IS-3DACT 1150 Standard
Public Comments Received for Round #2

In-Bound Comments – Committee Action Required						
#	Name	Section	Comment	Reason	Committee Response	Committee Vote
1.	Abdul Peerzada	202	**1-COMPONENT (1K) 3D PRINTING MATERIAL.** The definition has been significantly Modified and does not include bagged products.	Changes to previous definition.	Approve with no modifications	Mr. Tian motioned Mr. Hellmer seconded Approved Unanimously
2.	Abdul Peerzada	202	**3D PRINTING MATERIALS.** A proprietary or non-proprietary cementitious material (3D printing concrete or 3D printing mortar) that consists of cement, fibers (if applicable), supplementary cementitious materials (if applicable), fine aggregates or fine and fine and/or coarse aggregates, and admixtures (if applicable). ~~3D printing material is homogenously mixed and extruded in layers during construction.~~	Redundant.	Approve with no modifications	Mr. Hellmer motioned Mr. Mayer seconded Approved Unanimously
3.	Hussain Ashoor	202	**3D PRINTING CONCRETE:** A proprietary or non-proprietary cementitious 3D printing material with coarse aggregates of size not less than 4.75 mm in accordance ASTM C33.	To clearly specify the difference between the concrete and mortar.	Approve with minor modifications	Mr. Tamimi motioned Ms. Hojati seconded Approved Unanimously
4.	Abdul Peerzada	202	**FIELD MIX~~ED~~ 3D PRINTING MATERIAL.** Printing material mixture, either mortar or concrete, where constituent materials are stored and batched separately and mixed at the jobsite ~~or ready-mix plant~~.	Formatting/Language.	Approve with minor modifications	Mr. Tian motioned Mr. Kreiger seconded Approved Unanimously
5.	Abdul Peerzada	202	**MATERIAL BATCHING AND DELIVERY SYSTEM.** Mixing and delivery system-machinery or assembly that performs some or all of the following functions: material batching, material mixing, and material pumping ~~(or an alternative delivery method)~~.	Technical.	Approve with minor modifications	Ms. Hojati motioned Mr. Tian seconded Approved Unanimously
6.	Sean Platt	303.2	The compressive strength for 3D printing mortar shall be conducted on 2 in. (50 mm) cube specimens in accordance with ASTM C109/C109M ~~or on cylinder specimens in accordance with ASTM C39/C39M~~.	Cylinders for mortar should not be allowed unless limited to 2" x 4".	Disapprove	Mr. Hellmer motioned Mr. Kreiger seconded 8 positive votes Mr. Tian voted negative
7.	Abdul Peerzada	303.2	The compressive strength for 3D printing mortar shall be conducted on 2 in. (50 mm) cube specimens in accordance with ASTM C109/C109M~~ or on cylinder specimens in accordance with ASTM C39/C39M~~.	There is no research at the moment that supports use of cylinders for compression testing of mortar. This section should be removed and if committee still wants to have this test method, please provide scientific evidence which can effectively oppose all the published articles which suggest that mortar cannot be testing using a cylinder geometry as given in ASTM C39 (4x8 in minimum).		

