How to model construction joints in StructurePoint's pcaMats program?

In mat foundations and slabs on grade, construction joints are typically required to transfer vertical shear force between adjacent concrete placements. Transfer of moments across the joint may or may not be required. There are two possible ways to model a construction joints in pcaMats to analyze and design a concrete foundation where only shear is transferred and moment is not.

1. Introduce weak elements characterized by a narrow width at the location of the joint. In the illustration below, define a thin element with a low modulus of elasticity for the construction joint B that connects concrete block A and C. Since B is very flexible, moment transferred between blocks A and C is negligible.
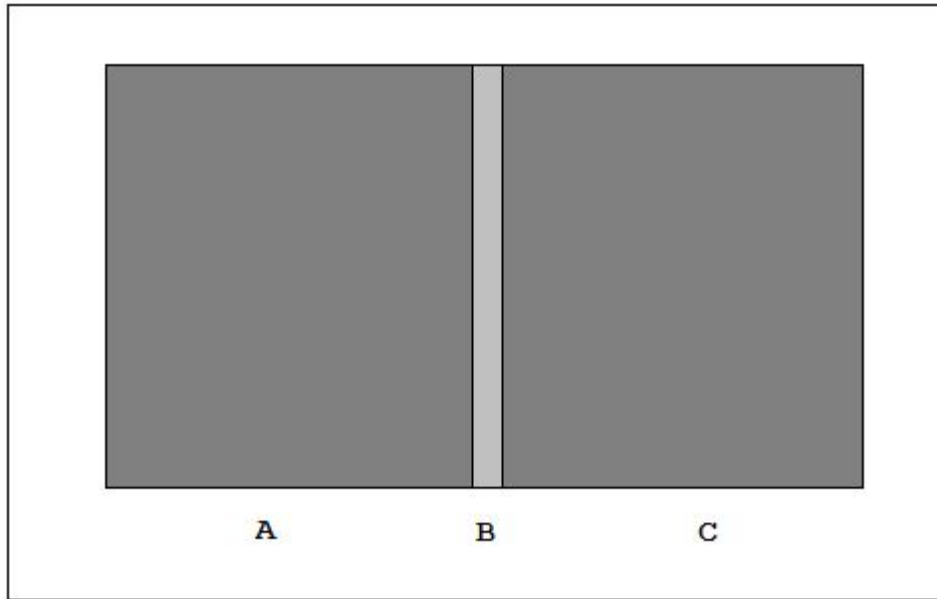


2. If dowels are employed to transfer shear they may be modeled by slaving node pairs in the direction of Dz (vertical displacement). In the illustration below, there are three dowels along the joint being modeled. Node pairs A-B, C-D, E-F may be slaved, respectively. Since nodes are slaved in Dz only, only shear force is transferred. It is recommended that three separate slaved node criteria are defined and assigned to the three node pairs, respectively. If only one slaved node criteria is defined and assigned to all the six nodes, then all the nodes will be forced to share the same displacement after the model is solved and this approach is not recommended.
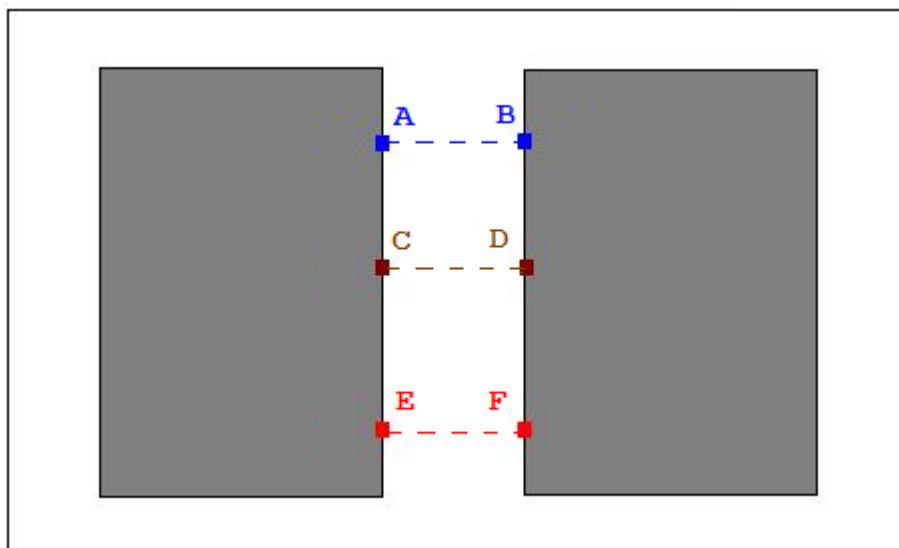


pcaMats is an engineering software program for analysis, design and investigation of foundation mats, combined footings, or slabs on grade. The slab is modeled as an assemblage of rectangular finite elements. The boundary conditions may be the underlying soil, nodal springs, piles, or translational and rotational nodal restraints. For more information please visit www.StucturePoint.org. pcaMats is a registered trademark of the Portland Cement Association and is used by StructurePoint under license.