Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
1.	HERBERT L BILL				ALL OF THESE COMMENTS HAVE TO DO WITH REINFORCEMENT DEVELOPMENT LENGTH	No response needed.
2.	Eric Koehler	N/A	N/A	N/A	There is no provision for the use of cores or non-destructive testing for the acceptance of concrete strength. Provisions should be added to be consistent with ACI 301 and 318.	Disagree. This document provides minimum requirements and if an owner wants to set higher requirements for acceptance, they can reference other documents. AHJ also has the ability to call for additional testing. Specifications and other requirements for residential concrete industry do not call for testing or the use of certified technicians. To require testing would likely place an unnecessary burden on residential contractors. In addition, concrete for residential construction is often produced to more than adequate strength levels to satisfy the 332 Code requirements. Because cylinders are not made to confirm the minimum strength of concrete, there is no need to add acceptance criteria such as provisions for cores or NDT.
3.	Kesner	1	1		Can the title be changed to “Code Requirements for Structural Concrete in Residential Structures”? This would be consistent with the title of other ACI codes, and better describe intent. As written, the title seems backwards, it is providing code requirements for structural concrete used in residential structures, not the other way around.	Agree, with modification. This title has been one of significant changes over the years of the Code, mostly directed by TAC. There are code requirements in 332 that are not structural in nature, meant to promote concrete durability. The most appropriate title seems to be one more like those used for 349 and 350. Committee suggests “Code Requirements for Residential Concrete and Commentary.”
4.	Luke Pinkerton	1	9		Please check the consulting member list, it needs to be updated based on the roster on the website.	ACI Staff will ensure the published committee roster per the TCM lists all effective members as of the date of document closure.
5.	Kesner	1	11		Does the code cover design and construction? I think it should read – “This code provides design requirements for cast-in-place…” Construction requirements should come from a specification. Same comment on line 13.	See response to #3 above (new proposed title). No change needed.

Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

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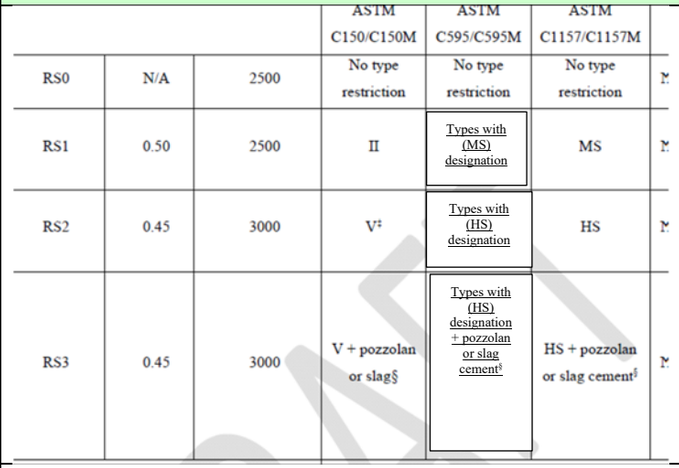
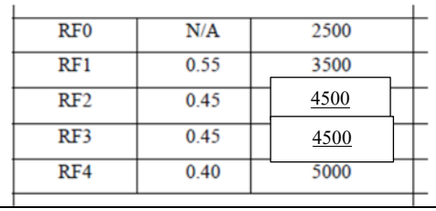
6.	Kesner	6	4		Should ACI 132 Responsibility in Concrete Construction be referenced in the discussion of responsibility?	Disagree. No change needed. ACI 318-19 does not reference ACI 132, which has been in effect since 2014. ACI 132 is not referenced in the ACI 318 or IRC, so why would 332 be the first to do so? The committee is not opposed to including some reference to or discussion about responsibility, but questions the legitimacy of the inclusion for a structural code to reference a guide in the general scope section.
7.	Greg Moody	11	10		Should it be “grade” or “ground”? If grade, does grade need to be defined?	Agree. The CT provides a definition of “grade” and references the prepared surface for a concrete slab to be placed. ACI 360 refers to ‘Slabs-on-Ground’ as does ACI 332 for correct reference. The CT does not provide a definition of “ground”. There seems to be inconsistency with the use of terms “grade” and “ground” and in general it is understood that terms are not to be defined unless unique to the document or differing from the CT. 332 suggests that the committee responsible for the CT consider updating the definitions to be in step with the vernacular and technical document use, at the very least offering a second version of “grade” if not also preferring the term “ground”. Add the following definition of grade to 332 and suggest it be considered for the CT as well: **grade** – the plane considered as the entrance surface to a structure which defines a structural member as exposed either to soil pressure and ground water (below grade), or to wind and snow loads (above grade); also the prepared surface to receive a slab.
8.	Greg Moody	12	4		Correct “cone” to “mold”. The shape is a frustrum, not a cone.	See response to #10 below.
9.	Greg Moody	12	6		Add “of each unit” and end of sentence. Otherwise it is unclear of open space refers to the group or to the unit.	Disagree.

