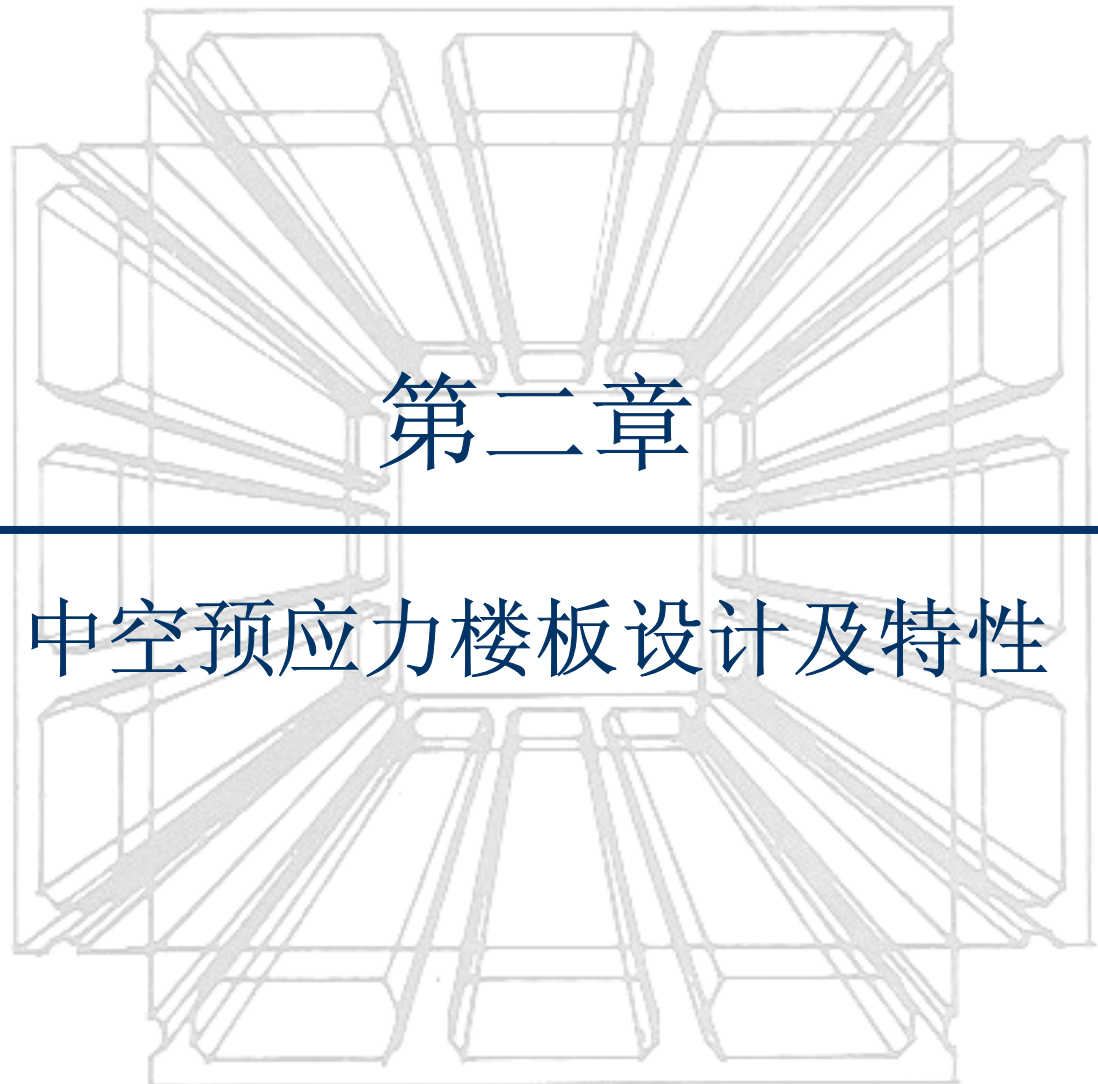
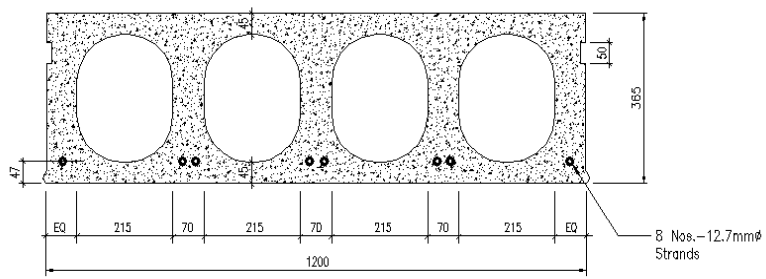


第二章

中空预应力楼板设计及特性

中空楼板设计及截面

1	**Class 2 members**						
2	**Size of member**	365	mm Thickness	x 1.2 m Width			
3	**Span**	9.2	m				
4	**Total strands required**	8	nos. Dia.12.7mm ASTM lower relaxation				
5	**Jacking force required**	68	% Initial prestress force				
6	**Concrete strength**						
	a. Transfer strength				25	N/mm2	
	b. Final strength specified				50	N/mm2	
	c. Final strength requied by calculation				31.567	N/mm2	
7	**Specified carrying capacity**						
	a. Dead load (hollow core slab selfweight)				4.42	KN/m2	
	b. Topping load	75	mm Thickness		1.8	KN/m2	
	c. Supperimposed dead load				1.7	KN/m2	
	d. Live load				15	KN/m2	
8	**Performance of the slab**						
	a. Deflection due pretressing & dead load & topping & supperimposed dead load					-3.78	mm
	b. Deflection due to live load					-11.11	mm
	c. Natural Frequency due to dead load & topping& supperimposed dead load					47.68	per Sec.
	d. Natural Frequency due to dead load & topping & supperimposed dead load & Live Load					28.05	per Sec.
9	**Member Weight Per Piece**				5.0	Tons	
10	**Concrete Consumption**				2.04	M3	



SECTION

我们在中空楼板设计、施工计术及其优点介绍

中空楼板抵抗水平力设计

Interrupted Shear Key

The ultimate shear strength of the unreinforced keyway shown by Fig. 4b should not exceed:

$$v_{lu} = \phi\, 4A_k \sqrt{f'_c} \qquad \text{Eq. (1)}$$

where A_k = 12 in^2 (the interrupted interface keyway shear area), f'_c is the 28 day grout strength of 2500 psi or greater, ϕ = 0.85 and v_{lu} is the ultimate shear force in lbs. per ft. for keyways spaced at 12 in. centers.

