


BOCA EVALUATION SERVICES, INC.

BOCA RESEARCH REPORT NO. ES 96-9

A Participating Member of the NES, Inc. 

DIVISION 05 - METALS SECTION 05260 - COMPOSITE JOIST SYSTEM 16-INCH and 24-INCH BLOCK JOIST SYSTEM™

BLOCK JOIST SYSTEM™
109 RALSTON ROAD
RICHMOND, VIRGINIA 23229

1.0 DESCRIPTION OF EVALUATION

This report evaluates the use of the Block Joist System™ as a structural floor and roof system, through the review of structural load tests and structural analysis. The 16-inch Block Joist System™ has been evaluated for both structural characteristics and as a fire-resistant assembly (i.e., protected) while the 24-inch Block Joist System™ has been evaluated only for structural characteristics (i.e., unprotected).

This report also evaluates the 16-inch Block Joist System™ for compliance with the referenced standard listed through review of data submitted:

ASTM E119-95a, *Test Methods for Fire Tests of Building Construction and Materials*

2.0 DESCRIPTION AND USE OF PRODUCT

2.1 GENERAL

The 16-inch and 24-inch Block Joist System™ is intended for use as the primary structural element and the decking system for either a roof or floor assembly in Types 1, 2, 3 or 5 construction. The Block Joist System™ consists primarily of either 8x8x16 inch or 8x8x24 inch concrete masonry units (CMU) and a proprietary steel joist called the 7-inch Block Joist™. The CMU are oriented with their faces laid flat on the bottom chord of the 7-inch Block Joist™. See Figure 1 at the end of this report for a diagram of the 7-inch Block Joist™ and Figure 2 for a sketch of the Block Joist System™. The 7-inch Block Joist™ is spaced 16 ¾ inches on center for the system utilizing the 8x8x16-inch CMU or 24 ¾ inches on center for the system utilizing the 8x8x24 inch CMU. When the floor or roof assembly is to be protected, steel reinforcing bars are required. Reinforcing bars are placed between the block webs and the

steel joist webs and grouted into place as shown in Figure 4. In all assemblies, W1.7 deformed reinforcing wires are placed parallel at right angles to the 7-inch Block Joist™ in preformed, or sawcut, grooves, ½ inches wide by ¾ inches deep, located in the top horizontal face of the CMU. These wires are extended across the full width of the assembly. Grout, consisting of portland cement, masonry sand and water, is poured in the spaces containing the top chord of the 7-inch Block Joist™ and into the grooves to fully encase the 7-inch Block Joist™ and reinforcing bars (when supplied) and the W1.7 wires, resulting in a smooth top surface for the entire assembly. The 16-inch Block Joist System™ can be constructed as either a protected assembly with a rating of either 2-hours or 3-hours as provided in Table 1 and Table 2 of this report or as an unprotected assembly as provided in Table 3 of this report. The 24-inch Block Joist System™ can be constructed as an unprotected assembly as provided in Table 4. The structural capacity for a uniform load, in excess of the system's dead load, and construction requirements for a 2-hour 16-inch Block Joist System™ is provided in Table 1 and Figure 4 of this report. The 3-hour 16-inch Block Joist System™ is similar to the 2-hour system except for the addition of 1 ½-inches of concrete topping. See Table 2 and Figure 4 of this report for the structural capacity for a uniform load, in excess of the system's dead load, and construction requirements for the 3-hour assembly. The structural capacity for a uniform load, in excess of the system's dead load, of an unprotected 16-inch Block Joist System™ with 30 lb/block, 30 to 35 lb/block and 35 to 40 lb/block is provided in Table 3. The structural capacity for a uniform load, in excess of the system's dead load, of an unprotected 24-inch Block Joist System™ with steel joists fabricated of steel of 36 ksi and 50 ksi yield strength is provided in Table 4.

2.2 STRUCTURAL DESIGN

The 16-inch and 24-inch Block Joist System™ is designed as a one-way reinforced concrete slab, based in principle on ACI 318 requirements. The 16-inch and 24-inch Block Joist System™ is limited to simple spans. For unprotected applications of the Block Joist System™, flexural tensile stress is assumed to be resisted by the bottom chord of the 7-inch Block Joist™. For protected applications of the Block Joist System™ the flexural tensile stress is assumed to be resisted by the grouted steel reinforcing bars located at the end of the CMU

Please contact BOCA Evaluation Services, Inc., with any questions you may have regarding this report. Additionally, please contact us if you have any information on the performance of the product described herein which is contrary to this report. This report is subject to the limitations listed herein and to the specific product, data and test reports submitted by the applicant requesting this report. Independent tests were not performed by BOCA Evaluation Services, Inc., and BOCA Evaluation Services, Inc., specifically does not make any warranty, either expressed or implied, as to any findings or other matter in this report or as to any product covered by this report. Evaluation reports are not to be construed as representing aesthetics or any other attributes not specifically addressed nor as an endorsement or recommendation for the use of the subject of the report. This disclaimer includes, but is not limited to, merchantability.