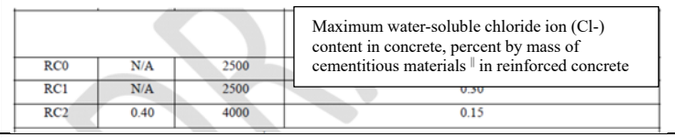
Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
						The committee's definition is in agreement with the IRC definition of townhome. There does not appear to be a significant improvement in clarity by adding the phrase "of each unit" when the definition clarifies the intent to apply to one of the units within the development.
10.	Greg Moody	12	3, and 4		Remove both lines. reporting tolerance should be left to the test method.	Agree. Committee agrees with the interpretation of technical measure not having relevance in a definition. Remove all text from the colon in line 2 to the end of definition and replace with a period. slump flow—measure of the unconfined flow potential of freshly mixed self-consolidating concrete or grout~~: the value is equal to the average of two perpendicular diameters of the material measured to the nearest 1/4 in. but reported to the nearest 1/2 in. after it is released from a slump cone and stops flowing~~.
11.	Greg Moody	14	29		Can "concrete" be added after the first "plastic" to make it clear we are not adding traditional plastic?	Agree. **4.1.5** Recycled plastic <u>concrete</u> – Recycled plastic concrete shall conform to ASTM C1798/C1798M. [Note to ACI editors: 4.1.2 Aggregates and 4.1.3 Water are also single-level entries, no sub-levels. For consistency, could modify all three to: ### Title as part of entry. For example, 4.1.5 Recycled plastic concrete shall conform to ASTM C1798/C1798M.]
12.	Eric Koehler	19	15	N/A	Table 5.3.2 does not include the use of Type IL (MS) cement for exposure class RS1 and Type IL (HS) for RS2 and RS3. Additional research was done to support the use of Type IL cements in sulfate environments when meeting MS or HS criteria, resulting in a change to allow MS and HS designations for Type IL cement in ASTM C595. In fact, both ACI 318-19 (Table 19.3.2.1) and the upcoming ACI 301-20 were updated. Table 5.3.2 should be likewise updated.	Agree. With both ACI 318 and ACI 301 documents allowing Type IL sulfate-resistant cements, 332 should make similar provisions to allow those per Table 5.3.2 in the appropriate exposure categories. Follow the convention of 318 and 301: For RS1: Types with (MS) designation For RS2: Types with (HS) designation For RS3: Types with (HS) designation plus pozzolan or slag cement

Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
						
13.	Dana Rotkovich	19	15	5.3.2	I would suggest for the minimum psi for RF2 & RF3 be raised to 4500psi. The required 0.45w/c ratio already dictates a 4500psi mix and this would be more in line with the freeze thaw exposure rate in ACI 318.	Agree. The durability (freeze-thaw resistance) of 4000 psi can be improved by increasing strength by 500 psi to 4500 psi for RF2 and RF3 levels. This aligns these requirements with those of ACI 318. (As an aside, a 0.45 w/cm often results in a 4500 psi strength level anyway, so this better aligns the w/cm with strength levels and does not pose any added burden on contractors.) 
14.	Eric Koehler	20	1	N/A	The maximum chloride contents in Table 5.3.2 for RC exposure classes are based on mass of cement rather than cementitious materials. ACI 318-19 (Table 19.3.2.1) was changed to express maximum chloride contents based on mass of cementitious material. Revise to match ACI 318-19.	Agree. Revise table heading for chloride exposures to match ACI 318-19:

Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
						Maximum water-soluble chloride ion (Cl–) content in concrete, percent by ~~weight~~ mass of cementitious materials[11] in reinforced concrete  Maximum water-soluble chloride ion (Cl-) content in concrete, percent by mass of cementitious materials [11] in reinforced concrete RC0 N/A 2500 RC1 N/A 2500 0.30 RC2 0.40 4000 0.15
15.	Greg Moody	23	7		Should it be “grade” or “ground”?	Disagree. For reasons delineated above in # 7, Committee does not agree with this term change suggestion.
16.	Dr. Fariborz Tehrani	41	25	7.7.3	The “Internal Curing” should be added as another mean to control plastic shrinkage cracking per ACI (308-213)R-13 Section 4.1.	No change needed. The current language does not spell out methods to control plastic shrinkage cracking and therefore does not disallow internal curing. In addition, while internal curing of concrete can be effective for this purpose, it is not a common method used in residential applications.
17.	Greg Moody	42	7		Correct “90 minutes” to 1½ hours”	Agree. C94 lists time limit in hours, not minutes, so change 90 minutes to 1-1/2 hours. **R7.2.1** Experience has shown that the ~~90-minute~~ 1-1/2 hour discharge time can be exceeded…
18.	Eric Koehler	42	9	N/A	ASTM C94 was revised to remove the “one-time” addition requirement (See Section 12.7 and 12.8); therefore, this provision in ACI 332 should be updated.	Agree, with modification. C94 also allows additions during transit, so remove “at the job site”. ASTM C94/C94M allows for the addition of water up to the allowable maximum *w/cm* before discharge. Note that the response to #19 further modifies this section and overrides this change.
19.	Greg Moody	42	11		Is “mid-range water-reducing admixture (MRWRA)” defined in any ACI or ASTM standard?	Agree that we were not consistent with the current C94 language. Delete reference to type of WRs (mid, high) and delete last two sentences. This change also overrides response to #18.

Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
						ASTM C94/C94M allows for the addition of water up to the allowable maximum *w/cm* or water-reducing admixtures, or both, before discharge.
20.	Greg Moody	42	20		Change "self-consolidating concrete and concrete with slump greater than 7 in." to "concrete with slump greater than 7 in. and self-consolidating concrete" since the original wording indicates SCC can have slump.	Agree. Reversing the order of these two items adds clarity: Usually, ~~self-consolidating concrete and concrete with slump greater than 7 in.~~ concrete with slump greater than 7 in. and self-consolidating concrete…
21.	Greg Moody	42	29		Add "Unless otherwise Specified"	Agree. Unless otherwise specified, final ~~Final~~ finishing can be a float, trowel, or broom finish.
22.	Dr. Fariborz Tehrani	43	10-11	R7.5	Internal Curing should be added to the list of common methods per ACI (308-213)R-13.	Disagree. As noted in response to #16 above, internal curing is possible and we don't disallow it, but it is not common in residential concrete practice.
23.	Dr. Fariborz Tehrani	43	12	R7.5	The ACI (308-213)R should be added to the list of references.	Agree. Although internal curing is not a common residential concrete practice (see #16 and #22), there is no reason we can't add reference to (308-213)R.
24.	HERBERT L BILL	44	25	8.2.2.1 .2	"36d_b into the wall and 6" into the footing" WHAT IS THE PURPOSE OF THIS "DOWEL"? DEVELOPMENT LENGTH SHOULD BE THE SAME ON EACH SIDE OF THE JOINT.	Disagree. No change to be made. The purpose of this dowel is to prevent the movement of the wall base relative to the footing during backfill (provide additional shear resistance). Because a basement slab is often not in place at the time of backfilling, the dowel provides a temporary connection to satisfy that need. The typical load at this juncture is less than 5 kips, which is the resistance capacity of a #4 bar in 6-in. of concrete.
25.	HERBERT L BILL	44	27	8.2.2.1 .2	ACI SHOULD NOT ENDORSE DRIVING DOWELS INTO THE SOIL BELOW THE FOOTING. EVENTUALLY, THAT KIND OF DETAIL PROMOTES DETERIORATION OF THE FOOTING.	Disagree. No change needed.

