PC #	First Name	Last Name	Beginning Page Number	Multiple Pages	Ending Page Number	Beginning Line Number	Multiple Lines	Ending Line Number	Public Comment
1	Phillip	Samblanet	2			63			Congratulations to the Committee on adding in Appendix D. Adding in such reinforcement has been a goal for several cycle. Well done and thanks for the hard work. However, please consider revising the term "glass fiber reinforced polymer (GFRP) masonry" here and throughout the document. The modifiers make it seem that the masonry is a polymer. I would suggest that you use glass fiber reinforced polymer (GFRP) reinforced masonry. Similar changes may be needed to discuss this "reinforcement" such as GFRP reinforcement.
2	Phillip	Samblanet	23			11			Please consider updating all standards if newer editions can be referenced. For example try to reference ASCE/SEI 7-22 if possible. Use this comment to make needed references throughout TMS 402, TMS 602, and Commentaries.
3	Richard	Bennett	156			35			In Figure CC-9.1-1, ey should be ety on the x-axis.
4	Kurt	Siggard	160			22	This comment applies to multiple lines	27	Chapter 9 has upper limits for design f'm found in 9.1.9.1.1. Chapter 8 does not have a provision with the same upper limits. Chapter 8 and Chapter 9 design provisions have been "harmonized" over the past couple of cycles, and we commonly say that "the wall doesn't know which design method is used". I suggest that the limits found in 9.1.9.1.1 be moved to Chapter 4, or a similar provision be added to Chapter 8.
5	Kurt	Siggard	342			8			It is common to use preblended masonry mortar in many regions. I suggest that 21. A be modified to include ASTM C1714. ...with ASTM C270, or ASTM C1714.
6	Kurt	Siggard	320			22			Add to 1.3 ASTM C1714 Standard Specification for Preblended Dry Mortar Mix for Unit Masonry.
7	Kurt	Siggard	24			23			Include ASTM C1714 Standard Specification for Preblended Dry Mortar Mix for Unit Masonry, and ASTM C270 Standard Specification for Mortar for Unit Masonry in 1.4.
8	Kurt	Siggard	41			12			The term "mortar" is used throughout the document, but there is no definition for mortar in 2.2. I suggest adding a definition for mortar to 2.2 which includes reference to ASTM C270 Standard Specification for Mortar for Unit Masonry, and ASTM C1714 Standard Specification for Preblended Dry Mortar Mix for Unit Masonry.
9	John-Jozef	Proczka	10			13			The radius of gyration as used in equations 8-13, 8-14, 8-16, 8-18, 8-19, 9-11, 9-12, 9-14, 9-15, and 9-16 in the 2016 version of TMS 402 is not well defined. The understood definition from other sources is that of the square root of the moment of inertia divided by the area. This leads to questions about which moment of inertia and which area, especially for partially grouted walls, and members undergoing cracking. Section 4.3.3 identifies it as the average net cross-sectional area, but this brings questions about how to incorporate 5.1.2 for the effective width per bar with this concept, as well as whether or not cracked moments of inertia should be used. I think it's worth mentioning the Table GN-8 from page 548 of the 7th edition reinforced masonry engineering handbook identifies both a net radius of gyration and an average radius of gyration, not a combined average net radius of gyration. I believe the primary question here is: is the radius of gyration intended as a stress calculation parameter or a stiffness calculation parameter?
10	John-Jozef	Proczka	180			25			The symbol used for the direct shear strength used in Section 11.1.8.4 and Equation 11-2, appears to be the wrong symbol. This symbol is defined on page 11 line 6 as the calculated shear stress, not the shear strength.
11	John-Jozef	Proczka	192			14			The symbol used in equation 11-30, Vcr, does not appear on the list of defined symbols on page C-13. Consider adding it.
12	John-Jozef	Proczka	37			19			Defining Column, with the knowledge of the IBC's wall definition applicable to Masonry, would be helpful. This is important as TMS 402 requires specific detailing requirements for columns that are not present for walls. It is obvious to me that a jamb next to a door or window opening, is not intended to be considered a column. The scenario that can come up where this definition clarification would be helpful is this: two masonry walls intersect at 90 degrees. Both of those walls have openings right next to the intersection, leaving only a 8 inch by 16 inch section of wall between those openings, is that a column?
13	John-Jozef	Proczka	129			28			Section 7.4.3.2.4 remains confusing. Are the first and second sentences separate topics, or are they intended to be related? Does the second sentence undo the first sentence? In other words, is the entire lateral force resisting system allowed to be provided by columns?
14	David	Biggs	246			1			Per Footnote 6, this table has fastener type with withdrawal strength and lateral strength given. a. There is no reference for the source of these values. b. The values are not for masonry and should not be in the masonry standard. c. Users should be directed to the wood industry standards (NDS) to obtain the values. d. The commentary (13.3.2.5 e) indicates that the tables do not address wet service conditions. Wet service conditions can greatly reduce strength values. e. The only material limitation given in the footnotes is on wood specific gravity. All the lhe limitations on the table should be with the table and not solely in the commentary. Remove the table and reference NDS standards.
15	David	Biggs	247			1	This comment applies to multiple lines	90	The source of the strength values in this table are not provided. The table should not be in the masonry standard. The strength values were not developed by the committee Remove the table and refer to the industry document from which the values were obtained.
16	David	Biggs	75			20	This comment applies to multiple lines	85	The standard discusses lateral-torsional buckling of beams. However, there is nothing that provides guidance to designers as to the design of masonry beams for torsional effects. For example, masonry lintels/beams might have a shelf angle bolted to them for support of an anchored veneer. This induces torsion into the beam and its supporting wall jambs. ACI 318 has criteria for concrete beams but TMS 402 is silent on torsion. Masonry code criteria should be provided for torsion. Until that code criterion is provided, users should be warned of the torsional concerns through commentary.
17	Fernando	Fonseca	75			4			The introductory statement of Section 5.2 indirectly prohibits unreinforced masonry beams, since the references are to sections 8.3. and 9.3 only. If this is the case, why not explicitly state this?
18	Fernando	Fonseca	75			60			Add commentary for 5.2.1.1.1 as follows: Design engineers commonly use the clear span or the distance between the centers of the bearing as the span length. It is the design engineer's responsibility to determine the span length
19	Fernando	Fonseca	75			63			Add commentary for 5.2.1.1.2 as follows: Design engineers commonly use the clear span or the distance between the centers of the bearing as the span length. It is the design engineer's responsibility to determine the span length.
20	Fernando	Fonseca	78			68			Add commentary for 5.2.2.1 as follows: Design engineers commonly use the clear span or the distance between the centers of the bearing as the span length. It is the design engineer's responsibility to determine the span length.
21	Fernando	Fonseca	37			35			Can a corbel (see section 2.2) be a single course? Consider revising definition/requirements to clarify.
22	Fernando	Fonseca	62			7			Section 5.1.1. is nicely revised, but several things to consider: -Typo in heading"Intersecton should be Intersection". -After reviewing the new layout of all content in Section 5.1 as well as the rest of Chapter 5, I am wondering if we should title 5.1. Masonry Walls, instead of "Masonry Assemblages". Everything under 5.1. appears to relate to walls, and beams, columns, and Pilasters (which all could technically be called "assemblages") are in the subsequent sections 5.2, 5.3., and 5.4. Alternatively, we may need a Definition in Chapter 2 for "Assemblages" if this term is meant to refer to something other than a wall in Chapter 5. -In the first and second sentence, neither clearly indicates that the walls referred to are intersecting walls. In the first sentence, it is not clear that pilasters are needed for lateral support. Suggest changing first sentence to become, "Masonry walls that intersect and require lateral support from one another or from pilasters within those walls shall be ..." Suggest changing second sentence to become, "Masonry walls that intersect and do not require lateral support..." -Could we reverse the contents of 5.1.1.1 and 5.1.1.3 so that the shortest and simplest solution (structurally independent walls) comes first, then walls that support each other but are not considered composite, then finally composite walls and how to satisfy this condition? -The following sentence in the commentary is confusing. "Achieving stress transfer at a T intersection with running bond only is difficult."No recommendation, limitations or checks are given to ensure the stress transfer is successful- so what is the purpose of this sentence? What value does it bring to the code or the commentary?
23	Fernando	Fonseca	67			70			Additional commentary may be helpful to define a concentrated load adjacent to an opening (see commentary to section 5.1.3 (b). Based on Figure CC-5.1-5 (c) is appears to be a load that is planar with the top of the opening. However, one can argue that the concentrated load in (b) is still adjacent to the opening. Stating explicitly in the commentary what adjacent means would be valuable.
24	Fernando	Fonseca	68			5			(see Figure CC-5.1-5) I see that the load distribution of 1 horizontal to 2 vertical is the same for a bond beam as it is for running bond - consider requiring the bond beam to be reinforced and then using a 1 horizontal to 1 vertical load distribution in the bond beam. This will help spread the load out in masonry walls.
25	Fernando	Fonseca	69			10			Code Commentary: Figure CC-5.1-5 (c) In the figure, the load is not shown as dispersed to "½ H below load" as depicted in the figure. That is, the end of the 3:1 line on the right hand side does not terminate at the half-height point of the wall below the load. I count 14 courses of masonry above the termination and 19 courses of masonry below the termination. Consider changing the line termination so that it is at the mid-point of the height.
26	Fernando	Fonseca	73			60			(see commentary to section 5.1.4.3.1, first paragraph) I do not understand the purpose of this sentence: "In non-composite masonry, the plane of the masonry is the plane of the space between wythes." Could we remove this sentence? Also, the last sentence in this paragraph ("Loads due to...) is similar, but in poorer language, with Code Section 5.1.4.3.1-b. I suggest removing this sentence from commentary.
27	Fernando	Fonseca	79			22			Provision 5.2.2.4 (a) is a little confusing given that the commentary states transverse (vertical?) shear reinforcement is not needed in deep beams.
28	Fernando	Fonseca	81			27			Consider revising section 5.3.2 as follows: "...gravity loads not exceeding 2,000 pounds (8,900 N) or 50 PSI..."
29	Fernando	Fonseca	81			77			Consider revising commentary of section 5.3.2 as follows: "...load of 2,000 pounds (8,900 N) or 50 PSI..."
30	John	Hochwalt	185			3			The first sentence of Section 10.1.5 states "Masonry beams and lintels shall have a uniform width and be fully grouted or solid, and reinforced to distribute anchorage forces." It does not appear that the code addresses how the designer should determine what reinforcing is required for the distribution of anchorage forces. Since this anchorage reinforcement is a code requirement, the code should include provisions for this reinforcement.
31	Darrell	McMillian	338			12			Regarding TMS 602, Article 1.8.C.3.b.2. Language setting the minimum acceptable mixing temperature set to 70 degrees F, while requiring the minimum placement temperature be maintained above 70 degrees F does not make sense. Is the mason to apply heat on the way to the wall to raise the grout temperature above what is minimally required at the mixer? Either raise the minimum mixing temperature, or lower the minimum placement temperature, to account for a reasonable temperature drop between the mixer and the wall.
32	Darrell	McMillian	365			1			When completing a low-lift wall, it would be helpful for the mason and/or inspector to have some wiggle room with respect to the cleanout requirement of TMS 602 3.2F. For instance, if a mason wants to build 7'-4" above the last 5'-4" build, to top out the wall in one final step, and wishes to do so without cleanouts, or a grout demonstration panel, the inspector should still be able to adequately inspect the cells down to the last grout lift and then allow the mason to grout the 7'-4" height in two lifts. Please add language allowing conditions similar to the one described above.
33	Darrell	McMillian	333			62			TMS 602, Table 4, Inspection Task 1.f, requires the special inspection of the sample panel construction for Levels 2 and 3, and lists Article 1.6 D for the inspection criteria. What is the purpose of these sample panels? So the mason and the inspector can practice the special inspection process before building and inspecting the actual walls? That does not seem beneficial since whatever might be established structurally by the completed sample panel would still have to be special inspected during the actual wall construction. Considerable code work has been done to require special inspections so that the actual construction agrees structurally with the approved construction documents, so why require it on a little piece of wall beforehand? If the structural engineer feels that a part of the construction warrants sampling for some structural reason, then he/she can always specify that outside of TMS 602, but sample panels should not be automatically required for every Level 2 or 3 masonry project. Please remove Inspection Task 1.f and let Article 1.6 D speak to aesthetic issues only, which most of the related commentary does anyway.