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#	Name	Section	Comment	Reason	Committee Response	Committee Vote
8.	Hussain Ashoor	303.2	The compressive strength for 3D printing mortar shall be conducted on 2 in. (50 mm) cube molded specimens in accordance with ASTM C109/C109M or on cylinder specimens in accordance with ASTM C39/C39M.	There should be a clear mention whether the specimens is saw cut from 3DCP shell sample or it is molded.	Disapprove	Mr. Tian motioned Mr. Doug Mayer seconded Approved Unanimously
9.	Abdul Peerzada	304.2	Consider adding MCPT (AASHTO T380) which is a more reliable test.	Alternate method available.	Approve with minor edits	Mr. Tian motioned Ms. Maryam seconded Approve Unanimously
10.	Larry Stevig	304.4	**304.4** **Permeability.** In all climates, air, water and vapor permeability of 3d printing material shall be compatible with cavity insulation and coatings on interior and exterior wall surfaces to ensure wall will dry and resist concealed condensation.	In addition to the 3 durability items in section 304 already, and considering the use of 3D printed construction in warm-weather climates to date, it seems that permeability of this wall system is especially important. The proposal in 304.4 is admittedly lacking any referenced standards, but is submitted for the purpose of asking if the committee has discussed how air, water, and vapor is handled by a wall system that is commonly not built with cladding, air or water resistive barriers, and may or may not be coated with sealants/paint that acts as a vapor barrier. Can the committee identify any appropriate standards that would help establish minimum permeance standards for various climates that will verify materials used will ensure long-term durability and adequate performance of the building's walls?	Approve with minor modifications	Ms. Maryam motioned Mr. Tian seconded. Approve Unanimously
11.	Larry Stevig	401.3.3.2	Shells without integral cores shall be considered a veneer, where out-of-plane load is transferred to structural shell(s) through a means of connection as described in Section 403.5. Shells without integral cores shall ~~have no axial load-carrying capacity~~ not support any axial load. Shells with integral *cores* shall be assumed to act as horizontal one-way flexural elements designed to transmit out-of-plane loads to *cores*. *Cores* shall be designed to transmit out-of-plane loads to the foundation and to a roof or floor diaphragm. The cross section consisting of *shells* and integral *cores* shall be assumed to act as axial elements designed to transmit gravity loads to the foundation.	Clarification.	Approve	Mr. Mayer motioned Mr. Langefeld seconded Approve Unanimously
12.	Larry Stevig	Table 403.7	[b] Reinforcement shall be fully embedded in *3D printing materials* and shall be protected from corrosion by using stainless steel or a hot-dipped galvanized coating or epoxy coating. If the above corrosion protection requirements are not met, minimum concrete cover 3/4 in. ~~shall be the same as for other reinforcement~~. Reinforcement material specifications shall comply with Section 404.2.3.	In Table 403.7, for minimum cover for cross ties and horizontal reinforcement exposed to weather or in contact with ground when not galvanized or stainless steel needs better clarification than footnote provides as written. Proposal suggests giving prescriptive requirement of 3/4" as required for WWF in ACI 318.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously

In-Bound Comments – Committee Action Required						
#	Name	Section	Comment	Reason	Committee Response	Committee Vote
13.	Larry Stevig	403.11	**403.11 Structural Integrity.** For multi-story 3D-ACT wall systems, ~~the size of~~ provide vertical integrity ties which shall be at least the equivalent of one #4 bar spaced...	Vertical integrity ties are not defined - this revision provides clarifying language.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously
14.	Hussain Ashoor	404.3.2.1	In the absence of published effective ~~structural contact widths~~ Effective side face contact based on measurements, effective side face contact shall be assumed if the ratio of the single-bead and double-bead effective structural contact widths is greater than or equal to the following:	This section is talking about the Effective side face contact not the structural contact widths.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously
15.	Trevor Ragnor	404.3.2.2	[Add text] Effective side face contact may be verified through either destructive cross-sectioning or through non-destructive quality assurance methods, including photographic documentation, layer height monitoring, bead overlap tracking, or digital print logs. All QA records shall demonstrate that at least 85 percent of the nominal bead height is in contact. Where destructive methods are used, a minimum of 15 measurements shall be performed and the reported contact height shall be 2.33 standard deviations below the mean, as measured per ASME B89.1.14.	This revision allows 3D printing operators to use non-destructive, automated QA methods in place of labor-intensive cross-cutting and measuring. It maintains structural performance verification while cutting costs, delays, and labor — all essential for scalable 3D printing workflows like those used by Apis Cor and others.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously
16.	Abdul Peerzada	501.1	Prequalification testing shall be performed on specimens printed using the *3D printing materials*, with the *3D printing material mix* ~~*design*~~, and *3D printing system* proposed for construction. Each *3D printing material mix* ~~*design*~~ and *3D printing system* model combination including the mixing, delivery, and extrusion equipment intended to be used in the construction project requires prequalification testing in accordance with this section to evaluate compatibility and execution.	Technical/editorial.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously
17.	Trevor Ragnor	501.1	Each Field prequalification testing shall only be required for a *3D printing material mix design* and *3D printing system* model combination including the mixing, delivery, and extrusion equipment intended to be used in the construction project requires prequalification testing in accordance with this section to evaluate compatibility and execution when the combination has not been previously prequalified under substantially similar environmental and operational conditions. Prequalified systems used without substantive modification from their original configuration may be accepted by the code official without additional field testing. Variation in environmental conditions shall be taken into consideration while the prequalification tests....	Reason: This revision provides flexibility for manufacturers using prequalified, previously tested materials and systems under similar environmental conditions, aligning more closely with common practices in CMU, concrete, and other structural systems. It avoids redundant field testing for standardized and repeatable 3D printing deployments—critical for scalability, affordability, and speed-to-market, especially in production-scale housing.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously
18.	Hussain Ashoor	501.3	~~If prequalifying 3D printing concrete is used for construction,~~ If prequalifying 3D printing concrete is used, the bead size shall be such that it will allow extraction of sawn samples for compression tests mentioned in Section 501.6.2.1 with a minimum dimension of four times the maximum aggregate size.	The original text was incomplete and required the addition of "used" to make the sentence grammatically correct.	Approve with minor modifications	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously

In-Bound Comments – Committee Action Required						
#	Name	Section	Comment	Reason	Committee Response	Committee Vote
19	Hussain Ashoor	Figure 501.3	Overlap ¼" min for round nozzle. Overlap 0" min for rectangular nozzle	The current figure specifies a minimum overlap of 1/4" for all nozzle types, which is impractical for rectangular nozzles in 3D concrete printing. When using rectangular nozzles, overlap significantly affects the geometry of the element and can lead to defects or dimensional inaccuracies. For example, the COBOD printer Standard Operating Procedure states that any circular element printed must have a minimum radius equal to the nozzle width. If the nozzle width is 40 mm, the minimum printable radius is also 40 mm, resulting in zero overlap between adjacent print lines. Achieving an overlap of 6.35 mm (1/4") would require reducing the radius to approximately 36.8 mm, which is not feasible for the printing system. The proposed revision ensures practicality and compliance with current 3DCP technology while maintaining clarity between nozzle types.	Added a new section 501.6.1, revised the reporting requirements in Section 501.7, and Figure 501.3 needs to be modified to change the overlap from 1/4" min. to max two bead widths.	Mr. Kreiger motioned Mr. Carrera seconded Approved Unanimously
20	Hussain Ashoor	501.4	1. ~~The delay between print layers 8 and 9, and 10 and 11 shall be~~ The prequalification element shall include 4 layers that represent the maximum interlayer print time that will be used during construction without application of bonding agent or special surface preparation between printing layers. During prequalification construction, there shall be no application of bonding agent or special surface preparation between these 4 printed layers ~~printing layers 8 and 9, and 10 and 11~~. 2. A print stop of at least 8 hours shall be incorporated between two designated layers of the prequalification element ~~layers 9 and 10~~. The producer's print stop interlayer protocol shall be followed prior to resuming printing. The print stop protocol may consist of the application of a bonding agent or other surface preparation techniques when used in the construction. The protocol shall be documented as part of the submittal and incorporated into the construction documents. 3. The prequalification element shall extend to the full height of the actual project, starting at the same level as the lowest printed layer in the structure. The prequalification element shall include 16 layers, with the 8-hour stop incorporated between layers 9 and 10, and the interlayer time matching the maximum expected during construction. 