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blocks, as such the tensile capacity of the bottom chord of the steel joist is neglected. In both protected and unprotected assemblies the flexural compressive stress is assumed to be resisted by the CMU. Shear stresses are resisted by the webs of the 7-inch Block Joist™. Stiffness of the 16-inch and 24-inch Block Joist System™ is computed based on the properties of the "cracked" section of the CMU. Bearing capacity of the Block Joist System™ is based on the capacity of the supporting construction. Perimeter anchorage and other connection details are to be provided by the registered design professional. Design uplift wind loads shall not exceed the system's dead load, as indicated in Section 4.7.

3.0 CODE ANALYSIS OF SUBMITTED INFORMATION

The following data were submitted by the proponent for demonstration of compliance with the respective code sections listed above each item of information. The basis is the 1996 edition of the *BOCA National Building Code*.

3.1 STRUCTURAL

Code Section 106.4 Alternative materials and equipment:

This code section states that alternative materials shall be approved when the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the materials are at least equivalent to that prescribed in the code in quality, strength, effectiveness, fire-resistance, durability and safety. In this report, the 16-inch and 24-inch Block Joist System™ has been evaluated as an alternative to reinforced concrete roof and floor assemblies.

Code Section 1901.1 Plain and reinforced concrete: This code section states that structural members of reinforced concrete shall be designed and constructed in accordance with the ACI 318.

Code Section 2205.1 General: This section states that steel joists used as structural members shall be designed and constructed to the standard specifications of the 1994 edition of the *SJI Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders*.

INFORMATION SUBMITTED:

- 3.1.1 Structural calculations for 2-Hour, 3-Hour and unprotected 16-inch Block Joist System™ signed and sealed by Armand H. Gustafarro, SE, dated February 2, 1996. The calculations determined the load capacity for the fire-resistant Block Joist System™ for one #4 bar per block and joist, one #5 bar per block and joist and two #4 bars per block and joist and for an unprotected 16-inch Block Joist System™. The results of these calculations are given in Tables 1, 2 and 3 of this report.
- 3.1.2 Structural calculations for determination of the construction loads for the Block Joist System™ capacity during construction. Calculations were signed and sealed by Philip T. Hodge P.E., dated May, 1995. The results of these calculations provide the limitation of construction loads for the Block Joist System™ prior to curing of the grout.
- 3.1.3 Deflection analysis of load tests and calculated deflections of the 16-inch Block Joist System™ signed and sealed by Armand H. Gustafarro, SE, dated August, 1995.

3.1.4 A report titled, "*Report of Structural Testing and Analysis of Block Joist System™*" by Dunbar, Milby & Williams, dated June, 1995. The report was a compilation of various load tests and structural analysis regarding properties of the 16-inch Block Joist System™. A cover letter containing a summary of the analysis was signed and sealed by Mr. Denwood Milby, P.E. Mr. Milby's conclusion was that the performance of the system was comparable to a reinforced concrete slab. The report contained load tests conducted at the University of Virginia on November 11, 1990. The report was signed and sealed by Fred Mc Cormick, P.E. The load tests conducted under Mr. Mc Cormick's supervision investigated the structural performance of the system. Strain gage data were also recorded from the steel joists. Testing was also conducted on the system to determine the ability of the system to recover deflection. Load tests conducted at Richmond, Va. on August, 1992, were conducted to investigate the structural equivalence to an alternative 7-inch Block Joist.

3.1.5 Structural calculations for unprotected 24-inch Block Joist System™ constructed with 8x8x24 inch CMU, signed and sealed by Armand H. Gustafarro, SE. The calculations determined the capacity for the 24-inch Block Joist System™ for flexure, shear and deflection. The results of these calculations are provided in Table 4 of this report.

3.1.6 A report titled, *Structural Tests of the Block Joist System™ (Using 8x8x24 inch CMU)*, by the National Concrete Masonry Association Research and Development Laboratory, dated October 23, 1996. The report provided test data for a 24-inch Block Joist System™ assembly in which structural effects of applying concentrated loads, uniform load and a cantilever condition were investigated.

3.2 FIRERESISTANCE RATING

Code Section 704.1.1 Fireresistance ratings: This section states that fireresistance ratings of building elements shall be determined in accordance with ASTM E119-95a.

INFORMATION SUBMITTED:

3.2.1 A report titled, *Steel Forming Members Used in a Floor-Ceiling Assembly*, by Underwriters Laboratories Inc., dated November 1994. The subject of the test concerned the ability of the 16-inch Block Joist System™ to pass the fire test protocol provided by ASTM E119-95a.

3.3 SPECIAL INSPECTIONS

Code Section 1705.14 Special Cases: This section states that special inspections shall be required for work that is unusual in nature. In addition, this section specifies that construction of materials and systems which are alternatives to materials and systems prescribed by the code, unusual design applications of materials prescribed in the code and materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in the code or referenced standards, is work which is to be considered to be unusual in nature, and requires special inspections of the construction process.

