

Technical Evaluation Report™

TER 2211-02

Superior Walls® Precast Concrete Wall Panels

Superior Walls® of America, Ltd.

Product:

Superior Walls® Xi and Xi Plus Wall Panels

Issue Date:

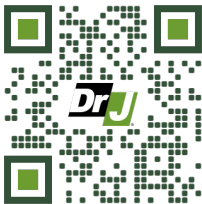
September 15, 2023

Revision Date:

September 15, 2023

Subject to Renewal:

October 1, 2024



Use the QR code to access the most recent version or a sealed copy of this Technical Evaluation Report (TER) at drjcertification.org.



COMPANY
INFORMATION:

ADDITIONAL
LISTEES:

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New Holland, PA 17557-9597

TF: 800-452-9255

www.superiorwalls.com

ADDITIONAL

LISTEES:

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Superior Walls® by Warrior Precast, LLC
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Northeast Precast
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DIVISION: 03 00 00 - CONCRETE

SECTION: 03 40 00 - Precast Concrete

SECTION: 03 41 00 - Precast Structural Concrete

1 Innovative Products Evaluated^{1,2}

1.1 Superior Walls® Xi Wall Panels

1.2 Superior Walls® Xi Plus Wall Panels

¹ For more information, visit drjcertification.org or call us at 608-310-6748.

² **Federal Regulation Definition.** 24 CFR 3280.2 "Listed or certified" means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner. **International Building Code (IBC) Definition of Listed.** Equipment, materials, products or services included in a list published by an organization acceptable to the building official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose Listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. **IBC Definition of Labeled.** Equipment, materials or products to which has been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

2 Applicable Codes and Standards^{3,4}

2.1 Codes

- 2.1.1 IBC—15, 18, 21: *International Building Code*®
- 2.1.2 IRC—15, 18, 21: *International Residential Code*®
- 2.1.3 IECC—15, 18, 21: *International Energy Conservation Code*®

2.2 Standards and Referenced Documents

- 2.2.1 ASTM E72: *Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*
- 2.2.2 ASTM E119: *Standard Test Methods for Fire Tests of Building Construction and Materials*
- 2.2.3 NFPA 286: *Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*
- 2.2.4 UL1715: *Fire Test of Interior Finish Material*
- 2.2.5 ICC 700 *National Green Building Standard*
- 2.2.6 CalGreen — *The California Green Building Standards Code—Part 11, Title 24, California Code of Regulations*

3 Performance Evaluation

- 3.1 Tests, test reports, research reports, duly authenticated reports and related engineering evaluations are defined as intellectual property and/or trade secrets and protected by Defend Trade Secrets Act 2016 (DTSA).⁵
- 3.2 Testing and/or inspections conducted for this TER were performed an ISO/IEC 17025 accredited testing laboratory,⁶ an ISO/IEC 17020 accredited inspection body,⁷ which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).
- 3.3 The Superior Walls® Xi and Xi Plus Wall Panels were evaluated to determine:
 - 3.3.1 Concrete Properties in accordance with ASTM C39 and C469
 - 3.3.2 Transverse loads for soil and wind in accordance with ASTM E72
 - 3.3.3 Racking shear loads in accordance with ASTM E72
 - 3.3.4 Compression loads in accordance with ASTM E72
 - 3.3.5 Brick ledge loads in accordance with ASTM E72
 - 3.3.6 Beam Pocket loads in accordance with general engineering principles

³ This Listing is a code defined research report, which is also known as a duly authenticated report, provided by an approved agency (see IBC Section 1703.1) and/or an approved source (see IBC Section 1703.4.2). An approved agency is “approved” when it is ANAB accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory. A professional engineer is “approved” as an approved source when that professional engineer is properly licensed to transact engineering commerce. Where sealed by a professional engineer, it is also a duly authenticated report certified by an approved source. (i.e., Registered Design Professional). DrJ is an ANAB accredited product certification body.

