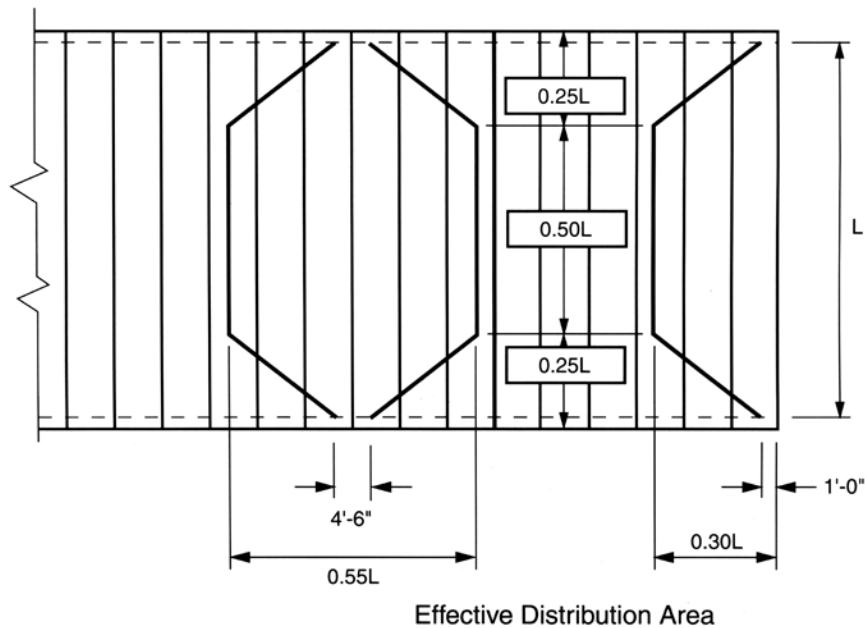


LOAD DISTRIBUTION

The Spancrete Manufacturers Association sponsored extensive research on the behavior of Spancrete® hollowcore plank subjected to non-uniform loads in the form of line loads and point loads, and the effect of openings.

It was determined from testing that non-uniform loads are resisted by multiple slabs and can be simply represented as a varying width of section, as shown below. This effective resisting section is used to determine peak moments and shears for design. The design method is similar to that presented in the PCI Design Handbook and the PCI Manual for the Design of Hollowcore Plank, except that testing on Spancrete plank established greater effective distribution widths as shown below. The relationship shown is applicable when the width to span ratio of the plank assembly is greater than 1.0.



A design example is given on the reverse side.

LOAD DISTRIBUTION

GIVEN:

8" Spancrete® hollowcore floor with loads as shown.

PROBLEM:

Determine the design loads, and check shear and flexure, for the plank example shown.

SOLUTION:

Flexural design is critical at midspan; use the maximum distribution width to find an equivalent uniform load

$$DW = 0.55L = 13.75 \text{ ft}$$

$$\text{Uniform: } w = 10 + 40 = 50 \text{ psf} \quad \text{Wall: } w = (700 + 1100) \div 13.75 = 131 \text{ psf}$$

$$M_w = (131 \times 8.5^2) \div 2 = 4732 \text{ ft}\#\text{/ft} \quad w_w = (8 \times 4732) \div 25^2 = 60.6 \text{ psf}$$

$$\text{Point Load: } w_p = 2 (2800 + 4400) \div (25 \times 13.75) = 42 \text{ psf} \quad \text{Total Equivalent Uniform Load} = 50 + 61 + 42 = 153 \text{ psf}$$

Use Spancrete series 8610 (3/4" clear cover, 10-3/8" 250 KSI strands)

Shear design is normally first evaluated at h/2 from the support.

$$DW = 4.5 + 0.333 (0.55L - 4.5) \div 6.25 = 4.99 \text{ ft. Use this width to distribute loads}$$

$$\text{Uniform: } W_D = 10 \text{ psf } w_L = 40 \text{ psf} \quad \text{Wall: } W_D = 700 \div 4.99 = 140 \text{ psf } w_L = 1100 \div 4.99 = 220 \text{ psf}$$

$$\text{Point: } P_D = 2800 \div 4.99 = 561 \text{ \#/ft} \quad P_L = 4400 \div 4.99 = 882 \text{ \#/ft}$$

Checking shear across the span using these distributed loads, we find that V_u is slightly greater than ϕV_c at h/2 ($\Delta V_u = 1.10$ k). The web shear capacity at this location can be increased by grouting cores (See Research Note 1007, "Shear Strength With Filled Cores").