INFORMATION SUBMITTED:

3.3.1 *Quality Control Manual for the Installation of Block Joist Systems™*, dated March 14, 1996. The manual contains requirements for material inspection, construction sequence, shop drawings, record keeping and inspections during construction.

4.0 INSTRUCTIONS TO THE CODE OFFICIAL

Block Joist Company's 16-inch and 24-inch Block Joist System™ has been evaluated for compliance with the 1996 edition of the *BOCA National Codes*. This report is limited to the applications and products as stated herein. This evaluation is based solely upon information provided to BOCA Evaluation Services, Inc. by the Block Joist Company and has not been independently verified. BOCA-ES intends that the report be used by the code official to determine that the 16-inch and 24-inch Block Joist System™ complies with those code requirements specifically addressed in Section 3.0 and referenced standards specifically addressed in Section 1.0 of this report, provided that this product is installed in accordance with the following limitations.

Limitations

- 4.1** This report is subject to annual certification. Reports that are not certified shall not be used or referred to. In order to determine the status of certification of this report, contact BOCA Evaluation Services, Inc., or visit our web site at www.boca-es.com/~boca-es and view the monthly listing of current reports.
- 4.2** The final design and installation of a 16-inch and 24-inch Block Joist System™ shall be in compliance with this report. Construction documents and structural calculations, as specified in Section 5.2. of this report, shall be signed and sealed by a registered design professional and shall be submitted to the code official for review prior to the approval of this product.
- 4.3** Uniform loads, in excess of the Block Joist System™ dead load, as required by Chapter 16 of the code, shall not exceed the applicable allowable uniform load specified in Table 1, Table 2, Table 3 or Table 4 of this report. The structural effects of non-uniform loads and point loads as required by Chapter 16 of the code, shall be investigated by the registered design professional.
- 4.4** Concentrated point loads shall not exceed an allowable load of 200 lbs in an area of one square inch or an allowable load of 2000 lbs in any area less than 6.25 square feet.
- 4.5** The ability of the 16-inch and 24-inch Block Joist System™ to resist compression stresses on the bottom of the assembly (i.e., negative bending capacity) has not been evaluated and is beyond the scope of this report. Use of the 16-inch and 24-inch Block Joist System™ shall be limited to simple spans. Use of cantilever conditions and continuous-multiple spans with the Block Joist System™ shall be prohibited.
- 4.6** Perimeter anchorage details and other structural connection details shall be provided by the registered design professional.
- 4.7** Block Joist System™ shall not be installed in conditions in which the wind uplift pressure exceeds the dead load of the system. Unless additional provisions are provided by the registered design professional, the Block Joist System™ provided in Table 1, Table 2 and Table 4 of this report shall be limited to a design wind uplift pressure of 30 psf, and 45 psf wind uplift pressure for the Block Joist System™ provided in Table 3 (16-inch CMU Block Joist System™ with 1 ½-inches of topping) of this report.
- 4.8** The bearing length for the 16-inch and 24-inch Block Joist System™ shall be not less than 3 ¼ inches when supported by masonry construction, unless structural calculations are provided which justify the use of a smaller bearing length, in which case 2-inches shall be the minimum length. The bearing length for the 16-inch and 24-inch Block Joist System™ shall be not less than 2-inches when supported by steel construction.
- 4.9** 7-inch Block Joist™ (Steel Joist) Requirements:
- 4.9.1** 7-inch Block Joist™ utilized in the fabrication of a Block Joist System™ shall be designed and constructed to the applicable requirements of the 1994 edition of the *Standard Specifications for Open Web Steel Joists, K-Series* and the *Plant Quality Control Manual for the 7-inch Block Joist System™*.
- 4.9.2** The 7-inch Block Joist™ shall be fabricated in accordance with the quality control manual titled, *Plant Quality Control Manual for the 7-inch Block Joist™*, dated December 20, 1995. The joist shall bear the mark of Law Engineering as the third party inspection agency.
- 4.9.3** 7-inch Block Joist™ used in the fabrication of a Block Joist System™ shall be 7-inches deep.
- 4.9.4** The top flange of the 7-inch Block Joist™ shall consist of two 1-inch wide by ¼-inch thick steel bars oriented vertically on each side of the steel joist webs.
- 4.9.5** The bottom flange of the 7-inch Block Joist™ shall consist of a flat 3/16 -inch by 3-inch wide plate welded horizontally to the bottom of the joist webs.
- 4.9.6** The web spacing, or panels, of the 7-inch Block Joist™ shall be from 8 to 16 inches in length in the first and last panel, while the intermediate panels shall be 16 inches on center.
- 4.9.7** 7-inch Block Joist™ utilized in the construction of a 16-inch Block Joist System™ which is unprotected and less than 18 feet in span and all 7-inch Block Joists™ utilized in protected assemblies shall be fabricated with a minimum of ASTM A36 steel. 7-inch Block Joist™ utilized in the construction of a Block Joist System™ which is unprotected and is 18-foot span and greater shall be fabricated with either ASTM A242 or ASTM A 572 steel.
- 4.9.8** 7-inch Block Joist™ utilized in the construction of a 24-inch Block Joist System™ shall be ASTM A36 steel, ASTM A242 or ASTM A572 steel as specified for the span and uniform load in Table 4.
- 4.9.9** 7-inch Block Joist™ utilized in protected Block Joist System™ shall bear the mark of a third party inspection agency in which the joist is labeled for use in a 2-hour or 3-hour assembly.