34	Darrell	McMillian	62			10			The use of other than running bond (formerly known as stack bond) is allowed by TMS 402 for shear walls but appears to be forbidden by Section 5.1.1.1 at wall intersections. This seems inconsistent. Please consider revising 5.1.1.1 to read, "Masonry shall be in running bond or constructed of solid grouted open-end units.", or other language the committee feels could help clarify the use of other than running bond at intersections.
35	Darrell	McMillian	156			55			While doing some out-of-plane CMU wall runs, I found at least one case where the equation listed in TMS 402 Table CC-9.1-1 for calculating the Pu limit results in a negative value (8"CMU, f'm = 2,000 psi, #8@8" o/c, Grade 60 vertical reinforcement cell centered). I interpreted this to mean that the wall is compression controlled for all values of Pu. If that is correct, and to avoid potential user confusion, I recommend that "≥ 0" be added to the end of all Pu limit equations of Table CC-9.1-1 for which the above condition applies.
36	Richard	Bennett	52			29	This comment applies to multiple lines	65	Note 1 to Table 4.2.2 states "As an alternative for prestressing steel, the modulus of elasticity, Eps, shall be permitted to be taken as 29,000,000 psi (200,000 MPa) for wires and bars and 27,560,000 psi (190,000 MPA) for strands." The commentary states "Prestressing steel - The modulus of elasticity of prestressing steel is often taken equal to 28,000 ksi (193,000 MPa) for design, but can vary and should be verified with the manufacturer." The conflict between the code and commentary should be resolved. It also seems that expressing the modulus to four significant figures is too precise.

37	John	Hochwalt	86			15			This section states that joint reinforcing conforming to TMS 602 Article 2.4 D is within the scope of Chapter 6. It is unclear, however, whether stainless steel joint reinforcement is covered by this reference. While TMS 602 Article 2.4 D references ASTM A951 which in turn references ASTM 580 for stainless steel wire, the minimum yield strength requirements for wire in ASTM A951 (70 ksi) is incompatible with the yield strengths for ASTM 580 Grade 304 or 316 wire (30 to 45 ksi). This suggests that there may not be stainless steel joint reinforcement that is in conformance with ASTM A951 due to non-compliance with the minimum yield strength. Note that TMS 602 has a separate article that addresses stainless steel joint reinforcement (2.4 I) which only references ASTM A580; this is a wire specification, not a joint reinforcement specification. If the intent is to allow the use of stainless steel joint reinforcement for applications where conformance with Chapter 6 is required, several items need to be addressed. First, the specification of stainless steel joint reinforcement in TMS 602 needs to define a minimum yield strength of the wire. In addition it should be clarified that stainless steel joint reinforcement must be fabricated in accordance with ASTM A951, but using the lower strength ASTM A580 wire as permitted by TMS 602. Second, the provisions should be reviewed for the potential implications of the differing yield strengths of carbon steel and stainless steel joint reinforcement. (1) Are they equally as effective when used to meet the prescriptive requirements of Sections 7.3.2.2.1 and 7.4.3.1.1? (2) Are the minimum joint reinforcing areas for resisting shear of Sections 7.4.1.2.1 and 7.4.3.2.6 applicable regardless of wire type? (3) Is the allowable tensile stress of 30 ksi in Section 8.3.3.2 applicable to all wire types? (4) Can stainless steel joint reinforcement be used for conformance with Section 9.1.9.3.1?
38	Diane	Throop	222	This comm	249	1	This comment applies to multiple lines	40	The components and claddings provisions of ASCE 7 have been evolving over the last few cycles. To my knowledge, the TMS 402/602 has not revisited the impact of these changing provisions on the prescriptive criteria listed in the veneer chapter (and possibly other locations where applicable), especially the prescriptive tie spacings for anchored veneer. There could also be criteria for adhered veneer that needs to be revaluated as well. Through this public comment I request the Committee to review the veneer chapter for compliance with the C&C provisions in ASCE 7-22.
39	Diane	Throop	37			10	This comment applies to multiple lines	13	This comment has multiple parts related to the definition of Cavity. The definition listed in the public comment draft is as follows: Cavity - The space between wythes of non-composite masonry or between masonry veneer and it backing, which may contain insulation. I request that the phrase, ' which may contain insulation.' be deleted so the definition would read, Cavity - The space between wythes of non-composite masonry or between masonry veneer and it backing. Reasons for this are 1.) the phrase 'may include insulation' is in effect including a code provision within a definition. The insultation statement should appear within the appropriate chapters not in the definition; 2.) also, by including only insultation in the definition as a permissible material in the cavity, the definition excludes anything else that could be in the cavity space such as drainage mat, mortar droppings, parging, and so on. 3.) The definition as written only permits insultation in the cavity -- this directly conflicts with the commentary. One or the other needs to be changed.
40	Diane	Throop	37			11	This comment applies to multiple lines	13	Revise the definition of Cavity to exclude adhered veneer by inserting the word "anchored' in the public comment draft definition of Cavity so it reads, Cavity - The space between wythes of non-composite masonry or between anchored masonry veneer and its backing. (note the public comment draft also includes the phrase "which may contain insulation" but I have proposed that be deleted in a previous comment so I did not include it here). I propose this as there is a fundamental difference between the way non-composite masonry walls and anchored veneer wall cavities function compared to adhered veneer. I find it confusing the think of a cavity in adhered veneer - which is intended to be mostly filled with adhesive, mortar or other materials. Limiting 'cavities' to non-composite and anchored veneer walls is consistent with the terminology the design community uses which was the primary reason I was given for changing the definition in the first place. If this change is accepted, Tables 13.3.2.5 and 12.3.2.6 will need some revision in terminology as will parts of the rest of the chapter
41	Diane	Throop	246			28			Note 1 of Table 13.3.2.5 defines the cavity as the space between the stud of the back of the veneer. This is in conflict with the definition of cavity in Chapter 2 which lists the cavity as from the backing to the inside face of the veneer. Please make Note 1 consistent with the definition
42	Diane	Throop	247			29			Note 2 of Table 13.3.2.6 defines the cavity as the space between the stud of the back of the veneer. This is in conflict with the definition of cavity in Chapter 2 which lists the cavity as from the backing to the inside face of the veneer. Please make Note 1 consistent with the definition
43	Diane	Throop	222			12			Please change the term ACHORED VENEER TO TIED VENEER. Reason: The committee changed the term for 'veneer anchors' to 'veneer ties' in the public comment draft. I was given two major explanations for this during the cycle when it was debated and voted upon -- 1.) that most users call veneer anchors, veneer ties, so it was a user friendly change; and 2.) that by referring to them as anchors some inspectors or designers may try to apply the ASCE 7 criteria for anchors to these veneer connectors. Since the term has been changed to veneer ties in the public comment draft, we are left with ANCHORED VENEER which is no longer ANCHORED, but TIED. To be consistent, it should be called TIED veneer not ANCHORED veneer. If the concern for confusion by inspectors and designers over the use of the word "anchor" within the chapter was valid enough to contribute to the Committee feeling the need to change the term (as was explained to me during the cycle), then, by extension, calling it ANCHORED VENEER should raise similar concerns which would be alleviated by the use of TIED VENEER. I have listed the page and line number of the first use of the term within the Veneer chapter but it will need to be changed throughout the document if this comment is found persuasive.
44	Philippe	Ledent	394			13	This comment applies to multiple lines	63	The TMS 602 requires that the Architect/Engineer specify the location of movement joints on the project drawings. Frequently, many Architects/Engineers will include a general note such as "Provide control joints at 25'-0" maximum" without physically locating the joints in plan or elevation which can lead to issues at flanged shear walls, lintels designed based on arching action, and wall intersections. AISC 341 requires a restricted zone for moment frame connections and for braced frames. The mandatory checklist could be more specifically, such as: "Indicate type and location of movement joints on the project drawings and specifically show graphically in plan or elevation locations where movement joints are not permitted." This would allow the contractors flexibility to place the joints in the wall without worrying about compromising the structural intent.
45	Heather	Sustersic	106			1	This comment applies to multiple lines	40	Consider balloting a change to Figure CC-6.1-8 to clarify that the lap shown is not a lap splice but rather the extension of negative moment reinforcement required by Section 6.1.10.
46	Heather	Sustersic	95			85			With the reorganization of Chapter 6, confirm that the following inserted commentary language is actually inserted in the right place: "Due to lack of experimental data on the splicing of welded deformed wires in grout, the splice length is determined without consideration of the beneficial effects of welded cross wires."
47	Heather	Sustersic	97			80			With the reorganization of Chapter 6, confirm that the following inserted commentary language is actually inserted in the right place: "Due to lack of experimental data on the splicing of welded deformed wires in grout, the splice length is determined without consideration of the beneficial effects of welded cross wires."
48	Heather	Sustersic	363			20			"6db, but" appears to have been inadvertently deleted from Table 6 for No.3 to No. 5 bar extensions for 135 Degree Hook requirements. Please review and re-insert, if appropriate.
49	Heather	Sustersic	386			55			We recently had a project where partial grout was used onsite as a bar positioner in select cells during construction in a toothed wall intersection, but the grout lift height is defined in TMS 602 commentary section 3.5D as "the height to which grout is placed into masonry in one continuous operation." By that definition, grout should not be packed/used intermittently as a means of bar positioning. The grout lift definition appears only in the commentary of TMS 602. Specification TMS 602 3.4 B.1 states that bars must be "supported" to prevent displacement during grout placement, but it does not limit the ways that this can be accomplished. The accompanying commentary 3.4.c requires that "there is sufficient clearance for grout and mortar to surround reinforcement, ties, and anchors so stresses are properly transferred." Arguably, partial grouted bar positioning prevents proper consolidation for the final grout pour does not provide 'sufficient clearance' around the bars, but without a codified definition of grout lift height, there is nothing to prevent the contractor from packing grout to hold bars in place. Consider adding the definition of 'grout lift height' to chapter 2 to require grout to be placed in one continuous operation, as intended
50	Heather	Sustersic	269			85			Reference to (Jawaheri Zadeh and Nanni, 2013) should be (Jawaheri Zadeh and Nanni (2013))
51	Heather	Sustersic	270			75			Reference to (D'Antino et al. 2018) should be (D'Antino et al. (2018))
52	Heather	Sustersic	270			80			Insert the qualifier "R" fater ACI 440.1 in commentary section D.2.1, 2nd sentence of 2nd paragraph as follows: "...The value of kb for bent bars was determined using Equation 6.2.1 from ACI 440.1R and setting the bend radius..."
53	Heather	Sustersic	271			88			Insert the qualifier "R" after ACI 440.1 in commentary section D.3.3, last sentence, as follows: "The required development of dowels in concrete should be determined in accordance with ACI 440.1R."
54	Heather	Sustersic	272			55			Clarify reference to ACI in commentary section as follows, "Although for steel reinforcement the splice length is the same as the development length for masonry structures, a splice length of 1.3 multiplied by the development length is chosen to be consistent with ACI 440.1R."
55	Heather	Sustersic	273			68	This comment applies to multiple lines	75	Insert the qualifier "R" after the ACI 440 reference in commentary section D.4.4 as follows, "Because of this, the shear strength of the masonry is reduced. Equation D-6 is based on ACI 440.1R." Also, replace reference in section D.4.5.1 to (Bischoff et al., 2009) with (Bischoff et al. (2009)).
56	Richard	Bennett	35			22			By including concrete, masonry, and light frame in the definition of backing, the code is requiring the backing to be one of the these types. However, the commentary for 13.2.2.3 states that there could be other backings. The definition of backing should be limited to: Structural wall or surface to which veneer is attached. The rest of the definition should be moved to the commentary.
57	Albert	Hernandez	1			200			where is the guidance for thru bolting for masonry. Say an all-thread bolt thru an 8" masonry.
58	John	Hochwalt	350			38			Item 4 in Article 2.4 G is listed as "Ties." It would be clearer to list this as "Wire ties" as in done for Item 4 in Article 2.4 I.
59	John	Hochwalt	238	This comm	239	27	This comment applies to multiple lines	7	Section 13.2.3.1.1 provides deemed to comply strength and stiffness values for commonly available types of veneer ties. As stated in the commentary, these deemed to comply values are based on data from tie tests. While Table 13.2.2.4 provides minimum geometric requirements that the ties must meet to achieve the deemed-to-comply capacities, there are no minimum mechanical properties for tie materials. While TMS 602 Articles 2.5G and 2.5 I lists ASTM standards for tie materials, these ASTMs by themselves are insufficient to ensure that ties fabricated in accordance with the code and specification will achieve the listed deemed-to-comply capacities. Two examples of this are: *Carbon steel sheet steel. ASTM A1008 allows yield strengths as low as 25 ksi. Based on Drysdale and Wilson (1989), the ties they tested had sheet steel yield strengths ranging from about 40 to 60 ksi. *Stainless steel wire. The deemed-to-comply values do not distinguish between ties fabricated from carbon steel and those fabricated from stainless steel, although the mechanical properties of stainless steel are typically lower than those of carbon steel. For example, we understand that the ASTM A1064 carbon steel wire typically used in ties has a yield strength of around 80 ksi, whereas the typical ASTM A 580 stainless steel wire used in ties has a yield strength of around 45 ksi. TMS 602 Articles 2.5 G and 2.5 I should be revised to specify minimum yield and tensile strengths for tie materials where the minimum strengths in the ASTM standard are insufficient to ensure that the ties will achieve the listed deemed-to-comply capacities.
