

List of References:

Handbook of Construction Tolerances 2 ed

by David Kent Ballast, AIA, CSI

ACI 117, Specifications for Tolerance for Concrete & Materials



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®



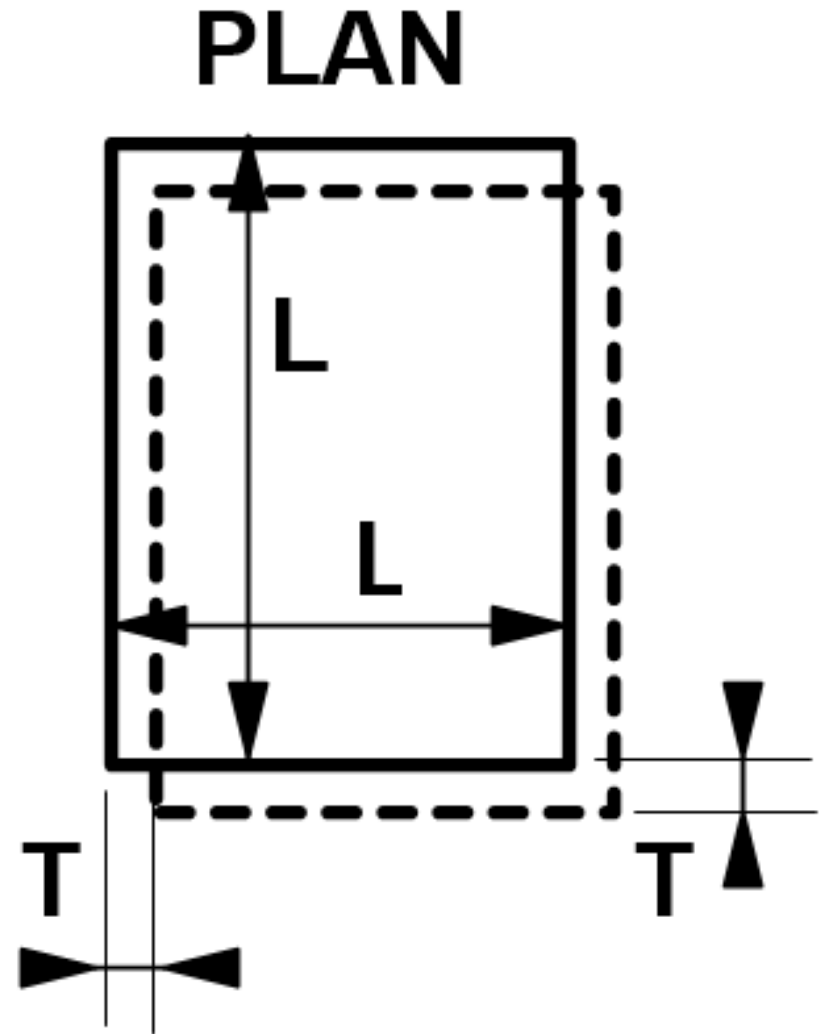
CONCRETE TOLERANCES: ***FOUNDATIONS***

Deviation from plan location

Foundations Horizontal deviation of the as-cast edge:

Dimensions is $8' \leq \pm \frac{1}{2}"$

Dimension is $< 8' = \text{the greater of}$
 $\pm 2\%$ of
specified
dimension or
 $\pm \frac{1}{2}"$