4.10 Concrete Masonry Units (CMU) Requirements:

4.10.1 CMU shall be 8x8x16-inch two-core blocks for the 16-inch Block Joist System™ or 8x8x24-inch three core blocks for the 24-inch Block Joist System™. CMU used in either a 16-inch CMU or 24-inch CMU Block Joist System™, which is not reinforced (i.e., unprotected) shall be either a square ended "Sash" blocks or "Tapered - Webbed - Stretcher" blocks. Reinforced (i.e., protected) 16-inch CMU Block Joist System™ shall utilize "Tapered - Webbed - Stretcher" blocks.

4.10.2 CMU blocks shall comply with ASTM C90-90, *Standard Specification for Load Bearing Concrete Masonry Units*.

4.10.3 The average compressive strength of the CMU, based on test of 10 units, shall be at least 1900 psi. Not more than one of the 10 units tested shall have compressive strength less than 1700 psi.

4.10.4 CMU dimensions and configuration shall comply with the dimensions specified in Figure 3a and 3b of this report. In addition, where steel reinforcing bars are required by Table 1 or Table 2 of this report for the applicable load and span, then the CMU on the side of the 7-inch Block Joist™ in which the steel reinforcing bar is located shall be a tapered stretcher block. The CMU on the side of the 7-inch Block Joist™ in which steel reinforcing bars are not installed shall be either sash blocks or tapered stretcher blocks.

4.10.5 CMU utilized in protected assemblies shall bear the mark of a third party inspection agency in which the CMU is labeled for use in a 2-hour assembly.

4.10.6 8x8x16-inch CMU shall weigh less than 30 lbs per block when used in a protected assembly as specified by Table 1 or Table 2 and Figure 4 of this report. For an 8x8x16-inch CMU utilized in assemblies as specified in Table 3 (unprotected) the average block weight shall comply with the specified range of average weight for the required allowable uniform load, in excess of the systems dead load. 8x8x24-inch CMU shall weigh less than 42 lbs per block.

4.11 Reinforcement Requirements:

4.11.1 Reinforcing steel shall be Grade 60 and comply with either ASTM A615, ASTM A616 or ASTM A617.

4.11.2 The reinforcing steel size and quantity shall be as specified in Table 1 or 2 of this report for the applicable load and span.

4.11.3 Reinforcing steel shall be of one piece. Splicing of reinforcement shall be prohibited.

4.11.4 Reinforcing wire shall be W1.7 in size and comply with ASTM A 82. The wire shall be deformed as specified by Section 3.2.1.1.2 in ACI 530.1 / ASCE 6 / TMS 602.

4.11.5 Splice laps of reinforcing wire shall be a minimum of 8 inches long.

4.12 Grout Requirements:

4.12.1 Grout shall consist of one part by volume Type I, II, or III portland cement comply with ASTM C150, 2½

parts of masonry sand comply with ASTM C144 and approximately 10 gallons of potable water per U.S. bag of cement, depending on moisture content of sand.

4.12.2 Grout shall have a timed flow rate of 10 to 12 seconds through the Block Joist™ specified funnel.

4.12.3 The minimum compressive strength of the grout shall be 2500 psi at 28 days.

4.12.4 The unit weight of grout shall be not less than 107 pcf.

4.13 Bearing Pad Requirements:

4.13.1 Bearing pads shall be supplied at all points of bearing on concrete or masonry.

4.13.2 Bearing Pads shall be either hardboard or plastic meeting the following requirements:

4.13.2.1 The grade of hardboard shall be class I tempered and comply with ANSI/AHA A135.4 and 1/8-inch in thickness.

4.13.2.2 Plastic pads shall be non-leaching strips having a compressive strength of a minimum of 8000 psi and no flow greater than 1% at 1000 psi for 10,000 hours at 73 degrees F.

4.13.3 Class I tempered hardboard bearing pads shall not be used in locations where preservatively treated wood is required by the 1996 edition of the *BOCA National Building Code*, such as exterior walls, and crawl spaces where the exposed ground is less than 18 inches to the pad elevation.

4.14 Opening Requirements:

4.14.1 Block Joist System™ with openings, less than 16 inches in length and located in between steel joists in the first quarter of the span shall be permitted without reduction in the capacity of the Block Joist System™.