60	John	Hochwalt	45			17			The definition of adhered veneer is unnecessarily restrictive on the types of backing that can be used to support cement backer units. I suggest striking the words "masonry, concrete, or light frame"and replacing them with "the."
61	John	Hochwalt	234			29			In the last row of Table 13.2.2.3 the "other requirements" should be streamlined. The current language starts off with the phrase "When required" and ends with the sentence "Not applicable to joint reinforcement." First, there are also no fasteners associated with unit wire ties; they should be treated the same as joint reinforcement. Second, it is redundant to have both the "when required" statement and a listing of specific tie types which don't have fasteners. I suggest deleting "Not applicable for joint reinforcing"from the table. If further clarity is desired, commentary could be added to note that unit wire ties and joint reinforcement do not require fasteners.
62	John	Hochwalt	101			25	This comment applies to multiple lines	30	Much of paragraph 6.1.8.1.3 is duplicative and potentially conflicting with subparagraphs 6.1.8.1.3.1 and 6.1.8.1.3.2. Suggest revising this paragraph to read "Joint reinforcement used as shear reinforcement shall be anchored in accordance with either Section 6.1.8.1.3.1 or 6.1.8.1.3.2."

63	John	Hochwalt	101	This comm	102	25	This comment applies to multiple lines	35	There appear to be no provisions for the anchorage of deformed wire placed mortar and used as shear reinforcing. Can it be terminated with hook like joint reinforcing as illustrated in CC-6.1-4?
64	Richard	Bennett	382			3	This comment applies to multiple lines	20	I am suggesting several changes to Article 3.4 E. 1. Commentary number 2. is commentary on item 1 in the spec. Change the number from 2 to 1. 2. If the specifications require adjustable ties, I am not sure how the contractor would meet item 2. I would suggest "Install adjustable veneer ties such that the vertical offset between the two pieces does not exceed 1-1/4 in. (31.8 mm)." 3. There was confusion over how "Unless otherwise required" should be interpreted in item 4. Does "unless otherwise required" allow the spacing to be increased? However, a bigger issue is that the 16 inch x 16 inch spacing is not always sufficient. For wind pressures greater than 75 psf, this may not be sufficient spacing. The best solution is to just delete part 4. The Architect/Engineer specifies the spacing, that is put in the project documents, and we are done. We don't have defaults for other designs, such as reinforcement in beams or walls. Just delete part 4.
65	John	Hochwalt	234			1	This comment applies to multiple lines	33	Table 13.2.2.3 lists prescriptive fasteners for the attachment of veneer anchors to the backing. There are a number of assumptions that were made in determining the size and embedment of these fasteners that are not documented in the table or in the commentary. In addition, while the capacity of the fasteners into the light frame backing can be determined from the NDS and AISI codes, the capacity of the fasteners into the concrete and masonry backing are not addressed by TMS or ACI. Rather the capacity of these fasteners are based on testing. In both cases, there is risk of the designer inadvertently specifying a fastener condition that has a lower capacity than intended by this table. For fasteners into concrete and masonry backing, I suggest that compliance with 13.2.2.3.2 be required. This would place the responsibility on the designer select an anchor based on published data. The same approach could be taken for the light frame backing, or the code and specification could provide additional detail so that the designer can specify fastener and backing materials that are consistent with the assumptions made in developing this table.
66	John	Hochwalt	228			5			A minimum factor of safety of 1.5 should be required for the stability analysis to maintain a level of safety consistent with Table 13.2.1.5.
67	John	Hochwalt	242	This comm	248	3			There are several uses of the term "backing" in the adhered veneer provisions that are inconsistent with the definition of backing in Section 2.2. Alternate terminology should be used at the following locations (noted as "page - line"): 242 - 66, 243 - 7, 243 - 54, 243 - 56, 243 - 30, 243 - 79, 248 - 56.
68	John	Hochwalt	245			27			In this section both the code and commentary, light frame backing is referred to as just "frame backing." The word "light" should be inserted in both the code and commentary.
69	Richard	Bennett	21			80			Commentary 1.2.1 There are two very similar sentences in the commentary. I think the second one should be deleted. Graphic depictions of movement joints may provide greater clarity than notes. Graphic depictions of joints may provide greater clarity compared to notes.
70	Richard	Bennett	27			8	This comment applies to multiple lines	24	On line 8, 20, and 24, there should not be a space between steel and the comma. On line 8 this causes the comma to go the next line. This is picky, but Phil says the best way to document this.
71	Richard	Bennett	34			19			The symbol should just be Chi, and not X. On page 273 line 7 X is used instead of Chi in 0.80Xf'm and should be changed to Chi.
72	John	Hochwalt	245			79			Should the reference to TMS 602 be to article 3.3 D.1 instead of 3.3 C.1.?
73	John	Hochwalt	242	This comm	247	3			There is potential confusion about the use sheathing and cement backing units in adhered veneers supporting by light frame backing. As I understand it, there is intended to be two options: *Sheathing: TMS 402/602 does not define this material; presumably it can be any IBC compliant sheathing. It would be helpful to state that in the commentary. Sheathing is always used in conjunction with lath and a scratch coat. The fastening in Tables 13.3.2.5 and 13.3.2.6 is for the attachment of the lath to the backing, not of the sheathing to do the backing. If that is correct, these tables should be labeled as "Lath Fastener . . .", not "Veneer fastener . . ." Functionally, there is lack of clarity about the purpose of the sheathing. The commentary to 13.3.1.1 states "When sheathing is present behind an adhered veneer, other than providing a load path for compressive out-of-plane loads into the backing, it is assumed to provide no contribution to the strength or stiffness of the adhered veneer assembly or fasteners." In contrast to that, the commentary to 13.3.2.5 (f) states "Adhered veneer assemblies are not intended to span between framing members and thus require the presence of sheathing to perform as intended." Does the sheathing need to be able to span between the light frame backing members or not? If it does, the code should provide either prescriptive or performance requirements for the sheathing. *Cement Backer Units: TMS 402/602 does not define this material. The veneer may be directly adhered to this material. If the veneer is directly adhered to the cement backer units, an engineered design would be required to determine the required properties of the cement backer units and the fastening of the cement backer units to the backing. Since adhering veneers directly to cement backer units is referenced multiple times in the standard, it would be good to state explicitly whether that system requires an engineered design.
74	Richard	Bennett	61			55			Delete the heading in the commentary of 4.7.1 Embedded conduits, pipes, and sleeves
75	Richard	Bennett	89			71			There are two periods at the end of the sentence. "... that have a 6-in. (152 mm) length per core or cell.."
76	Richard	Bennett	94			64	This comment applies to multiple lines	75	Equation 6-3 in line 64 should be Equation 6-1. It seems strange to start with a sentence telling how Equation 6-1 was derived, then have sentences on 8 inch limit, where to find additional information, and epoxy coated wire, and then go back to the derivation of Equation 6-1. I would suggest grouping together the two discussions on the derivation of Equation 1.
77	Richard	Bennett	94			69	This comment applies to multiple lines	82	Line 69 refers the reader to commentary of Section 6.1.7.1.2.2.. (note the double period which needs to be corrected). Line 81 also refers the reader to commentary of Section 6.1.7.1.2.2. When the reader goes to 6.1.7.1.2.2 two pages later they read "Refer to commentary for Section 6.1.6.2.2." So they go right back to the page they were on. I would suggest directly referencing Section 6.1.6.2.2.
78	John	Hochwalt	80			60	This comment applies to multiple lines	85	The code limit on column slenderness defines the slenderness in terms of the distance between lateral supports, not the effective height, yet the commentary uses the nomenclature "h" and the terminology "effective height." It is suggested to remove "h/r" from the first sentence of the commentary, and to move the second sentence, along with Figure CC-5.3-1, to Section 2.2 as commentary on the nomenclature "effective height." This would have the additional benefit of making this commentary applicable to walls as well as columns.
79	Richard	Bennett	101			34			Delete "either" in the following. This was deleted in the ballot, but mistakenly not deleted in the working draft. Where the joint reinforcement consists of two longitudinal wires, both of the wires shall be anchoredeither by one of the following:
80	John	Hochwalt	101			25			Can prefabricated tees and corners be used to anchor joint reinforcement at wall intersections?
81	Richard	Bennett	119			60	This comment applies to multiple lines	68	Delete the second comma after exception in line 60. Delete the comma and t at the end of the paragraph in line 68.
82	Richard	Bennett	122			87			The commentary labeled as (d) is really commentary on (e) in the code. Change (d) to (e) in the commentary.
83	Richard	Bennett	123			75			Insert "as" between "used" and "shear" in the following sentence. Section 6.1.8.1 also addresses the anchorage of reinforcing bars and deformed wires used shear reinforcement in walls.
84	Richard	Bennett	124			52			Change (f) to (h) in the following sentence. See commentary for item (f) for additional discussion of plastic hinge zones.
85	Richard	Bennett	124			59			Insert a hyphen between "force" and "resisting" in the following. The 2.0 load factor for special reinforced masonry shear walls that are part of the seismic-forceresisting system designed by allowable stress design procedures is applied only to in-plane shear forces.
86	John	Hochwalt	99			3	This comment applies to multiple lines	11	There are no limitations on the size of mechanical splices or requirements for their placement and protection. It is suggested mechanical splices be subject to the size limits of 6.1.3.2.4 and 6.1.3.2.5 (laps included limit); the placing requirements of 6.1.4.3 and 6.1.4.5, and the protection requirements of 6.1.5.1. In addition, mechanical splices are not addressed in TMS 602. It is suggested to list mechanical splices as required submittal in Section 1.5, and to address the installation of mechanical splices (in accordance with manufacturer's instructions) in 3.4 B.7. The installation instructions should also reference compliance with other relevant requirements such as 3.4 B.3, 3.4 B.4, 3.4 B.5.
87	John	Hochwalt	128			27			The prescriptive reinforcement for non-participating elements in SDC C+ is permitted to be placed in either the horizontal or vertical direction. Should this prescriptive reinforcement be required to be placed in the direction of span? Providing horizontal reinforcement, for example, in a wall spanning vertically would seem to offer little improvement to the integrity of the wall.
88	John	Hochwalt	122			87			This commentary section should be labeled "(e)" not "(d)."
89	John	Hochwalt	123			75			The word "as" should be inserted between "used" and "shear."
90	John	Hochwalt	122	This comm	123	37	This comment applies to multiple lines	62	Since "shear reinforcements is now a defined term, it is suggested to replace the phrase "reinforcement required to resist in-plane shear" in six locations in this section with "shear reinforcement."
91	Richard	Bennett	155			58			fu should be in italics and the "u" a subscript in the following. anchor bolt strength was changed to be based on fu
92	Richard	Bennett	225			54			The commentary should reference the commentary of 4.5, not 4.6. On page 227, line 63, the commentary should reference 4.6, not 4.5.
93	John	Hochwalt	123			10			The first sentence of 7.3.2.5 (f) is redundant with provisions in 8.3.5.2.2 and 9.3.5.2. Can it be deleted?
94	John	Hochwalt	132			13			The last sentence in 7.4.4.2.1 is redundant with the first sentence of 5.3.1.4 (d). Can it be deleted?

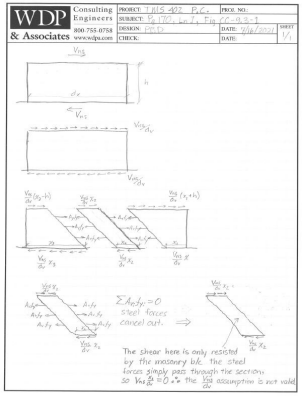
95	John	Hochwalt	96			26	This comment applies to multiple lines	30	In talking with designers, there seems to be confusion about the application of the provision for development of hooked bars in Section 6.1.6.3.3, with some designers believing that le is the development length of a hooked bar, and others believing that the development length of a hooked bar is ld - le. Can this be clarified?