4. Previous prequalification data shall be submitted to the licensed engineer before project execution. This documentation shall clearly state the layer times for each layer, mix design details, layer dimensions, nozzle specifications, and printer type.	• Printing the prequalification element under separate conditions does not accurately replicate real construction conditions. Let us break this down: • If the element is printed separately before the project execution, start-stop procedures would need to be artificially implemented to simulate the actual layer times. Based on our experiments and experience, artificially creating layer times by start-stop printing is not representative of actual printed elements and results in a significant reduction in material performance. • If multiple prequalification elements are printed together to achieve realistic layer times, this would cause significant delays (up to two extra days) and increase costs. • If the element is printed during the project, the designated stop layer location might not align with the actual construction sequence, causing project management and scheduling issues. **Our proposed approach:** • Print the prequalification element alongside the actual structure as a full-height element. • This ensures accurate simulation of interlayer time, print-stop protocol, curing, and material performance. • Test specimens can be extracted from this element without impacting the main structure. • Data from previous projects will serve as prequalification for future projects while simultaneously acting as a QA/QC measure.	Disapprove (language already clear, no modifications are made)	Mr. Langefeld motioned Mr. Kreiger seconded Approved Unanimously

In-Bound Comments – Committee Action Required						
#	Name	Section	Comment	Reason	Committee Response	Committee Vote
21	Abdul Peerzada	501.6.1.4	A minimum of six specimens for compression strength tests shall be molded from each prequalification element. The specimens for *3D printing mortar* shall be 2 in. (50 mm) cube specimens molded in accordance with ASTM C109/C109M~~ or cylinder specimens molded according to ASTM C39/C39M~~	As explained earlier in chapter 3. There is no research at the moment that supports use of cylinders for compression testing of mortar. This section should be removed and if committee still wants to have this test method, please provide scientific evidence which can effectively oppose all the published articles which suggest that mortar cannot be testing using a cylinder geometry as given in ASTM C39 (4x8 in minimum).	Refer comment #7 (same change requested related to compression tests)	No vote as this was addressed with Comment #7
22	Abdul Peerzada	501.6.2.1	The line 4-5 second Paragraph of the section is confusing.	Clarity needed.	Approve with minor modifications	Mr. Hellmer motioned Mr. Tamimi seconded Approved Unanimously
23	Abdul Peerzada	501.6.2.1	The actual dimensions of the sawn samples shall be determined as the average of five measurements taken for each cube face. One measurement at each corner and one measurement at the face center. ~~Similarly, for *3D printing concrete* samples, procedures in ASTM C109/C109M shall be followed for testing, and the load rate shall be modified to impart a stress rate equivalent to what is specified in ASTM C109/C109M.~~	There are no correction factors to support this statement. Additionally astm C109 specifies 2-inch cube which are extremely small for concrete. Might need larger cubes and some non-astm standards allow large cubes for concrete.	Refer comment #7 (same change requested related to compression tests)	No vote as this was addressed with Comment #7
24	Hussain Ashoor	502.4.3(9)	Maximum design wind speeds no greater than 160 mph for Exposure B, 136 mph for Exposure C, and 125 mph for Exposure D in accordance with ASCE 7.	To clarify that the exposure categories refer to those defined in ASCE 7, ensuring better understanding for users unfamiliar with ASCE terminology.	Approve with minor modifications	Mr. Hellmer motioned Ms. Hojati seconded Approved Unanimously
25	Abdul Peerzada	502.4.3	This section defeats the purpose of why the chapter 5 was created. It wasn't discussed over in the working group meetings with all members. We suggest it should be removed.	Loop-hole in the chapter for field testing.	Approved with voting count: Seven affirmative Five Negative	Mr. Tian motioned Ms. Hojati seconded

In Bound Comments – Staff Editorial						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
26	Larry Stevig	102.1	Fire resistance and smoke prevention, where required, ~~must~~ shall comply with IBC Chapter 7, IRC Section R302, and local building code requirements.	Since many 3D printed buildings are residential and single-family homes, it is appropriate to include a reference to the International Residential Code (IRC) in the standard in addition to references to the IBC. Section R302 of the IRC includes Fire Resistant Construction requirements needed for wall construction. Proposed change also replaces "must" with "shall" as preferred code language.	yes	No Action taken. Staff Editorial
27	Larry Stevig	108.1	All other requirements related to construction documents from IBC or IRC shall still apply.	Since many 3D printed buildings are residential and single-family homes, it is appropriate to include a reference to the International Residential Code (IRC) in the standard in addition to references to the IBC.	yes	No Action taken. Staff Editorial