Shear Reinforcement in Grouted Joints

The shear capacity of V_{lu} or V_{tu} for Span-Deck slabs employing reinforcement in grouted keyway and slab ends is based upon the shear friction approach. The reinforcement in the grouted and reinforced keyways or slab ends can be determined from:

$$A_{lu} = \frac{V_{lu}}{\phi\, f_y u} \qquad \text{Eq. (2)}$$

$$A_{tu} = \frac{V_{tu}}{\phi\, f_y u} \qquad \text{Eq. (3)}$$

where A_{lu} and A_{tu} are sq. in. of reinforcement required as shown by Fig. 3, f_y is the yield strength of the reinforcement in ksi, ϕ = 0.85, u is 0.7 for continuous keyways or 1.0 for interrupted keyways or slab ends using void plugs, and V_{lu} and V_{tu} are the ultimate shear force in kips acting upon the total joint length. The following limitations are imposed upon Eqs. (2) and (3):

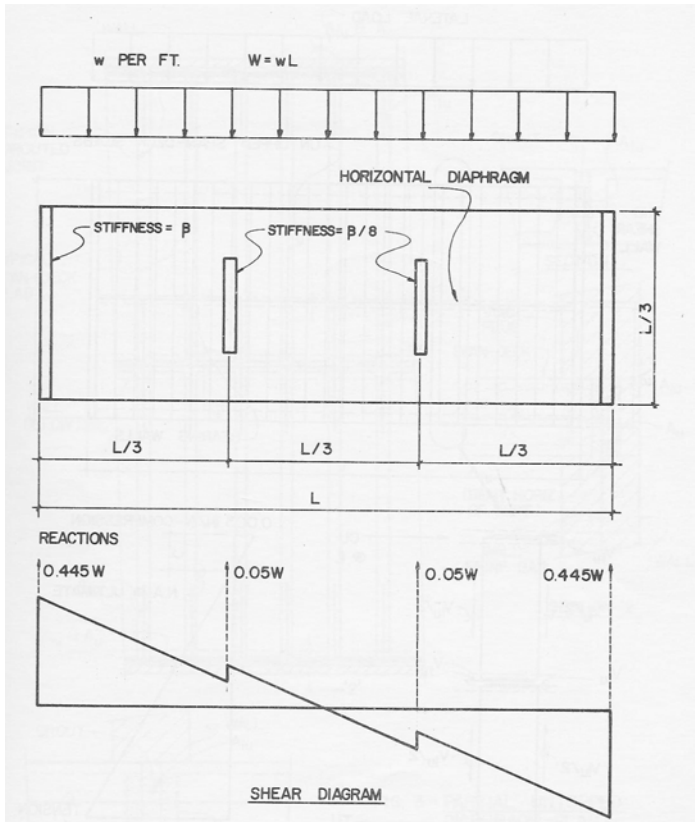


FIG. I - PLAN VIEW OF DIAPHRAGM HAVING SHEAR WALLS OF DIFFERENT STIFFNESS

我们在中空楼板设计、施工计术及其优点介绍

中空楼板水平力设计及接头处理详图

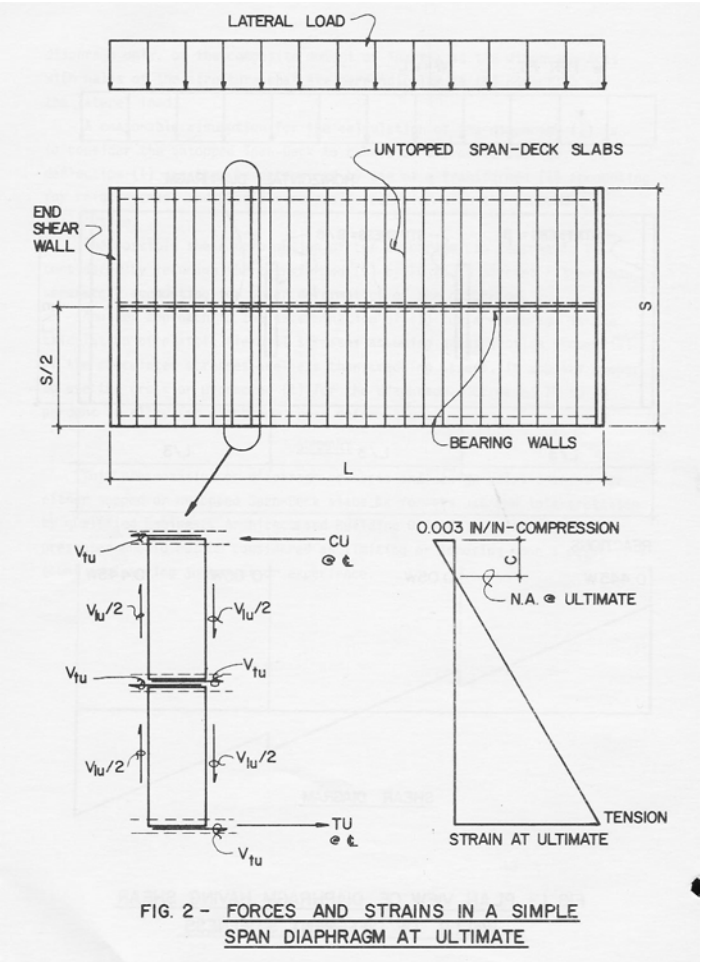


FIG. 2 - FORCES AND STRAINS IN A SIMPLE SPAN DIAPHRAGM AT ULTIMATE

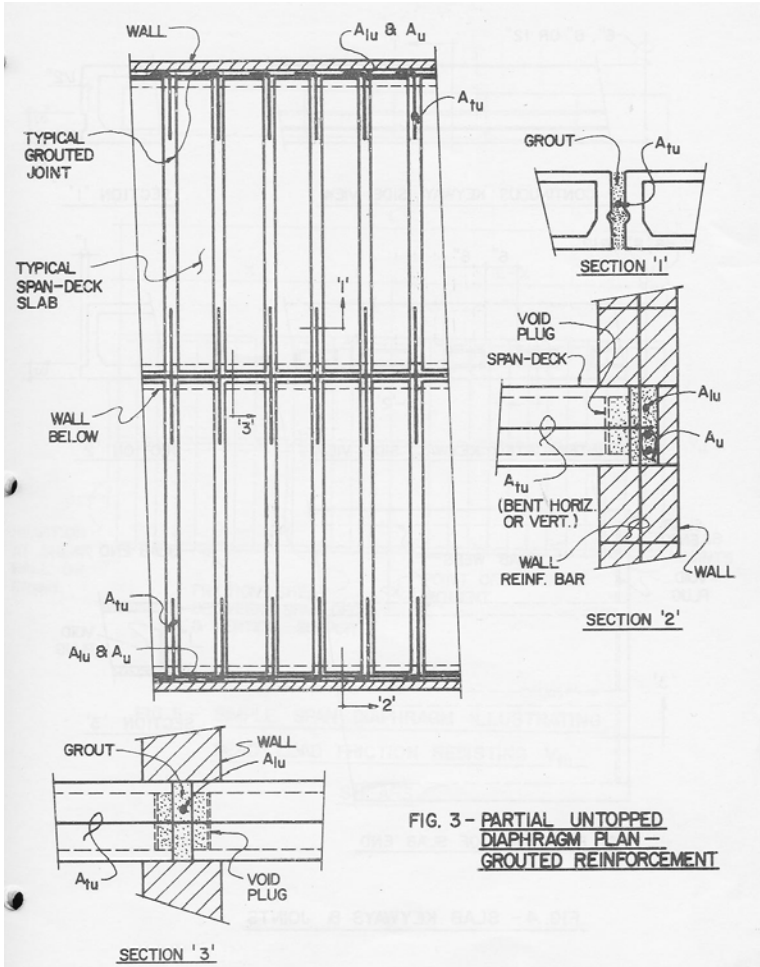
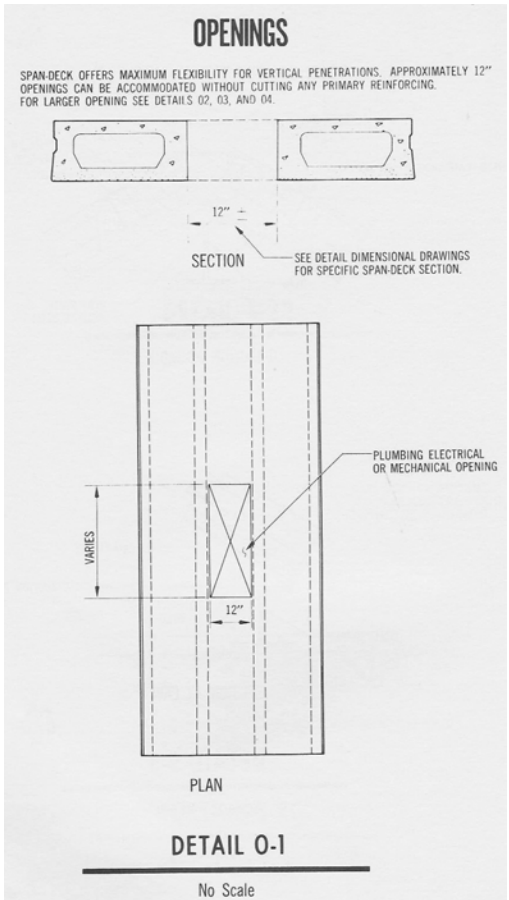
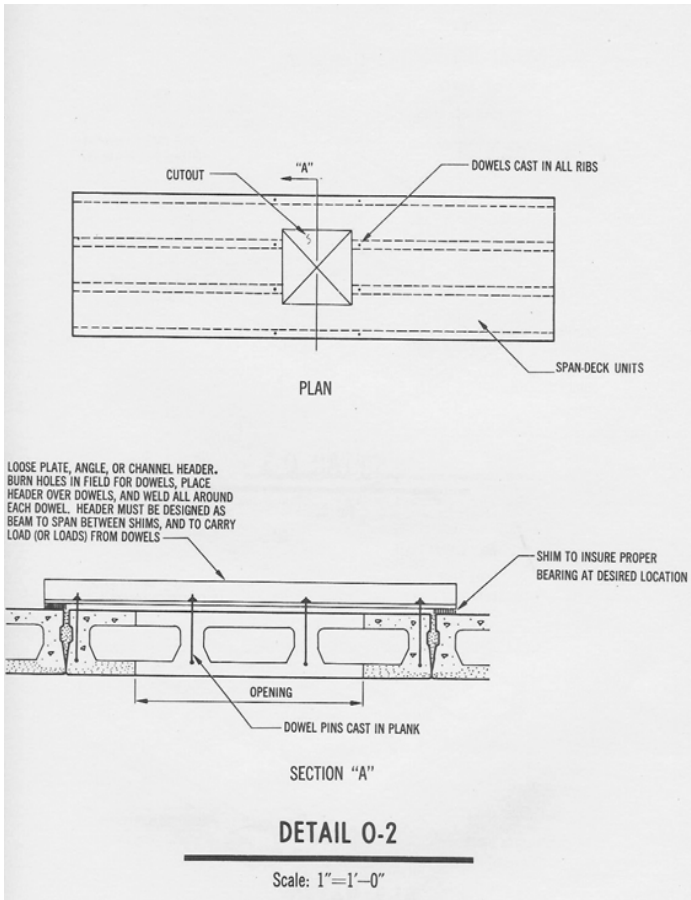


