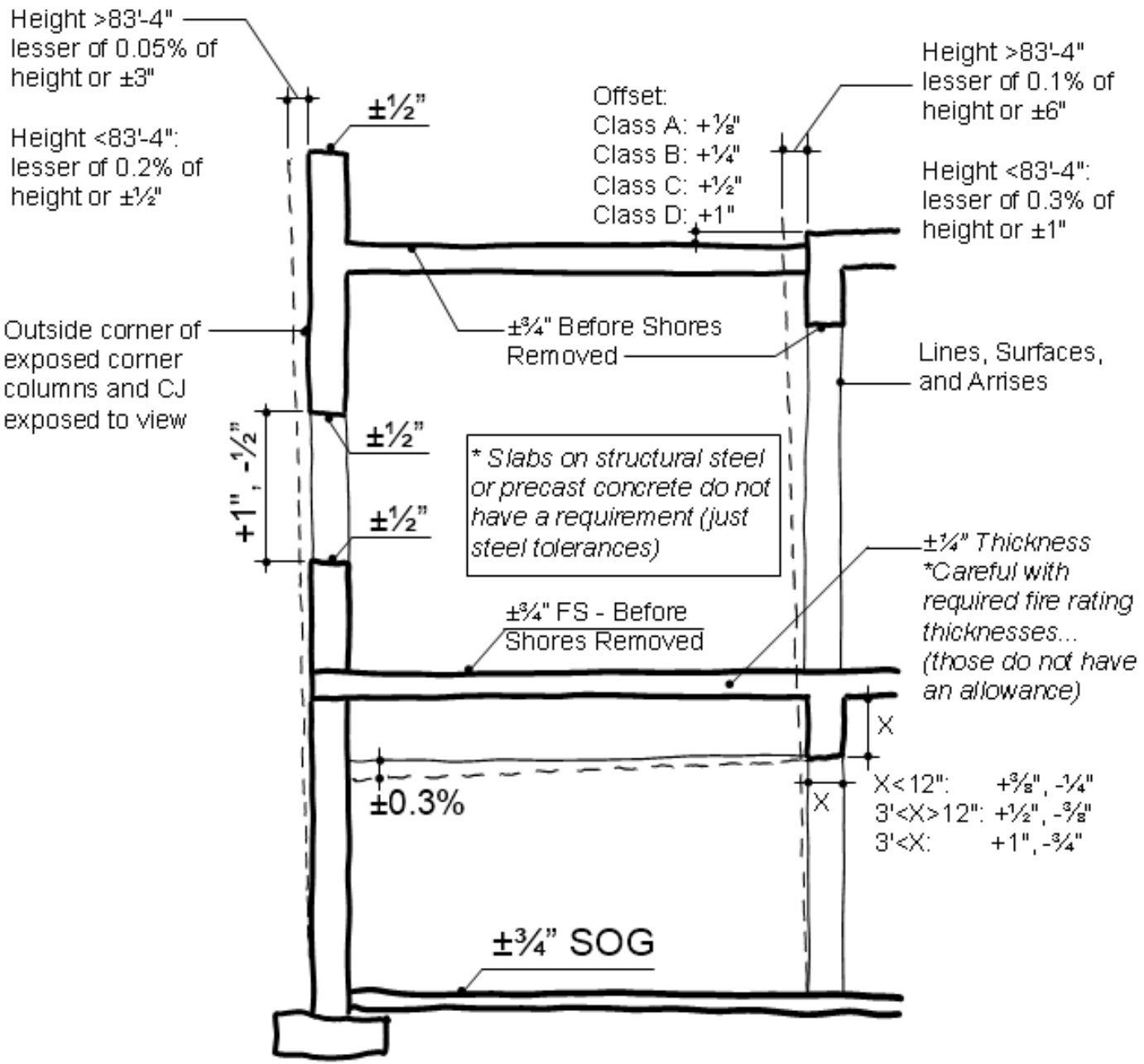
3/4” and 7/8” bolts: ± ¼”

1”, 1 ¼”, and 1 ½” bolts: ± 3/8”

