

Penetrations of the LCLS Injector Shield Wall at Sector 20¹

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Penetrations through the LCLS injector shield wall are needed for the alignment of the accelerator, a diagnostic laser beam and utilities, and are shown in figure 1. The 1" diameter LCLS injector beam tube is blocked by the PPS stopper when the injector side of the wall is occupied. The two 3" diameter penetrations above and to the left of the beam tube are used by Precision Alignment and will be open only during installation of the injector beamline. Additional 3" diameter penetrations are for laser beams which will be used for electron beam diagnostics. These will not be plugged when the injector occupied. Other penetrations for the RF waveguide and other utilities are approximately 13" from the floor and as such are far from the line-of-sight of any radiation sources. The waveguide and utility penetrations pass only through the thicker wall as shown in the figure.

The principal issue is with the two laser penetrations, since these will be open when the linac is operating and people are in the LCLS injector area. A principal concern is radiation streaming through the penetrations due to direct line-of sight of the PEP-2 lines. To answer this, fans of rays were traced through the 3" diameter laser penetrations as shown in Figures 2 and 3. Figure 2 gives the top view of the shield walls, the main linac and PEP-2 lines, and the ray-fans. The fans appear to originate between the walls since their angular envelope is defined by the greatest angle possible when rays are just on the 3" diameter at the inner most and outermost wall surfaces. The crossovers of all possible rays lie half way between these two surfaces. As the end-on view of Figure 3 clearly shows, there is no direct line-of-sight through the laser penetrations of the PEP-2 or linac beamlines.

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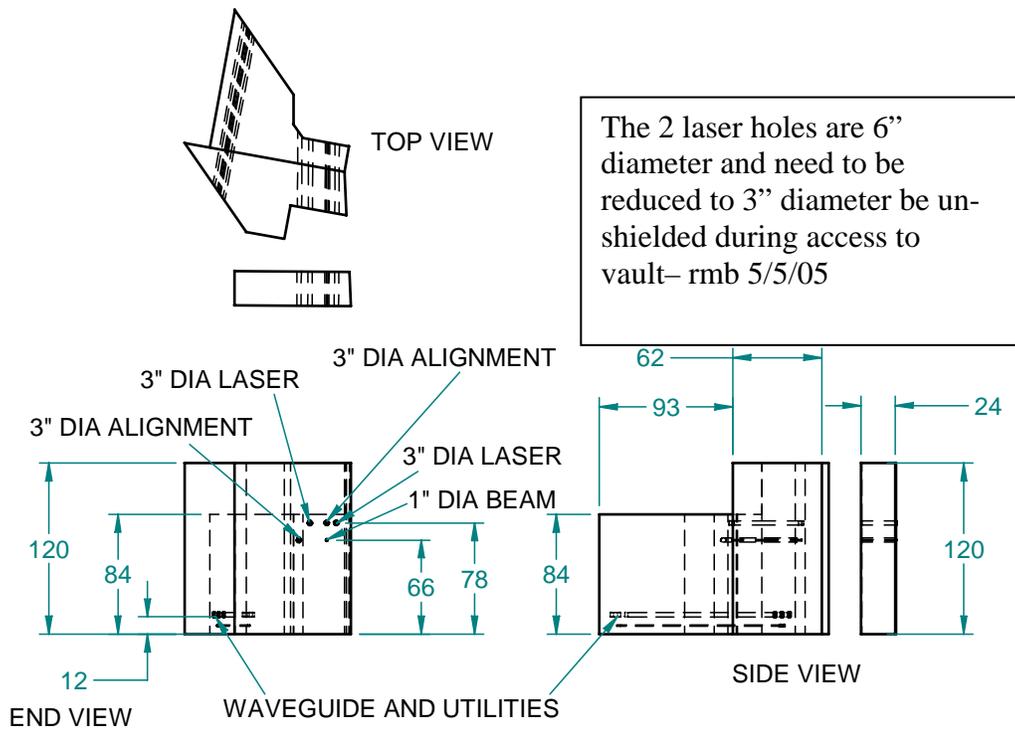


Figure 1. Top and end views of the penetrations through the LCLS injector shield walls.