96	John	Hochwalt	50			13	This comment applies to multiple lines	18	There is redundant language across Part 3 in regards to legally adopted load cases that should be consolidated in this section. In addition IBC 2021 now adopts the ASCE 7 load combinations by reference, with the exception of retaining the alternate ASD load combinations. This change may not change how the legally adopted load combinations are referenced in TMS 402, but is brought to the committee's attention. Sections that should be looked at for potential consolidation with 4.1.2 include 9.1.2, 11.1.2, and 12.1.2. It is anticipated that the individual chapters would still state whether ASD or SD load combinations should be used for a given chapter. Chapter 8 does not, but should, have a requirement to use allowable stress design load combinations. Lastly, while Section 10.2.1 is already consistent with this comment, the wording of should be looked at for consistency across Part 3.
97	Richard	Bennett	234			1	This comment applies to multiple lines	27	A withdrawn negative on Ballot item 17-VG-022A asked that the phrase "or, where sheathing is present, into the structural member behind the sheathing;" be added in four places after "penetration into backing." Although the withdrawal was unconditional, the negative voter did ask the VG subcommittee to consider the negative, which it never did. The addition of this phrase should be considered.
98	Richard	Bennett	227			15			Ballot item 17-VG-013A proposed changes to Section 13.2.1.4. There was a negative on this ballot item which was found persuasive on ballot item 18-VG-013A. The rationale for finding the negative persuasive was that the negative provided improved language. However, there was no ballot to make the change with the improved language. Please consider the following for the code and commentary. 13.2.1.4 Joint thickness - 13.2.1.4.2 For specified veneer ties that rely on embedment in mortar for strength, the specified mortar bed joint thickness shall be at least twice the thickness of the veneer tie. 13.2.1.4.3 For veneer ties that utilize a mechanical connector or engage horizontal reinforcement for anchorage, the specified mortar joint thickness shall be greater than the thickness of the tie. Code Commentary: 13.2.1.4 Joint thickness - There are ways in which veneer ties and joint reinforcement may co-exist in the same joint. This provision is not intended to prohibit the placement of joint reinforcement and veneer tie in the same bed joint, but they must not be stacked to exceed the maximum joint thickness if the tie derives it strength by embedment in the mortar. Wire joint reinforcement and veneer ties installed in the same bed joint have performed well. The veneer tie and joint reinforcement may bypass each other if the veneer is sufficiently thick to allow minimum cover over both. The embedded tie may allow joint reinforcement to be depressed wire so that they can be stacked as long as the combination of tie and joint reinforcement does not exceed half the specified joint thickness. The configuration of the veneer tie may provide a mechanical attachment, but veneer tie manufacturers' installation instructions should be consulted to specify appropriate configurations. If the veneer tie utilizes the joint reinforcement for anchorage, Section 13.2.1.4.1 still applies away from the tie.
99	Richard	Bennett	234			32			Footnote 1 is not needed in Table 13.2.2.3. When the sheathing or ties meet the requirements of 13.2.2.3.3, the cavity width is measured from the back of the veneer to the face of the sheathing. This should be limited to 6 inches, and not increased by 5/8 inch, allowing 6-5/8 inch between the back face of the veneer and the sheathing. This footnote is a remnant of an older definition of cavity width.
100	Richard	Bennett	238			72	This comment applies to multiple lines	73	Commentary 13.2.3 Add a space between "modeling analysis" method and the beginning parentheses "(Section 13.2.3.3)." I think the "or" should be "and": Engineered design options include the tributary area method (Section 13.2.3.2) or modeling analysis method(Section 13.2.3.3).
101	Richard	Bennett	241			61			The word "code" should be in uppercase in "this Code."
102	Richard	Bennett	245			28			Subsection (f) should end with a period and not a dash.
103	John	Hochwalt	227			11	This comment applies to multiple lines	14	Veneer not-laid in running bond is required to have "joint reinforcement" consisting of at least one wire. Joint reinforcement is defined in both TMS 402 and TMS 602 as a product conforming with ASTM A951; i.e. a welded assembly of wires. The mostly commonly used material for this application is not a welded assembly of wires; it is a single knurled wire. As a result, it is suggested that this material be defined as "Veneer joint reinforcement" or "veneer reinforcement" and be defined in TMS 602 as consisting of one of the following products: * ASTM A1064 wire or ASTM A580 stainless steel wire, meeting the mechanical properties required for joint reinforcement, and knurled in accordance ASTM A951. * Deformed wire reinforcement *ASTM A951 joint reinforcement (this could be used, for example if three wire joint reinforcement was used to reinforce the masonry backing, the veneer and act as a veneer tie. It is also suggested that rather than list a single wire size for all widths of veneer, that the area of steel be required to conform to Section 4.6. The commentary could then suggest wire size and spacing for typical veneer widths. (Note that the commentary currently references Section 4.5; this should be Section 4.6.) Lastly, it is suggested that the placement requirements for this material in TMS 602 3.4 B.11 be reviewed for this specific application. For example, consider requiring that veneer joint reinforcing be centered on the wythe when solid units are used.
104	John	Hochwalt	125	This comm	131	27			The following suggestions are made relative to the treatment of prestressed shear walls in Chapter 7: *7.3.2.10 (a) and (e) have incorrect references to the special reinforced wall provisions. 7.3.2.5 (b), (c), and (d) should be referenced in lieu of 7.3.2.5 (a) and (b). *In the first paragraph of the commentary for both 7.3.2.10 and 7.3.2.11, the commentary should state "bonded reinforcement" instead of "mild reinforcement" since 7.3.2.10 (e) allows the use of bonded prestressed reinforcement to meet the prescriptive requirements *In the first paragraph of the commentary for both 7.3.2.10 and 7.3.2.11, the references to detailing requirements that are not required by the code should be deleted. *It is suggested to delete 7.3.2.11 (a) as it is redundant relative to 7.3.2.10 (e). *7.3.2.11 (d) references 9.3.5.6 for ductility requirements. The classification of special reinforced prestressed walls in Table 9.3.5.6.1 should be clarified. *In the commentary for Section 7.4.4, special prestressed walls should be added to the first sentence. This sentence should be moved to 7.4.4.2.
105	John	Hochwalt	131			78	This comment applies to multiple lines	85	The commentary to Section 7.4.4 starting with the second sentence should be moved and incorporated into Section 7.3.2.5.
106	Donato	Pompo	243			1	This comment applies to multiple lines	9	13.3.2.1 references ASTM C482 which is a laboratory shear bond test for adhered tile that cannot be performed in situ on an actual installation. It should be clearly stated that ASTM C482 is a quality assurance test performed prior to the intended installation. ASTM C482 protocol is based on using a fresh mortar bed at a certain ratio of sand, cement and water, and then bonding the tile to it with a portland cement paste. That is not a realistic representation of how tile is installed today. Plus your standard says to use an ANSI A118.4 or 118.15 thin-set. So the ASTM C482 lab test should be modified to using the specified tile, thin-set adhesive, and substrate for the intended use. This section implies that the 50 psi shear bond strength required is the resultant bond strength after the tile is installed on the respective project. ASTM C482 can't be used to test if that bond strength was actually achieved considering it is a lab test and considering all of the factors as stated that can lead to failure such as lack of surface preparation, contaminates and poor workmanship. There is an ASTM C1823 test protocol for performing a shear test in situ after the adhered tile has been installed. ASTM C1823 should be listed for quality assurance testing protocol and not ASTM C482.
107	John	Chrysler	21			15			I have never seen 'loads used for the design of masonry structures' indicated on project drawings or project specifications. It may be relevant to the information provided for permit approval, but listing as a construction project document requirement does not seem appropriate. Suggest deleting this requirement.
108	John	Chrysler	386			27			As a matter of clarification, the Specification indicates that grout pours 12 inches or less do not require reconsolidation, yet the commentary suggests that (all) grout needs to be reconsolidated. Please clarify so that Specification and commentary are consistent.
109	John	Chrysler	386			29			Article 3.5 E.b is clear that grout should be reconsolidated after initial water loss and settlement has occurred, but does not give any indication limiting how long after initial water loss and settlement. Previous codes used the term 'before plasticity is lost". I would suggest some upper limitation, such as 'loss of plasticity' since the attempt to reconsolidate grout that has lost plasticity does more damage than good.
110	James	Farny	121			85			I understand that not all the masonry cement limitations can be listed in Code Commentary 1.2.1 (j), but I think users would be helped if we added a few words to explain that fully grouted members have no limitations on mortar type per Section 7.4.4.2.2. I suggest revising "...and participating masonry elements (Section 7.4.4.2.2)" to "...and participating masonry members that are not fully grouted (Section 7.4.4.2.2)."
111	James	Farny	65			4			In 5.1.1.2, I believe it would remove redundancy of "supporting walls that support" and be more clear to describe walls that provide lateral support as "intersecting" rather than "supporting" walls. This occurs twice in the sentence. Proposed section would read: Masonry walls depending upon intersecting masonry walls or pilasters for lateral support, without composite action between those members, shall be anchored to the intersecting walls or pilasters in accordance with sections 5.1.1.2.1 through 5.1.1.2.3.
112	William	McGinley	227			1			Table 13.3.2.5 has a number of assumptions that were used in the design. The commentary indicates that many other factors can influence the nail design. As the commentary is not code, I suggest that you add footnotes to this table defining the conditions where this table is applicable, similar to what is provided for specific gravity. The very least you should indicate that these values are for fasteners placed in the dry condition, used in a dry conditions, and in the side grain of the wood.
113	Richard	Bennett	235			15	This comment applies to multiple lines	22	Section 13.2.2.3.3 provides two means for transfer of load through sheathing: a sheathing that has a minimum allowable bearing stress of 100 psi or veneer ties with prongs. However, the point is that the compressive load on the veneer tie has to somehow be transferred through the sheathing to backing; there needs to be a continuous load path. The two means of transferring the load are either 1) through bearing/compression of the sheathing, or 2) through prongs. Thus, it is proposed that criteria 1 be modified to require that the applied bearing stress on the sheathing is less than the allowable bearing stress. Sheathing with allowable bearing stresses of 100 psi or greater could be deemed to comply and a calculation is not necessary. If the allowable bearing stress is less than 100 psi, then the designer would have the option of calculating the applied bearing stress and if it is less than the allowable bearing stress, veneer ties with prongs are not needed and the compressive load can be transferred through bearing.

114	John	Hochwalt	33	This comm	38	24			The notation and nomenclature used in TMS 402 to discuss lateral building movements is inconsistent and should be revised for clarity. The following nomenclature is used for story drifts: *Calculated story drift, . This notation is defined in Section 2.1. From Section 7.2.4 it can be inferred that that this is intended to include inelastic seismic displacements. *Design story drift, which includes inelastic displacements and is a defined term in Section 2.2. The notation is not necessary as it is not used in any formulas; it is suggested to only use the term "design story drift." Alternatively, the notation Cd could be used in conjunction with "design story drift," to make the inclusion of inelastic effects more transparent and the notation more consistent with that used for system drifts. System (top of wall) drifts are defined using the notation Cdne where ne is defined in Section 2.1 as "displacements calculated using code-prescribed seismic forces and assuming elastic behavior." While it can be inferred that this is measured at the top of wall, consider making that part of the definition. Some other minor other suggestions related to drifts include: *Delete the reference to the â€œequivalent lateral force methodâ€ in the definition of design story drift in Section 2.1. This is applicable to all elastic analyses. *Delete the reference to â€œflexible frame systemsâ€ in the commentary to section 4.1.4 as the behavior described is not limited to flexible frame systems. *Reference the ASCE 7 provisions for building separations in the discussion of building separations in the commentary to Section 7.2.4.
115	John	Hochwalt	160			36			While the compressive strength of grout in concrete masonry is required to equal or exceed f'm, there is not a corresponding requirement for clay masonry. Suggest either requiring a minimum grout strength for both materials or neither. Note TMS 602 2.2 B. only requires a minimum grout strength when f'm exceeds 2,000 psi.
116	Jason	Thompson	82			13	This comment applies to multiple lines	25	The requirement to prescriptively hook all horizontal reinforcement regardless of strength or ductility needs is too onerous. Consider the following revisions: 1) Remove the general requirement for hooking of horizontal shear reinforcement from Chapter 6. The broad rationalization for this revision is that shear reinforcement (Vsreq > 0) is required to be developed...and how that detail is to be accomplished should be left to the engineer and not prescriptively mandated to permit more flexibility in detailing. 2) Introduce a requirement into Chapter 7 requiring standard hooks around the end vertical bar in special reinforced shear walls for both prescriptive horizontal reinforcement (Vsreq = 0) and shear reinforcement (Vsreq > 0). Hooks are permitted to be 180° or 135° degree hooks at wall terminations or 180°, 135°, or 90° degree hooks at wall intersections. The rationalization for this change recognizes the potential high inelastic demand unique to special reinforced shear walls without specifically attributing the need to any performance objective (mitigating toe crushing, development of horizontal reinforcement, confinement of vertical reinforcement, etc.).