Out-of-Bound Comments – No Action Required. Editorial Requested						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
28.	Larry Stevig	203	A_s = area of longitudinal ~~reinforcement located at least 2/3 of the overall element depth away from the extreme compression fiber~~, in.^{2}	This notation definition for A_s includes language that is related to a code requirement which is stated in Section 404.4.2.6, and should be deleted from the definition in Section 203.	no	No Action taken. Staff Editorial
29.	Larry Stevig	301.1	Editorial change only. **301.1 Material Mixture Constituents.** 301.1.1 Cementing materials shall conform to ASTM C150/C150M, ASTM C595/C595M, or ASTM C1157/C1157M. 301.1.2 Aggregates shall conform to ASTM C33/C33M or ASTM C144. 301.1.3 Admixtures shall conform to ASTM C260/C260M, ASTM C494/C494M, or ASTM D98. 301.1.4 Steel fibers shall be deformed and conform to ASTM A820/A820M. 301.1.5 Glass fibers shall conform to ASTM C1666/C1666M. 301.1.6 Synthetic fibers shall conform to ASTM D7508/D7508M. 301.1.7 Natural fibers shall conform to ASTM D7357. 301.1.8 Fly ash or natural pozzolans such as metakaolin shall conform to ASTM C618. 301.1.9 Silica fume shall conform to ASTM C1240. 301.1.10 Slag cement shall conform to ASTM C989/C989M. 301.1.11 Mixing water for 3D printing material shall comply with ASTM C1602/C1602M.	Section 301.1 will be much easier to read and find the various constituents and their associated ASTM standards if written in a list format, rather than as a paragraph.	no	No Action taken. Staff Editorial
30.	Larry Stevig	401.2.2	It shall be permitted to determine the structural design of 3D-ACT wall systems through alternative testing requirements of Section 406. Wall systems shall meet the minimum detailing requirements of Section 403 and the connection requirements of Section 405 unless structural testing is performed showing that an alternative method provides equal or better performance than the minimum requirements outlined in Section 403 and Section 405.	Clarification.	no	No Action taken. Staff Editorial
31.	Larry Stevig	401.3.2.2	Webbing is defined as printed extrusions between multiple shells. Webbing shall utilize *effective side face contact* in accordance with Section 404.3.2 to provide connection from webbing to shells. Examples of webbing are shown in Figure 401.3.2.2.	Clarification.	no	No Action taken. Staff Editorial
32.	Larry Stevig	401.3.2.3	Non-axial load bearing walls are permitted to be designed without integral cores provided the top of the wall is laterally supported or stability of the wall can be demonstrated through a rational analysis.	Clarification.	no	No Action taken. Staff Editorial

Out-of-Bound Comments – No Action Required. Editorial Requested						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
33.	Larry Stevig	401.3.3.1	Single-shell wall sections with integral cores shall be permitted. The shell shall be assumed to act as a horizontal one-way flexural element designed to transmit out-of-plane loads to cores. Cores shall be designed to transmit out-of-plane loads to the foundation and to a roof or floor diaphragm. The cross-section consisting of the shell and cores shall be assumed to act as axial elements designed to transmit gravity loads to the foundation.	Clarification.	no	No Action taken. Staff Editorial
34.	Larry Stevig	401.4	A continuous load path, or paths, with adequate strength and stiffness shall be provided to transfer all vertical and lateral loads from the roof, wall, and floor systems from the point of application to the supporting structural elements and foundation.	Clarification.	no	No Action taken. Staff Editorial
35.	Larry Stevig	401.8	~~401.8~~ 401.2.3 **Structural Analysis.**	Move 401.8 into a sub-paragraph of 401.2 since it is related to the design approach.	no	No Action taken. Staff Editorial
36.	Larry Stevig	402.1	Structural elements of 3D-ACT wall systems shall be capable of resisting the design loads given in the building code adopted by the administrative authority adopting this standard.	Editorial clarifications to match similar language elsewhere in the standard.	no	No Action taken. Staff Editorial
37.	Larry Stevig	402.2	Load combinations applied to structures containing 3D-ACT wall systems shall be in accordance with the building code adopted by the administrative authority adopting this standard.	Editorial clarifications to match similar language elsewhere in the standard.	no	No Action taken. Staff Editorial
38.	Larry Stevig	Table 403.3	Minimum Reinforcement Ratio[a] a Minimum reinforcement ratio shall be determined by: (Area of steel horizontal reinforcement, in.2) divided by (heff, in. x Spacing of horizontal reinforcement, in.)	In Table 403.3, "Minimum Reinforcement Ratio" needs definition and specification for how to determine.	no	No Action taken. Staff Editorial
39.	Larry Stevig	404.1	This section provides minimum design requirements for 3D-ACT wall systems used for structural and ~~non-structural~~ non-loading bearing walls...	Clarifying language for walls in this section covering STRUCTURAL wall design.	no	No Action taken. Staff Editorial.
