rotation but no translation in either horizontal or vertical directions.

604.03 VERTICAL EXPANSION RESTRAINERS

Vertical expansion restrainers consist of cable and appropriate hardware and are designed to allow rotation and longitudinal translation but no transverse translation. Some limited vertical displacement is allowed to permit replacement of bearings if required.

604.04 EXTERNAL SHEAR KEYS

External shear keys are reinforced concrete blocks designed to limit transverse displacement while allowing longitudinal and rotational movements. External shear keys are preferred to internal shear keys since they are more accessible for repairs and easier to construct.

604.05 INTERNAL SHEAR KEYS

Internal shear keys are reinforced concrete blocks designed to limit transverse displacement while allowing longitudinal and rotational movements.

604.06 KEYED HINGE

A keyed hinge is a restraining device which limits displacements in both horizontal directions while allowing rotation.

For a typical expansion seat abutment where restraining devices are required, the restraining devices will consist of vertical expansion restrainers and external shear keys.

For a typical pinned seat abutment for a post-tensioned box girder bridge, restraining devices will consist of vertical fixed restrainers and external shear keys. For a typical pinned seat abutment for a prestressed girder bridge, restraining devices will consist of vertical fixed restrainers and external or internal shear keys.

For a typical expansion pier, restraining devices will consist of vertical expansion restrainers and internal shear keys.

For a typical pinned pier, restraining devices will consist of vertical fixed restrainers and internal shear keys or a keyed hinge.