117	Jason	Thompson	62			10	This comment applies to multiple lines	30	TMS 602 Page S-62 Consider incorporating a reference to ASTM C1780 for the installation of adhered veneer as those provisions are more comprehensive that those proposed here.
118	Alan	Robinson	118			86	This comment applies to multiple lines	88	Commentary to section 7.2.4 The word "exceeded" in the line "As such, the committee felt that requiring designers to check story drifts for those systems of low and moderate ductility was not exceeded." is not correct. Suggest using "warranted."
119	Alan	Robinson	119			62			There is a double comma after the word "exception"
120	Alan	Robinson	119			64	This comment applies to multiple lines	66	The commentary language "The influence of any non-isolated nonparticipating elements can inadvertently have on performance of a structural system should be considered in design in accordance with Section 4.1.6 of this code, and other applicable provisions such as the modeling criteria of ASCE /SEI 7." is language that should be mandatory and placed in the code, not the commentary. The reference to ASCE 7 can be left in the commentary, but the first part should be placed in the code as ""The influence of any non-isolated nonparticipating elements can inadvertently have on performance of a structural system shall be considered in design in accordance with Section 4.1.6 of this code."
121	Alan	Robinson	119			69			In the commentary at the end of the sentence, there is an added ", t" that does not belong.
122	Alan	Robinson	122			86			In the commentary, the reference to section "(d)" should be "(e)".
123	Alan	Robinson	123			75			In the commentary, the line that ends with "used shear reinforcement in walls." should be "used as shear reinforcement in walls."
124	Alan	Robinson	124			51			In the commentary, the reference toe section"(f)" should be "(h)"
125	john	tawresey	20			30	This comment applies to multiple lines	35	Implys TMS 402 coverns when conflicting with the legally adopted building code. IBC-18 102.4.1 "Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply." Add the sentence: When conflicts between the legally adopted building code and this code occur the legally adopted building code shall govern.
126	john	tawresey	38			25			Need an additional definition: Dimension, Actual - the measured dimension.
127	john	tawresey	39			5			Using the term net instead of gross would be more appropriate.
128	john	tawresey	40			35			Don't understand the meaning of "in other documents"
129	Kevin	Wensel	242	This comm	248	1	This comment applies to multiple lines	90	Below are my comments regarding the proposed changes to the adhered veneer section (13.3) in the TMS 402. Overall, I think these changes move the standard in the proper direction. However, some areas could use clarification or additional commentary. Please contact me with any questions or comments. I would like to become more involved in the adhered veneer TMS committee. 1.Section 13.3.2.1. TMS should provide more guidance for testing per ASTM C482 or consider developing its own ASTM standard for adhered veneer. ASTM C482 is a tile shear bond strength testing using a ceramic tile and portland cement paste as the mortar. Without heavy modification, it is not suitable for adhered veneer. There needs to be clarification of: a.What backing (substrate) should be used? C482 has two mortar mix options in Section 9.1 (cement/sand or cement/lime/sand). However, these do not necessarily represent the substrate the adhered veneer will actually be applied to. Would it be more accurate to use a substrate that better matches the real backing (i.e., CMU, ASTM C926 plaster, etc.)? b.C482 Section 9.2 requires the veneer to be applied to the substrate between 1 to 1.5 hours after molding. Veneer could never be installed this quickly in the field. I think the substrate should be conditioned similarly to what will occur in the field, which would vary depending on the answer to the question in 1.a above. c.As best I can tell, the intent of Section 13.3.2.1 is to use the actual mortar and veneer unit, but this section does not clearly state this. I think it should be more clear. 2.Section 13.3.2.2. Commentary. The commentary states tat "consideration should be given to back buttering the unit". Even at the old 15 psf limit, the units should have greater than 95% coverage to help ensure long-term performance. If the weight limit is going to be increased to 30 psf, using proper installation methods will be even more important. I think additional commentary or requirements for coverage and installation should be included. 3.Section 13.3.2.3.a. This section covers a mortar scratch coat using a full setting bed. Most of the Western US typically applies adhered veneer over three coat or one coat plaster systems. I think it would be good to add a full plaster system as a backing option. 4.Section 13.3.2.3.c. The â€œjointing mortarâ€ term is only used in this section and is not defined anywhere in the TMS. It should be defined. 5.Section 13.3.2.3.f. I do not see anything regarding sheathing in TMS 602 3.3.C.1 (or 3.3.D). Does this requirement apply to assemblies with only a scratch coat and setting bed? In other words, if a three coat or one coat plaster system was used, would sheathing still be required? This section needs clarification. 6.Section 13.3.3.e Commentary: â€œIf masonry units do not comply with Section 13.3.2.1, testing would need to be performed. The testing would primarily be to determine the shear bond strength and the modulus of rupture.â€ Shear bond strength is tested per ASTM C482 per Section 13.3.2.1. What test is needed for modulus of rupture? Section 11.1.8.3 mentions ASTM C78 for testing modulus and C78 â€œStandard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)â€seems like the proper test, but it should be stated in this section. 7.Section 13.3.3.f. The term â€œflexural tension design strengthâ€ does not appear anywhere else in the TMS 402; â€œflexural tension stressâ€ appears a few times without definition. These terms should be defined. The â€œshear stressâ€ is not defined either but is likely the ASTM C482 shear bond strength; this needs to be clarified.
130	john	tawresey	41			19			add "in design" before "to resist forces"
131	john	tawresey	41			23			add "in design" after "is neglected"
132	john	tawresey	41			38			This definition does not define the masonry modulus of elasticity. It is defined in Table 4.2.2.
133	john	tawresey	42			27			Delete ""required by the contract documents" after "work". The contract documents are the drawings and specifications. The reason they are called contract documents is that they are the contract for the contractor in the usual legal definition.
134	john	tawresey	47			90			Delete the two sentences after the first sentence. There are multiple responsible persons, (engineer, architect, building official, inspection agency). Individuals move and sometimes die. Projects continue often for years. Additionally, the first sentence identifies the requirement. The next two identify the procedure, which should be left to the design team to fit the needs of the project.
135	john	tawresey	51			5			It is a long time engineering practice to distribute lateral load by tributary area for low rise buildings with flexible diaphragms. It is more accurate for one or two story construction and as far as I know is still allowed by the IBC and ASCE 7 I suggest referencing ASCE 7. This is a complicated subject.
136	john	tawresey	81			10			Needs clarification. Seems to say no longitudinal bars can be spaced more than 6 inches with out ties. Figure CC-5.3-3 seems to contradict this requirement.
137	Brad	Leidal	47	This comm	49	1			Foundation dowels add resilience for better long term performance, and also improve construction safety of masonry walls. The concrete code has had dowel requirements for several years. Is there any consideration to adding a dowel requirement to the masonry code?

138	Sarah	Twine	384			10	This comment applies to multiple lines	20	The verbiage for the addition of water for ready-mixed grout is extremely unclear. After contacting The Masonry Society for clarification in June, we propose new verbiage for Section 3.5 A. The new verbiage proposed for the code provision is as follows: 3.5 A. Placing time - Place grout within 1½ hr from introducing water in the mixture and prior to initial set. 1.After the initial mixing of materials, discard site-mixed grout (grout prepared at the jobsite) that does not meet specified slump. Additional water shall not be added to the site-mixed grout after the completion of initial mixing to adjust slump. 2.For ready-mixed grout: a.At truck arrival, check slump either visually or with a preliminary slump test (this does not satisfy the testing requirements of ASTM C1019) before commencing with grouting operations. b.If slump is in conformance with the Construction Documents, commence with grouting operations. Grout shall maintain required slump throughout entire grouting operation(s). c.If the slump is not in conformance with Construction Documents, the addition of water is permitted to adjust slump at onsite truck arrival prior to the commencement of grouting operations. Grout shall maintain minimum design compressive strength as outlined in the Construction Documents. Mix grout in accordance with ASTM C476. d.After initial mixing and addition of water, re-check grout slump. If slump is in conformance with Construction Documents commence with grouting operations (see Article Section 3.5 A.2.b). Otherwise, reject grout truck and discard ready-mixed grout that does not meet the specified slump. The time limitation is waived as long as the ready-mixed grout meets the specified slump. The new verbiage proposed for the code commentary is as follows: 3.5 A. Placing time - Grout placement is often limited to 1½ hours after initial mixing, but this time period may be too long in hot weather (initial set may occur) and may be unduly restrictive in cooler weather. One indicator that the grout has not reached initial set is a stable and reasonable grout temperature. However, sophisticated equipment and experienced personnel are required to determine initial set with absolute certainty. Article 3.5 A.2 permits water to be added to ready-mixed grout to compensate for evaporation that has occurred prior to discharge. Replacement of evaporated water is not detrimental to ready-mixed grout. However, water may not be added to the already discharged ready-mixed grout. A flow-chart is to interpret the code section is also recommended. We have drafted a proposed flowchart. Since we cannot attach anything to this public comment, please email me for the flowchart if desired. Thank you for your consideration!
139	John	Hochwalt	217	This comm	221	2			It is unclear how the participating infills in Section 12.3 relate to Chapter 7. In what Seismic Design Categories is it anticipated that these would be used?
140	John	Hochwalt	118			87			Should the word "exceeded" be replaced by the word "necessary"?
141	John	Hochwalt	119			68	This comment applies to multiple lines	82	At line 62,", t" should be replaced with a period. At line 82, the phrase "can be achieved" should be deleted.
142	John	Hochwalt	120			64			This should say "plain shear wall types" rather than "unreinforced shear wall types."
143	Patrick	Dillon	243			1			**I appreciate the many hours of effort put in by members of the VG subcommittee in developing the recent updates to the veneer chapter. With the momentous breadth and scope of the changes, the work that has been accomplished this far is impressive to say the least. I am submitting the following comment to help further the committee's goal of producing the best final document possible. My comment is based on my literal reading and understanding of the provisions from my perspective as one who was not involved with their development or the VG subcommittee, which I hope the subcommittee will find helpful and insightful.** The wording of this section exempts most AMV units from any requirement for bond strength between units and backing. While compliance with the listed ASTM standards should provide a reasonable assurance for the bond strength between the unit and the setting mortar, the standards give no assurance of the bond strength between the setting bed and the backup. I understand the intend of this particular section (13.3.2.1) is to address the units themselves and not necessarily bond between the units and the backing, but since the 50-psi shear bond strength requirement was moved to this section, there is no longer a quantitative benchmark for judging AMV performance. I recommend rewording the section or adding a new section such that the 50-psi shear bond strength requirement still applies to the adhesion to the backing for all units.
144	Patrick	Dillon	248			17			Page 248, Line 18, Section 13.3.3(f) **I appreciate the many hours of effort put in by members of the VG subcommittee in developing the recent updates to the veneer chapter. With the momentous breadth and scope of the changes, the work that has been accomplished this far is impressive to say the least. I am submitting the following comment to help further the committee's goal of producing the best final document possible. My comment is based on my literal reading and understanding of the provisions from my perspective as one who was not involved with their development or the VG subcommittee, which I hope the subcommittee will find helpful and insightful.** This subsection provides values that can be assumed for flexural tension and shear design strength but there are no references provided for these values. In my personal research I have yet to find any test results reported in any peer-reviewed publications that would substantiate the shear design strengths listed. To date there is still no industry standard to my knowledge for testing the in-situ field shear bond strength of installed AMV. ASTM C1823 for adhered dimension stone provides some basis, but even then, it was only published last year. We recently performed shear bond testing on a newly installed AMV mockup panel. The panel was constructed under a level of QA that is above what is typically for AMV construction, including verification of substrate preparation and continuous visual observations. When tested at 35 days a third of the specimens (three out of nine) did not achieve 50 psi (see Dillon & Dalrymple, 2021, reference below). While this was an isolated test, the lower-than-expected strengths despite the better-than-average QA suggest that the 50-psi value may not be as "conservative" as the commentary claims. I'd be slightly less concerned about the listed design values if there were some requirements for quality assurance to verify that the assumed design values are actually achieved in the field, but no QA requirements are provided for AMV less than 60 in height. I recommend that recommended design value be withheld from TMS 402 until they can be substantiated by sufficient field testing of AMV installations. Omitting the design strength values will not prohibit the design professional from using the engineered design method, but it would place responsibility on the designer to determine appropriate design strength values and to put in place requirements to verify that the assumed strengths are realized. Ref: Dillon, P. B. and Dalrymple, G. A. (2021). â€œIn-Field Shear Bond Strength Testing of Adhered Masonry Veneer.â€ Proc. 14th Canadian Masonry Symposium, Montreal, QC, Canada.