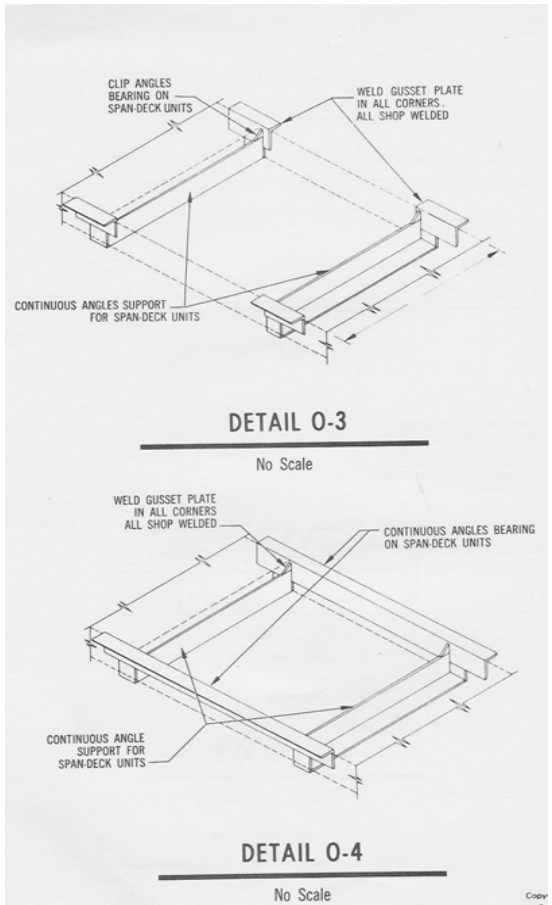
FIG. 3 - PARTIAL UNTOPPED DIAPHRAGM PLAN — GROUTED REINFORCEMENT

我们在中空楼板设计、施工计术及其优点介绍

中空楼板开洞处理详图

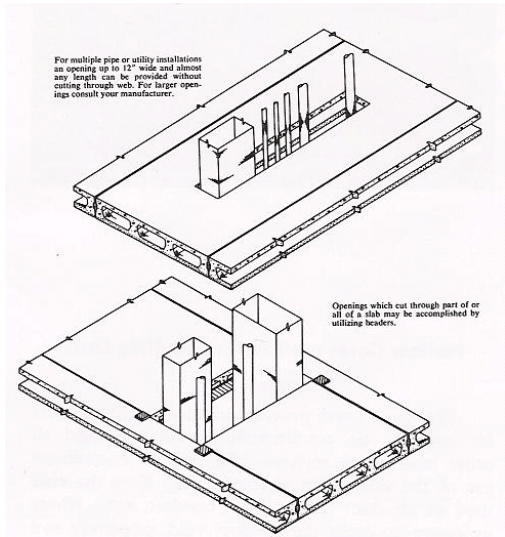


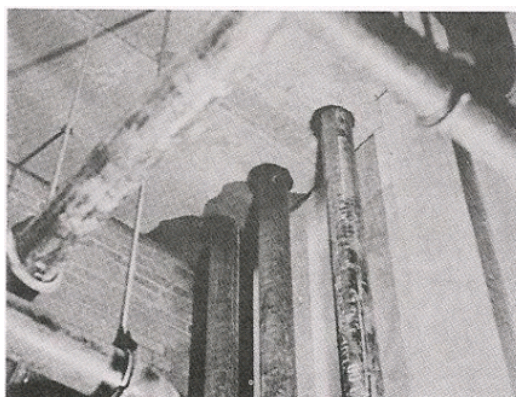




我们在中空楼板设计、施工计术及其优点介绍

中空楼板开洞工程实例



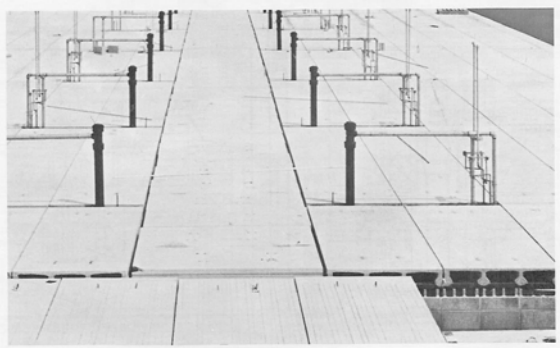


我们在中空楼板设计、施工计术及其优点介绍

中空楼板工程中管道开洞实例

Pipe Installation
Simple, Practical, Time-Saving, Versatile.

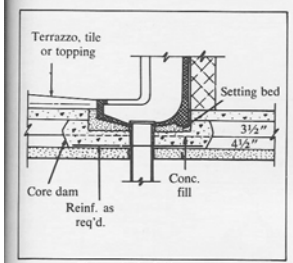
Each of the above adjectives describes the Span-Deck system which allows for any type of piping. On-the-job use in thousands of applications has proved that the cutting or drilling of small openings after erection of deck is generally the best method. Since there are many plumbing situations, each with a variety of methods of handling, we have attempted to illustrate in this section various ways in which typical installation problems can be quickly and easily solved. In all cases, the large Span-Deck cores can be efficiently used by the architect for pipe handling.