40.	Larry Stevig	404.2.1.4	The design interlayer bond strength, shown in Figure 404.2.1.4, shall be ~~taken as~~ 75 psi (520 kPa) minimum	Terminology "taken as" does not appear to be good code language. Suggest committee consider revising with "minimum" bond and shear strength.	no	No Action taken. Staff Editorial
41.	Larry Stevig	404.2.1.5	The design interbead shear strength, shown in Figure 404.2.1.4, shall be ~~taken as~~ 80psi (550 kPa) minimum	Terminology "taken as" does not appear to be good code language. Suggest committee consider revising with "minimum" bond and shear strength.	no	No Action taken. Staff Editorial
42.	Larry Stevig	404.12.1.3	~~404.12.1.3~~ 404.12.1.2.1	Renumber as subparagraphs to 404.12 1.2.	no	No Action taken. Staff Editorial
43.	Larry Stevig	404.12.1.4	~~404.12.1.4~~ 404.12.1.2.2	Renumber as subparagraphs to 404.12 1.2.	no	No Action taken. Staff Editorial
44.	Larry Stevig	406.3.2.6	A minimum of three replicate specimens of each connection between the intermediate floors or roof and the 3D-ACT wall system. Tests shall be conducted for out-of-plane bending and vertical shear effects of *3D-ACT* wall system and each floor or roof connection, and for horizontal shear transfer between the *3D-ACT* wall system and each floor or roof system.	Load transfer for roof-wall connection is as important as floor-wall connection.	no	No Action taken. Staff Editorial

Out-of-Bound Comments – No Action Required. Discussion Requested						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
45.	Abdul Peerzada	301.2	In the case of pre-packaged 3D printing materials, the final product shall be submitted ~~for testing along with mixing proportions. For all 3D printing materials, the same mixing procedure shall apply to both laboratory prequalification tests mentioned in Section 302 and the actual field use of the materials~~.	The mixing proportions for a Bagged product are proprietary and cannot be disclosed. The field mixing method and lab prequalification mixing method cannot be same.	no	No Action Required.
46.	Hussain Ashoor	401.3.2.2	~~Webbing~~ Infill is defined as printed extrusions between multiple shells.	Infill is a more common word in additive manufacturing than Webbing.	no	No Action Required.
47.	Larry Stevig	403.8	[text added at end] Cleanouts shall be provided for fill heights exceeding 5'4" in accordance with high-lift grouting procedures for masonry walls.	Provide additional direction for high-lift grouting of walls.	no	No Action Required.
48.	Larry Stevig	403.12	**403.12 Corners and Wall Intersections.** Unless separated by an expansion joint, walls that intersect shall be designed to provide lateral support for one another or from infill elements within those walls. ~~The joints and connections shall be designed and detailed to allow vertical and in-plane deformation of the supported wall without restraint.~~	Not clear how the deleted sentence requirement is to be achieved.	no	No Action Required.
49.	Larry Stevig	403.13	**403.13 Parapets.** Parapet walls in areas subject to ~~wind~~ Component and Cladding loads of 30 pounds per square foot (1.4 kPa) or more from combined positive and negative wind pressure shall be reinforced.	Clarifies use of component & cladding loads.	no	No Action Required.
50.	Larry Stevig	403.14.1	**403.14.1 Expansion/Contraction Joints.** ~~Contraction~~ Vertical control joints shall be spaced at a minimum of 25 ft. (7.6 m) on-center and within 15 ft. (4.6 m) of a wall corner.	Suggests use of more appropriate term.	no	No Action Required.
51.	Abdul Peerzada	404.2.1.3	Please check the relationship again as per ACI.	Need clarity on the relationship of equations.	no	No Action Required.
52.	Abdul Peerzada	404.2.2.2	Please check the relationship again as per ACI.	Need clarity on the relationship of equations.	no	No Action Required.

Out-of-Bound Comments – No Action Required						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
53.	Hussain Ashoor	203	A_g = gross area of ~~concrete~~ section, in.^{2}	The section could be made of different material than concrete.	no	No Action Required.
54.	Larry Stevig	401.3.2	The *3D-ACT* wall systems shall consist of one or more shells of 3D printing materials. If reinforcement is required, walls shall comply~~ing~~ with the minimum reinforcement requirements in Section 403, with regularly spaced cores printed integrally with the shells. Cores shall be reinforced and filled with 3D printing material, concrete, or grout.	Clarification.	no	No Action Required.