4.14.2 Block Joist System™ with openings, less than 16 inches in length and located in between the joists in the center one half of the span shall be reduced 26 percent of the allowable uniform load specified by the applicable table.

4.14.3 Steel joists adjacent to openings not complying with the limitations given in limitation of use 4.14.1 and 4.14.2 shall be designed and constructed in accordance with the Steel Joist Institute's *Standard Specifications for Open Web Steel Joists, K-Series, 1992*. As such the reported capacities in this report are not applicable for those steel joists adjacent to the opening which do not comply with limitation of use 4.14.1 and 4.14.2, above.

4.14.4 Independent structural support complying with the requirements of Chapter 19, Chapter 21 or Chapter 22 of the code shall be provided for openings that are wider than the clear spacing of the steel joists, which is 13 5/8 inches for the 16-inch CMU Block Joist System™ or 21 5/8 inches for the 24-inch CMU Block Joist System™.

4.15 The slope of the 16-inch and 24-inch Block Joist System™ shall not exceed ¼:12.

4.16 The scope of this report is limited to the installation of the Block Joist System™ in covered dry conditions of use. In roof applications, the Block Joist System™ shall be protected with an approved roof covering or by other means of weather protection.

4.17 Loads shall not be placed on the grouted Block Joist System™ until the grout has attained a compressive strength of 1650 psi. Prior to grouting, loads shall be prohibited from exceeding the weight to one row of CMU placed perpendicular to the joists and one worker less than 250 lbs.

4.18 The 16-inch CMU Block Joist System™ utilized in locations requiring a fire-resistant rating (i.e., protected) shall be constructed as specified in Table 1, Table 2 and Figure 4 of this report for the applicable load and span.

4.19 Concrete topping for a 16-inch Block Joist System™ with a 3-hour level of protection shall be 1 ½-inches thick and have a minimum compressive strength of 3000 psi at 28 days. The range of density shall be 110 to 153 pcf.

4.20 At a minimum, erection bracing of the Block Joist System™ shall consist of placing one CMU at each end of each pair of steel joist for proper on center spacing of the joists. Exterior end steel joists and steel joists located adjacent to openings shall be braced laterally along their length prior to the installation of blocks. At a minimum, bracing shall utilize either walls or beams or field constructed bracing and shall be connected to the joists so as to prevent rotation of the steel joist. Installation of interior blocks shall be installed in complete rows parallel to the support (or perpendicular to the joists) prior to installing adjacent rows.

4.21 Special inspection shall be provided for all Block Joist System™ installations, as required by Section 1705.1 and Section 1705.14 of the Code and the *Quality Control Manual for Installation of the Block Joist Systems™*. The scope of special inspection shall include, but not necessarily be limited to, the following items:

4.21.1 Steel Joist requirements of Section 4.9 of this report.

4.21.2 CMU requirements of Section 4.10 of this report.

4.21.3 Reinforcement requirements of Section 4.11 of this report.

4.21.4 Grout requirements of Section 4.12 and Section 4.17 of this report.

4.21.5 Bearing pad requirements of Section 4.13 of this report.

4.21.6 Opening requirements of Section 4.14 of this report.

4.21.7 Installation in accordance with *Block Joist System Installation Instructions*, dated December 20, 1995.

5.1 The language "See BOCA Evaluation Services, Inc., Research Report No. 96-9."

5.2 A registered design professional shall sign and seal construction documents and calculations in accordance with the state laws where the project is located. All permit applications for buildings using Block Joist System™ shall be accompanied by structural calculations which address the following items, but are not limited to the following items:

5.2.1 Applicable design loads and load combinations for the Block Joist System™ in accordance with Chapter 16 of the Code.

5.2.2 Allowable design loads for the Block Joist System™ as specified in Table 1, 2, 3, or 4 of this report for the applicable span and reinforcing level.

5.2.3 Design and details for perimeter anchorage of the Block Joist System™ and other structural connections to the Block Joist System™.

5.2.4 The design and details for all Block Joist System™ openings, as specified in Section 4.14 of this report.

5.3 The manufacturer shall provide the user of this report with complete instructions on the construction of the Block Joist System™ which shall include, but are not limited to, the installation instructions titled, *Block Joist System Installation Instructions*, dated December 20, 1995.

5.4 As required by Section 1705.1 of the code and limitation of use 4.21 of this report, the permit applicant shall provide evidence that special inspections will be provided, and, at a minimum, all items specified in limitation of use 4.21 of this report will be included in the report provided by the Special Inspector.

6.0 IDENTIFICATION

All 7-inch Block Joists™ manufactured in accordance with this research report shall be marked at the plant with identifying language "See BOCA Evaluation Services, Inc., Research Report 96-9."

Reference to this research report is limited to the identification as described herein.

5.0 INFORMATION REQUIRED ON CONSTRUCTION DOCUMENTS

To aid in the use of this report, the following represents the minimum level of information to be reflected on construction documents in order to determine compliance with this research report.