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
						The footing for the residential foundation wall has very low priority. Dowels that are of a distance apart such as 24 in. do not pose structural fatigue to this element over the duration of service it would take for any such corrosion to impact the footing. As stated in No. 24, these dowels are simply used to transfer early shear loads between the wall and footing during construction. Anecdotal evidence based on decades of using this practice suggests that there is no significant corrosion of bars driven into the subgrade nor deterioration of concrete around these bars.
26.	Greg Moody	45	6		Change "Vertical ties shall pass through the construction joint consisting of No. 3 or larger, spaced a maximum of 48 in. on center" to "Vertical ties consisting of No. 3 or larger, spaced a maximum of 48 in. on center, shall pass through the construction joint"	Agree. Committee accepts this change as better clarity of the intent of the language. Vertical ties ~~shall pass through the construction joint~~ consisting of No. 3 or larger, spaced a maximum of 48 in. on center, shall pass through the construction joint…"
27.	HERBERT L BILL	58	7	Fig. R8.2.2. 1.2	WITHOUT A KEY BELOW THE FOOTING, DEVELOPMENT OF THE DOWEL CAN NOT BE ACHIEVED. INSTEAD OF ADDING A KEY, I WOULD SUGGEST ELIMINATING THE DOWEL. IF SEISMIC DEMANDS TIEING ALL ELEMENTS TOGETHER, THEN I WOULD SUGGEST THAT AN ENGINEER DESIGN/STAMP THE DESIGN.	Disagree. No change needed. The purpose of the dowel, as stated in #24 above, is to provide shear resistance between the wall and top surface of the footing during backfill when the floor slab may not yet be in place. Development length of the dowel is not the issue.
28.	HERBERT L BILL	60	12	Fig. R8.2.5	I WOULD SUGGEST THAT TWO DIFFERENT CASES BE DETAILED HERE. THIS COULD BE CASE A. IN THIS FIGURE, I WOULD RECOMMEND THAT THE DEVELOPMENT LENGTHS ON EITHER SIDE OF THE HORIZONTAL DISCONTINUITY BE CALLED OUT BY REFERENCE TO TABLE 6.8.2, Pg 35.	Disagree. No change needed. Committee notes that the direction for the dimension of the reinforcement across the condition is specified as 3-ft minimum in section 9.2.5 as directed by 8.2.5. This will always be greater than the min. development length described by Table 6.8.2.
29.	HERBERT L BILL	60	13	Fig. R8.2.5	I WOULD SUGGEST ANOTHER FIGURE, CASE B, FOR THE CASE WHERE THE HORIZONTAL DISCONTINUITY IS PERPENDICULAR TO THE MAIN/FULL HEIGHT WALL. THIS CASE PRESENTS AN ISSUE WITH DEVELOPMENT LENGTH INTO THE MAIN WALL. I WOULD SUGGEST THAT A FULL HEIGHT x 2' PANEL, PERPENDICULAR TO THE MAIN WALL,	Disagree No Change Needed.