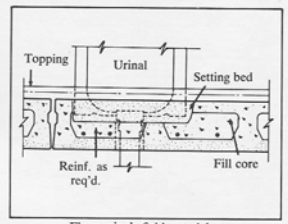
7

Detail

Urinals

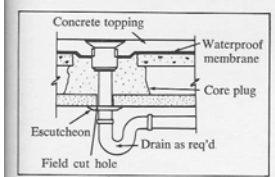


Floor urinals field cut slab

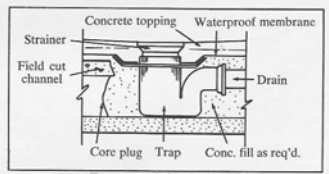


Floor urinals field cut slab

Floor or Shower Drains

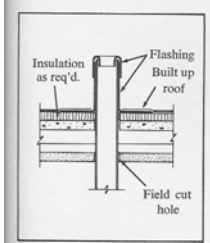


Trap below floor slab

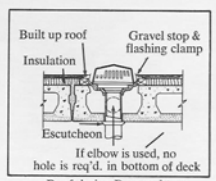


Trap concealed in floor slab

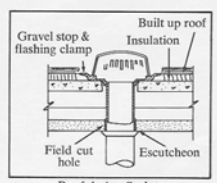
Vents or Drains Through Roof



Vent thru roof — flat roof



Roof drains Recessed type

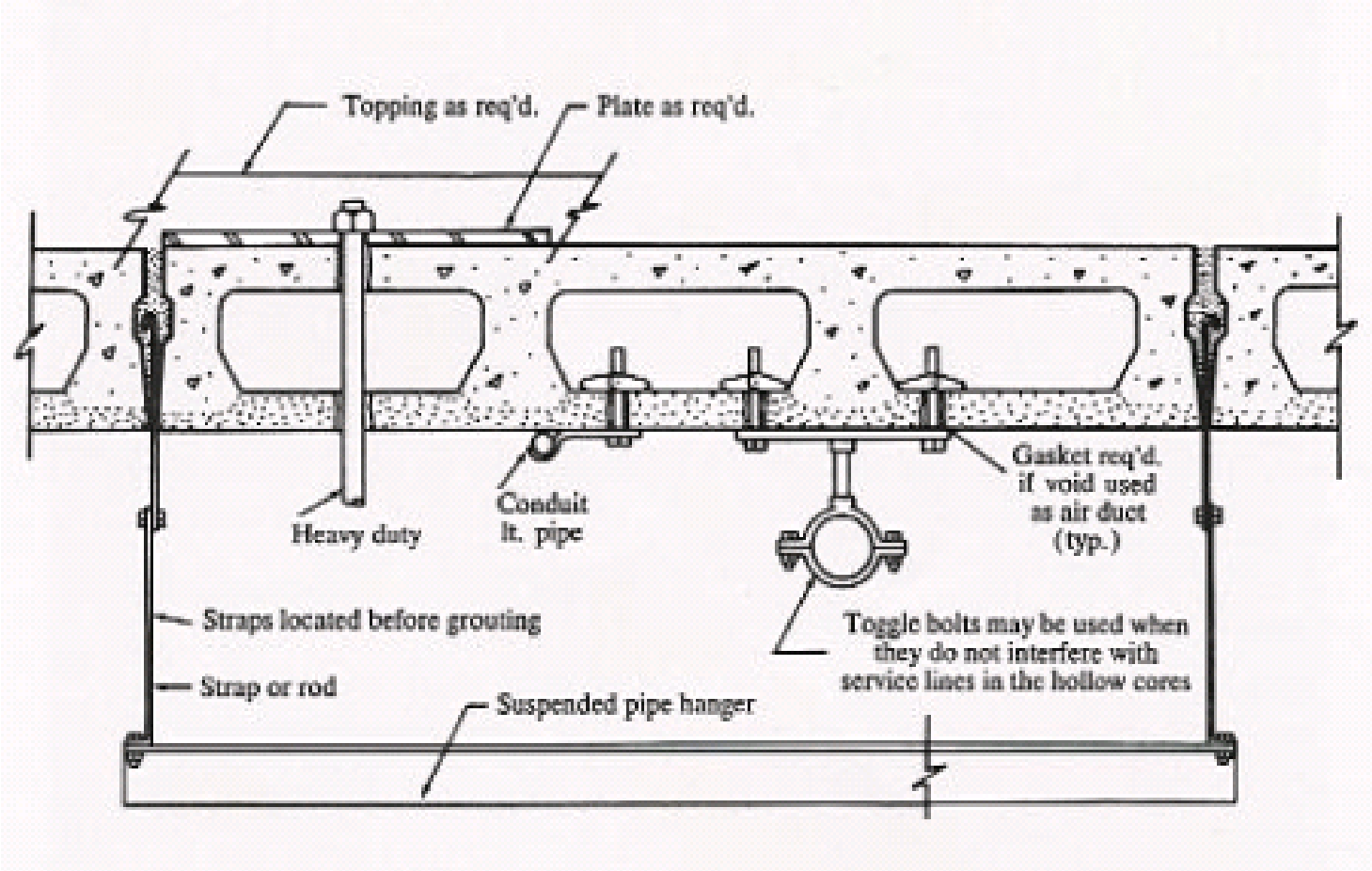


Roof drains flush type

11

我们在中空楼板设计、施工计术及其优点介绍

中空楼板悬挂系统



我们在中空楼板设计、施工计术及其优点介绍

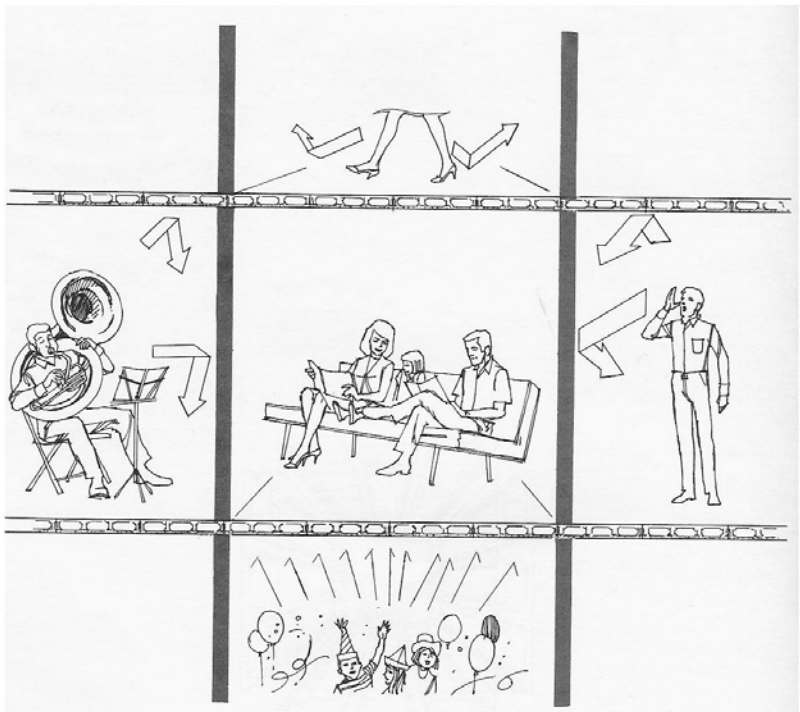
中空楼板防火特性

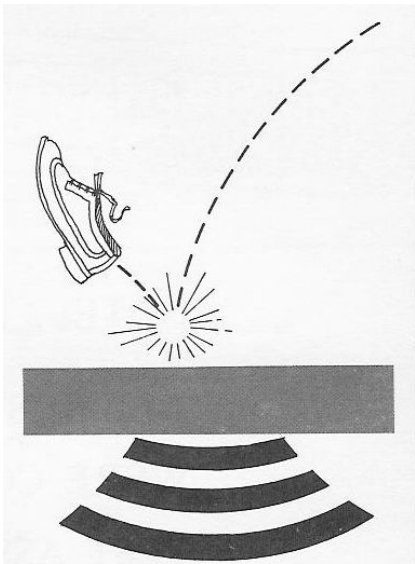
FIRE RESISTANCE RATINGS

U. L. Design No.	Restrained Rating (hr.)	Unrestrained Rating (hr.)	Topping (In.)	Illus. No.	Top Concrete	Soffit Concrete	Strand Cover (In.)