⁴ Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

⁵ <https://www.law.cornell.edu/uscode/text/18/part-II/chapter-90>. Given our professional duty to inform, please be aware that whoever, with intent to convert a trade secret (TS), that is related to a product or service used in or intended for use in interstate or foreign commerce, to the economic benefit of anyone other than the owner thereof, and intending or knowing that the offense will, injure any owner of that trade secret, knowingly without authorization copies, duplicates, sketches, draws, photographs, downloads, uploads, alters, destroys, photocopies, replicates, transmits, delivers, sends, mails, communicates, or conveys such information; shall be fined under this title or imprisoned not more than 10 years, or both. Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. As the National Society of Professional Engineers states, “Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.” Therefore, to protect intellectual property (IP) and TS, and to achieve compliance with public records and trade secret legislation, requires approval through the use of Listings, certified reports, technical evaluation reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

⁶ Internationally recognized accreditations are performed by members of the International Accreditation Forum (IAF). Accreditation Body and Regional Accreditation Group Members of IAF are admitted to the IAF MLA only after a stringent evaluation of their operations by a peer evaluation team, which is charged to ensure that the applicant complies fully with both international standards and IAF requirements. Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.

⁷ Ibid.

- 3.3.7 Bolted connections at the top and bottom of the walls in accordance with general engineering principles.
- 3.3.8 Compliance with the mass wall provisions of the [IRC Section N1102.2.5](#) and [IECC Section R402.2.5](#)
- 3.3.9 Fire resistance rated wall construction in accordance with ASTM E119 and CAN ULC S101.
- 3.3.10 Thermal Barrier requirements in accordance with [IBC Section 2603.9⁸](#) and [IRC Section R316.6](#).
- 3.3.11 *Dampproofing:*
 - 3.3.11.1 Water permeability test conducted in accordance with ASTM E96
- 3.3.12 Green Construction in accordance with CalGreen Section A4.404.3.3 for pre-manufactured building systems, and ICC 700 Sections 601.5 and 11.601.5.
- 3.4 Any building code and/or accepted engineering evaluations (i.e. research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an [ISO/IEC 17065 accredited certification body](#) and a professional engineering company operated by RDPs / [approved sources](#). DrJ is qualified⁹ to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.
- 3.5 Engineering evaluations are conducted with DrJ's ANAB [accredited ICS code scope](#), which are also its areas of professional engineering competence.
- 3.6 Any regulation specific issues not addressed in this section are outside the scope of this TER.

4 Product Description and Materials

4.1 The innovative products evaluated in this TER are shown in Figure 1, Figure 2, Figure 3 and Figure 4.

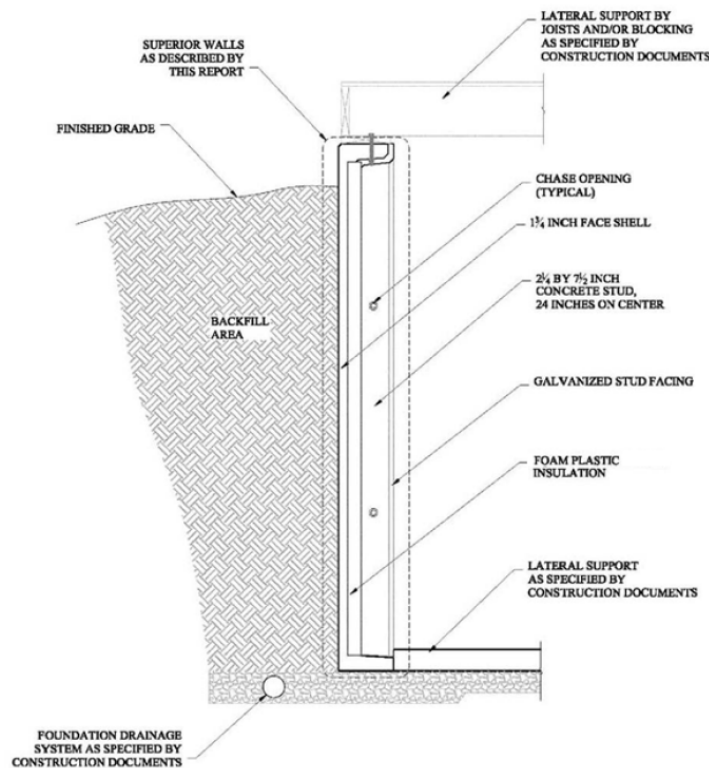


Figure 1. Vertical Cross Section of Superior Walls® Xi and Xi Plus Wall Panel Assembly

⁸ 2006 IRC Section R314.6; 2012 IBC Section 2603.10

⁹ Qualification is performed by a legislatively defined [Accreditation Body](#). [ANSI National Accreditation Board \(ANAB\)](#) is the largest independent accreditation body in North America and provides services in more than 75 countries. [DrJ](#) is an ANAB accredited [product certification body](#).

