Design No. D923
December 10, 2001

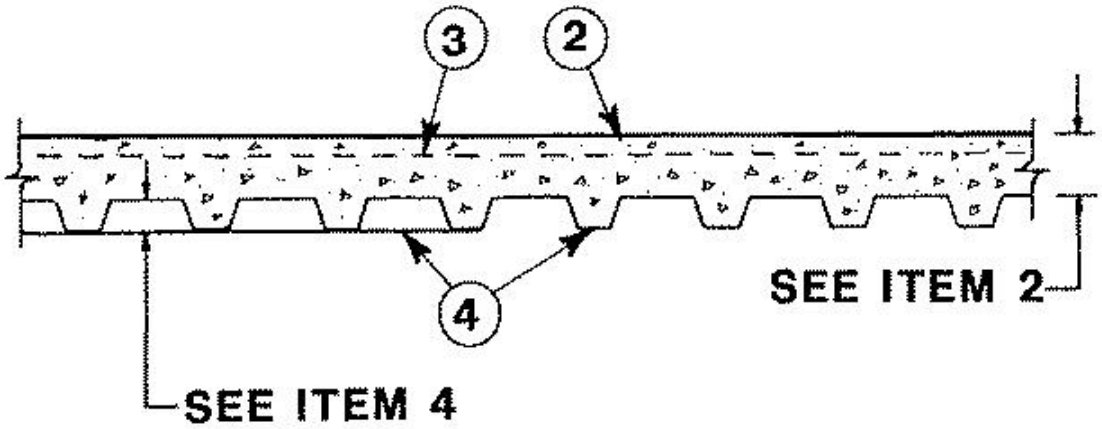
Restrained Assembly Ratings — 3/4, 1, 1-1/2, 2 or 3 Hr

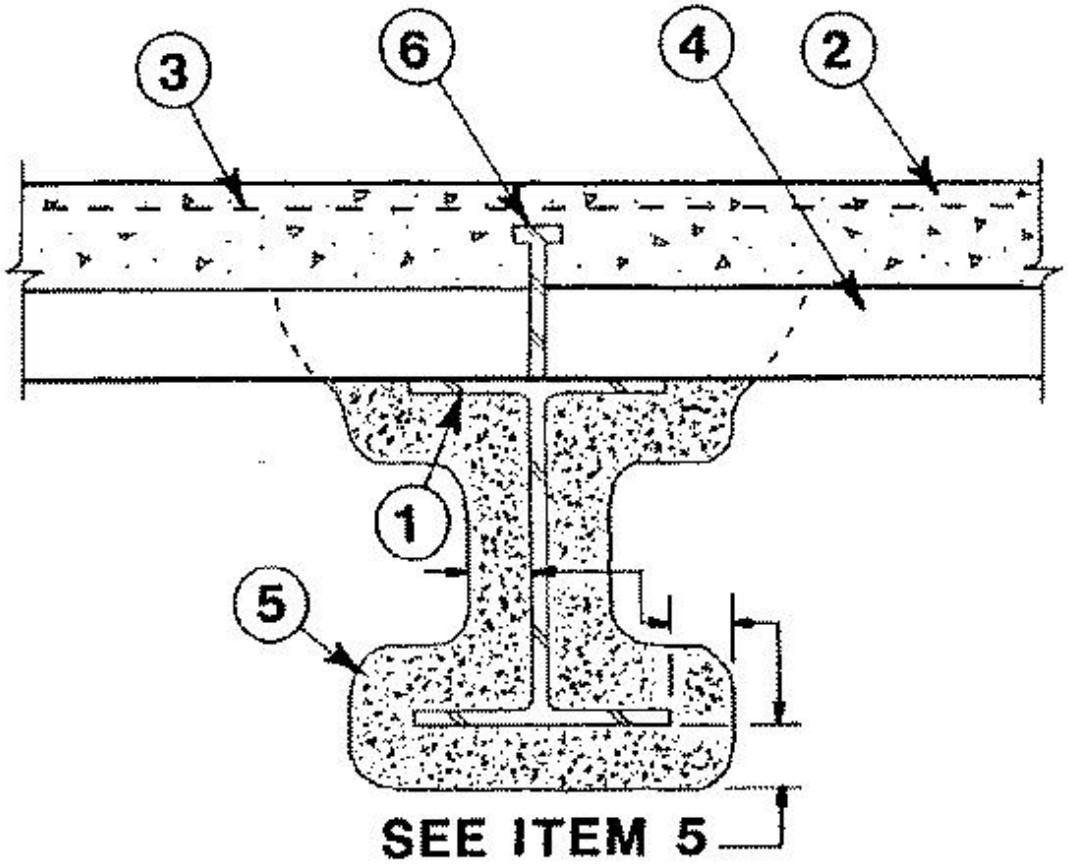
(See Items 2, 7, 8, 9 and 12)