145	Patrick	Dillon	244			24			Page 244, Line 26, Section 13.3.2.5(c) **I appreciate the many hours of effort put in by members of the VG subcommittee in developing the recent updates to the veneer chapter. With the momentous breadth and scope of the changes, the work that has been accomplished this far is impressive to say the least. I am submitting the following comment to help further the committee's goal of producing the best final document possible. My comment is based on my literal reading and understanding of the provisions from my perspective as one who was not involved with their development or the VG subcommittee, which I hope the subcommittee will find helpful and insightful.** There is a disagreement between the last phrase of the sentence and the subject. The last phase is intended to refer to "adhered masonry veneer", but the actual subject of the sentence is "the prescriptive design". In other words, the sentence actually says: "The prescriptive design of adhered masonry veneer shall comply with the requirements of either Table 13.3.2.5 or Table 13.3.2.6 or [the prescriptive design of adhered masonry veneer] shall be directly applied to concrete or masonry backing." I recommend rewording to align what is meant and what is said. I also recommend omitting the "prescriptive design of" piece; it is redundant since this section is nested under 13.3.2.5. I also found the connection between the first phrase and the tables to be less clear. When I initially went to the tables, I had to go back to the section and verify that I hadn't accidently gone to the wrong tables in the anchored veneer section. I think the connection between the two is described pretty clearly in the commentary, but I think having a better connection in the code itself would improve the readability of the code. Here is some suggested wording to help improve the section: "Adhered masonry veneer units shall be applied to scratch coat and lath fastened to backing in accordance with either Table 13.3.2.5 or Table 13.3.2.6 or shall be directly applied to concrete or masonry backing."
146	Patrick	Dillon	244			26			Page 244, Line 26, Section 13.3.2.5(c) **I appreciate the many hours of effort put in by members of the VG subcommittee in developing the recent updates to the veneer chapter. With the momentous breadth and scope of the changes, the work that has been accomplished this far is impressive to say the least. I am submitting the following comment to help further the committee's goal of producing the best final document possible. My comment is based on my literal reading and understanding of the provisions from my perspective as one who was not involved with their development or the VG subcommittee, which I hope the subcommittee will find helpful and insightful.** 13.3.2.4 requires scratch coat and lath over concrete or masonry where inadequate bond can be developed. With how 13.3.2.5(c) is worded, it would not permit prescriptive design of AMV units over scratch coat and lath fastened to concrete or masonry because Tables 13.3.2.5 and 13.3.2.6 only cover wood and steel stud backings. I suggest adding prescriptive fastener spacing for lath and plaster installations over concrete and masonry backings.
147	John	Hochwalt	132			60	This comment applies to multiple lines	68	Consider updating this commentary. Would it be clearer to refer to beneficial effects of column ties as "confinement"? Also, the last phrase "and better resistance to shear" is incorrect. Shear will be constant over the height of the column; when heavier ties are provided at the top and bottom of the column it is to provide enhanced confinement of potential hinge regions. Should enhanced confinement of potential hinge regions be made mandatory?

148	Patrick	Dillon	243			14			Page 243, Line 25, Section 13.3.2.4 See also: Page 369, Line 15, Section 3.3.D.2 **I appreciate the many hours of effort put in by members of the VG subcommittee in developing the recent updates to the veneer chapter. With the momentous breadth and scope of the changes, the work that has been accomplished this far is impressive to say the least. I am submitting the following comment to help further the committee's goal of producing the best final document possible. My comment is based on my literal reading and understanding of the provisions from my perspective as one who was not involved with their development or the VG subcommittee, which I hope the subcommittee will find helpful and insightful.** This section provides qualitative installation criteria for the direct adhesion of AMV to concrete or masonry backings. Similar requirements are also found in Â§ 3.3.D.2. The requirements require the backings be free of materials that would inhibit bond to the backing, but do not provide any quantitative requirements for what that bond strength needs to be. The bond strength is not only dependent on the backing condition, it has been found to also be highly influenced by the installation practices. It has been observed that the installation requirements in Section 3.3.D.4.a do not prevent the formation of voids in the setting bed, even under watchful supervision and careful compliance with the requirements. It should also be remembered that A118.4 and A118.15 are material standards (not installation standards) and that the bond strengths listed in those standards are for adhesion between the mortar and ceramic tile under carefully controlled lab conditions. Those strength values would not be in any way representative of the bond strength between the mortar and concrete or masonry backing achieved in the field. These points are somewhat compounded by the fact that there are no special inspection requirements for prescriptively design AMV installation below 60 ft. Frankly, based on the AMV failures I've seen, the thought of 75-pound AMV units installed 59 feet in the air without any inspections scares me. Either way, there is no way to verify that the assumed strengths are actually achieved in the field (or if they are even achievable in the field, given the lack of field research). I believe there should be quantitative strength requirements for bond between AMV units and their substrate, whether it be concrete, masonry, cement board, etc. Specifying performance requirements would set a minimum standard of performance that could then be verified through testing. It also has secondary benefits. 1. For retrofit applications, it may be difficult or cost prohibitive to obtain a substrate surface that is completely free of other material but in many cases a slightly lower level of substrate preparation may still achieve the intended level of performance. By having a quantitative requirement, testing could be performed to verify whether substrate preparation requirements will meet the performance requirements. 2. It would pave the way for new, innovative systems. For example, I know of one system designed to adhere the AMV units directly to the face of the water barrier. Based on current requirements, such a system could not be designed using the prescriptive requirements. But if the prescriptive requirements were performance-based, such a system could follow the prescriptive design path if it was demonstrated to meet the performance requirements. I also believe the special inspection requirements for AMV are too loose and recommend they be expanded to include more installations.
149	Charles	Tucker	214	This comm	221	1			Please consider adding provisions to allow small openings in masonry infills.
150	Jason	Thompson	33			25			Page C33/Line 25 This comment is from me, but was considered by the TMS Cast Stone Committee on their July 15, 2021 call. The use of the property f'm for cast stone should be reconsidered for the following reasons: 1) in the context of TMS 402/602, f'm is solely applicable to clay and concrete masonry; 2) the relationship between compressive strength and MOE applied here may be appropriate for a material such as concrete (f'c), but the compressive strength of a masonry unit and a masonry assembly are fundamentally different. Further, the compressive strength of concrete (f'c) is determined from a standard 2:1 cylinder whereas the compressive strength of cast stone is determined from a 1:1 cube making the use of this ACI 318 relationship speculative at best. 3) Cast stone systems are designed both as a material and as a system...depending on the application. For example, a large cast stone element may be set on shims and the joints sealed with caulking instead of mortar. It is understood that in the context of the 402/602 provisions the intent is to provide an option for the engineered design of cast stone veneers, but this nuance is likely going to be missed by the casual user. Recommend replacing the MOE relationship in 402 Table 4.2.2 with a requirement that the MOE for cast stone be determined by testing only.
151	Jeremy	Douglas	213			13224	This comment applies to multiple lines	13224	Table 13.2.2.4 - Veneer Tie Requirements - The requirements for the Tie Type - Unit Wire appear to have been written for a "Z" shaped wire tie, which is in fact referenced in the diagram in the commentary, same section. The requirements call specifically to "..... have ends bent to form an extension from the bend at least 2" long". For a Z-shaped tie this is fine, as the 2" extension will develop the necessary pullout strength, however, Z-shaped ties are nearly non-existent today. Further compounding the confusion, later in the table, under the Tie Type - Adjustable, the requirement for wire components of adjustable ties is for those ties to conform with the requirements under the Tie Type - Unit Wire. The wire components of the vast majority of adjustable veneer ties are either pintles or triangular ties, neither of which unambiguously conform to the language found within Unit Wire. If the intention is to provide a minimum of 2" of wire to be embedded in a mortar joint, please reword the Unit Wire requirements to state that instead of having commonly used ties conform to non-existent product requirements.
152	Jeff	Snyder	373			55			Rebar positioners are not required by Code, therefore they should not be depicted or referenced in the Code Commentary. Their presence is often interpreted by design professionals (architects and engineers), building officials and special inspectors to imply necessity.
153	Charles	Muehlbauer	223			1			In TMS 402, table CC-13.1.1, prescriptive methods for dimension stone anchored veneer are prohibited. This seems reasonable for larger scale projects, large dimension stone panels, or curtainwall applications extending well above grade. But there is no reference to height or scope of the installation, so strict enforcement of this code would require a base course on a storefront to have an engineerâ€™s stamp. This seems overly restrictive, particularly when Clay, Concrete, and Cast products are allowed to be installed without an engineerâ€™s review.
154	Charles	Muehlbauer	243	This comm	244	10			In TMS 402 Section 13.3.2.2, the unit weight and thickness limits for adhered veneer, as well as the height above grade plane listed in 13.3.2.5 (b) seem to be excessive and beyond my personal comfort level for most installations. Is there a document that would explain the rationale behind these limits?
155	Charles	Muehlbauer	319			3			In TMS 602, sections 1.3, 2.3C, and Table SC-5, the document references ASTM Standard specifications C503 (Marble), C568 (Limestone) C615 (Granite), C616 (Quartz-Based), and C629 (Slate). Yet nowhere does it refence C1526 (Serpentine) or C1527 (Travertine). Why are these two standards omitted?
156	Scott	Walkowicz	225			6	This comment applies to multiple lines	11	This limitation is placed as a subsection of 13.1.2 and therefore applies to all methods of designing veneer - prescriptive, tributary area and engineered. It makes a lot of sense for veneer designs using prescriptive and, also, the tributary area design methods since there is not an engineering analysis being done on the veneer or its anchorage. It does not make sense, to me, though, to include the limitation for engineered design of veneer. The design engineer should be able to use the method and analytical tools to evaluate the applied load and its connection with regard to how it influences the veneer and to design to appropriate un-cracked limits using Chapters 8 or 9, in the least. Because of the wording and its placement, I don't believe that a design utilizing Chapter 8 or 9 would be permitted under the veneer chapter and it seems that the entire veneer design would have to move to one of the other design methods for masonry. This seems unnecessary and can be easily corrected by modifying the language to include 'using Section 13.2.2' between '...on the face of veneer' and shall not exceed...' This would allow any load to be included when using Section 13.2.3 (engineered). A reasonable qualifier would be, since, or when, the veneer is treated as un-cracked and therefore un-reinforced, that a restriction be added either within the veneer chapter or added to the seismic provisions in Chapter 7. This would protect against brittle failure during seismic events. Thank you!
157	Scott	Walkowicz	225			6	This comment applies to multiple lines	11	Section 13.1.2.4, and its placement would allow for the load to be applied to all adhered veneer designed using TMS 402. I have serious concerns about allowing this at this time. It seems unsafe and the section should contain a prohibition against use in Section 13.3. Consideration could be given to allowing it in 13.3.3 and not 13.3.2, for consistency with anchored veneer, but I'm not sure that there is enough data in 13.3 or completed testing that would allow a designer to well design a connection to adhered veneer... even for these modest loads.
158	Scott	Walkowicz	369			25	This comment applies to multiple lines	29	A TAC comment suggested prohibiting open jointed adhered veneer in freeze-thaw climates. There was no action taken and the rationale noted, incorrectly, that the TAC comment only required a response - the TAC comment said 'do not allow open joints...' which seems like direction to remove, or consider removing, the allowed open joints in the freeze-thaw zones. I voted negative on this response and was found non-persuasive via a ballot that did not include the former information and seemed inappropriate but that's the way the Committee voted. I'd like to see the TAC comment re-considered because it seems that open joints are not a good idea for exterior adhered veneer in freezing climates. Several people have noted failures. And, the Rationale to finding me non-persuasive not only didn't dispute that failures had occurred in open jointed systems, but noted as new information, that failures had occurred in filled/jointed systems. It seems that there should be a Code provision, or certainly in the least some strong Commentary language, to prohibit or discourage the use of open jointed, and per the Committee, 'jointed' adhered veneer in freezing environments. The provision/exclusion can allow for protection measures, performance proven systems, etc... but we really don't want 'code compliant' adhered veneer falling off of buildings.