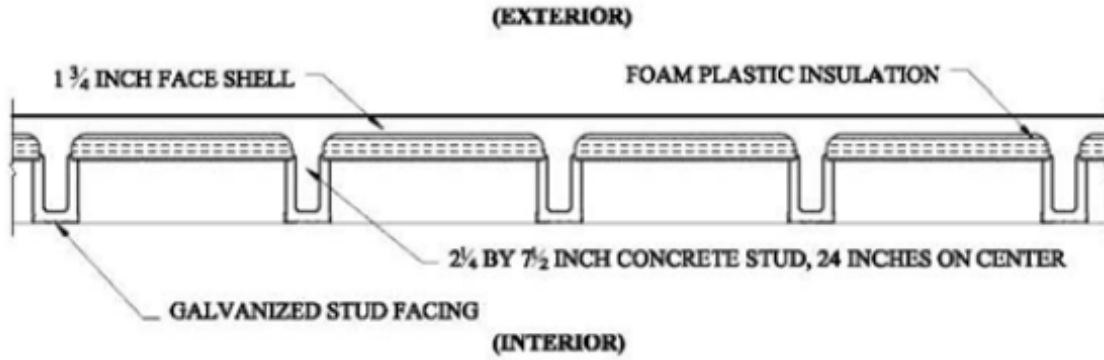


Figure 2. Horizontal Cross Section of Superior Walls® Xi and Xi Plus Wall Panel Assembly

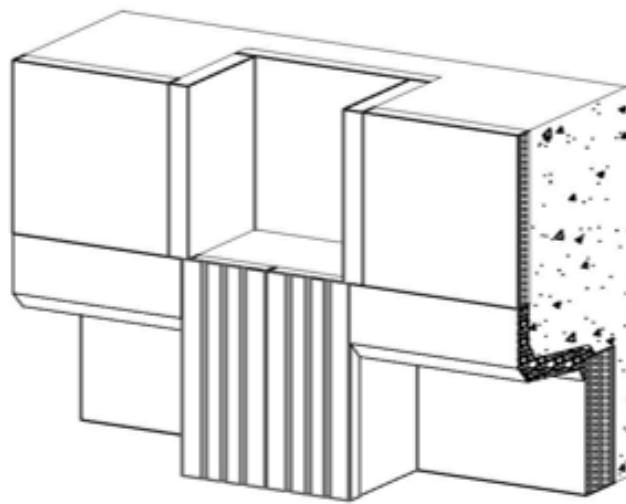


Figure 3. Typical Beam Pocket Detail

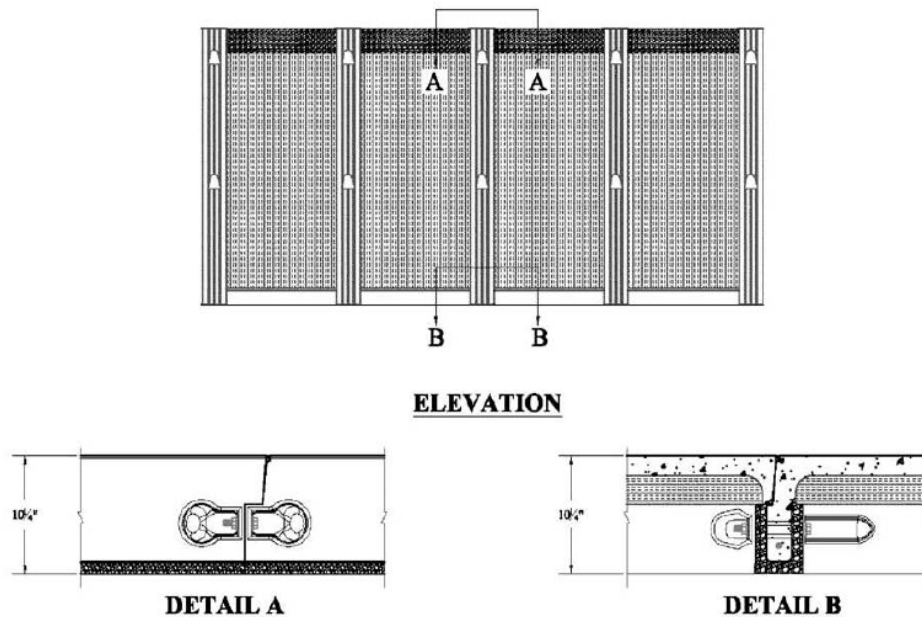


Figure 4. Wall Connection Detail for Superior Walls® Xi and Xi Plus Wall Panel Assembly

