ADAPT

STRUCTURAL CONCRETE SOFTWARE SYSTEM

ADAPT-PT/RC® v21

NEW FEATURES SUPPLEMENTAL MANUAL

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1 Introduction

This supplemental manual provides descriptions and instruction on ADAPT-PTRC's latest features. These new features have been introduced to meet the needs for general analysis/design, and reporting capabilities

1.1 Analysis/Design Improvements

Modeling of Openings near columns for punching (two-way) shear design: ADAPT-PTRC now includes an option to model openings or penetrations near columns and evaluates punching shear strength based on the reduced effective area of critical section. This feature is available only for ACI and Canadian codes.

Design Code Update: ADAPT- PTRC now includes the Australian Standard, AS 3600:2018.

More Economical Designs (ACI-318): The user now has an option to limit stud spacing to 3d/4, for PT or RC slabs, as per ACI-318 Table 8.7.7.1.2, instead of the conservative d/2 spacing. As a result, the number of calculated studs for columns where this adjustment applies will be less resulting in a more economical punching shear design solution.

1.2 Reporting Improvements

Enhanced Base Reinforcement Reporting: The Base reinforcement report is extended to include new tabular report, 10.3.3 Stirrups, that reports stirrups as modeled by the user in the Base Reinforcement input dialog. This report is available only for one-way and beam models.

2 Analysis/Design Improvements

2.1 Modeling of Openings near columns for punching (two-way) shear design.

Openings in RC and PT two-way slabs are critical factors that impact the punching shear strength of the slab. Openings next to columns reduce the concrete area that resist punching shear and can significantly reduce the slab's shear capacity. Therefore, the presence of opening must be considered in punching shear design.

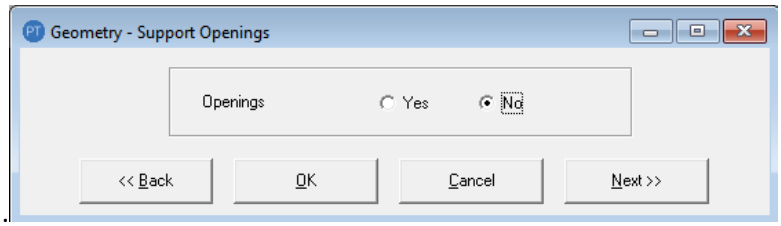
ADAPT-PTRC now includes an option to model openings or penetrations near columns and evaluate punching shear strength based on the reduced effective area of the critical section. This feature is available only for ACI and Canadian codes.

Openings included in ADAPT-PTRC are only considered in calculation of punching shear strength and have no effect on analysis or flexural design.

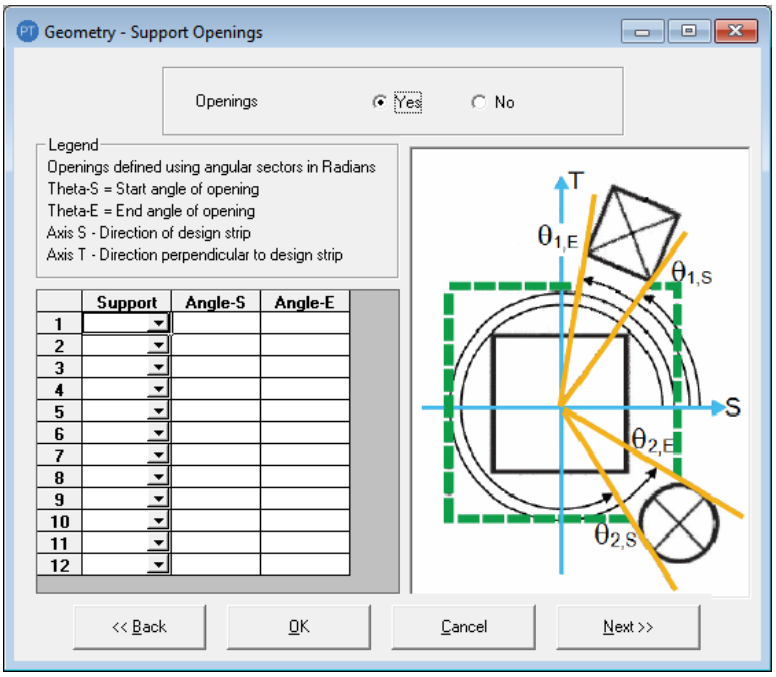
In ADAPT-PTRC, a support opening is modeled as an angle of reduction enclosed by two straight lines projecting from the centroid of the column and tangent to the boundaries of an opening. The portion of critical section, b0, enclosed by angle of reduction is considered ineffective.