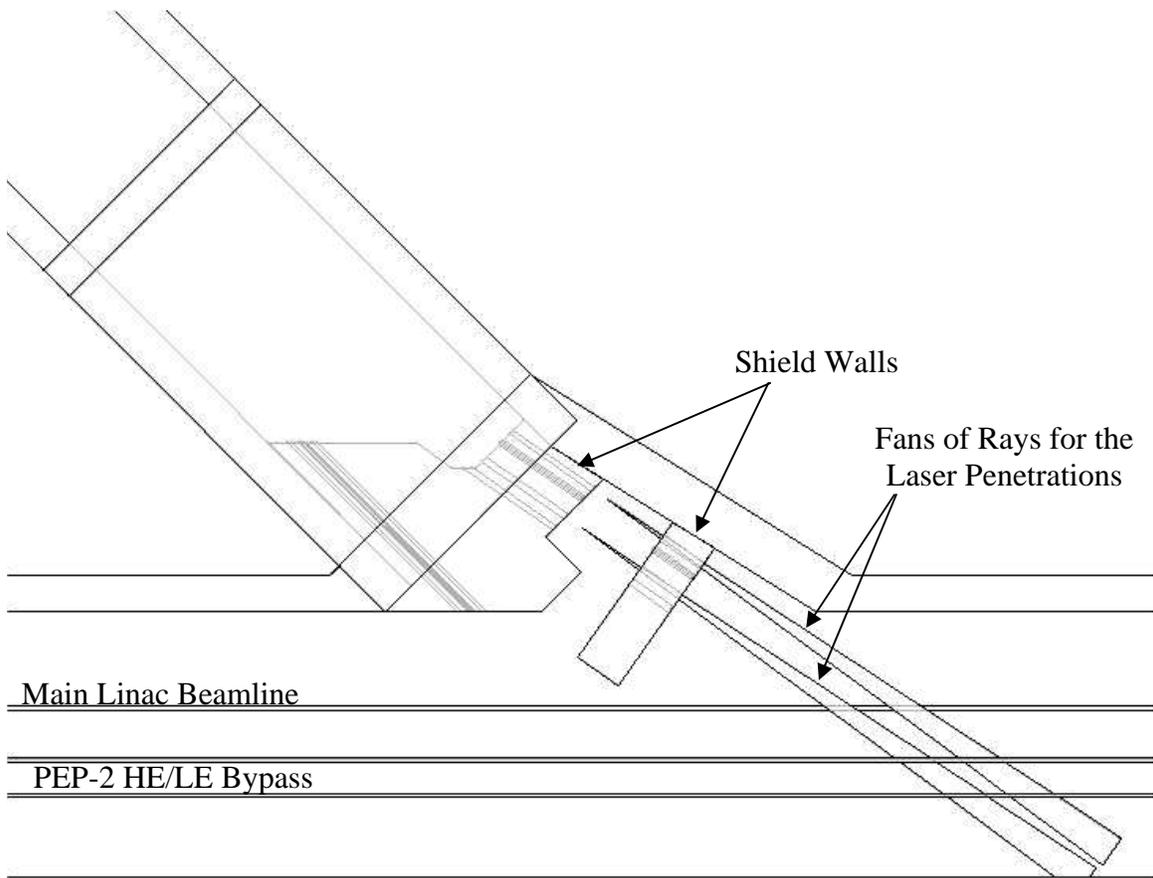


Figure 2. Top view of the shield walls with fan of rays through the laser penetrations.

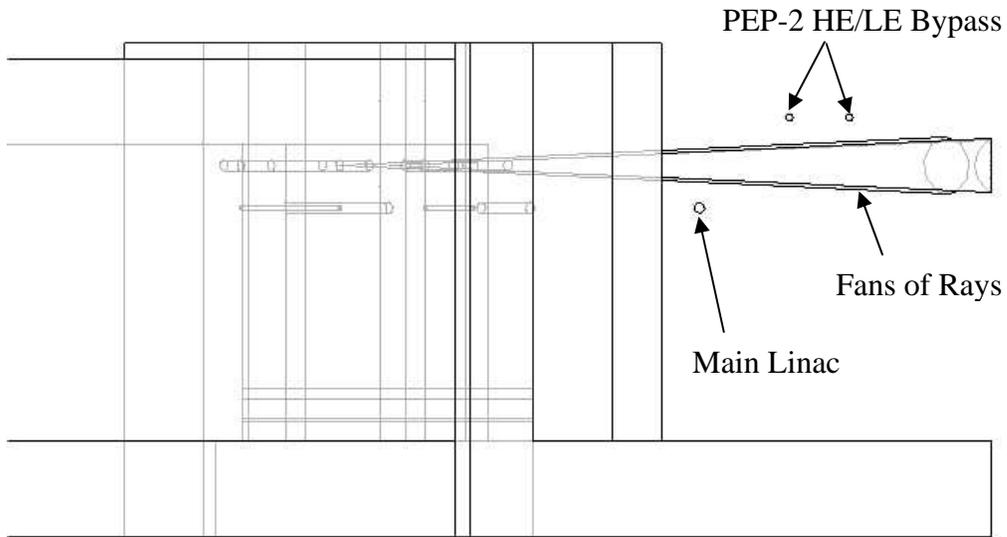


Figure 3. End view of the LCLS injector shield wall region looking down the beamline along the main linac.