Unrestrained Assembly Rating — 0 Hr (See Item 4)

Unrestrained Beam Ratings — 1, 1-1/2, 2 and 3 Hr

(See Items 5, 8 and 12)





1. **Supports —** W8x28 min size steel beams.

2. **Normal Weight or Lightweight Concrete —** Normal weight concrete, carbonate or siliceous aggregate, 147 to 153 pcf unit weight, 3500 psi compressive strength, vibrated. Lightweight concrete, expanded shale, or slate aggregate by rotary-kiln method, or expanded clay aggregate by rotary-kiln or sintered-grate method; 3000 psi compressive strength, vibrated, 4 to 7 percent entrained air.

Restrained Assembly Rating Hr	Concrete (Type)	Concrete Unit Weight pcf	Concrete Thkns In.
1	Normal Weight	—	3-1/2
1-1/2	Normal Weight	—	4
2	Normal Weight	—	4-1/2
3	Normal Weight	—	5-1/4
3/4 or 1 (See Item 6)	Lightweight	107-113	2-1/2
1	Lightweight	107-120	2-5/8
1-1/2	Lightweight	107-113	3
2**	Lightweight	107-113	3-1/4
2**/4*	Lightweight	107-116	3-1
2	Lightweight	107-120	3-1/2
3	Lightweight	107-113	4-3/16
3	Lightweight	107-120	4-7/16

*For use with 2 or 3 in. steel floor and form units only.

**When optional Items 7 and 11 are used, the Restrained Assembly Ratings of the 3-1/4 in. lightweight concrete thicknesses are reduced to 1-1/2 h.

3. **Welded Wire Fabric —** 6x6, 10x10 SWG.

4. **Steel Floor and Form Units* —** Composite 1-1/2, 2 or 3 in. deep galv units. Fluted units may be uncoated or phosphatized/painted. Min gauges are 22 MSG for fluted and 20/20 MSG for cellular units. The following combinations of units may be used:

(1) All 24 or 36 in. wide cellular.

(2) All fluted.

(3) One or two 3 in. deep, 12 in. wide, 18/18 MSG min cellular, alternating with 3 in. deep fluted or other cellular.

(4) Any blend of fluted and 24 or 36 in. wide cellular.

(5) 3 in. deep, 30 in. wide cellular with 8-1/8 in. wide valley along side joints may be used when 3/8 in. diam reinforcing bars are placed 1-1/2 in. to each side of side joints and 1 in. above bottom of unit.

CONSOLIDATED SYSTEMS INC — 24 or 36 in. wide Types CFD-2, CFD-3; 24, 30 or 36 in. wide Type CFD-1.5; 24 in. wide, Types NC. Units may be phos/ptd.

Spacing of weld attaching units to supports shall be 12 in. OC for 24 and 36 in. wide units, four welds per sheet for 30 in. wide units. Unless noted otherwise adjacent units button-punched or welded together 36 in. OC along side joints. For 3 Hr Rating, units with overlapping type side joints welded together 24 in. OC max.

The Unrestrained Assembly Rating is 1-1/2 h for the following units with the stated limitations:

(a) 1-1/2 in. deep, 24 in. wide, 22 MSG or thicker fluted with clear spans not more than 7 ft, 8 in.

(b) 1-1/2 in. deep, 24 in. wide, 20 MSG or thicker fluted with clear spans not more than 8 ft, 8 in.