2.1.1 To Model Support Openings

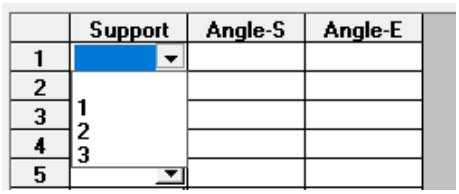
Within PTInput, open the ***Geometry - Support Openings*** dialog. You can access the dialog by clicking *Next* in the ***Supports - Boundary Conditions*** dialog, or *Back* in the ***Loads*** dialog. Alternatively, the dialog can be opened by going to *Geometry->Openings* from the menu items. The dialog will not be available if the *No Columns* option is selected in the ***Support Geometry and Stiffness*** dialog. The default setting for *Openings* is *No* as shown in the dialog below



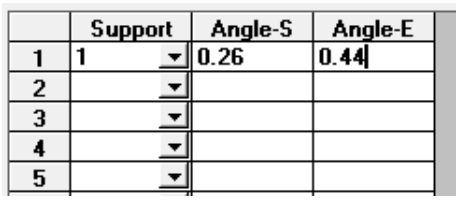
Select Yes to open the input table shown in the following figure.



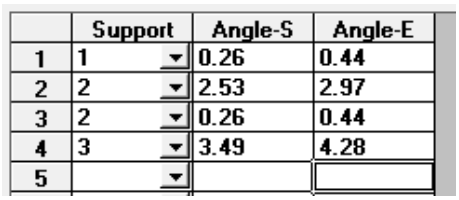
Select the support ID from the drop-down list.



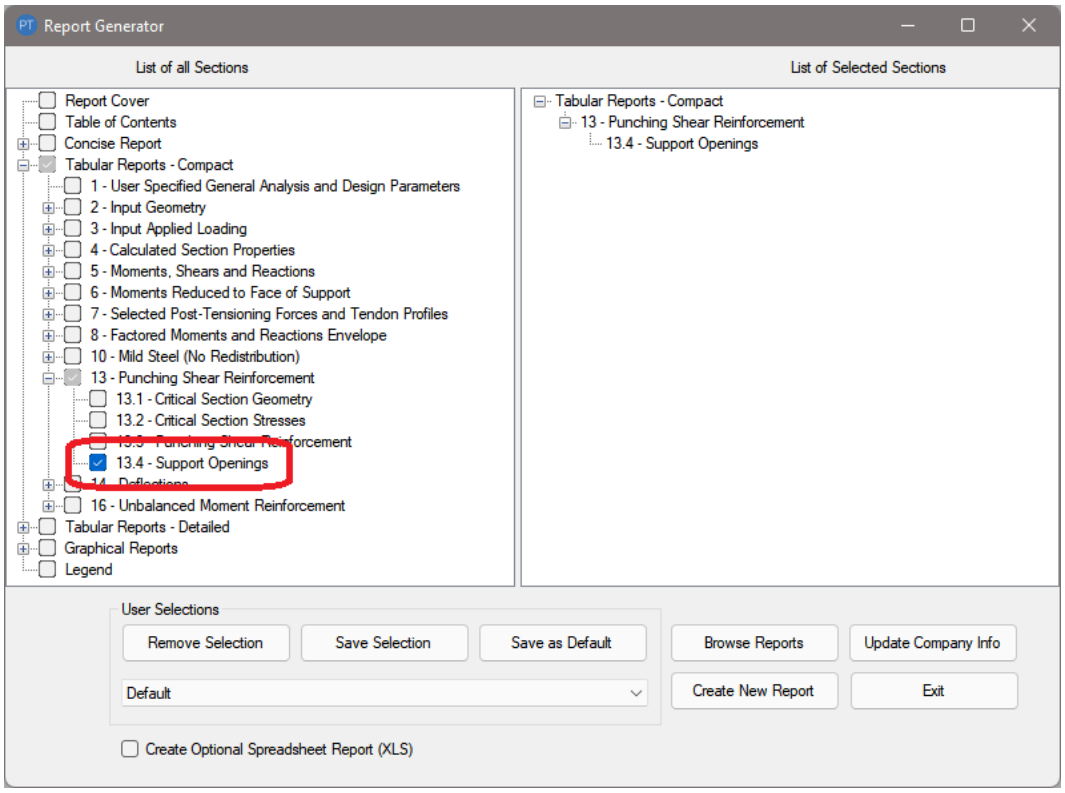
Enter the value for Angle-S in radians measured counterclockwise from local S axis to the first projection line. Enter the value for Angle-S in radians measured counterclockwise from local S axis to the second projection line.