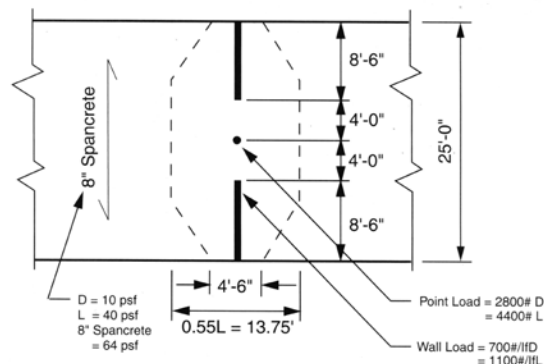
At $x = 2.38$, the shear capacity is also exceeded, but the loads can be recalculated using the wider distribution width at this location: $DW = 4.5 + 2.38(13.75 - 4.5) \div 6.25 = 8.02$ ft. Using this width, the revised loadings are:

Wall:	$w_{dl} = 700/8.02 = 87 \text{ PSF}$	$w_{ll} = 1100/8.02 = 137 \text{ PSF}$
Point Load:	$P_{dl} = 2800/8.02 = 349 \text{ PLF}$	$P_{ll} = 4400/8.02 = 549 \text{ PLF}$

Recheck shear and find that $V_u < \phi V_c$ at 2.38 ft. and at all points in the span beyond.

Additional information for Shear Design is provided in Research Note titled, "SHEAR STRENGTH".

Note: Sample calculations are intended to illustrate the concept presented and do not represent all considerations necessary for the complete. This research was done using 40" wide, 8" thick Standard Spancrete. However, this concept applies to all Spancrete cross sections.



EAST

Oldcastle Precast, Inc.
South Bethlehem, NY

Oldcastle Precast, Inc.
Manchester, NY

Conewago Precast Building Systems
Hanover, PA

MIDWEST
Spancrete, Inc.
Green Bay, WI

Spancrete Industries, Inc.
Waukesha, WI

Hanson Structural Precast
Midwest, Inc.
Maple Grove, MN

Spancrete of Illinois, Inc.
Arlington Heights, IL

WEST
Hanson Structural Precast
Pacific, Inc.
Inwindsale, CA

KIE-CON
Div. of Kiewitt Pacific Co.
Antioch, CA

Owell Precast
Sandy, UT

SOUTHWEST
Manco Structures, Ltd.
Schertz, TX

SOUTH

Cement Industries, Inc.
Fort Myers, FL

Florida Precast Industries, Inc.
Sebring, FL

MC Precast, Inc.
Atlanta, GA

CANADA
Burnco Concrete Products Ltd.
Calgary, Canada

EGYPT
Samcrete Egypt
Ahran, Giza

MEXICO
ITISA
Mexico City, Mexico

Spancrete Noreste
Monterrey, Mexico

TURKEY
Yapi-Merkezi
Camlica-Istanbul, Turkey

CARIBBEAN
Preconco Limited
Barbados, West Indies

Spancrete Caribbean, Ltd.
Trinidad, West Indies

UAE
Hi-Tech Concrete Products, LLC
Abu Dhabi, UAE

MACHINE MANUFACTURER
Spancrete Machinery
Corporation
Waukesha, WI

Spancrete is also manufactured in

Armenia	Denmark	Russia
Australia	Guatemala	South Korea
Belgium	Hungary	Spain
Brazil	Ireland	Switzerland
China	Israel	
Croatia	Japan	