4.2 Information on Superior Walls® Xi and Xi Plus Wall Panels is provided in Table 1.

Table 1. Product Information

Product	Foam Board Options	Wall Heights/Weight	Description	Material Properties
Xi	Option 1: 2½ inch (63.5 mm) thick rigid polystyrene	4', 170 lb/ft; 8'2", 303 lb/ft; 9', 329 lb/ft; and 10', 361 lb/ft	Precast Concrete Wall Panels consisting of a 1¾ inch (44 mm) thick exterior face shell of monolithically cast concrete with 10¼ inch (260 mm) wide top and bottom bond beams and 2¼ inch by 7½ inch (57 mm by 190.5 mm) concrete studs at 24 inches (610 mm) on center (See Figure 1 and Figure 2). Various rigid foam boards (see next column) are bonded to the inside face of the shell. Each stud is wrapped with 1 inch (25.4 mm) thick expanded polystyrene insulation on all three of the exposed sides and faced with a galvanized steel channel for interior finish fastening. Chase openings with knockouts are provided in each stud for plumbing and electrical wiring (See Figure 1).	Concrete has 5,000 psi (34.4 MPa) compressive strength and contains synthetic fibers.
	Option 2: 2½ inch (63.5 mm) thick rigid phenolic foam insulation			
	Option 3: 2 inch (50.8 mm) thick ridged polystyrene and a ½ inch (12.7 mm) layer of polyisocyanurate insulation			
	Option 4: 1½ inch (38.1 mm) thick rigid polystyrene and a 1 inch (25.4 mm) layer of polyisocyanurate insulation			
	Option 5: 2½ inch (63.5 mm) thick polyisocyanurate			
Xi Plus	4½ inch (114.3 mm) thick-ridged polystyrene and a ½ inch (12.7 mm) layer of polyisocyanurate insulation on the inside face.	4', 178 lb/ft; 8'2", 318 lb/ft; 9', 345 lb/ft; and 10', 378 lb/ft		

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/ft = 0.0146 kN/m, 1 psf = 0.0479 kN/m², 1 psi = 0.00689 MPa

4.2.1 All insulation is factory installed in the precast walls and must be as described in approved quality control documentation.

5 Applications

5.1 Transverse Loading

- 5.1.1 Table 2 provides the maximum allowable loads for positive and negative transverse wind loads for above grade walls and allowable transverse soil loads for below grade walls.

Table 2. Allowable Transverse Loads for Superior Walls® Xi and Xi Plus Wall Panels

Product	Wall Height (ft)	Allowable Transverse Positive Load, psf (kN/m ²)	Allowable Transverse Negative Load, psf (kN/m ²)
Xi and Xi Plus	≤10	235 (11.25)	120 (5.7)
1. Assumes wall is supported at top and bottom.			

5.2 Backfill Soil Loads

- 5.2.1 A maximum 100 lbf/ft²/ft equivalent fluid pressure is permitted for backfill soil loading.

5.3 Brick Ledge Loads

- 5.3.1 Use of Superior Walls® Xi and Xi Plus Wall Panels with a brick ledge is limited to an allowable load of 2,900 lbf/ft (42.32 kN/m) on the brick ledge. The load applied to the brick ledge shall be considered as part of the total allowable load on the wall as described in Table 3 of this TER.

5.4 Combined Soil and Compression Loading for Below Grade Walls

- 5.4.1 Table 3 provides the maximum allowable compression loads on the top of the wall when loads from a 100 lbf/ft²/ft (1602 kg/m²/m) soil load is considered along with a 2,900 lbf/ft (42.32 kN/m) vertical load applied to a brick ledge.

Table 3. Maximum Allowable Compression Load for Superior Walls® Xi and Xi Plus Wall Panels

Product	Allowable Compression Load, ¹ lbf/ft (kN/m)
Xi and Xi Plus	7,500 (109.45)
1. A maximum 2900 lbf/ft load on a brick ledge is permitted as part of the total allowable compression load.	
2. Wall must be supported at top and bottom.	
3. A maximum 100 lbf/ft ² /ft soil load is permitted in combination with the maximum allowable compression load.	

5.4.2 In-Plane Shear Loads:

- 5.4.2.1 Superior Walls® Xi and Xi Plus Wall Panels were tested in accordance with ASTM E 72 to determine the allowable racking shear loads as shown in Table 4.

Table 4. ASTM E72 Allowable Shear Load¹

Product	Allowable Racking Shear Load, plf (kN/m)
Xi and Xi Plus	745 (10.87)
1. Allowable shear load is applicable to wind and soil loading.	