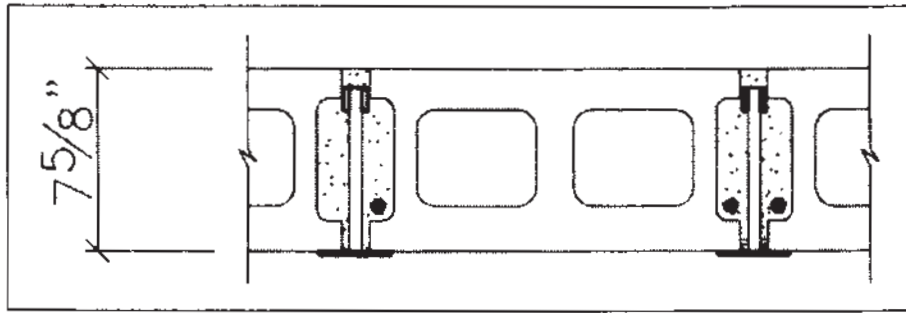


TABLE 1
ALLOWABLE UNIFORM LOAD (PSF)
FOR 2-HOUR PROTECTED
BLOCK JOIST SYSTEM™ w/ 8x8x16-inch CMU

SIZE AND NUMBER OF REINFORCING BARS per BLOCK JOIST™	SPAN (ft)											
	8 ft or less	9 ft	10 ft	11 ft	12 ft	13 ft	14 ft	15 ft	16 ft	17 ft	18 ft	19 ft
1 #4	188	141	107	81	62	47	35	26	—	—	—	—
1 #5	306	233	182	143	114	91	73	59	47	37	29	—
2 #4	312	256	200	159	127	102	83	67	54	44	35	27

1. Maximum slope of system shall be ¼:12.
2. Applications shall be limited to simple spans.
3. Maximum block weight shall be 30 lbs.
4. The dead load of the 16-inch Block Joist System has been deducted from the tabulated allowable uniform load, above.

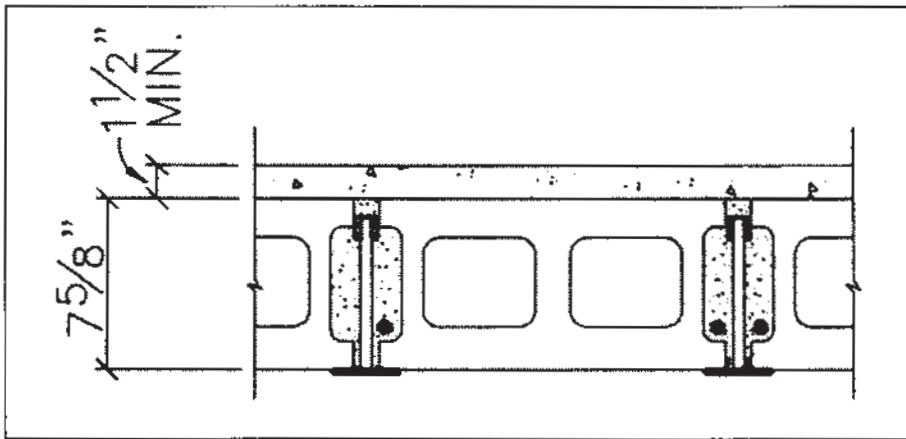


TABLE 2
ALLOWABLE UNIFORM LOAD (PSF) FOR 3-HOUR
PROTECTED BLOCK JOIST SYSTEM™ with
1½-inch CONCRETE TOPPING and 8x8x16-inch CMU

SIZE AND NUMBER OF REINFORCING BARS per BLOCK JOIST™	SPAN (ft)										
	8 ft or less	9 ft	10 ft	11 ft	12 ft	13 ft	14 ft	15 ft	16 ft	17 ft	
1 #4	173	125	91	65	46	31	—	—	—	—	
1 #5	290	218	166	127	98	76	58	43	31	21	
2 #4	292	241	184	143	111	87	67	51	39	28	

1. Maximum slope of system shall be ¼:12.
2. Applications shall be limited to simple spans.
3. Maximum block weight shall be 30 lbs.
4. Concrete topping density shall be between 100 lbs/ft³ and 150 lbs/ft³ and the minimum compressive strength shall be 3000 psi at 28 days.
5. For concrete topping thicker than 1½ inches, deduct 6 psf for each inch of concrete from the applicable tabulated value.
6. The dead load of the 16-inch Block Joist System has been deducted from the tabulated allowable uniform load, above.