(c) 1-1/2 in. deep, 24 in. wide, 16 MSG or thicker fluted and 18/18 MSG or thicker cellular with clear spans not more than 9 ft, 11 in.

(d) 3 in. deep, 36 in. wide, 18 MSG or thicker fluted and 24 in. wide, 20/18 MSG or thicker cellular with clear spans not more than 13 ft, 2 in.

5. **Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying in more than one coat to the beam to the final thicknesses shown below. When fluted or corrugated steel floor units are used, crest areas above the beam shall be filled with Spray-Applied Fire Resistive Materials. Beam surfaces shall be clean and free of dirt, loose scale and oil. Min avg and min ind density of 23 and 21 pcf, respectively.

Unrestrained Beam Rating Hr	Restrained Assembly Rating Hr	Spray Applied Fire Resistive Mtl Thkns In.
1	1, 1-1/2, 2	1/2
1-1/2	1, 1-1/2, 2, 3	3/4

SOUTHWEST VERMICULITE CO — Type 7MP or FP-2

6. **Shear-Connector Studs —** (Optional) — Studs 3/4 in. diam by 3 in. long, for 1-1/2 in. deep form units to 5-1/4 in. long for 3 in. deep form units, headed type or equivalent per AISC specifications. Welded to the top flange of the beam through the steel form units.

7. **Electrical Inserts* —** (Not shown) Classified as "Outlet Boxes and Fittings Classified for Fire Resistance".

H H ROBERTSON — Present Inserts. For use with 2-1/2 in. lightweight concrete topping over Q1-WKX steel floor units. Installed over factory-punched holes in floor units per accompanying installation instructions. Spacing shall not be more than one insert in each 14 sq ft of floor area with spacing along floor units not less than 48 in. O.C. The holes cut in insert cover for passage of wires shall be no more than 1/8 in. larger diam than wire. Restrained Assembly Rating is 3/4 h with Tapmate II-FS-1 and 1 h with Tapmate II-FS-2 inserts.

H H ROBERTSON — Tapmate II-FS-1, II-FS-2; Series KEB.

WALKER SYSTEMS INC — After set inserts. Single-service after set inserts installed per accompanying installation instructions in 2-1/2 in. diam hole core-drilled through min 3-1/4 in. thick concrete topping to top of cell of any min 3 in. deep cellular steel floor unit specified under Item 3. Spacing shall be no more than one insert in each 10 sq ft of floor area in each span with a min center to center spacing of 16 in. If the high potential and low potential raceways of the cellular steel floor unit are separated by a valley filled with concrete, the center to center spacing of the high potential and low potential single-service after set inserts may be reduced to a min of 7-1/2 in. Restrained Assembly Rating is 2 h or less with internally protected Type 436 after set insert with Type M4-, M6- or M8- Series single-service activation fitting.

WALKER SYSTEMS INC — Internally protected Type 436 after set insert with Type M4-, M6- or M8-Series single -service activation fitting.

8. **Mineral and Fiber Boards* —** (Optional, not shown). Applied over concrete floor with no restriction on board thickness. When mineral and fiber boards are used, the unrestrained beam rating shall be increased by a minimum of 1/2 hr. See Mineral and Fiber Board (CERZ) category for names of manufacturers.

9. **Roof Covering Materials* —** (Optional, not shown) — Consisting of materials compatible with insulations described herein which provide Class A, B or C coverings. See Built-Up Roof Covering Materials in Building Materials Directory.

10. **Insulating Concrete —** (Optional, not shown) — Various types of insulating concrete prepared and applied in the thickness indicated:

A. **Vermiculate Concrete —** (Optional, not shown).

1. Blend 6 to 8 cu ft of Vermiculate Aggregate* to 94 lb Portland Cement and air entraining agent. Min thickness of 2 in. as measured to the top surface of the structural concrete or foamed plastic (Item 11) when it is used.

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2. Blend 3.5 cu ft. or Type NVC Concrete Aggregate* or Type NVS Vermicualte Aggregate* to 94 lb Portland Cement. Slurry coat, 1/8 in. thickness beneath foamed plastic (Item 11) when used, 1 in. min topping thickness.