Verify anchor bolts remain centered on column

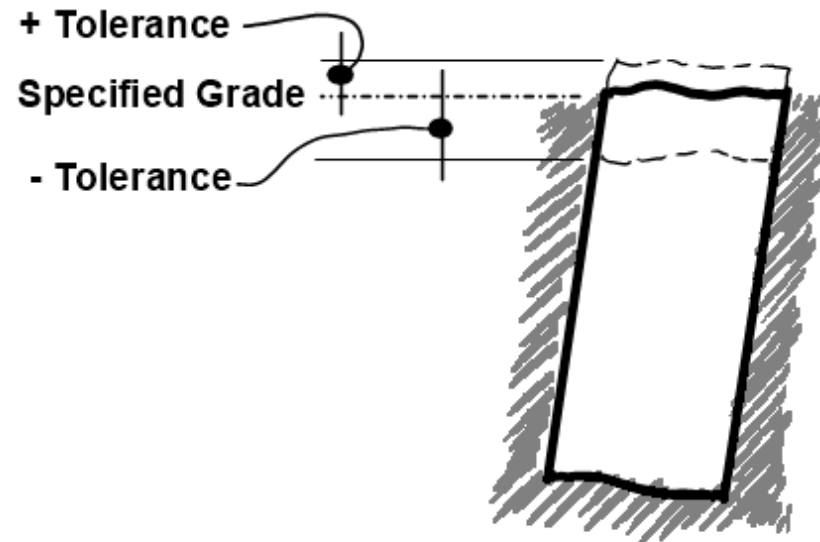
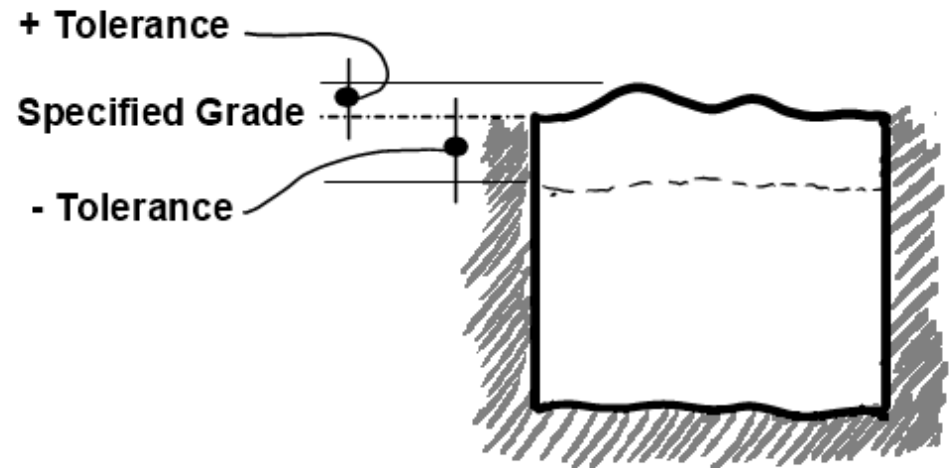


