STAIR DESIGN CHECKLIST PROJECT_____FLOOR ___ OCCUPANCY _____

Fill in the blanks with the calculated results to determine compliance with stair requirements.
Use the most populated floor in the building to determine the most restrictive stair geometry.

CAUTION: This checklist is NOT intended to be used without the codes and will NOT guarantee full compliance with your particular building design.

This information is based on the 2009 edition of NFPA 101 (LSC) and 2006 edition of IBC
Code references noted are from NFPA 101 followed by the IBC reference

STAIR WIDTH

- ☐ Calculated occupant load (OL) of floor (see tables 7.3.1.2 / 1004.1.1) _____
- ☐ Number of exits (X) required minimum (7.4.1.1 and 7.4.1.2) / 1019.1 _____
  - o 2 if OL = 50 to 499 (unless single exit exception is met)
  - o 3 if OL = 500 to 999
  - o 4 if OL = 1000 or more
  - o More than the minimum may be required if travel distance cannot be met
- ☐ Total minimum exit width (W) = occupant load (OL) x exit capacity factor (F) - (Tables 7.3.3.1 / 1005.1, 1009.1) _____
- ☐ Handrails shall encroach not more than 4-1/2" into required stair width (7.2.2.2.1 / 1012.7) * new in 2003 LSC & 2006 IBC
- ☐ Minimum stair width = exit width (W) ÷ number of exits (X) _____ = _____"
  - o But not less than 44" (36" for stairs where occupant load of all floor served less than 50)
  - o 57" width if serving area of refuge to accommodate 48" clear between handrails
  - o 50% at main entrance of assembly (12.3.6 / 1025.2) – 50% at main entrance wall of large mercantile (101:36.2.5.7 only)
  - o New in LSC 2006 - 56" to LED if stair serving more than 2000 above that floor (7.2.2.2.1.2(B))

RISER AND TREAD (7.2.2.3 / 1009.3)

- ☐ Floor to floor height in inches (H)*1 _____
- ☐ Number of risers (N) = H ÷ 7 (rounded to next whole number) _____ *2
- ☐ Riser height in inches (R) = H ÷ N (7.2.2.2.1) 7" maximum _____ *2
- ☐ Minimum tread depth (13" if (h) is 21" or less (7.1.7.2) or 11" minimum if (h) is greater than 21") _____ *2
  - o IBC requires a ramp at less than 12" (IBC 2006 - 1003.5)
  - o If slope is <1:20 handrails not required on ramp

***1 Where floor to floor heights are different in multi story buildings, risers must be recalculated for each condition**
***2 For Tread and Riser at stepped aisles in grandstands or theater seating in assembly occupancies - see 101:12.2.5.6 / IBC 1025**

LANDINGS (7.2.2.3.2 / 1009.4)

- ☐ If floor to floor height (H) is greater than 144" (12 feet), intermediate landings are required
- ☐ Number of intermediate landings L=(H ÷ 144) round down to next whole number _____
  (examples – L=0.75=0 intermediate landings / L=1.1=1 intermediate landing / L=2.9 =2 intermediate landings)
- ☐ Landing width (at least same as stair width minimum) _____
- ☐ Landing depth (if stair changes direction, then same as stair else 48" maximum length) _____
  - o IF ADA (48") CLEARANCE REQUIRED, THEN MAINTAIN 48" CLEAR AT HANDRAIL HEIGHT AT SWITCHBACK LANDINGS

HANDRAILS (7.2.2.4.1 / 1012)

- ☐ Both sides of stair within 30" of required egress width (7.2.2.4.1.1 & 7.2.2.4.1.2 / 1012.8)
- ☐ If over 75" stair width, intermediate handrail required with not less than 22" clear between
  Note: verify that strength of handrail complies with building code requirements (IBC 2006:1607.7)
- ☐ Height - 34" - 38" above line of tread nosings to top of rail (7.2.2.4.4.1 / 1012.2)
- ☐ (42" height allowed by LSC if it is the top of a guard - 7.2.2.4.4.3) also see 7.3.2.2 for means of egress
- ☐ 2-1/4" minimum clearance from wall or guard (7.2.2.4.4.5) * new in 2003 LSC / permitted by IBC 1012.7
- ☐ 1-1/4" minimum to 2" maximum diameter round (7.2.2.4.4.6(1) / 1012.3).
- ☐ If not round, must be graspable shape with 4" to 6-1/4" circumference (7.2.2.4.4.6(2) / 1012.3)
- ☐ Continuous and graspable for full length of flight (7.2.2.4.4.7 / 1012.4)
- ☐ Return handrails to wall or floor or terminate at newel post (7.2.2.4.4.9 / 1012.5)
- ☐ Extend handrail 12" at top of flight and at slope 1 tread at bottom of flight (7.2.2.4.4.9./.1012.5)
- ☐ Add 12" level at bottom if serving area of refuge (ADAAG Requirement)
- ☐ Continuous at turns and returns (7.2.2.4.2 / 1012.4)
- ☐ No projections that may engage loose clothing or straps (7.2.2.4.3)

GUARDS (7.1.8 & 7.2.2.4.5 / 1013)

- ☐ Are landing(s) more than 30" above grade? _____ (guard required by 7.1.8 must comply with 7.2.2.4.5)
- ☐ Are tread(s) more than 30" above grade and with an open side? _____ (guard required - 7.1.8)
- ☐ OSHA 1910.24(h) requires "standard railings" 42" high at open sides of fixed stairs & platforms.
  OSHA permits compliance with NFPA 101 for stair design
- ☐ Height of guard 42" above line of tread nosings to top of guard (7.2.2.4.5.2)
  Note: verify that strength of guard complies with building code requirements (IBC 2006:1607.7.1)
- ☐ Continuous for full length of flight and continuous at inside turns and returns (7.2.2.4.2)
- ☐ Intermediates to 34" so that 4" sphere will not pass (6" sphere at tread/riser triangle) (7.2.2.4.5.3 / 1013.3)
- ☐ 8" sphere shall not pass above 34" (1013.3)
- ☐ 4" sphere shall not pass at open risers - Implied by LSC 7.2.2.4.5.3 and IBC:1013.3 exception #1
- ☐ 21" max clear between parallel top & intermediate rails at industrial, storage, & detention
  See (LSC:7.2.2.4.5.3(2) - IBC:1003.3 Exception #3)
- ☐ 48" visual screen at any landing at exterior stair 4 floors or more in height (7.2.2.6.2)
- ☐ See IBC:1023.3 for Exterior stairs at ends of breezeway corridors. (35 sf clear area above 42" guard height)