55.	Peter Cooperman	401.3.2	The *3D-ACT* wall systems shall consist of one or more *shells* of *3D printing materials* complying with the minimum reinforcement requirements in Section 403, with the option of regularly spaced *cores* printed integrally with the *shells* or horizontal/vertical placed reinforcement that performs equally or greater than traditional CMU structures. *Cores* shall be reinforced and filled with *3D printing material*, concrete, or grout. Alternative non-grout filled wall designs must meet minimum performance standards and be designed and signed off by licensed professional structural engineer.	In Newport News Virginia, Alquist and Habitat for Humanity Peninsula and Greater Williamsburg 3D printed two homes that utilized MAPEI Planitop 3D and Black Buffalo 3D printers. The approved wall design was an ungrouted wall with only horizontal joint reinforcement and was approved by the local engineer. This current documentation does not properly account for the ability to utilized unfilled walls as loadbearing, or walls without sizeable vertical rebar and may lead to increased material and labor costs for the builder/buyer. If the material and wall design match or exceed traditional build methods, they should be permitted to be used.	no	No Action Required.
56.	Pasquale Caccavo	401.3.2	The *3D-ACT* wall systems shall consist of either a single full-section wall or one or more *shells* of *3D printing materials* complying with the minimum reinforcement requirements in Section 403. For shell-based systems, ~~with~~ regularly spaced *cores* shall be printed integrally with the *shells*.These *cores* shall be reinforced and filled with *3D printing material*, concrete, or grout.	Unreinforced, single-layer full-section concrete walls printed without integral cores are excluded from the definition of wall composition under this provision. Suggest the committee to reword.	no	No Action Required.
57.	Pasquale Caccavo	401.3.3.3	**401.3.3.3 Full Section Walls.** Single full printed wall sections without integral cores shall be permitted. The wall shall be asumed to act as a horizontal one-way flexural element designed bear out-of-plane loads. The cross section shall be assumed to act as axial elements designed to transmit gravity loads to the foundation.	Unreinforced, single-layer full-section concrete walls printed without integral cores are excluded from the definition of wall composition under this provision. Suggest the committee add a new paragraph.	no	No Action Required.
58.	Trevor Ragnor	402.4	3D-ACT wall systems used as the lateral-force-resisting system are limited to SDC A and B unless additional testing and analysis beyond the scope of this standard is performed and approved by the administrative authority adopting this standard. Use in SDC C and D shall be permitted when the 3D-ACT wall system complies with the structural detailing requirements of this standard and when rational analysis and/or full-scale structural testing demonstrates compliance with the applicable provisions of ASCE 7 and ACI 318. The results of such analysis or testing shall be submitted to the code official for approval, and need not be prescriptively addressed within this standard.	The proposed change enables use of 3D printed walls in higher seismic zones without requiring a separate approval path outside of ICC 1150, as long as performance is demonstrated through recognized engineering procedures or full-scale testing. This mirrors how proprietary CMU systems are treated and is essential for this technology to access to key seismic markets like California, Utah, and the Pacific Northwest, while still ensuring safety.	no	No Action Required.

Out-of-Bound Comments – No Action Required						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
59	Trevor Ragnor	403.2	Minimum vertical reinforcement for *3D-ACT* wall systems shall consist of one #4 bar or larger in each integral *core* with integral *cores* spaced no further than 75 percent of the vertical span of the wall unless alternative configuration is justified by rational analysis or full-scale structural testing demonstrating equivalent or superior performance under applicable loads. An integral *core* containing one #4 bar or larger shall be located within 8 in. (200 mm) of the ends of walls. For conventionally reinforced systems, at least one integral core with vertical reinforcement shall be located within 8 in. (200 mm) of each end of wall or structural discontinuity, unless equivalent confinement and axial capacity can be demonstrated by engineering analysis. Exception: Non-load-bearing walls or walls subject to limited axial and lateral demands may use reduced reinforcement spacing and core reinforcement size where substantiated by test data or anaylsis approved by the code official.	This revision introduces flexibility for structural optimization, allowing 3D printed wall systems to match or exceed CMU performance using engineered justification rather than rigid spacing rules. It reduces unnecessary material usage and cost while preserving safety through verification. This is essential for companies to remain competitive with conventional construction, particularly in single-story, non-load-bearing, or repetitive housing applications.	no	No Action Required.