5.4.3 *Beam Pocket Loads:*

Table 5. Maximum Allowable Load for Beam Pockets

Product	Wall Height (ft)	Maximum Allowable Beam Pocket Load, lbf (kN)
Xi and Xi Plus	10	24,000 (106.75)
Xi and Xi Plus	<10	21,600 (96.08)

1. Beam pocket with two support studs under the beam pocket.
 2. Other beam pocket configurations are outside the scope of this TER.

5.4.4 *Bolted Connections at the Top and Bottom of the Walls:*

Table 6. Maximum Allowable Shear Load for Bolted Panel Connections

Product	Maximum Allowable Load lbf (kN)
Xi and Xi Plus	1500 (6.75)

1. Determined by performance testing

5.5 *Mass Walls*

5.5.1 Superior Walls® Xi and Xi Plus Wall Panels are classified as a Mass Wall as defined in the [IRC Section N1102.2.5](#) and [IECC Section R402.2.5](#). Both the header sections and the interior portions of the wall panels exceed the requirement to be 6 Btu/ft²-F (123kJ/m²-K) as follows:

5.5.1.1 The interior portion of the Superior Walls® Xi and Xi Plus Wall Panels have a heat capacity of 6.46 Btu/ft²-F (132 kJ/m²-K).

5.5.1.2 The header portion of the Superior Walls® Xi and Xi Plus Wall Panels have a heat capacity of 10.55 Btu/ft²-F (216 kJ/m²-K).

5.6 *Fire Resistance Rated Wall Construction*

5.6.1 Superior Walls® Xi and Xi Plus Wall Panels were tested to determine their fire resistance rating in accordance with ASTM E119 and CAN ULC S101 with results as follows:

5.6.1.1 *Two-Hour Fire Resistance Rating:*

5.6.1.1.1 The addition of two layers of 5/8" (15.98mm) Type X gypsum wallboard complying with ASTM C1396, attached to the stud facing in accordance with the applicable code, provide Superior Walls® Xi and Xi Plus Wall Panels having a maximum allowable axial compressive load of 5000 lbf/ft. (72.97 kN/m), including brick ledge loads, with a two-hour fire-resistance rating.

5.6.1.2 *One-Hour Fire Resistance Rating:*

5.6.1.2.1 The addition of one layer of 5/8" (15.98mm) Type X gypsum wallboard complying with ASTM C1396, attached to the stud facing in accordance with the applicable code, provide Superior Walls® Xi and Xi Plus Wall Panels having a maximum allowable axial compressive load of 5000 lbf/ft. (72.97 kN/m), including brick ledge loads, with a one-hour fire-resistance rating.

5.6.2 Thermal Barrier:

- 5.6.2.1 Superior Walls® Xi and Xi Plus Wall Panels were tested to determine their use as a wall finish without the use of a thermal barrier in accordance with UL 1715 or NFPA 286.
- 5.6.2.2 A code-prescribed thermal barrier separating the foam plastic from the interior of the building is not required based on testing conducted in accordance with IRC Section R316.6 and IBC Section 2603.9.¹⁰

5.7 Dampproofing

- 5.7.1 Superior Walls® Xi and Xi Plus Wall Panels require no additional dampproofing.

5.8 Green Building Codes and Standards Compliance

- 5.8.1 Superior Walls® Xi and Xi Plus Wall Panels conform to the requirements of CalGreen Section A4.404.3.3 for pre-manufactured building systems.
- 5.8.2 Superior Walls® Xi and Xi Plus Wall Panels conform to the requirements of ICC 700 Sections 601.5 and 11.601.5 for pre-manufactured components.
- 5.8.3 Project specific requirements for use of these products to conform to these codes and standards are outside of the scope of this TER.
- 5.9 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

6 Installation

- 6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this TER and the applicable building code.
- 6.2 In the event of a conflict between the manufacturer installation instructions and this TER, the more restrictive shall govern.
- 6.3 *Installation Procedure*
 - 6.3.1 Installation must be completed by Superior Walls® certified installers.