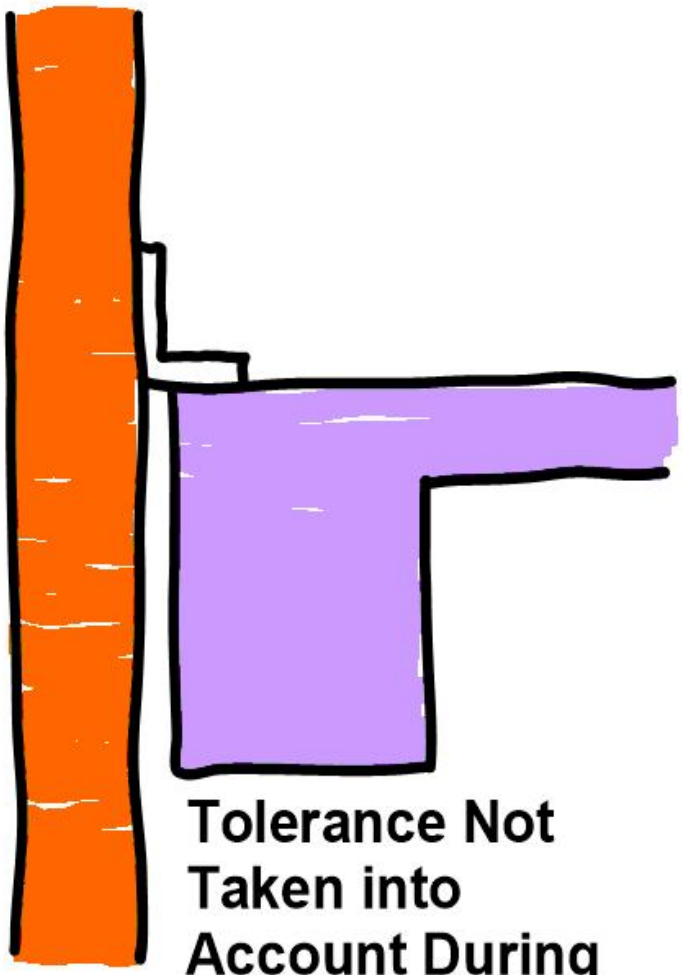
1 ¾”, 2”, and 2 ½” bolts: ±½”