CONCRETE TOLERANCES: FOUNDATIONS

Deviation from elevation

Top surface of foundation vertical
deviation = $+1/2''$ to $-2''$

Top surface of drilled piers
vertical deviation = $+1''$ to $-3''$

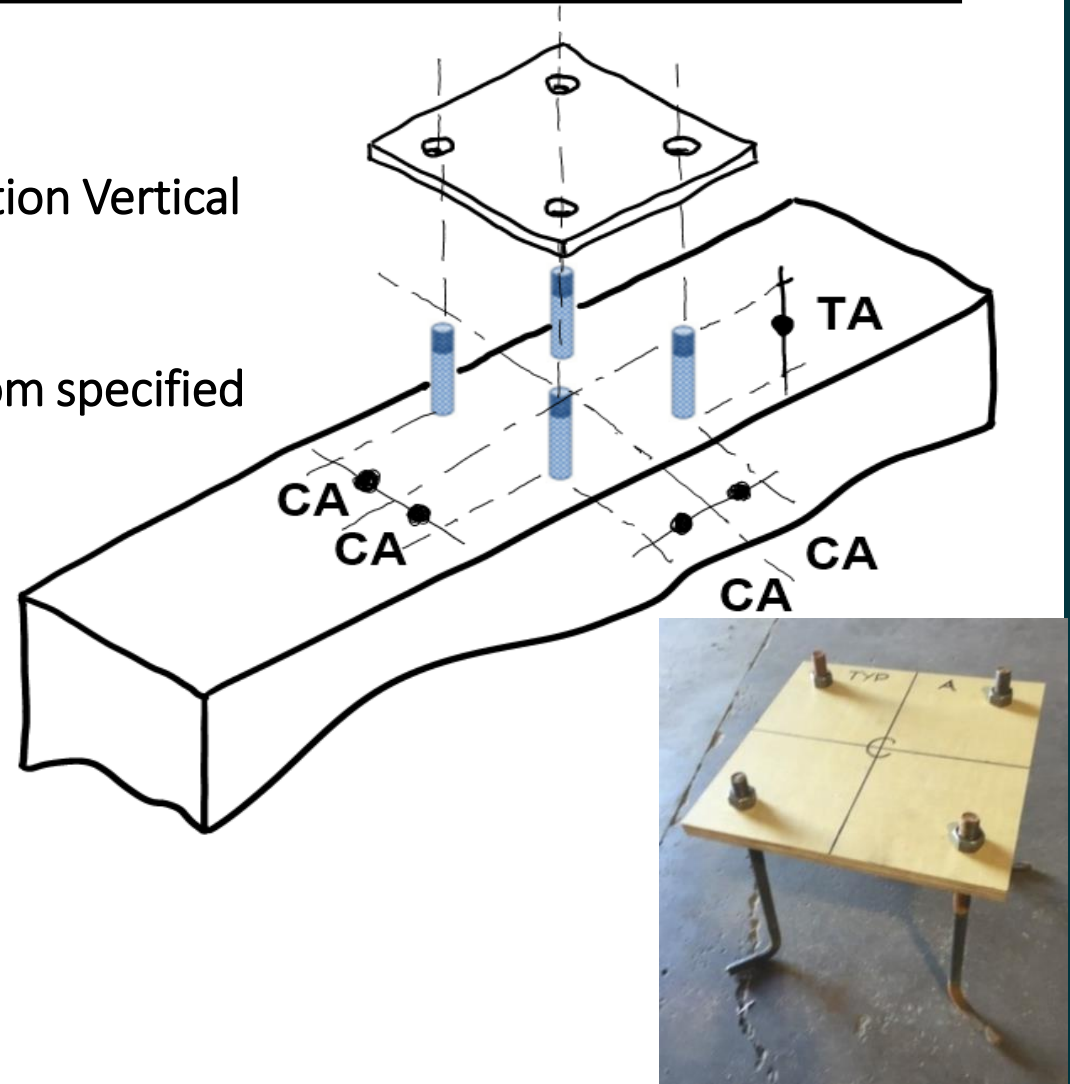


ANCHOR BOLT TOLERANCE

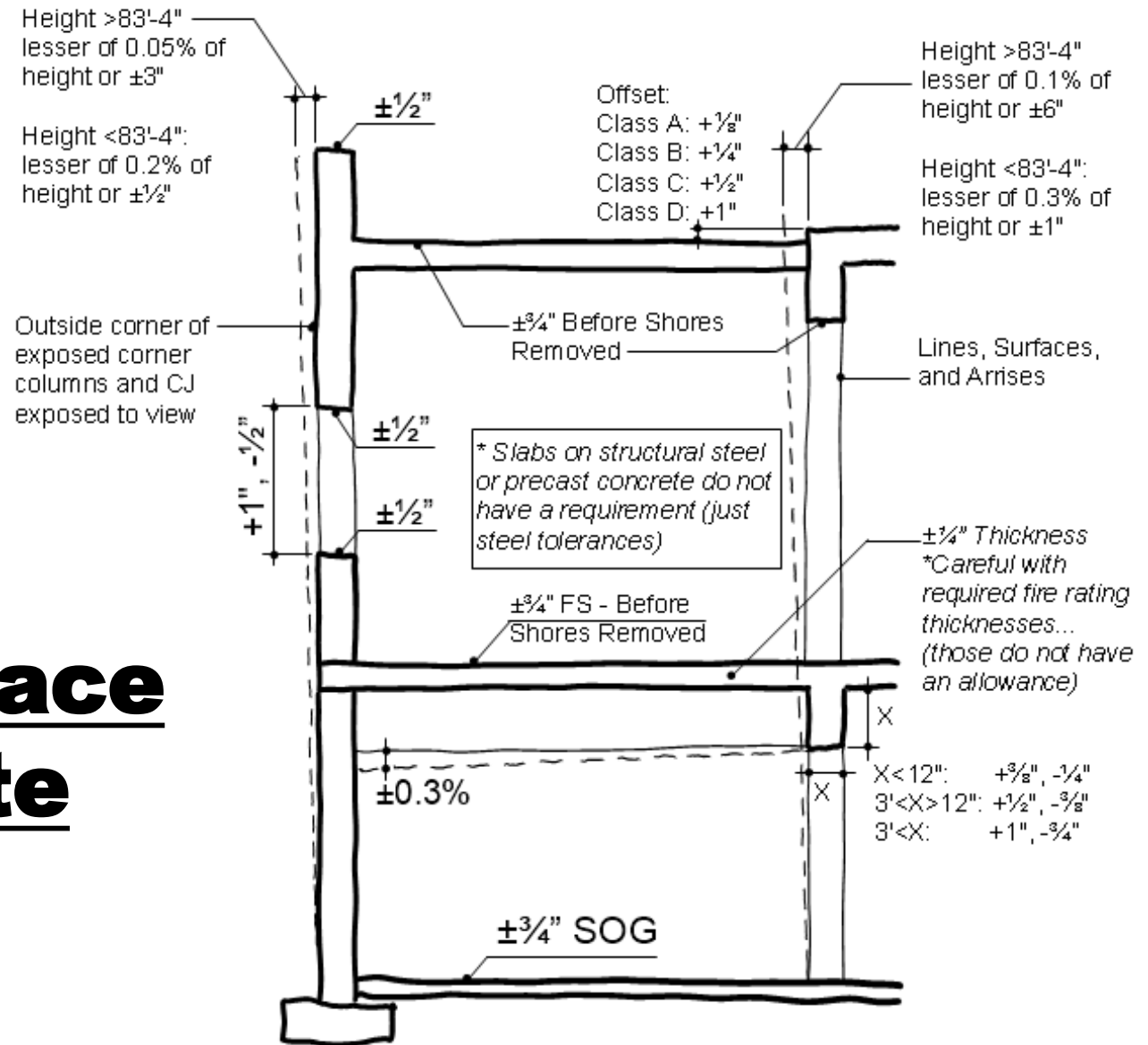