7 Substantiating Data

- 7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
 - 7.1.1 Concrete Properties in accordance with ASTM C39 and C469
 - 7.1.2 Transverse loads for wind in accordance with ASTM E72
 - 7.1.3 Transverse loads for soil in accordance with ASTM E72
 - 7.1.4 Racking shear loads in accordance with ASTM E72
 - 7.1.5 Compression loads in accordance with ASTM E72
 - 7.1.6 Brick ledge loads determined by performance testing in accordance with accepted engineering principles
 - 7.1.7 Beam Pocket loads determined by performance testing in accordance with accepted engineering principles
 - 7.1.8 Bolted connections at the top and bottom of the walls determined by performance testing in accordance with accepted engineering principles
 - 7.1.9 Fire Resistance Rated Wall Construction in accordance with ASTM E119 and CAN ULC S101

¹⁰ 2006 IRC Section R314.6; 2012 IBC Section 2603.10

- 7.1.10 Thermal Barrier requirements in accordance with [IRC Section R316.6](#) and [IBC Section 2603.9](#)¹¹
- 7.1.11 Water Permeability for Dampproofing in accordance with ASTM E96
- 7.2 Information contained herein may include the result of testing and/or data analysis by sources that are [approved agencies](#) (i.e., ANAB accredited agencies), [approved sources](#) (i.e., RDPs), and/or [professional engineering regulations](#). Accuracy of external test data and resulting analysis is relied upon.
- 7.3 Where pertinent, testing and/or engineering analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ's engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as [being equivalent](#) to the code-adopted provision in terms of quality, [strength](#), effectiveness, [fire resistance](#), durability, and safety.
- 7.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, [Listings](#), [certified reports](#), [duly authenticated reports](#) from [approved agencies](#), and [research reports](#) prepared by [approved agencies](#) and/or [approved sources](#) provided by the suppliers of products, materials, designs, assemblies and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this TER, may be dependent upon published design properties by others.
- 7.5 Testing and engineering analysis: The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.¹²
- 7.6 Where additional condition of use and/or code compliance information is required, please search for Superior Walls® Xi and Xi Plus Wall Panels on the [DrJ Certification](#) website.

8 Findings

- 8.1 As delineated in Section 3, Superior Walls® Xi and Xi Plus Wall Panels have performance characteristics that were tested and/or meet pertinent standards and are suitable for use pursuant to its specified purpose.
- 8.2 When used and installed in accordance with this TER and the manufacturer installation instructions, Superior Walls® Xi and Xi Plus Wall Panels shall be approved for the following applications:
 - 8.2.1 Foundation and basement walls to support wood frame construction in accordance with [IBC Section 1807](#), [IRC Section R402.3.1](#) and [IRC Section R404](#).
 - 8.2.2 Mass wall provisions of [IRC Section N1102.2.5](#) and [IECC Section R402.2.5](#).
- 8.3 Unless exempt by state statute, when Superior Walls® Xi and Xi Plus Wall Panels are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.
- 8.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Superior Walls® of America, Ltd.
- 8.5 [IBC Section 104.11](#) ([IRC Section R104.11](#) and [IFC Section 104.10](#)¹³ are similar) in pertinent part states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

¹¹ [2006 IRC Section R314.6](#); [2012 IBC Section 2603.10](#)

¹² See Code of Federal Regulations (CFR) [Title 24 Subtitle B Chapter XX Part 3280](#) for definition.

¹³ [2018 IFC Section 104.9](#)

- 8.6 **Approved:**¹⁴ Building codes require that the building official shall accept duly authenticated reports¹⁵ or research reports¹⁶ from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction.
- 8.6.1 Acceptance of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).
- 8.6.2 Acceptance of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved, as denial without written reason deprives a protected right to free and fair competition in the marketplace.
- 8.7 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.
- 8.8 Through ANAB accreditation and the IAF Multilateral Agreements, this TER can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “*certified once, accepted everywhere.*” IAF specifically says, “*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.*”¹⁷

9 Conditions of Use

- 9.1 Material properties shall not fall outside the boundaries defined in Section 3.
- 9.2 As defined in Section 3, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.
- 9.3 For Superior Walls® Xi and Xi Plus Wall Panels used in buildings constructed in accordance with the IRC, dampproofing accordance with IRC Section R406 is not required. Waterproofing is required when a high water table or other severe soil-water condition is known to exist or required by adopted legislation and enforced by the authority having jurisdiction (i.e., building official).
- 9.4 For Superior Walls® Xi and Xi Plus Wall Panels used in buildings constructed in accordance with the IBC, where a subsurface soil investigation has not been performed, or where a subsurface soil investigation has been performed per IBC Section 1803 and indicates that the ground-water table is above or within five (5) feet below the elevation of the lowest below grade floor, the foundation wall must be waterproofed in accordance with IBC Section 1805.
- 9.4.1 Evaluation of this waterproofing is outside of the scope of this TER.
- 9.5 Superior Walls® certified installers shall complete installation.
- 9.6 Soil capacity of the site must either undergo a complete geotechnical evaluation or may be assumed to have the load bearing values specified in IRC Table R401.4.1.
- 9.7 Backfill material shall not exceed 100 lbf/ft²/ft (1602 kg/m²/m) equivalent fluid pressure for the Superior Walls® Xi and Xi Plus Wall Panels unless a specific engineering assessment is submitted to justify greater loads.