J914	2 3 4	2	none 1–1/8 2–1/16	1	Normal weight	Insulating	1–11/16
J915	2 3 4	2 3	none 1–1/8 2–1/16	1	Normal weight	Insulating	2–5/16
J916	2 3	2 3	none 1–1/18	1	Lightweight	Insulating	2–1/8
J917	2	1	2	2	Lightweight or Normal weight	Lightweight or Normal weight	3/4
J918	-	1	none	2	Lightweight or Normal weight	Lightweight or Normal weight	1¼
J949	2	1	none	3	Lightweight or Normal weight	Lightweight or Normal weight	3/4
J952	2 3	2	none 1–1/8	1	Lightweight or Normal weight	Lightweight or Insulating	1–11/16

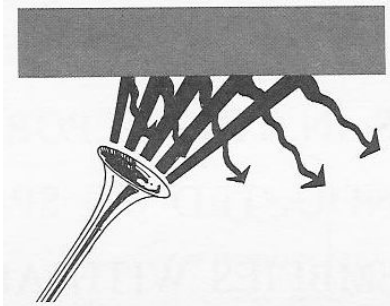
我们在中空楼板设计、施工计术及其优点介绍

中空楼板隔音特性





Impact sound transmission is the conveyance of sounds directly generated by percussive contact with a surface such as a wall, floor, or ceiling.

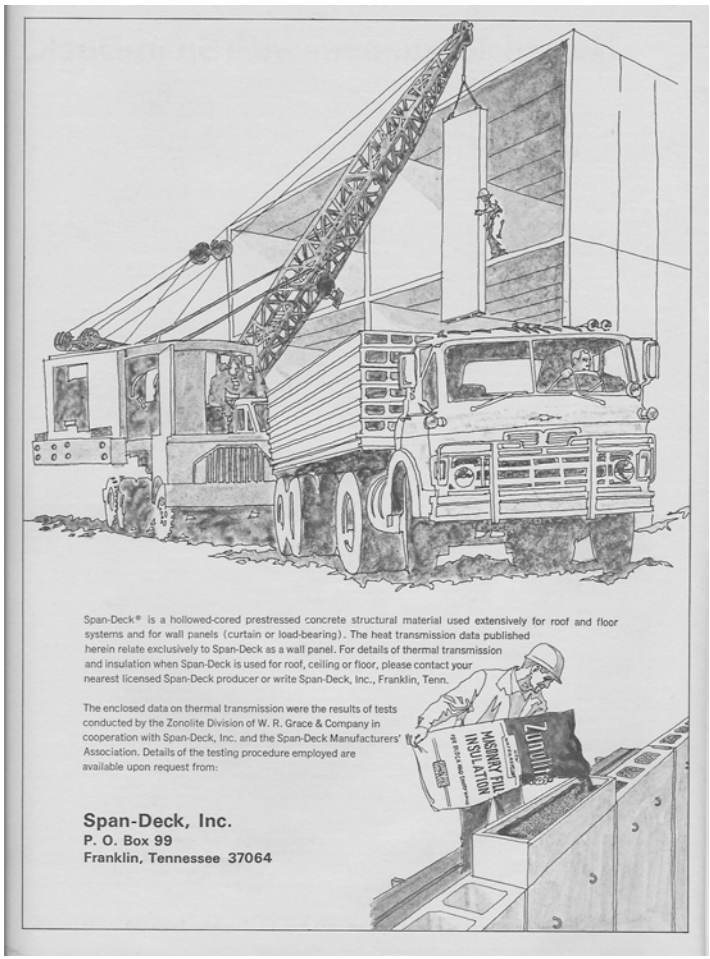


Sound absorption is the degree of engrossing, dampening, or reflecting sound that a material or surface characteristic may exhibit.