Top of anchor bolt from specified elevation Vertical deviation = $\pm \frac{1}{2}"$

Centerline of individual anchor bolts from specified horizontal location:

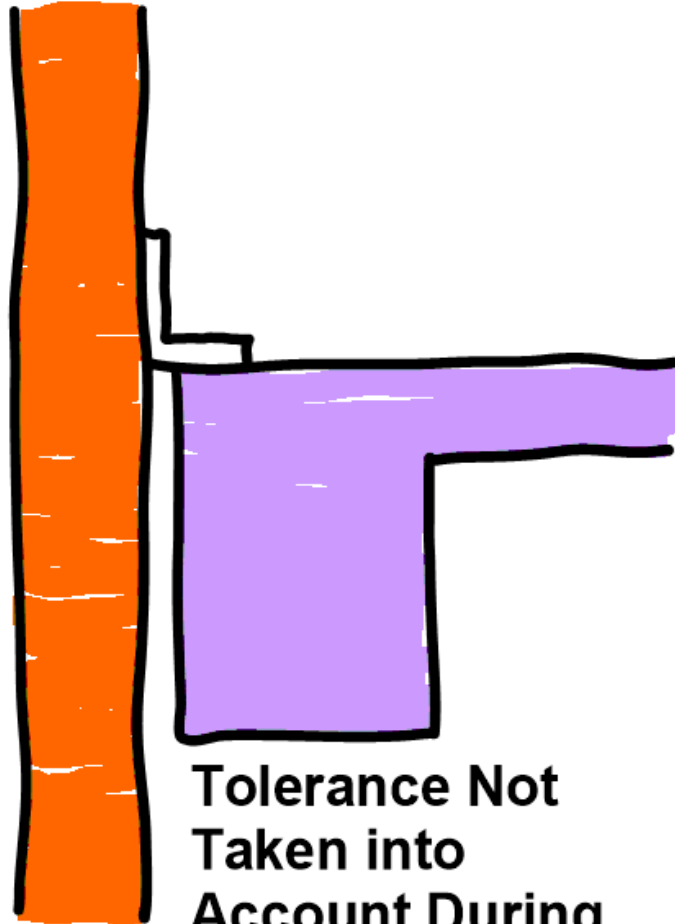
3/4" and 7/8" bolts:	$\pm \frac{1}{4}"$
1", 1 1/4", and 1 1/2" bolts:	$\pm \frac{3}{8}"$
1 3/4", 2", and 2 1/2" bolts:	$\pm \frac{1}{2}"$



