A New Lattice for the Main Injector

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This paper discusses some ideas in regard to lattice changes for the Main Injector. Prior to the workshop a technical review of the Main Injector project had recommended that some symmetry be reintroduced into the Main Injector design. The assymetric design of the Main Injector had come about because of an interest in providing a variety of potential extraction locations which would allow new experimental areas. In a sense, the assymetric design was an exercise in demonstrating that straight sections could point in almost any direction. The interest in these auxilliary experimental areas has waned and furthermore, the changes do not rule them out. A second reason for the assymetry was to point the abort lines away from the site boundary. At one point the Main Injector was considered a proton - proton machine. The straight section for the clockwise rotating proton beam had been moved so that it did not point toward the site boundary at a location close to the Main Injector. But this is now the direction of the antiproton beam in the Main Injector. The straight section which will be used for the proton abort in the new design runs parallel to the site boundary.

The lattice prior to the Breckenridge workshop was designated MI_11. Figure 1 indicates magnet placement for this design. As can be seen, this MI lattice had no cells between the rf straight and the extraction straights, while on the opposite side of the ring there were two cells between the rf style straight and the extraction straights. The new design (designated as MI_14) has one cell between the rf straight and the extraction straights on both sides of the ring. A slight rotation of the 8 GeV proton injection straight was done in order to make this insertion symmetric. This layout is shown in Figure 2. The lattice functions do not change because each of the segments are matched at each end. The beamlines are around 35 meters longer, although they each require 4 additional bending magnets. For reasons relating to the beamlines, this design places the elevation of the MI at the Tevatron elevation. This version is now the favored design.