159	Brian	Trimble	312	This comm	313	77	This comment applies to multiple lines	85	The commentary has explanations for Dimension (nominal), drainage space and Inspection, but does not have the titles like the Spec column does, Please add titles to these three definitions in the Commentary. This would make TMS 602 definitions consistent with TMS 402 definitions.
160	John	Hochwalt	48			30			With the deletion of Section 3.2, commentary that stated â€œSelection of units and bonding pattern should be coordinated to achieve requirements.â€ There was an important idea here for both designers and contractors that should be incorporated in the Code and Specification in order to reduce the risk of a disconnect between the grout space assumed by the designer and the grout space as constructed by the contractor. Accordingly, the following suggestion are made. â€¢In TMS 402 Section 1.2.1, mandate that the designer specify the minimum grout space required by design. The commentary could include suggested minimum values for vertical cells of hollow units based on what was assumed in constructing the commentary tables in Section 6.1.3.2.5. For other situations, such as bond beams, the minimum grout space would presumably be based on the specified reinforcing area and Table 6.1.3.2.5. â€¢In TMS 402 Section 1.2.1, require the designer to specify the bond pattern when reinforcing is to be placed in the cells of hollow units if the units are intended to be laid in other than one-half unit running bond. â€¢In TMS 602 Article 2.3, address the need to supply hollow units that can achieve the minimum grout space required by the design drawings and which can also meet the construction requirements of Table 7. â€¢In TMS 602 Article 3.3 A, when vertical reinforcing is used in hollow units the bond pattern should specifically be half unit running bond. The commentary could note that while stack bond would typically provide additional grout space, that there additional requirements for masonry not-laid-in-running bond that the designer may not have considered if they have not specified a not-laid-in-running bond pattern.
161	Brian	Trimble	231			63	This comment applies to multiple lines	67	Vents in a rainscreen wall may not be at the "top of the wall" as stated, but may be at the top of a compartment (below a shelf angle or below a sill). Reword this section to better explain venting strategies.
162	Brian	Trimble	223	This comm	243	1	This comment applies to multiple lines	10	Table CC-13.1.1 and Section 13.3.2.1 are not consistent in regard to cast stone being used in an adhered veneer application. The table or the Section should be modified so that they are correct. In addition, should cast stone be allowed to use the Engineered Design method when used in an adhered veneer?

163	Edwin	Huston	123			27			Mechanical Splices must develop the specified tensile strength of the bar. ASCE 7-16 requires "6.1.6.1.1.4 Where M/Vudv exceeds 1.5 and the seismic load associated with the development of the nominal shear capacity exceeds 80% of the seismic load associated with development of the nominal flexural capacity, lap splices shall not be used in plastic hinge zones of special reinforced masonry shear walls. The length of the plastic hinge zone shall be taken as at least 0.15 times the distance between the point of zero moment and the point of maximum moment." TMS 402 should review this requirement and develop a more rational requirement for inclusion in TMS 402.
164	Brian	Trimble	231			38	This comment applies to multiple lines	88	The title for Section 13.2.2.2 in the Code and the Commentary don't match. The Commentary title should read "Specified weight and thickness".
165	Brian	Trimble	242			82	This comment applies to multiple lines	85	There has been considerable discussion about the appropriate applications for the use of dry stack or dry-fit joint applications for adhered veneers. Some additional language should be added that alerts users to possible issues in certain climates. Consider adding language to the commentary of Section 13.3.1.3 at the end: "Since water penetration is a critical issue for adhered masonry veneer, consideration should be given to appropriate drainage layers within the adhered veneer system. Adhered masonry veneer with tight-fit joints (joints between adhered veneer units that are not purposely filled with mortar), also referred to as dry-stack veneer, should be carefully considered in wet climates that include freeze thaw conditions and should closely follow the installation requirements in TMS 602 Article 3.3 C."
166	Edwin	Huston	132			31			ASCE 7-16 Chapter 14.4 contains the following provision. "9.3.4.2.5 Coupling Beams. Structural members that provide coupling between shear walls shall be designed to reach their moment or shear nominal strength before either shear wall reaches its moment or shear nominal strength. Analysis of coupled shear walls shall comply with accepted principles of mechanics. The design shear strength, ϕVn, of the coupling beams shall satisfy the following criterion: ϕV=> 1.25(M1+M2)/Lc + 1.4Vg where M1, M2 = Nominal moment strength at the ends of the beam; Lc = Length of the beam between the shear walls; and Vg = Unfactored shear force caused by gravity loads. The calculation of the nominal flexural moment shall include the reinforcement in reinforced concrete roof and floor systems. The width of the reinforced concrete used for calculations of reinforcement shall be six times the floor or roof slab thickness. ACI has similar requirements. TMS 402 should consider this requirement and either adopt a similar provision, or prohibit coupling beams. This provision would also enhance Appendix C.
167	Jason	Thompson	223			10			Table CC-13.1.1 is incorrect. Cast stone is permitted to be used under both the prescriptive and engineered adhered veneer provisions. (See Code Section 13.3.2.1.) Natural stone is permitted only under the engineered option as an adhered veneer.
168	Jason	Thompson	170			27			Section 9.3.3.2.2.1 makes sense for beams under gravity loads, but not for uplift. A singly reinforced beam over an opening and at the top of a wall may be subjected to a small amount of uplift from the roof that the reinforcement at the bottom of the beam can safely resist...but because the beam is bending about its weak vertical axis, it cannot meet the cracking moment check.
169	John	Hochwalt	48			30			With the deletion of Section 3.2 the following commentary was deleted: "The TMS 602 Specification addresses material and construction requirements. It is an integral part of the Code in terms of minimum requirements relative to the composition, quality, storage, handling, and placement of materials for masonry structures." It is unclear what provision this commentary was intended to address. Regardless, this is an important requirement for designers to be aware of and to require the compliance of contractors with. As a result, it is suggested that compliance with TMS 602 be listed as a required item on the contract documents in Section 1.2.1. The commentary that was deleted in Section 3.2 would be then be restored at that location. Note that the commentary to the preface for TMS 602 makes a similar statement: "Part 1 of the Building Code Requirements for Masonry Structures (TMS 402) makes the Specification for Masonry Structures (TMS 602) an integral part of TMS 402."
170	Brian	Trimble	243			1	This comment applies to multiple lines	8	The new standard ASTM C1823 "Standard Test Method for Shear Bond Strength of Adhered Dimension Stone" has recently been adopted and should be incorporated into the code and commentary as appropriate.
171	Patrick	Dillon	170			1			Page 170, Line 1, Figure CC-9.3-1 I admire the simplicity of the figures in attempting to concisely explain Vns, but unfortunately I have some concerns about them, more particularly about (b). Item 1. The commentary notes that only the horizontal forces are shown for clarity. The diagrams are in equilibrium in in the x direction but are not in equilibrium for in-plane rotation. This means that additional forces are required, or the assumed stress distribution in the reinforcement is not correct, or both. Equilibrium could be attained in diagram (a) reasonably easily because vertical forces from the vertical reinforcement, axial load, and masonry compressive stress block are all within the wedge. This makes sense because it has a high aspect ratio. However, I have tried multiple approaches to find a complete set of free body diagrams for (b) that are at least somewhat consistent with the other forces and reactions and satisfy equilibrium, but have not been able to find anything where the x value cancels out of the equation. The equation assumptions do not appear to be valid or are only valid for a crack at a specific location and with a specific combination of loads. Item 2. I will send a figure to accompany this comment item but will try to walk the reader through it textually as well. This item will only consider the forces in the horizontal direction, as assumed in the commentary. The free body diagram in (b) works for a single crack. But consider the scenario where two or more parallel cracks form. Assume they form at a 45-degree angle, similar to the figure. Now, construct a free body diagram for a strip of masonry running between two cracks. The strip will have a rhomboid shape. Assume the horizontal width of the strip at the top and bottom are x. Based on the commentary's assumptions, the shear force from Vns at the top and bottom will both equal Vns*x/dv. In addition, there will be multiple horizontal forces projecting out from both sides representing the horizontal reinforcement, with each force equal to Av*fy. Since the horizontal reinforcement forces on the two sides of the masonry strip are equal and opposite, they sum to zero. This means that the forces in the reinforcement pass through the strip from one side to the other side without transferring any load into or from the masonry strip. Since the shear reinforcement forces have no effect on the strip, an equivalent free body diagram could be constructed for the strip wherein the reinforcement forces are omitted and only the Vns*x/dv forces remain. In either case, the shear forces at the top and bottom of the strip are resisted by the masonry itself. But this violates the assumptions of the figure because Vns is supposed to be resisted by the shear reinforcement, not the masonry. It appears that one or more of the figure's assumptions are not valid. Conclusions I do not think we should include figure (b) because the I have shown two different ways that the figure is not valid, first by showing that the assumptions do not satisfy equilibrium, and second by showing that it contradicts its own assumptions. It's a shame that it didn't work out since it's a simple explanation, but it's no surprise because there has been disagreement in the research community for years about the proper interpretation of the empirical shear equation. I recommend removing figure (b) entirely or, better yet, revising the shear strength equation to a form that has a solid mechanical basis and revising the figure to match. There has been a good amount of research on this latter topic in the past decade or so that could be used as a starting point.

									
172	Brian	Trimble	243			59	This comment applies to multiple lines	65	The Commentary to Section 13.3.2.2 refers to density, but that is not a part of the code. The commentary should be revised to: "The unit limitations are imposed to reduce the..."
173	Brian	Trimble	243			22	This comment applies to multiple lines	23	The restriction of Type S mortar for setting bed mortar should be reconsidered, especially as it relates to interior applications or residential applications such as wainscots.
174	Brian	Trimble	243			27	This comment applies to multiple lines	30	Clay masonry walls should be included in Section 13.3.2.4 as an appropriate backing for adhered veneer without the need for lath and scratch coat. However, the section must include language that not all clay masonry backings are appropriate, for example an existing brick veneer wall or a brick that has a glazed or smooth face or an existing wall that is weathered and spalled.
175	John	Hochwalt	187			65	This comment applies to multiple lines	74	The section of commentary presents expected losses for "typical wall applications." It is unclear what would constitute a typical wall application. It is our understanding that the intent of the commentary is that a typical wall application would be one in which a high strength steel would be prestressed to near the maximum limits permitted by code. The commentary should be revised to clarify this intent and to warn the user that losses may be considerably higher for applications with lower prestressing strains.
176	Brian	Trimble	244			13	This comment applies to multiple lines	14	Consideration should be given to non-vertical applications that are small in nature such as an L-shaped masonry unit that forms the soffit of an opening. It could be interpreted that the L-shaped unit is not allowed since it has a horizontal surface. This often applies to an arch where more decorative units are used, but may be unnecessarily restricted.
177	Brian	Trimble	369			72	This comment applies to multiple lines	74	The commentary for Article 3.3 D 4.b really applies to the entire installation section. Move the existing language from 3.3 D 4.b to the end of the existing language of 3.3 D and reword to: "Proprietary systems or products may have requirements that are different than the generic prescriptive requirements shown here."
178	Patrick	Dillon	363			3			Page 363, Line 3, Table 6 See also Page 101, Line 20, Section 6.1.8.1.2 Section 6.1.8.1.2 requires the tail of a standard hook to extend into the intersecting wall a minimum distance of twice the development length. The tail extension of a "standard hook", by definition in Table 6, is only 12 db. I recommend changing "Extension" to "Minimum Extension".
179	John	Hochwalt	189			66	This comment applies to multiple lines	69	With the revised phi factors for tension controlled and compression controlled sections in Section 9.1.4.4, this commentary is no longer correct and should be revised.
180	John	Hochwalt	190			5			In equation 10-1 should the terms be â€œed_psâ€ instead of â€œdâ€?
181	John	Hochwalt	192			24	This comment applies to multiple lines	31	The ratio a/d does not seem right, especially given that there may not be bonded reinforcing. Should this be a/d_ps? a/x_t?
182	Brian	Trimble	384	This comm	388	25			The term "grout pour" is not understood by the design community and is too often confused with the pouring of grout into the wall which we call placement. The term should be deleted from the code and spec and described in another way. In many places in TMS 602, the phrase "maximum height of masonry prior to grouting" or "maximum height of the masonry to be grouted" can be used instead of grout pour to denote the maximum height the masonry may be built. This will eliminate the need to explain in great detail the difference between a lift and a pour.