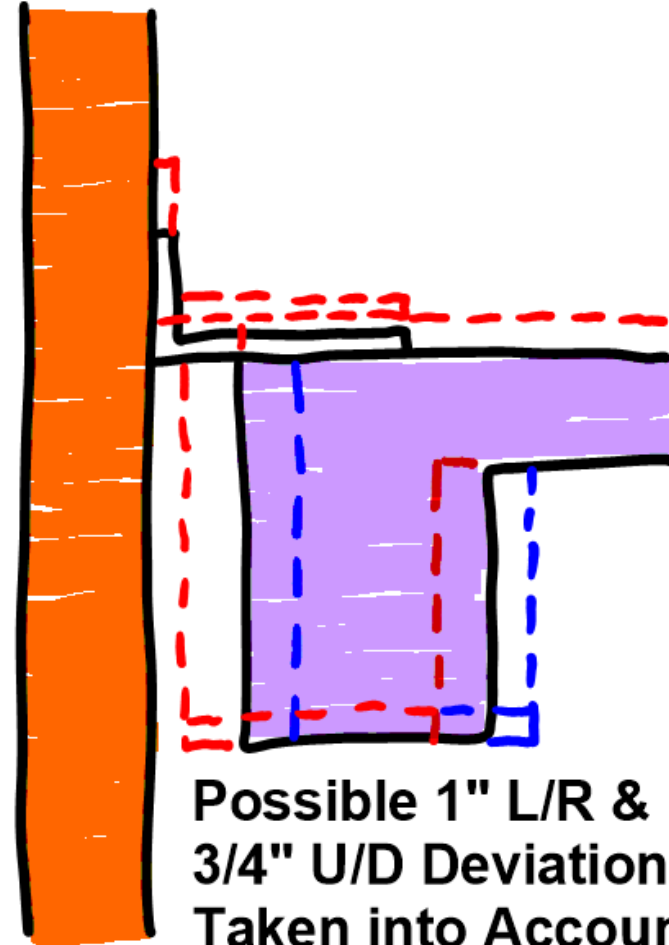
Cast in Place Concrete



Tolerance in Design Development

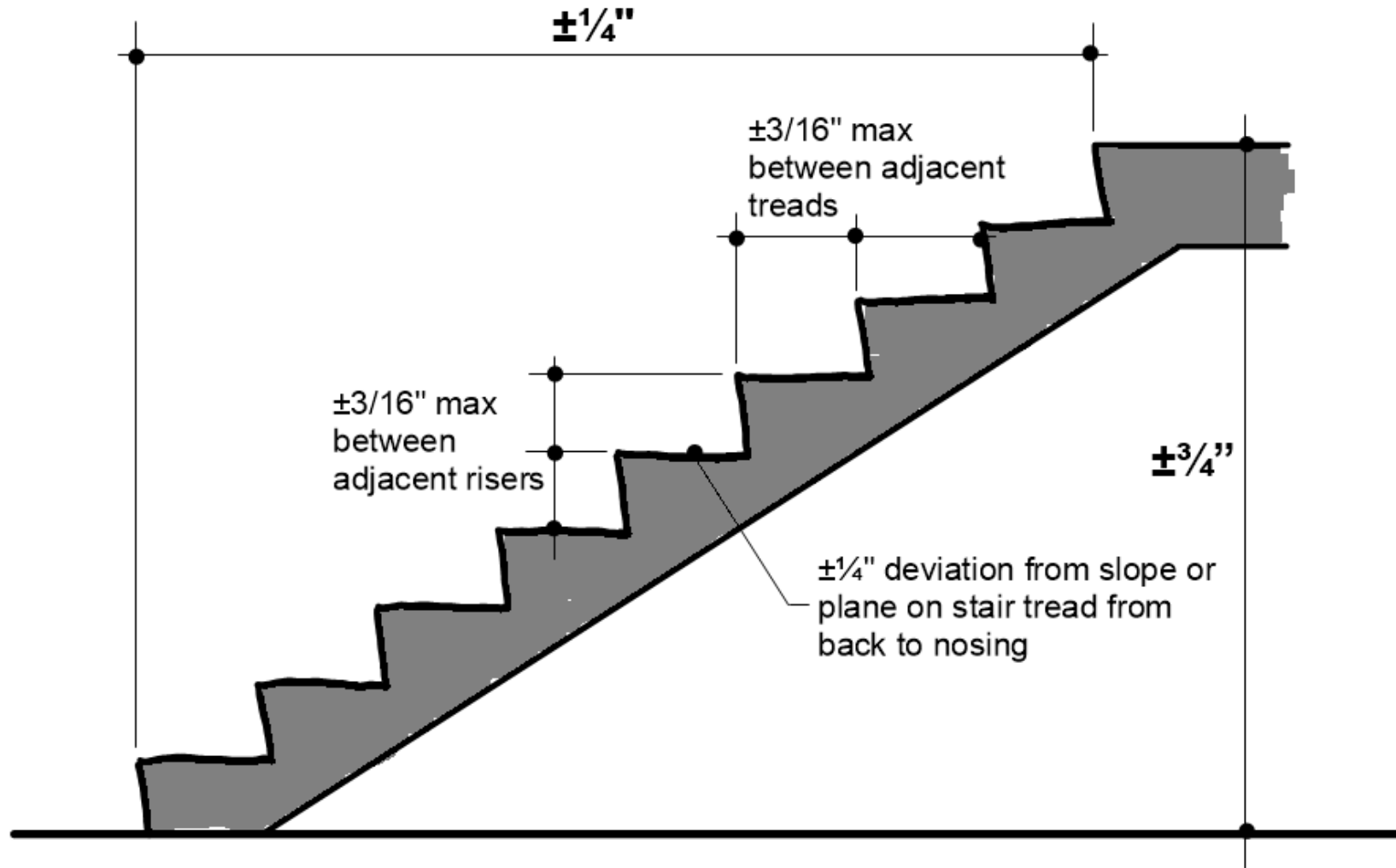


Tolerance Not
Taken into
Account During
Design



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

CIP Concrete Stairs



Rebar Coverage and Tolerance

Concrete / Rebar Condition

Coverage

Concrete:

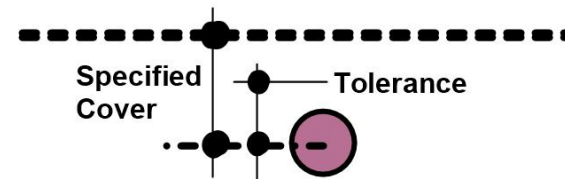
Concrete against Earth:.....	3 Inches
#6 thru #18 bar exposed to weather.....	2 Inches
#5 or less bar exposed to weather.....	1 ½ Inches
#14 thru #18 bar NOT exposed to weather.....	1 ½ Inches
#11 or less bar NOT exposed to weather.....	¾ Inches

Concrete Beams or Columns:

Primary Reinforcement, Ties, Stirrups, Spirals, etc.....	1 ½ Inches
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Shells or Folded Plate Members:

#6 or larger bar	¾ Inches
#5 or less bar	½ Inch



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

Non-prestressed Reinforcement

Member Depth (or Thickness) is $<4'' = \pm 1/4''$

Member Depth (or Thickness) is $4'' < 12'' = \pm 3/8''$

Member Depth (or Thickness) is $>12'' = \pm 1/2''$

Per ACI 117, Rebar Installation Tolerances:

Bar Size	Tolerance
$\leq \#4$	$\pm 1/4''$
$\#5 - \#12$	$\pm 3/8''$
$\geq \#12$	$\pm 1/2''$