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					BE ADDED TO ACCOMMODATE THE REQUIREMENTS OF TABLE 6.8.2, Pg. 35.	The detail shows development length of the horizontal bar as 3-ft, as noted in No. 28 response. This development length is shown to be beyond the "opening" created by the discontinuity. This opening is the same, whether in-plane or perpendicular to the line of the shorter wall. Therefore, it is understood that a bend is required to extend that 3-ft into the taller wall in such a case. The addition of a 2-ft "panel" or full height wall in line with the shorter wall does not improve the development condition but rather is a detail that would be used for a concentrated load (column) need or to facilitate a greater jump length than the 4-ft maximum prescribed.
30.	Greg Moody	99	30, 31		"standing water removed from the forms immediately before concrete is placed." Should not be under "joints".	Agree. Delete the entry under joints. The provision for water to be moved by concrete placement exists in commentary R7.2.4 sufficiently. **9.7.2.1** The joint surface shall be clean and wetted ~~and standing water removed from the forms~~ immediately before concrete is placed.
31.	Luke Pinkerton	112	23	13.7.2	While I support the work of committee 544, I do not believe a code document can reference is guide document as mandatory. I would suggest moving the reference to 544.4 to the commentary as a reference for engineers to draw upon at their discretion but remove it from the code. If the 544.4 language is included in the code as non-mandatory language or commentary, there should also be a statement that indicates engineers may also refer to ISO 17065 building product evaluations reports (e.g. ICC-ES, IAPMO-ES) which demonstrate compliance with the alternative provisions in section 1.2 for dosage calculation. Evaluation reports are is still necessary given the diversity of fiber product offerings. It is therefore difficult to offer a one size fits all solution. There are criteria available for both macro synthetic (ICC AC 32), steel fibers (ICC AC 208) and twisted reinforcement (ICC AC 470). These companies put the product through a battery of tests at third party, accredited labs, against criteria developed through a third-party peer/public review process. These reports allow the market to continue to develop better solutions for meeting the codes basic	Agree. A code document, which is in mandatory language, cannot reference a guide, which is non-mandatory. However, identifying ACI 544.4 as a resource of best practices based upon industry acceptance is important, so move that to commentary. **13.7.2** Fiber reinforcement—The dosage rate of synthetic microfibers used for plastic shrinkage crack control shall be determined by a licensed design professional. Macro fibers and steel fibers dosage rates shall be determined by a licensed design professional ~~in accordance with ACI 544.4R, Guide to Design with Fiber-Reinforced Concrete~~. **R13.7.2** Synthetic microfibers may be used to control plastic shrinkage cracking. Synthetic macrofibers, steel fibers, or both, may be used to control drying shrinkage cracking and provide post-crack load-carrying capacity in place of or in combination with steel reinforcement. Macro fiber and steel fiber dosage rates may be determined in accordance with ACI 544.4R, Guide to Design with Fiber-Reinforced Concrete. Building product evaluation reports published by an organization accredited by ISO 17065 may additionally be used.

Document: 332 Residential Code Requirements for Structural Concrete (ACI 332-XX) and Commentary

No.	Public Commenter Name	Pg #	Line #	Item #	Public Comment	Committee Response Proposal
					performance requirements and performance design is already allowed under section 1.2.	Currently, ICC AC reports exist for synthetic and steel fibers. Refer to Table R13.6.2 for the common descriptions and dosage rates for synthetic fibers.
32.	Dr. Fariborz Tehrani	115	12	Comm. Ref.	The ACI (308-213)R and the ASTM C1761/C1761M-17 should be added to the list of ACI references.	Agree. Add these two documents to the list of references. 308-213R-13 Report on Internally Cured Concrete Using Prewetted Absorptive Lightweight Aggregate ASTM C1761/C1761M - 17 Standard Specification for Lightweight Aggregate for Internal Curing of Concrete
33.		101	5, 7	R9.2.5		To ACI editors: As we reviewed the public comments, the Committee identified two typos in R9.2.5. The two commentary provisions numbered R9.2.6.1 and R9.2.6.2 should be corrected to R9.2.5.1 and R9.2.5.2.