¹⁴ Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

¹⁵ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>

¹⁶ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>

¹⁷ <https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise>

- 9.8 When used as lateral force-resisting systems, Superior Walls® Xi and Xi Plus Wall Panels are limited to use in Seismic Design Categories A or B for compliance with the IBC and is limited to Seismic Design Categories A, B, or C for compliance with the IRC. Special inspections shall comply with [IBC Section 1705.13](#).¹⁸
- 9.9 Design calculations and construction details must be submitted to the code official for approval. These must include the following:
 - 9.9.1 Waterproofing requirements, if applicable.
 - 9.9.2 Footing depth and specifications consistent with this TER.
 - 9.9.3 Resistance to overturning and uplift forces.
 - 9.9.4 Details for lateral supports at the top and bottom of the wall panels.
- 9.10 Brick ledges shall not be loaded in excess of 2,900 lbf/ft (42.32 kN/m) unless engineering is submitted to justify higher loads.
- 9.11 Footings supporting Superior Walls® Xi and Xi Plus Wall Panels shall be in accordance with the applicable code.
- 9.12 For buildings constructed in accordance with the IRC, Superior Walls® Xi and Xi Plus Wall Panels may be supported on crushed stone footings provided the construction be in accordance with [IRC Section R403.4](#) and Table 7 in this TER.

Table 7. Minimum Depth (inches) of Crushed Stone Footings

Number of Stories	Assumed Wall Loading (plf)	Load Bearing Capacity (psf) and Class of Materials (Soil Types)					
		1,500	2,000	2,500	3,000	3,500	4,000
		MH, CH, CL, ML	SC, GC, SM, GM, SP, SW		GP, GW		
Light-Frame Construction							
1	1,100	4	4	4	4	4	4
2	1,800	7	4	4	4	4	4
3	2,900	14 ¹	9 ¹	5	4	4	4
Masonry Veneer over Light-Frame Construction							
1	1,500	5	4	4	4	4	4
2	2,700	13 ¹	8	4	4	4	4
3	4,000	22 ¹	14 ¹	10 ¹	7	5	4

1. For crushed Stone Footings greater than 8" in depth, footings shall be consolidated in a Maximum of 8 inch lifts with a plate vibrator.
2. See [IRC Table R401.4.1](#) for description of Class of Materials associated with various bearing capacities.
3. Stone depths are determined using the assumed wall loading (plf) + 378 plf for the self-weight of a 10' Xi Plus foundation wall with a 10 1/4" wall width.
4. The assumed wall loading shown in pounds per linear foot (plf) is the assumed uniform load of the structure that is supported by the foundation wall and does not include the self-weight of the foundation wall.
5. Stone depths in this table are calculated as follows: Minimum Stone Depth (in) = { [Assumed uniform load (plf) + self weight of foundation wall (plf) / soil bearing capacity (psf)-(wall width (in)/12)] / [2 x TAN(30)] } x12

- 9.13 Beam pockets must be designed and constructed in accordance with the details, dimensions, and specific loading limitations identified in this TER, or as engineered by an RDP.
- 9.14 When required by adopted legislation and enforced by the [building official](#), also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
 - 9.14.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice, and, when prepared by an [approved source](#), shall be approved when signed and sealed.
 - 9.14.2 This TER and the installation instructions shall be submitted at the time of [permit](#) application.
 - 9.14.3 These innovative products have an internal quality control program and a third-party quality assurance program.

¹⁸ [2018 IBC Section 1705.12](#)

- 9.14.4 At a minimum, these innovative products shall be installed per Section 6 of this TER.
- 9.14.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.
- 9.14.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.
- 9.14.7 The application of these innovative products in the context of this TER are dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2 and any other regulatory requirements that may apply.
- 9.15 The approval of this TER by the AHJ shall comply with IBC Section 1707.1, where legislation states in pertinent part, “*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11*”, all of IBC Section 104, and IBC Section 105.4.
- 9.16 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).
- 9.17 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner’s authorized agent.