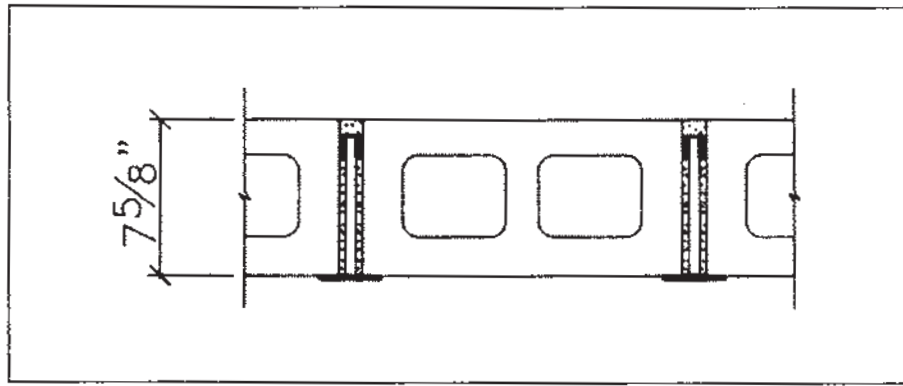


TABLE 3
ALLOWABLE UNIFORM LOAD (PSF) FOR
UNPROTECTED BLOCK JOIST SYSTEM™
w/8x8x16-inch CMU

Average Block Wt. /lbs.	SPAN (ft)								
	12 ft or less	13 ft	14 ft	15 ft	16 ft	17 ft	18 ft	19 ft	20 ft
30 or less	186	159	131	109	91	76	64	53	44
30 to 35	180	154	126	104	86	71	59	48	39
35 to 40	174	149	121	99	81	66	54	43	34

1. Maximum slope of system shall be ¼:12.
2. Applications shall be limited to simple spans.
3. Joists 18 ft. and longer shall be of steel with a yield stress of 50 ksi.
4. The dead load of the 16-inch Block Joist System has been deducted from the tabulated allowable uniform load, above.

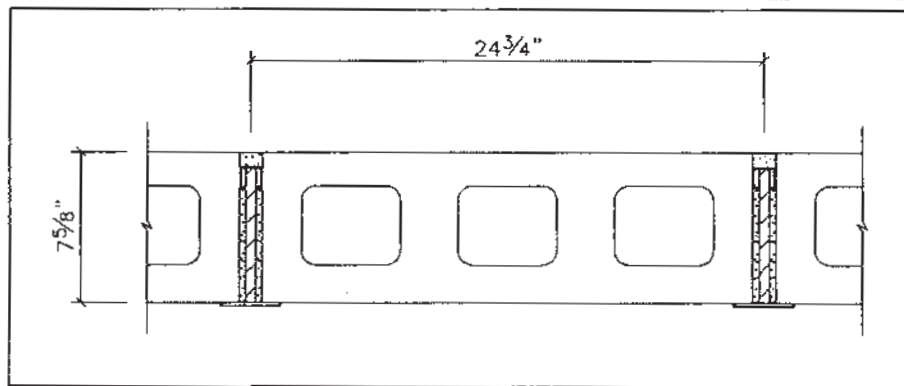


TABLE 4
ALLOWABLE UNIFORM LOAD (PSF) FOR
UNPROTECTED BLOCK JOIST SYSTEM™
w/8x8x24-inch CMU

Joist Yield Stress	SPAN (ft)										
	10 ft or Less	11 ft	12 ft	13 ft	14 ft	15 ft	16 ft	17 ft	18 ft	19 ft	20 ft
36 ksi	195	155	125	101	82	67	55	44	36	29	—
50 ksi	280	225	184	151	126	105	102	85	71	61	52

1. Maximum block weight shall be 42 lbs.
2. Load limited to live load deflection of $l/360$
3. The dead load of the 16-inch Block Joist System has been deducted from the tabulated allowable uniform load, above.