60	Pasquale Caccavo	403.2	If integral cores are needed, minimum vertical reinforcement for *3D-ACT* wall systems shall consist of one #4 or larger in each integral core with integral cores spaced no further than 75 percent of the vertical span of the wall. An integral core containing one #4 bar or larger shall be located 8 in. (200 mm) of the ends of walls. -OR- For-section concrete walls printed in a single layer without integral cores are excluded from the scope of this provision.	Application of this provision may be misleading in the case of unreinforced full-section concrete walls printed without integral cores.	no	No Action Required.
61	Trevor Ragnor	403.14.2	Print stops are horizontal discontinuities created by stopping and then starting printing. The maximum start-stop time between extrusion *layers* defining a print stop shall be specified in the construction documents. Minor print stops of less than 30 minutes in duration may be resumed without bonding agent application, provided surface contamination is visually absent and dimensional continuity is maintained. The print stop interlayer protocol such as the application of a bonding agent or other surface preparation techniques shall be specified in the construction documents.	This revision gives printer operators the flexibility to pause and resume printing safely without unnecessary delays, bonding agents, or procedures for short stops. This is vital for managing material refills, nozzle maintenance, or brief technical issues during active construction and reduces downtime without compromising wall performance.	no	No Action Required.
62	Trevor Ragnor	404.3.1.1	If the nominal bead width is not given or defined, the designer shall assume and justify a nominal bead width. Alternatively, where in-process dimensional control and quality assurance systems (e.g., machine-verified nozzle height, bead width monitoring, or photographic/laser documentation) are used to validate layer placement and consistency, the full nominal bead width may be used as the effective structural contact width, subject to approval by the code official.	The default assumptions in the current draft are excessively conservative, especially for modern 3D printers with real-time feedback systems and dimensional verification. Allowing validated systems to use full nominal bead width (subject to code official review) supports innovative QA/QC approaches and avoids unnecessary structural capacity penalties. This improves design efficiency and competitiveness without compromising safety, which is critical for material and structural optimization.	no	No Action Required.
63	Trevor Ragnor	404.3.1.1.1	1. ~~70~~ 80 percent of the nominal *bead* width for *non-dimensionally controlled extrusions*. 2. ~~90~~ 100 percent of the nominal *bead* width for *dimensionally controlled extrusions*.			
64	Trevor Ragnor	404.3.1.1.2	1. (~~0.7~~ 0.8 + 0.85(N-1) 2. (~~0.9~~ 1.0 + 0.95(N-1)			

Out-of-Bound Comments – No Action Required						
#	Name	Section	Comment	Reason	Round# 1	Committee Response
65.	Trevor Ragnor	404.3.1.2	[Add text] The effective structural contact width may be verified by either destructive cross-sectioning and measurement or by non-destructive quality assurance methods, such as in-process photographic documentation, continuous extrusion monitoring, bead height and width validation, or digital records from the printer control system, subject to approval by the code official. Where destructive methods are used, a minimum of 15 measurements shall be taken and the effective structural contact width reported as 2.33 standard deviations below the mean.	This revision gives 3D printing teams the option to replace labor-intensive, destructive testing with in-process QA technologies such as cameras, sensor logs, or printer telemetry. It maintains structural verification while significantly reducing field workload and material waste, helping companies scale production more efficiently.	no	No Action Required.
66.	Hussain Ashoor	404.9.1	Openings wider than 16 in. (400 mm) shall include steel lintels or 3D-ACT headers over opening. Steel lintels shall be designed in accordance with ANSI/AISC 360. 3D-ACT headers shall be designed in accordance with ~~Section 404.5.2~~ ACI 318, Chapter 9. The calculated deflection of lintels and headers providing vertical support to portions of the 3D-ACT wall systems shall not exceed $l/600$ under service dead and live loads.	Section 404.5.2 refers to Minimum Wall Dimensions, not the structural design of flexural elements. Therefore, the reference should be revised to direct the designer to ACI 318, Chapter 9, which governs the design of flexural members such as lintels and headers. Alternatively, a reference to Section 404.4.2.5 of this code could also be considered if consistency with other provisions is required.	no	No Action Required.