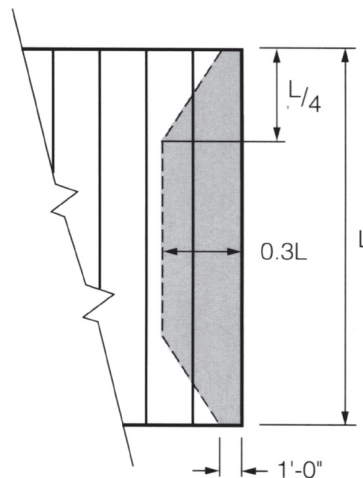


SHEAR DESIGN FOR EDGE LOADS

Research on load distribution has been a major part of the continuing testing program conducted by the Spancrete Manufacturers Association.



The shaded area represents the effective section carrying edge loads

FIGURE 1

CONCLUSIONS:

To account for torsional shear stresses in addition to direct shear stresses, it is recommended that an effective resisting section, as shown in Figure 1, be used to carry edge loads. The significant change from earlier recommendations is the reduction of the width at the support to one foot. Use of this resisting section will result in a prediction of the peak shear stress in the outermost webs.

A design example is given on the reverse side.

SHEAR DESIGN FOR EDGE LOADS

GIVEN:

An 8" x 40" Spancrete® hollowcore system as shown on the other side.
 L = 25'; self weight = 64 psf; uniform superimposed live load = 40 psf and dead load = 10 psf.
 A wall load on the outermost free edge represents line loads of 100 plf dead load and 350 plf live.

PROBLEM:

Select a prestressing level for the plank and check shear.

SOLUTION:

1. Select prestressing level on the basis of flexure

$$W_D = 10 + \left(\frac{100}{0.3 \times 25}\right) = 23 \text{ psf} \quad W_L = 40 + \left(\frac{350}{0.3 \times 25}\right) = 87 \text{ psf}$$

From load tables, use eight 3/8" dia. 250 k stands, with initial stress = 65% of ultimate and clear bottom cover = 3/4"

2. Check web shear at $h/2 = 0.33'$

$$W_u = 1.2 (10 + 64) + 1.6 (40) + \frac{1.2 (100) + 1.6 (350)}{DW} = 153 + 680/DW$$

$$DW = \frac{0.33}{6.25} (7.5 - 1) + 1 = 1.34'$$

$$v_u = \left(\frac{25}{2} - 0.33\right) \left(153 + \frac{680}{1.34}\right) = 8.04k' \quad \frac{v_u}{\phi} = \frac{8.04 \times 3.33}{.75 \times 17 \times 7.06} = .298 \text{ ksi}$$

$$v_{cw} = 3.5 \sqrt{f_c} + 0.3 f_{pc} \quad \text{Assume prestress loss} = 20\%, \text{ bearing} = 3"$$

$$f_{pc} = \frac{8 \times 20 \times .65 \times .8}{218} \left(\frac{3 + 4}{50 \times .375}\right) = .142 \text{ ksi (accounting for transfer length)}$$

$$v_{cw} = 3.5 \sqrt{4000} + 1000 + 0.3 (.142) = 0.264 < 0.298 \text{ NO GOOD}$$

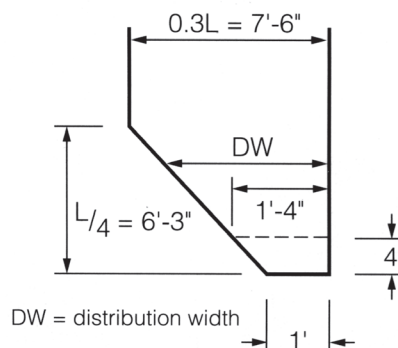
Web shear capacity can be increased by grouting cores, (See Reserach Note, "SHEAR STRENGTH WITH FILLED CORES").

3. Check inclined shear at 2.75' from support. Starting with the same load values at $h/2$; $\frac{v_u}{\phi}$ will be 241 psi and v_{ci} will be only 220 psi. Therefore, recalculate the loads as would be distributed at 2.75'.

$$DW = \frac{2.75}{6.25} (7.5 - 1) + 1 = 3.86' \quad W_u = 153 + 680 + 3.86 = 329 \text{ #/ft}$$

Now a new check of inclined shear will show shear is OK at all points.

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



MIDWEST

Hanson Structural
 Precast Midwest, Inc.
 Maple Grove, Minnesota

Spancrete, Inc.
 Green Bay, Wisconsin

Spancrete Industries, Inc.
 Waukesha, Wisconsin

Spancrete of Illinois, Inc.
 Arlington Heights, Illinois

Wells Concrete
 Wells, Minnesota

WEST

Hanson Structural
 Precast Pacific, Inc.
 Irwindale, California

KIE-CON

Division of Kiewit Pacific Co.
 Anitoch, California

Owell Precast
 Sandy, Utah

SOUTHWEST

Manco Structures, Ltd.
 Schertz, Texas

SOUTH

Cement Industries, Inc.
 Fort Myers, Florida

Florida Precast Industries, Inc.
 Sebring, Florida

EAST

Mid-Atlantic Precast, LLC.
 King George, Virginia

EGYPT

Samcrete Egypt
 Ahram, Giza

MEXICO

ITISA
 Mexico City, Mexico

Spancrete Noreste
 Monterrey, Mexico

CROATIA

Mucic & Co
 Dugopolje, Croatia

CARIBBEAN

Preconco Limited
 Barbados, West Indies

TURKEY

Yapi-Merkezi
 Camlica-Istanbul, Turkey

UAE

Hi-Tech Concrete
 Products LLC
 Abu Dhabi, UAE

MACHINE

MANUFACTURER
 Spancrete Machinery
 Corporation

N16 W23415 Stoneridge Drive
 Waukesha, WI 53188
 Telephone: 414-290-9000
 Fax: 414-290-9130
 www.spancrete-machinery.com

SPANCRETE IS ALSO MANUFACTURED IN:

Armenia	Ireland
China	Japan
Denmark	Russia
Guatemala	South Korea
Hungary	Switzerland

Spancrete® hollowcore is a registered trademark