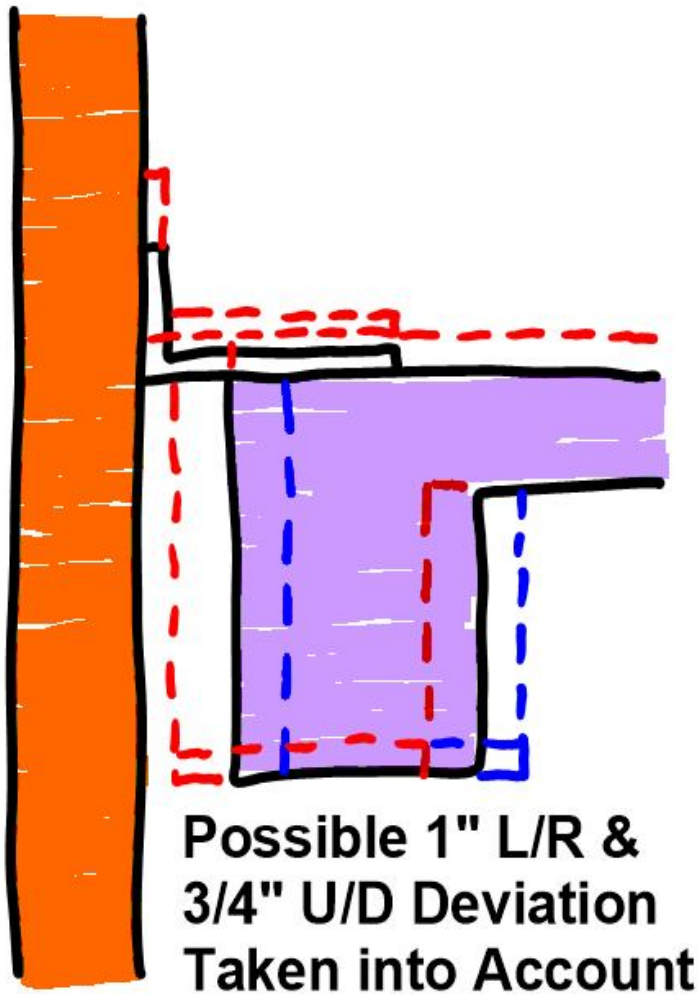
Cast in Place Concrete



Tolerance in Design Development

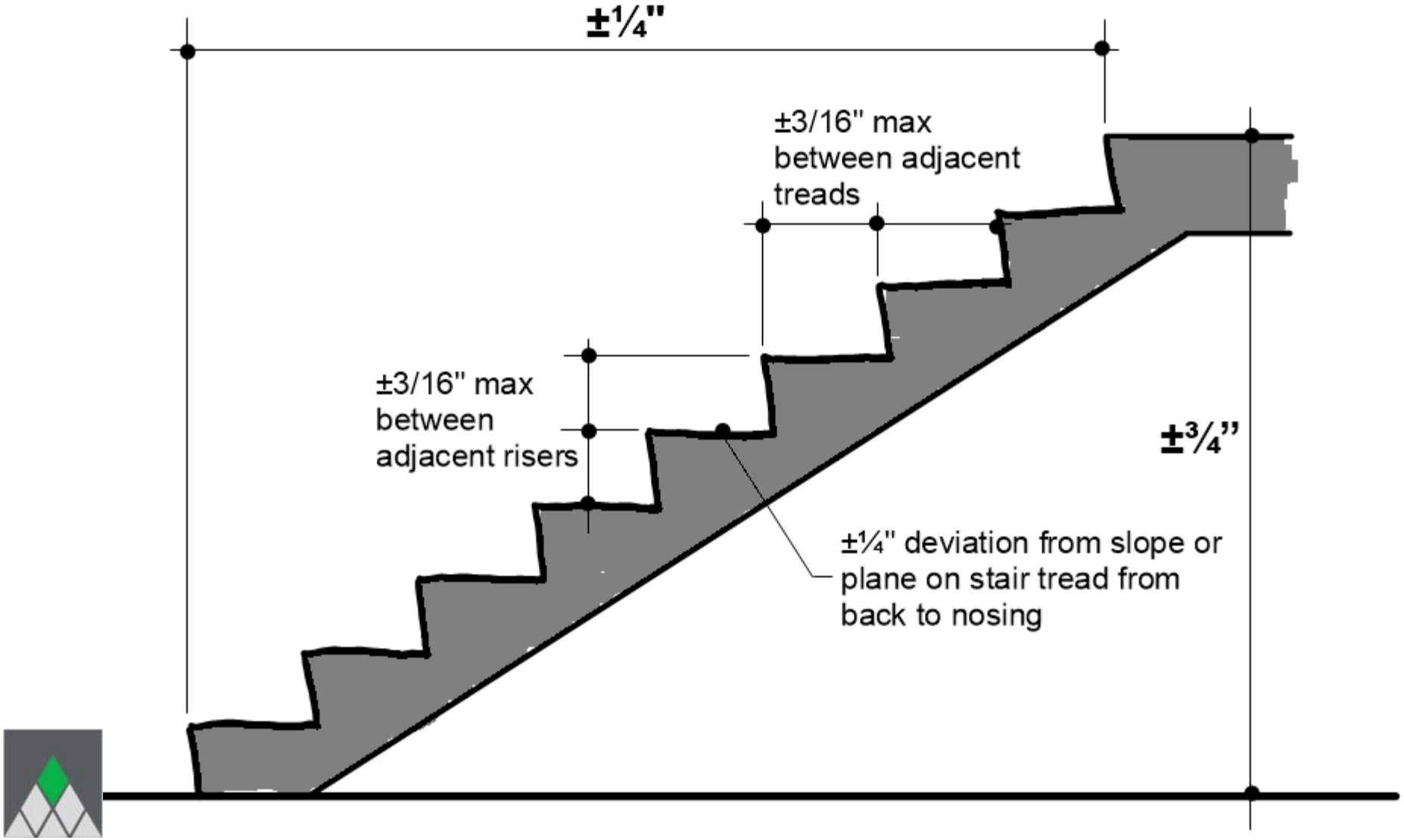


Tolerance Not Taken into Account During Design



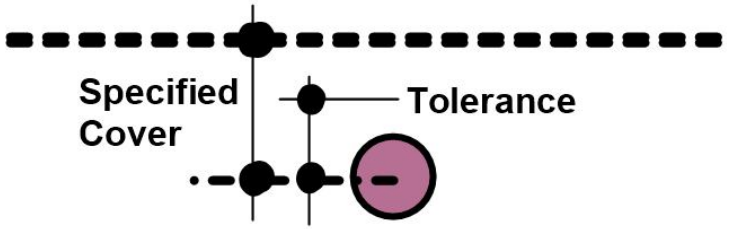
Possible 1" L/R & 3/4" U/D Deviation Taken into Account During Design

Cast in Place Concrete Stairs



Rebar Coverage and Allowable Tolerance

Concrete / Rebar Condition	Coverage
Concrete:	
Concrete against Earth:.....	3 Inches
#6 thru #18 bar exposed to weather.....	2 Inches
#5 or less bar exposed to weather.....	1 ½ Inches
#14 thru #18 bar NOT exposed to weather.....	1 ½ Inches
#11 or less bar NOT exposed to weather.....	¾ Inches
Concrete Beams or Columns:	
Primary Reinforcement, Ties, Stirrups, Spirals, etc.....	1 ½ Inches
Shells or Folded Plate Members:	
#6 or larger bar	¾ Inches
#5 or less bar	½ Inch



Bar Size	Tolerance
≤12"	- ⅜"
≥12"	- ½"

CONCRETE TOLERANCES: *Reinforcing*

Non-prestressed Reinforcement

Member Depth (or Thickness) is <4" = ±¼"

Member Depth (or Thickness) is 4"<12" = ±⅜"

Member Depth (or Thickness) is >12" = ±½"

Per ACI 117, Rebar Installation Tolerances:

Bar Size	Tolerance
≤#4	± ¼"
#5-#12	± ⅜"
≥#12	± ½"