ELASTIZELL CORP OF AMERICA

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Vermiculite concrete may be covered with Roof Covering Materials (Item 9).

B. **Cellular Concrete — Roof Topping Mixture* —** Concentrate mixed with water and Portland Cement per manufacturer's specifications. Cast dry density 28-day min compressive strength of 190 psi as determined with ASTM C495-66.

CELCORE INC — Cast dry density of 31 (+ or -) 3.0 pcf.

CELLULAR CONCRETE L L C — Cast dry density of 37 (+ or -) 3.0 pcf.

ELASTIZELL CORP OF AMERICA — Type II. Mix #1 of cast dry density 39 (+ or -) 3.0 pcf, Mix #2 of cast dry density 40 (+ or -) 3.0 pcf, Mix #3 of cast dry density 47 (+ or -) 3.0 pcf.

LITE-CRETE INC — Cast dry density of 29 (+ or -) 3.0 pcf.

C. **Cellular Concrete — Roof Topping Mixture* —** Concentrate mixed with water and Portland Cement per manufacturer's specifications. 28-day min compressive strength of 190 psi as determined with ASTM C495-66.

SIPLAST INC — Mix No. 1 or 2. Cast dry density of 32 to 35 pcf for Mix No. 1 or 36 to 39 pcf for Mix No. 2.

D. **Perlite Concrete —** 6 cu ft of Perlite Aggregate* to 94 lb of Portland Cement and 1-1/2 pt air entraining agent. Min thickness 2 in. as measured to the top surface of structural concrete or foamed plastic (Item 11A) when it is used. See Perlite Aggregate (CFFX) in Fire Resistance Directory for names of manufacturers.

E. **Cellular Concrete — Roof Topping Mixture* —** Foam concentrate mixed with water, Portland Cement and UL Classified Vermiculite Aggregate per manufacturer's application instructions. Cast dry density of 30 to 36 pcf and 28-day compressive strength of min 250 psi as determined in accordance with ASTM C495-86.

CELLULAR CONCRETE L L C — Mix No. 3.

SIPLAST INC — Mix No. 3.

F. **Floor Topping Mixture* —** (Optional, not shown) — Approx 4.5 gal of water to 41 lbs of NVS Premix floor topping mixture. Slurry coat 1/8 in. thickness beneath foamed plastic (Item 11) when used, 1 in. min topping thickness.

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Floor Topping Mixture may be covered with Built-Up or Single Membrane Roof Covering.

11. **Foamed Plastic* —** (Optional, not shown) — For use only with vermiculite (Item 10A) or cellular (Item 10C) concretes or Floor-Topping Mixture (Item 10F) -rigid polystyrene foamed plastic insulation having slots and/or holes sandwiched between vermiculite concrete slurry which is applied to the normal or lightweight concrete surface and vermiculite concrete topping (Item 10A). Max thickness to be 8 in.

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11A. **Foamed Plastic* —** (Optional) — Nom 24 by 48 in., 48 by 48 in. or 30 by 60 in. by max 8 in. thick polystyrene foamed plastic insulation boards with holes symmetrically placed having a max density of 2.0 pcf. For use only with cellular concrete roof topping mixture (Item 10B).

STARRFOAM MFG INC

11B. **Foamed Plastic* —** (Optional, not shown) — For use only with cellular concrete. Nom 24 by 48 by max 8 in. thick polystyrene foamed plastic insulation boards having a density of 1.0 + 0.1 pcf encapsulated within cellular concrete topping (Item 10B). Each insulation board shall contain six nom 3 in. diam holes oriented in two rows of three holes each with the holes spaced 12 in. OC, transversely and 16 in. OC longitudinally. See Foamed Plastic* (BRYX) category in the Building Materials Directory or Foamed Plastic* (CCVW) category in the Fire Resistance Directory for list of manufacturers.

12. **Foamed Plastic* —** (Optional, not shown). Polyisocyanurate roof insulation applied over concrete floor with no restriction on insulation thickness. When polyisocyanurate insulation is used, the unrestrained beam rating shall be increased by a minimum of 1/2 hr. See Foamed Plastic (CCVW), category in the Fire Resistance Directory for list of manufacturers.

*Bearing the UL Classification Mark