Each row in a table represents one opening. You can modify multiple openings per support by repeating the same support ID in a different row. Note that the location of local s axis is in the direction of span.



Support openings are not displayed graphically. The openings can be viewed in a tabular report by generating the *13.4 Support Openings* report found in the ***Tabular Reports – Compact*** tree of the ***Report Generator*** as shown below.



13.4 Support Openings

Col.	Opening	Theta-S	Theta-E
		Rad	Rad
1	1	0.26	0.44
2	1	2.53	2.97
2	2	0.26	0.44
3	1	3.49	4.28

2.2 Design Code Update

ADAPT- PTRC now includes the Australian Standard, AS 3600:2018.

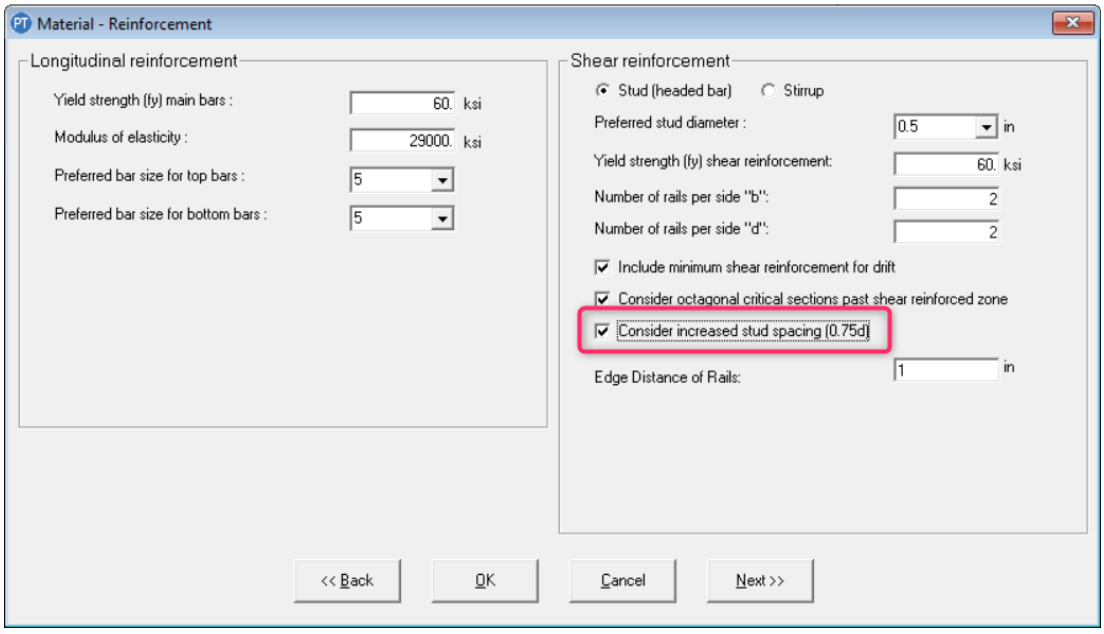
2.3 More Economical Designs (ACI-318)

The user now has an option to limit stud spacing to 3d/4, for PT or RC slabs, as per ACI-318 Table 8.7.7.1.2, instead of the conservative d/2 spacing. As a result, the number of calculated studs for columns where this adjustment applies will be less resulting in a more economical punching shear design solution.