10 Identification

- 10.1 The innovative products listed in Section 1.1 and Section 1.2 are identified by a label on the board or packaging material bearing the manufacturer name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at www.superiorwalls.com .

11 Review Schedule

- 11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.
- 11.2 For information on the status of this TER, contact DrJ Certification.

12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A

- 12.1 Superior Walls® Xi and Xi Plus Wall Panels are included in this TER published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:
 - 1.1.1 Advance Innovation,
 - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and
 - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice.
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize Superior Walls® Xi and Xi Plus Wall Panels to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
 - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies and/or methods of construction. The goal is to “protect economic freedom and opportunity by promoting free and fair competition in the marketplace.”
 - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation, and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
 - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),¹⁹ where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than 10 years²⁰ and/or a \$5,000,000 fine or 3 times the value of²¹ the Intellectual Property (IP) and Trade Secrets (TS).
 - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.
 - 1.2.4 For new materials²² that are not specifically provided for in any building code, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
 - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.²³
 - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence, provided in writing, that specific legislation has been violated by an individual registered PE.
 - 1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.²⁴

¹⁹ <http://www.drjengineering.org/AppendixC> and <https://www.drjcertification.org/cornell-2016-protection-trade-secrets>.

²⁰ <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years>

²¹ <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided>

²² <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>

²³ [IBC 2021, Section 1706.1 Conformance to Standards](#)

²⁴ [IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General](#)

- 1.3 **Approved²⁵ by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards, which apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.²⁶ The Superintendent of Building roster of approved testing agencies is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a CBI Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.²⁷
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed²⁸ an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement²⁹ (i.e., ANAB, International Accreditation Forum (IAF), etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation, by 1) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods; 1) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 3) A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code; 4) A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code; 5) A statewide product approval issued by the Florida Building Commission. The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

²⁵ See Section 8 for the distilled building code definition of Approved

²⁶ Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

²⁷ https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

²⁸ New York City, The Rules of the City of New York, § 101-07 Approved Agencies

²⁹ New York City, The Rules of the City of New York, § 101-07 Approved Agencies

- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation [553.842](#) and [553.8425](#).
- 1.8 **Approved by New Jersey:** Pursuant to Building Code 2018 of New Jersey in [IBC Section 1707.1 General](#),³⁰ it states: “In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from [approved agencies](#) in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the [Uniform Construction Code \(N.J.A.C. 5:23\)](#)”.³¹ Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.
1. A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. 2. Reports of engineering findings issued by nationally recognized evaluation service programs, such as, but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. The [New Jersey Department of Community Affairs](#) has confirmed that technical evaluation reports, from any accredited entity listed by [ANAB](#), meets the requirements of item 2 given that the listed entities are no longer in existence and/or do not provide “reports of engineering findings”.
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, [Part 3282.14](#),³² and [Part 3280](#),³³ the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) “All construction methods shall be in conformance with accepted engineering practices”; 2) “The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.”; and 3) “The design stresses of all materials shall conform to accepted engineering practice.”
- 1.10 **Approval by US, Local, and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For [new materials](#) that are not specifically provided for in this code, the [design strengths and permissible stresses](#) shall be established by tests.³⁴
- 1.10.2 For [innovative alternative products, materials, designs, services and/or methods of construction](#), in the absence of approved rules or other approved standards...the building official shall accept duly authenticated reports (i.e., listing and/or research report) from [approved agencies](#) with respect to the quality and manner of use of [new materials or assemblies](#).³⁵ A building official [approved agency](#) is deemed to be approved via certification from an [accreditation body](#) that is listed by the [International Accreditation Forum](#)³⁶ or equivalent.

³⁰ https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

³¹ <https://www.nj.gov/dca/divisions/codes/codereg/ucc.html>

³² <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>

³³ <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>

³⁴ [IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials](#). Adopted law pursuant to IBC model code language 1706.2.

³⁵ [IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General](#). Adopted law pursuant to IBC model code language 1707.1.

³⁶ Please see the [ANAB directory](#) for building official approved agencies.

- 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.³⁷ An approved source is defined as a PE subject to professional engineering laws, where a research and/or a technical evaluation report certified by a PE, shall be approved.
- 1.11 **Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,
 - 1.11.2 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.
 - 1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.
 - 1.11.4 **Approved:** The purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA, and subsequently acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.

³⁷ IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.