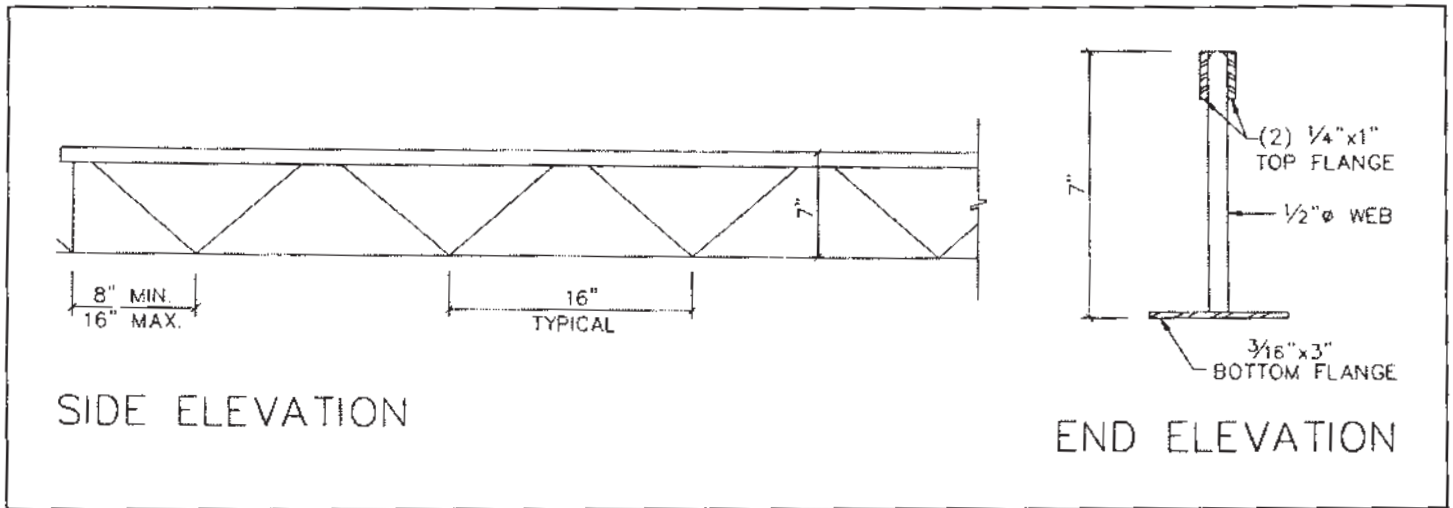


FIGURE 1
7-INCH BLOCK JOIST

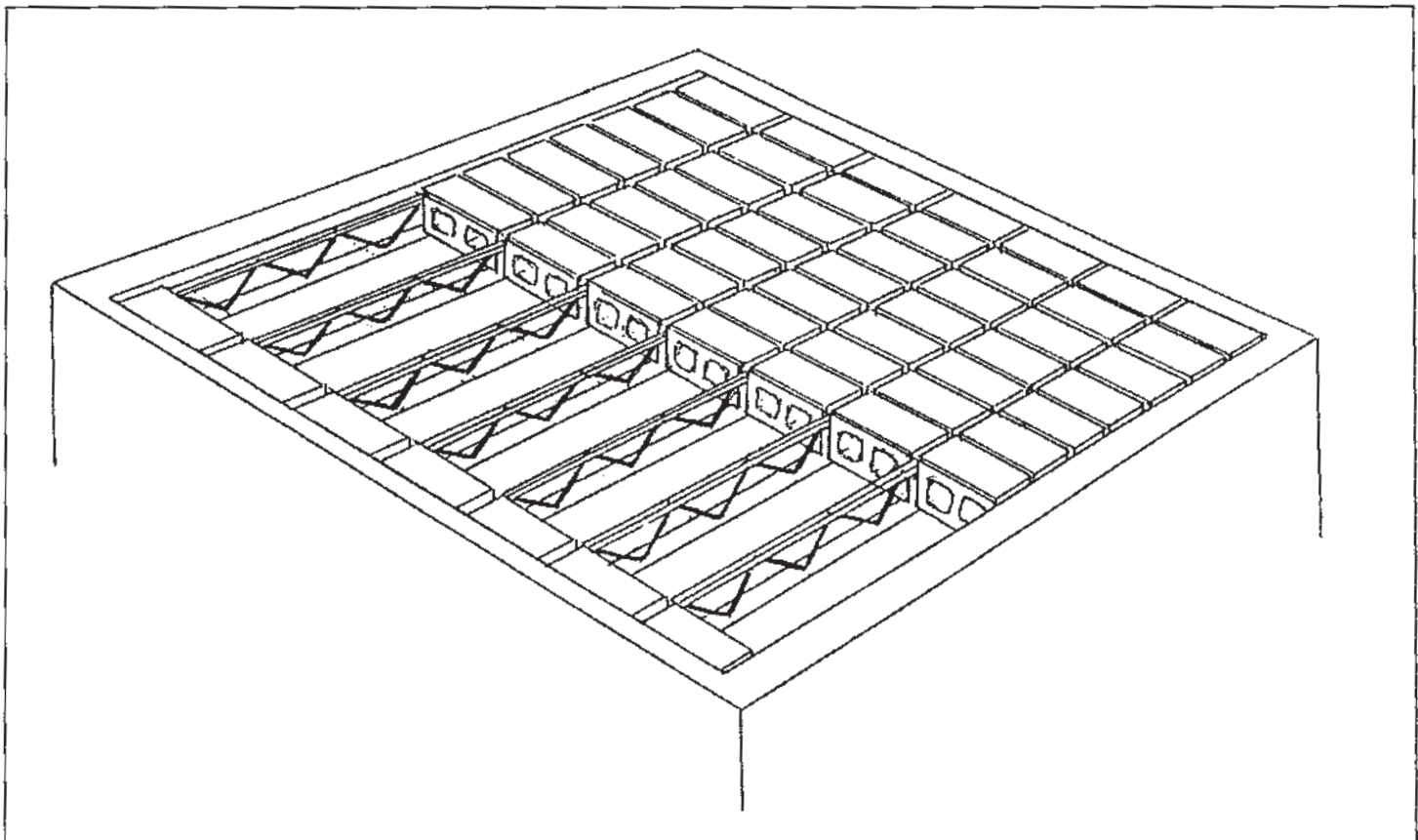


FIGURE 2
ISOMETRIC OF 16-INCH BLOCK JOIST SYSTEM