Table 8.7.7.1.2—Shear stud location and spacing limits

Direction of measurement	Description of measurement	Condition		Maximum distance or spacing, in.
Perpendicular to column face	Distance from column face to first peripheral line of shear studs	All		$d/2$
	Constant spacing between peripheral lines of shear studs	Nonprestressed slab with	$v_u \le \phi 6\sqrt{f'_c}$	$3d/4$
		Nonprestressed slab with	$v_u > \phi 6\sqrt{f'_c}$	$d/2$
		Prestressed slabs conforming to 22.6.5.4		$3d/4$
Parallel to column face	Spacing between adjacent shear studs on peripheral line nearest to column face	All		$2d$

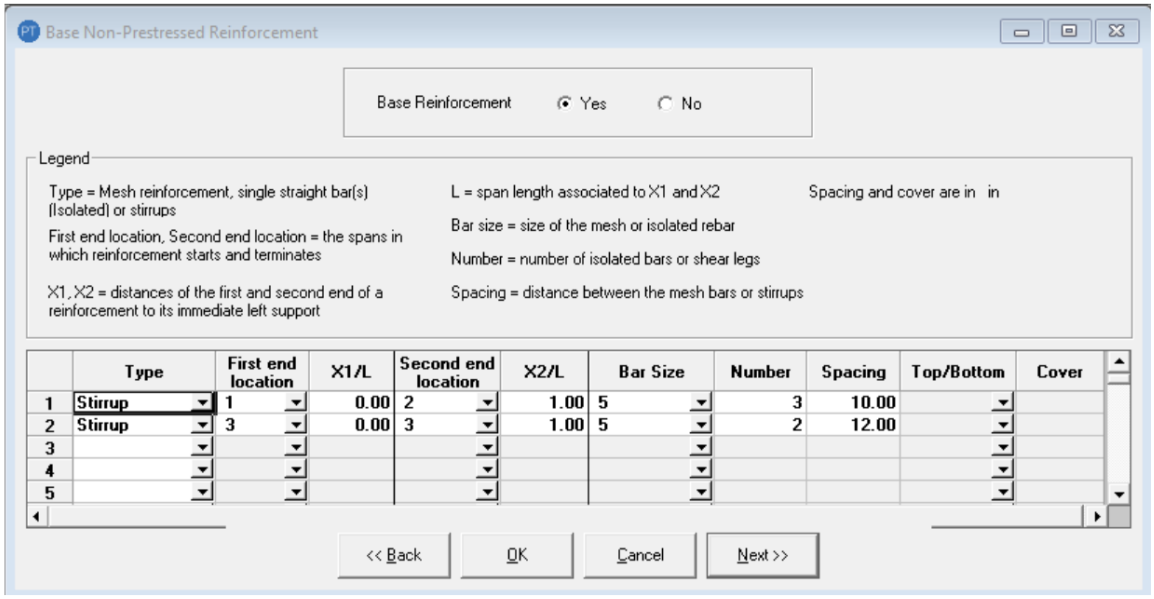
To invoke this option, select **Consider increased stud spacing (0.75d)** option in the Material-Reinforcement input dialog. The program considers this spacing only for columns where this adjustment is allowed per design code, for other columns the d/2 spacing will be used instead.



3 Reporting Improvements

3.1 Enhanced Base Reinforcement Reporting

The Base reinforcement report is extended to include new tabular report, 10.3.3 Stirrups, that reports stirrups as modeled by the user in the Base Reinforcement input dialog. This report is available only for one-way and beam models.



10 - MILD STEEL - NO REDISTRIBUTION

10.3 - Base Reinforcement
10.3.3 Stirrups

Span	From	Legs	Size	Spacing	Length	Area
--	ft	--	--	in	ft	in2
1	.00	3	5	10.00	46.34	.93
3	.00	2	5	12.00	22.75	.62