II. EXTERNAL SOIL AND WATER LOADS:

A structure buried underground will experience loads from the soil. If water is in the area it will add some load to the horizontal force of the soil. The horizontal force increases as depth increases so walls designed for shallow depths cannot be used at deeper levels. The common practice is to design for the deepest wall and make all risers the same design. While this is uneconomical, it helps to avoid the possibility of a weak riser due to improper placement in the field.

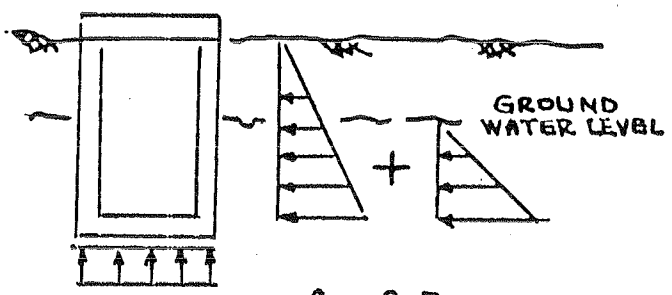

fig. 2-3

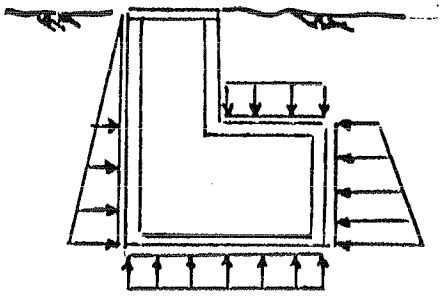

fig. 2-4

III. INTERNAL LIQUID LOADS:

The previous discussion included only external loads. When a structure is filled with liquid, the horizontal forces of the liquid are opposite to external forces. Thus the wall does not experience the external loads for which it was designed. The structure, however, must be designed to restrain external loads (without reduction of interior loads) even though in some cases the container will be storing liquids most of its life. The reason is that during installation the walls may experience external forces only (as in fig. 2-3) and cracking may occur before the liquid is in place.

When the structure is completely buried, internal forces must be calculated to make sure they do not exceed external forces. When the structure is above ground, there are no external resisting forces and it is important that the structure be designed for the internal forces. In the case of partially buried structures, it is best to design all walls for both internal and external forces.

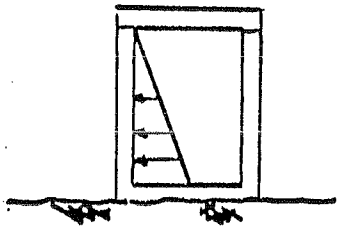

fig 2-5

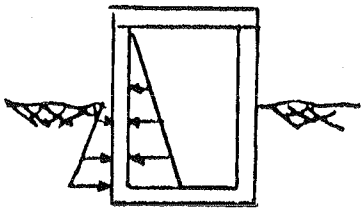

fig 2-6

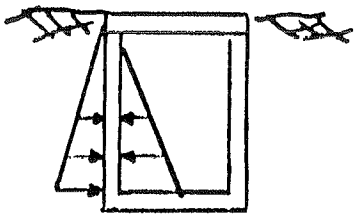

fig 2-7