Airborne sound transmission refers to the conveyance of sounds generated by a disjunctive source, such as a musical instrument or human voice, through the air or through a wall or through a floor.

我们在中空楼板设计、施工计术及其优点介绍

中空楼板温控特性



Span-Deck® is a hollowed-cored prestressed concrete structural material used extensively for roof and floor systems and for wall panels (curtain or load-bearing). The heat transmission data published herein relate exclusively to Span-Deck as a wall panel. For details of thermal transmission and insulation when Span-Deck is used for roof, ceiling or floor, please contact your nearest licensed Span-Deck producer or write Span-Deck, Inc., Franklin, Tenn.

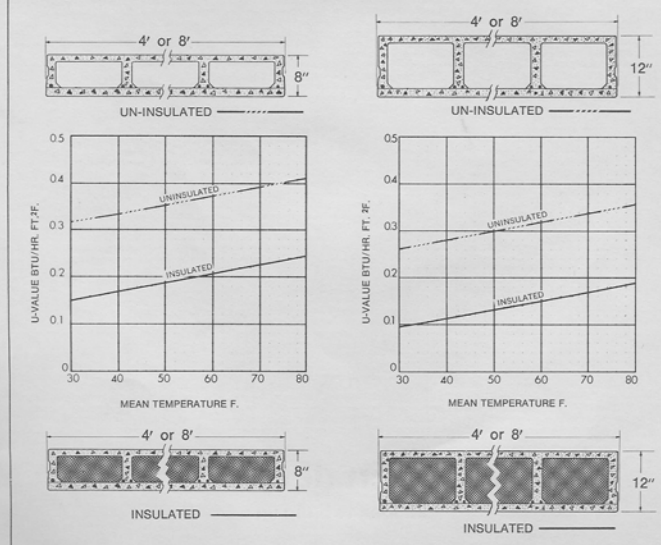
The enclosed data on thermal transmission were the results of tests conducted by the Zonolite Division of W. R. Grace & Company in cooperation with Span-Deck, Inc. and the Span-Deck Manufacturers' Association. Details of the testing procedure employed are available upon request from:

Span-Deck, Inc.
P. O. Box 99
Franklin, Tennessee 37064

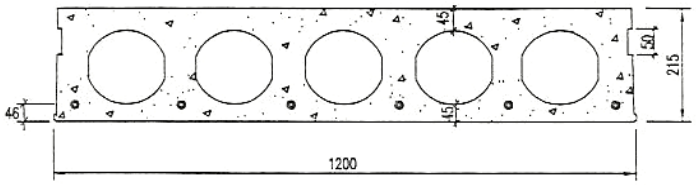
HARD ROCK CONCRETE - SMOOTH SOFFIT

"U" VALUES – COEFFICIENTS OF HEAT TRANSMISSION (C) AT 70° F MEAN TEMPERATURE – "U" VALUES IN BTU/HR. FT.^{2} F.

8 IN	PLANK ONLY (CORE AREAS VOID)	12 IN
.39	UNINSULATED	.34
.23	INSULATED WITH ZONOLITE	.17
8 IN	**PLANK INSULATED, FURRED AND PLASTERED (⅜ IN GYPSUM LATHE AND ½ IN VERMICULITE PLASTER)**	**12 IN**
.18	1 IN. AIR SPACE UNINSULATED	.13
.15	1 IN. AIR SPACE INSULATED	.11
.11	2 IN. AIR SPACE INSULATED	.09



215mm 厚预应力中空楼板承载力图表

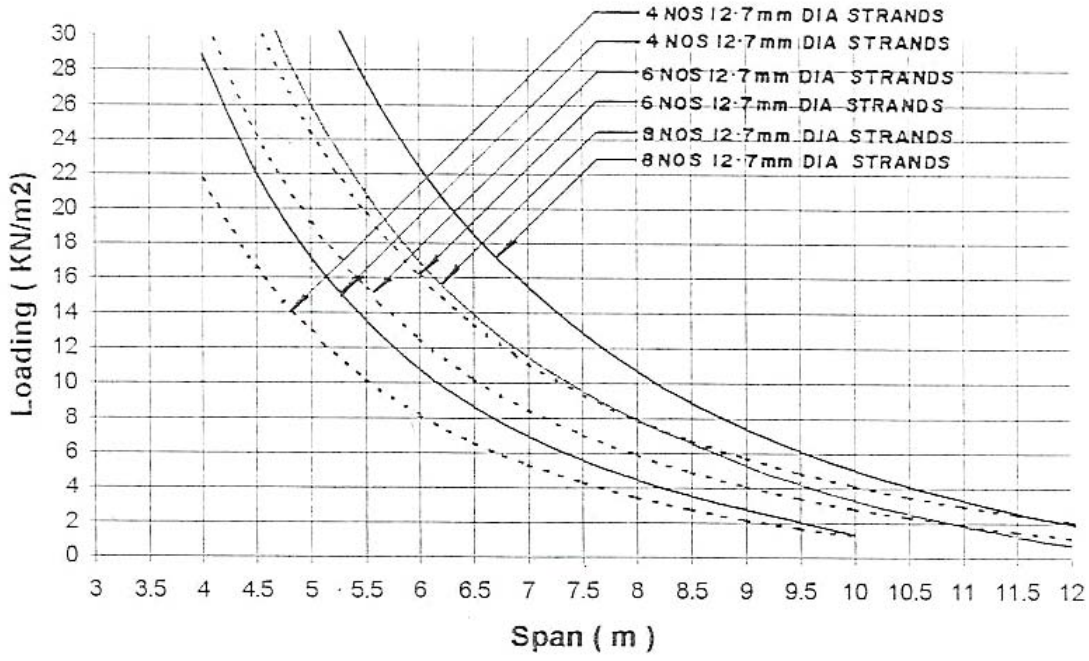


结面特性

无面层			面层			材料特性
A =	153618	mm^2	I' =	$1.62x10^9$	mm^4	楼板混凝土 = 50N/mm^2
I =	$8.48x10^8$	mm^4	Zb' =	$1.12x10^7$	mm^3	面层混凝土 = 30N/mm^2
Yb =	107	mm	Zt' =	$2.30x10^7$	mm^3	预应力钢绞极限强度，
Yt =	108	mm				直径(12.7mm) = 184kN
Zb =	$7.92x10^6$	mm^3				
Zt =	$7.86x10^6$	mm^3				
Wt =	3	KN/m^2				