183	Patrick	Dillon	40			32			Page 40, Line 33 The term Licensed Design Professional is defined in Chapter 2 and used 4 times in the document. The term Architect/Engineer is not defined and is used 61 times in the document. The term Licensed Design Professional appears to be favored in the IBC, at least in part because it is more inclusive. I recommend using picking one and using it consistently. I recommend using Licensed Design Professional because there are cases where non-Architect/Engineers may use the code, particularly the prescriptive design chapters. For example, landscape architects will use the anchored veneer provisions for masonry site walls and certified interior designers may use the adhered veneer provisions for interior adhered veneer.
184	Brian	Trimble	245			71			A figure should be added to the commentary that shows the various terms used in Section 13.3.2.5 (e) such as cavity and what is considered as the veneer assembly. These terms are also used in Tables 13.3.2.5 and 13.3.2.6 and a figure could help explain how these occur in adhered veneer assembly.
185	Patrick	Dillon	268			1			Page 268, Line 1, Appendix D Since GFRP bars are more sensitive to elevated temperatures, I recommend either including limitations for in-service temperatures or introducing strength reduction factors for elevated temperature service.
186	Patrick	Dillon	246	This comm	247	1			Page 246-247, Line 1, Tables 13.3.2.5 & 13.3.2.6 The tables should list all the assumptions used in developing the values and specify that conditions not satisfying those requirements must be engineered.
187	John	Hochwalt	185			66	This comment applies to multiple lines	74	This paragraph of commentary appears to be the only place that verification of material strength prior to transfer of the prestressing forces is addressed. Given the hazard of transferring prestressing forces to materials with inadequate strength, there should be requirements in TMS 602, including in the QA table, for the verification of material strength prior to force transfer. The reference to reliance on a past history of strength gain should be deleted. There is sufficient variation in the strength gain of masonry materials that this could result in unsafe conditions. Prestressed concrete manufacturers, for example, take cylinders and test them prior to force transfer. If concrete end blocks are being used f'ci needs to be verified as well as f'mi. There may also be a role for testing the grout strength, f'gi, when concrete end blocks are not used as the grout will experience the highest stresses at the anchorages.
188	John	Hochwalt	184			35			This requirement seems applicable to walls only. How is this intended to be applied to beams?
189	John	Hochwalt	190	This comm	191	19			Now that "d_ps" has been introduced, should "d_ps" be used in this section instead of "d"?

190	Patrick	Dillon	79			6			Page 79, Line 10, Section 5.2.2.3 The requirements for distribution of flexural reinforcement for deep beams appears to be excessive and makes designers less likely to use the deep beam provisions. The zone where distributed flexural reinforcement is required by code is based on dv. As shown in the figure on the previous page, dv is an arbitrary value selected by the designer during beam design and could vary from a single course to the full depth of the panel above the opening. The masonry panel does not know what beam depth was used in its design and will not behave differently for varying values of dv. If cracking in the bottom half of dv is a concern for deep beams, then it should be a similar concern for masonry supported on a shallow beam, because the masonry will perform the same either way. If you look up the original primary research on which the deep beam provision are based, you'll find that the depth from the bottom to the neutral axis for beams with l_eff / dv < 1 is dependent on l_eff, not dv. So, for a given span, once dv exceeds l_eff, the flexural tension zone does not get any deeper. And unlike what is inferred in the commentary, the depth of the flexural tension zone is only 0.28 l_eff for a simply supported beam. In addition, the resultant tension force changes very little and is nearly constant at these high depths. I recommend revising the provisions to make them align better with the research and remove the over-conservatism so that designer can better use the benefits of deep beams in their designs without unnecessary penalties.
191	John	Hochwalt	186			70	This comment applies to multiple lines	76	It is suggested to delete the paragraph of commentary about the effects of sequential stressing because the effects are small, and the complexity of the analysis required to consider those effects is not warranted. For example, Note that Woodham and Hamilton (2003) only showed a 2% to 3% loss due to stressing sequence with closely spaced prestressing steel (2' on center). For additional context, stressing sequence is not considered in prestressed concrete design.
192	John	Hochwalt	240			75	This comment applies to multiple lines	78	The discussion of the work of Hochwalt et al should note that only simple span backing was investigated. Multi-span backing, backing with cantilevers, and backing interrupted with openings were not considered.
193	John	Hochwalt	265			74			Correct the reference to Chapter 9 to 9.3.5.6.2.3 (a
194	John	Hochwalt	265			28	This comment applies to multiple lines	32	Are the angular deformation capacities of shear controlled elements intended to be the lesser of C3.1 and C3.2? As written, it could be interpreted that shear controlled elements need only comply with C3.2. This could be addressed by revising C3.2 to state that angular deformation capacity should be taken as not greater than 1/400 or 1/200, depending on detailing.
195	John	Hochwalt	382			2	This comment applies to multiple lines	37	I have the following comments on TMS 602 Article 3.4 E.: *It appears there are no requirements for the minimum embedment of the ties into the veneer. Perhaps 1-1/2" minimum embedment should be required similar to the requirement for wall ties in 3.4 C.1. *Requirements for the embedment of unit wire ties into masonry backing should be addressed. Perhaps 1-1/2" minimum embedment should be required similar to the requirement for wall ties in 3.4 C.1. *3.4 E.1.b and 3.4 E.8: Replace "anchors" with "ties."
196	Gary	Sturgeon	21			81			"Graphic depictions" statement is made twice...one must be deleted.
197	John	Hochwalt	76			12			Delete the word â€œreinforced.â€ All masonry beams must be reinforced per Section 5.2.
198	Gary	Sturgeon	21			25			With respect to (h)...Other engineering involvement, for example, design of cladding on the structure, requires statements (not necessary prescribed provisions) about movements of the structure and backing so that the cladding design is able to be designed to accommodate differential movements.
199	Gary	Sturgeon	22			58			Is the following statement really true??? "Masonry design by prescriptive approaches relies on rules and masonry compressive strength need not be verified."
200	Gary	Sturgeon	22			60			"...joint and opening locations assumed in the design..." use of the term "assumed" is not appropriate. The design must be concluded...nothing about the design should be assumed. All that is needed to construct the structure in accordance with the design should be suitably communicated by the architect and/or engineer within the contract documents.
201	Gary	Sturgeon	37			10			The definitions of "cavity" and "cavity wall" are somewhat inconsistent. Under "cavity", it states correctly that the cavity may contain insulation. Under "cavity wall", it states that the air space may contain insulation. These are contradictory. Itis the "cavity" that may contain the insulation, not the air space. An air space IS the cavity, or forms part of the cavity where other components such as insulation are included (in the cavity).
202	Gary	Sturgeon	38			33			The term "cement backer unit" is used multiple times in this code, and is neither defined nor described.
203	Gary	Sturgeon	41			18			The definitions for "masonry, reinforced" and "masonry, unreinforced" are not suitably harmonized in description or terms. "Taken into consideration" is different than "used to resist forces"...are they intended to be different in these definitions?
204	Gary	Sturgeon	45			6			Use of the terms "attach" and "connect" are not harmonized throughout this code, and to some extend, neither is "anchor". Also examine the non-harmonized use of the term "tied". These terms appear at multiple locations throughout the code without consistency.
205	Gary	Sturgeon	45			23			Veneer, masonry...why not include in the definition the critical condition that the veneer is non-load-bearing.
206	Gary	Sturgeon	45			20			"tiess" spelling.
207	Gary	Sturgeon	48			25			Use of the terms "collar joint", "grouted collar joint" and "mortared collar joint" are not used consistently or harmonized throughout this code.
208	Gary	Sturgeon	22			78			"Failures...contract documents"....This is not necessarily a true statement and should be deleted. Many investigations will reveal errors/omissions by the designer.
209	Gary	Sturgeon	223			75			Lines 75-80. This is far from being a comprehensive list and does not serve as a suitable introduction to the discussion under 13.1.2.2.
210	Gary	Sturgeon	225			66			"water penetration into the building"...What exactly is the extent of "into the building"...into the backing??...into interior space?? This statement must be consistent with the extent of water penetration permitted by the applicable building code.
211	Scott	Walkowicz	91			10	This comment applies to multiple lines	35	Commentary Figure CC-6.1-1 is a great aid in helping designers understand and then verify available gross grout space. It is, however, mostly representative of CMU although figure (b) may somewhat represent certain structural clay units. Please consider adding additional figures to show a couple generic structural clay unit configurations and their resulting gross grout area when laid in one-half running bond. Consider adding a sentence or two of verbal Commentary to accompany the figure and to remind users to consider their locally available unit geometry and/or the effects of different bond patterns, corbeling or other detailing that may affect the available gross grout space. Also consider adding a verbal Commentary that the Gross Grout Space does not include mortar extrusions, other vertical or horizontal bars, etc... and is based solely on the unit geometry and dimensions, while noting that concrete units are molded and commonly have a taper, being thicker at the top when laid, and that clay units are generally constant thickness due to being an extruded unit.
212	Gary	Sturgeon	230			88			"...entering into the building." What exactly is the extent of "into the building"...into the backing??...into interior space?? Such statements must be consistent with that permitted by the applicable building code.
213	Kenneth	Bownds	243	This comm	246	10	This comment applies to multiple lines	40	I wish to know the rational or data behind the increase of the adhered masonry from 15psf to 30psf. This is doubling the allowable and is very concerning for me as a designer. I am uncomfortable putting a 2 5/8" thick piece of concrete masonry adhered only to the wall in regions as tall as 60ft high. This in combination with the 2" rigid insulation additions in table 13.3.2.5 do not make sense. Has any in plane load testing been performed with these assemblies to see how the system will react? Especially what will be the in plane deflections of the assembly with a 30psf stone, mortar bed, scratch coat assembly (which could total up to 50 psf) as the nailed assembly cantilevers thru the insulation board. How were these nail sizes and spacing determined? Empirically or by testing? I would have to see this data before I could begin to support any kind of increase of this magnitude.
214	Gary	Sturgeon	230			40			13.2.1.8...For water penetration resistance...it is interesting that so many redundancies, such as air space and weep holes, etc., are required for water management forconventional (anchored) masonry veneer systems, but so little is required for adhered veneer with respect to water management! How is this possibly rationalized?????
215	Gary	Sturgeon	235			20			Why use of (only) "prongs"...there are other means!
216	Gary	Sturgeon	236			69			The term "mechanical free play" should be defined. It is used repeatedly.
217	Scott	Walkowicz	21			25	This comment applies to multiple lines	26	Sub-Section (h) is very important and also seems to be one of the most vague and misunderstood sections of code. Sometimes architects take responsibility for all movement provisions, sometimes engineers do so for engineered masonry elements, sometimes neither one does or neither does it very well. At a minimum, it seems that the sub-section could be modified to say 'Provision, including vertical and/or horizontal movement joints and other detailing as necessary, for dimensional changes...'. It is my opinion that the movement joints should be located in the drawings, either in plan or elevation view, and they should be detailed for proper performance including dimensions and materials. Or, at a minimum add Commentary to clarify what 'Provision' may actually entail in the drawings. Also, it would be good to add Commentary non-engineered veneer and non/engineered masonry movement provisions should be included in the architectural but may require input from the engineer in the case of horizontal joints below relief angles; and that joints in any engineered masonry (in my opinion, anything that's not veneer and has a prescriptive or engineered basis of design) should be developed and shown by the engineer. And, that engineered veneers should have provisions developed and shown by the design engineer.
218	Kenneth	Bownds	223			1	This comment applies to multiple lines	10	Table CC-13.1.1. Your disallowing Dimension Stone from being prescriptive under Anchored Veneer. I understand the need for larger dimensional stones to be engineered but smaller split-face elements which are currently being mortar set (1'x2'x4"thk limestone elements as case in point) with bed ties are considered prescriptive designs per IBC Chapter 14 and are currently being done w/o engineering calcs or drawings.
219	Scott	Walkowicz	59			73	This comment applies to multiple lines	83	The Commentary for Section 4.5 is good and the information is getting better and better. Consider expanding the Commentary discussion to include discussion of dead load and which dead load or how much should be considered. If the goal is to prevent long-term visible deflection and serviceability problems (I read that as objectionable crack size), then maybe all dead loads should be considered but this is kind of like a pre-stressed concrete design or a deck design - do we care about deflections that occur before the masonry is laid and should the pre-masonry dead loads be considered or not? If we it takes larger deflections to become visible then the L/600 seems more about cracking and therefore it seems that the dead load considered should be the masonry self-weight and that dead load that is applied after the masonry is placed. Please consider what is appropriate and add Commentary, possible modify the Code language if needed, if mandatory language should be added to properly address the issue.
220	Gary	Sturgeon	242			33			...not many requirements for water management for adhered veneer compared to anchored veneers...not rational. Prevent water from entering the building...what does this mean exactly? Statements in the masonry code should be consistent with the building code requirements for permissible penetration.