承载力

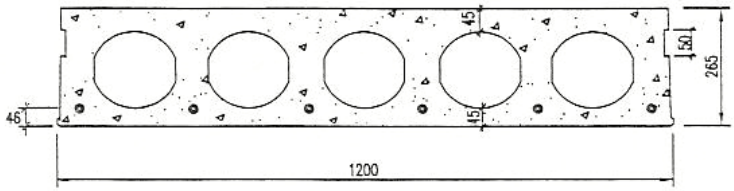
活载力，不包括横载力及面层附加横载力



面层

无面层

265mm 厚预应力中空楼板承载力图表

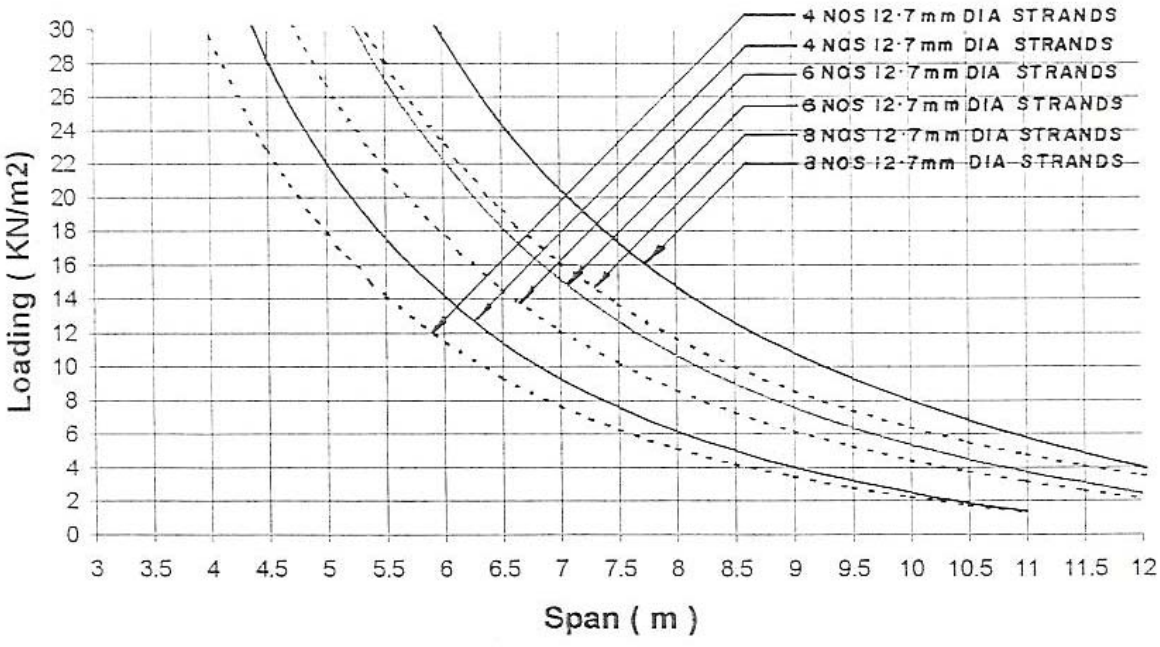


结面特性

无面层			面层			材料特性
A =	174239	mm^2	I' =	$2.65x10^9$	mm^4	楼板混凝土 = 50N/mm^2
I =	$1.52x10^9$	mm^4	Zb' =	$1.54x10^7$	mm^3	面层混凝土 = 30N/mm^2
Yb =	131	mm	Zt' =	$2.86x10^7$	mm^3	预应力钢绞极限强度，
Yt =	134	mm				直径(12.7mm) = 184kN
Zb =	$1.16x10^7$	mm^3				
Zt =	$1.14x10^7$	mm^3				
Wt =	3.4	KN/m^2				

承载力

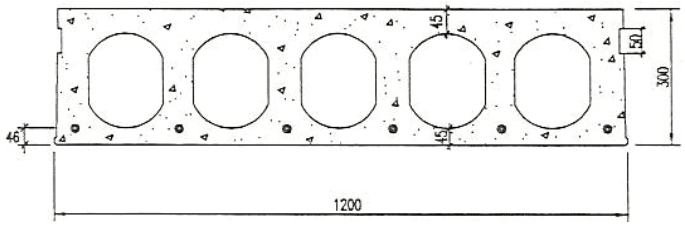
活载力，不包括横载力及面层附加横载力



面层

无面层

300mm 厚预应力中空楼板承载力图表

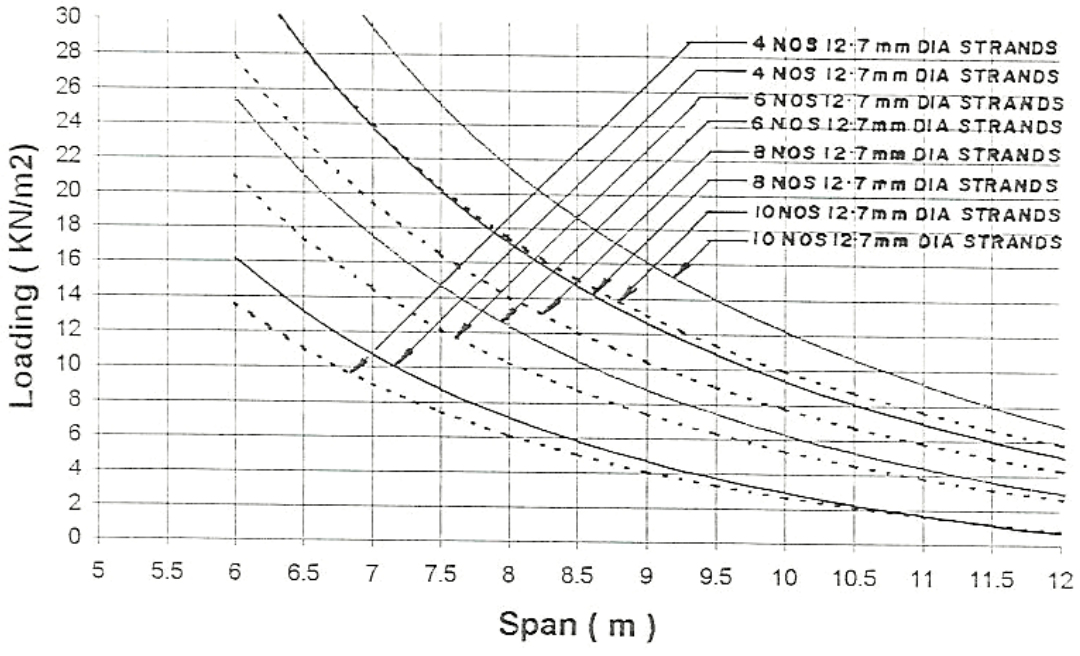


结面特性

无面层			面层			材料特性
A =	200923	mm^2	I' =	$3.65x10^9$	mm^4	楼板混凝土 = 50N/mm^2
I =	$2.21x10^9$	mm^4	Zb' =	$1.92x10^7$	mm^3	面层混凝土 = 30N/mm^2
Yb =	149	mm	Zt' =	$3.31x10^7$	mm^3	预应力钢绞极限强度，
Yt =	151	mm				直径(12.7mm) = 184kN
Zb =	$1.48x10^7$	mm^3				
Zt =	$1.47x10^7$	mm^3				
Wt =	3.95	KN/m^2				

承载力

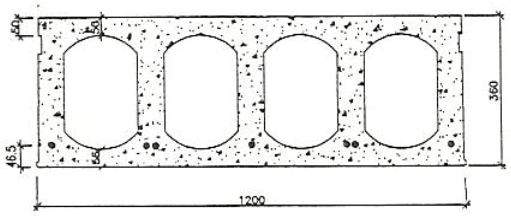
活载力，不包括横载力及面层附加横载力



面层

无面层

360mm 厚预应力中空楼板承载力图表



结面特性

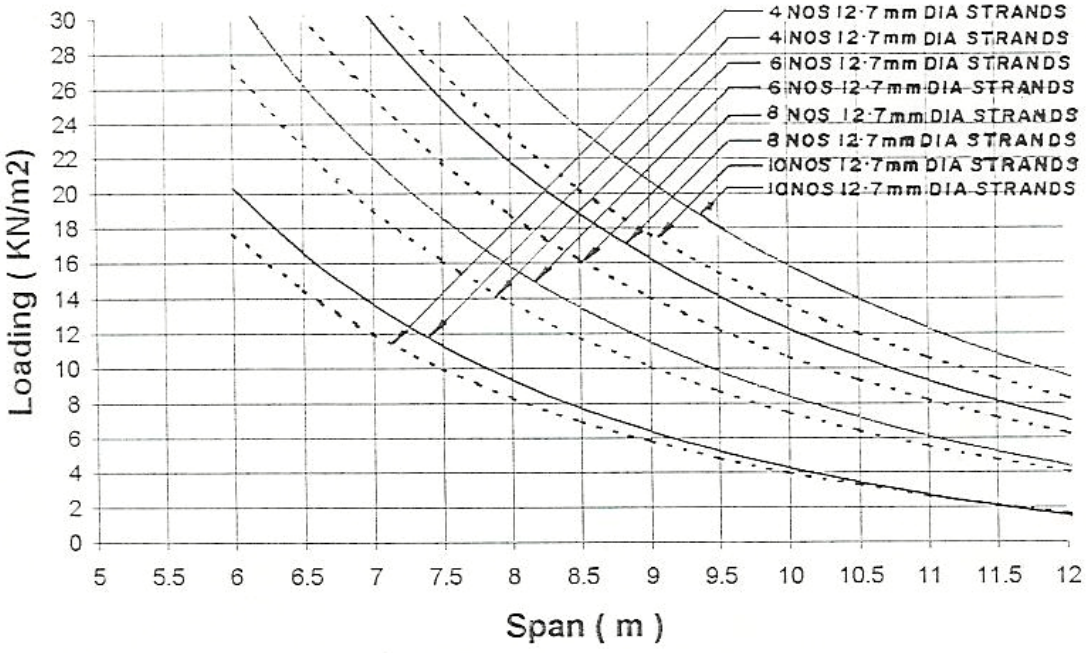
无面层			面层		
A =	216430	mm^2	I' =	$5.48x10^9$	mm^4
I =	$3.48x10^9$	mm^4	Zb' =	$2.45x10^7$	mm^3
Yb =	179	mm	Zt' =	$4.03x10^7$	mm^3
Yt =	181	mm			
Zb =	$1.94x10^7$	mm^3			
Zt =	$1.92x10^7$	mm^3			
Wt =	4.26	KN/m^2			

材料特性

楼板混凝土 ＝ 50N/mm^2
面层混凝土 ＝ 30N/mm^2
预应力钢绞极限强度，
直径(12.7mm) ＝ 184kN

承载力

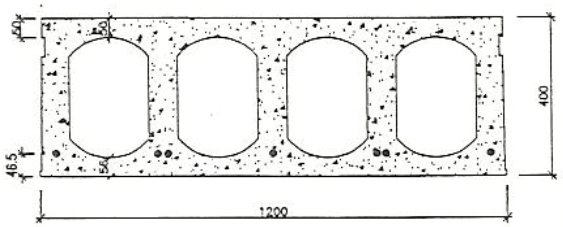
活载力，不包括横载力及面层附加横载力



——— 面层

- - - - - 无面层

400mm 厚预应力中空楼板承载力图表



结面特性

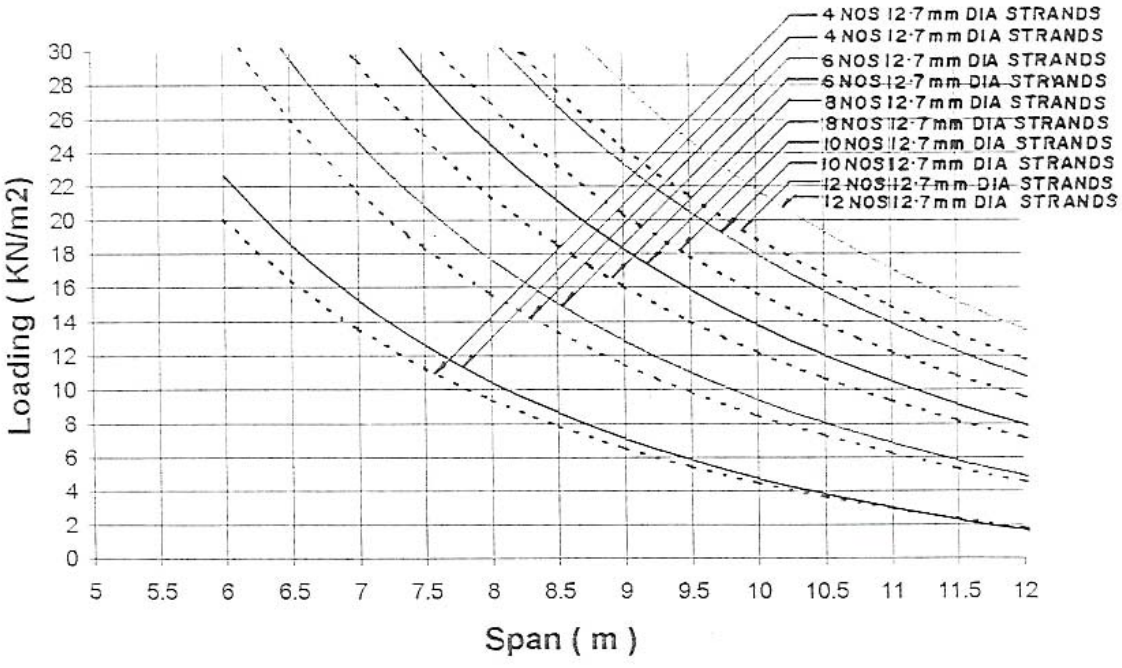
无面层			面层		
A =	249045	mm^2	I' =	$7.49x10^9$	mm^4
I =	$4.93x10^9$	mm^4	Zb' =	$3.12x10^7$	mm^3
Yb =	196	mm	Zt' =	$4.68x10^7$	mm^3
Yt =	204	mm			
Zb =	$252x10^7$	mm^3			
Zt =	$2.41x10^7$	mm^3			
Wt =	4.9	KN/m^2			

材料特性

楼板混凝土 = $50N/mm^2$
面层混凝土 = $30N/mm^2$
预应力钢绞极限强度，
直径(12.7mm) = 184kN

承载力

活载力，不包括横载力及面层附加横载力



面层

无面层