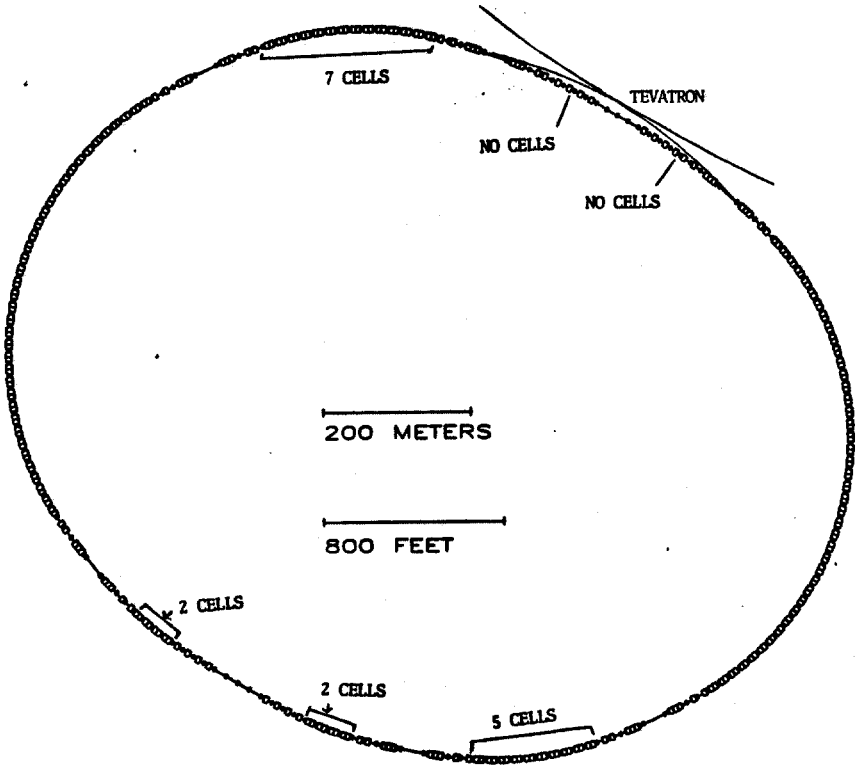


Figure 1: Magnet Placement in Design MI_11

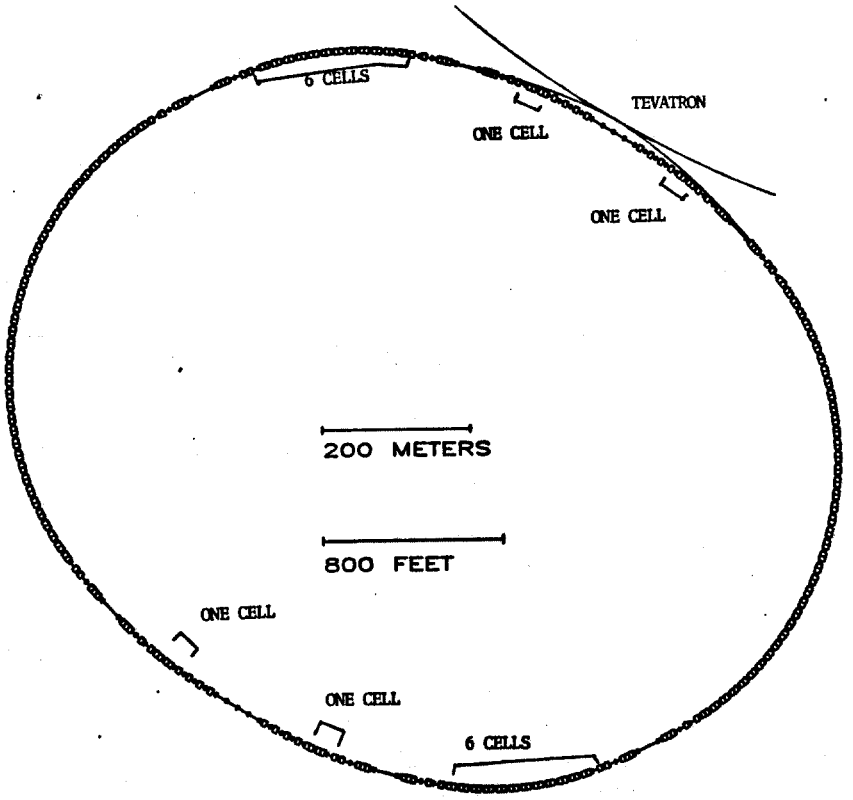
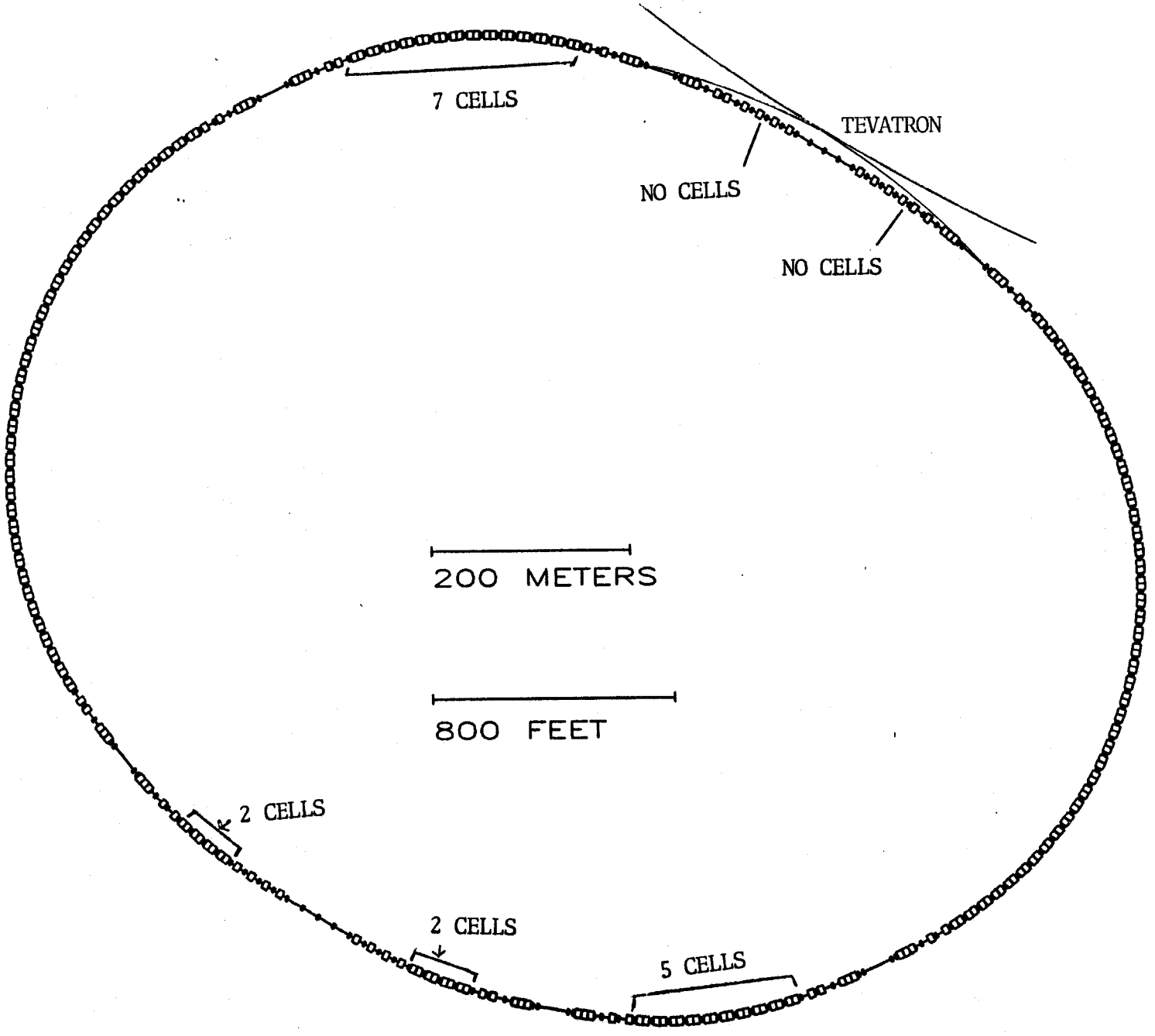
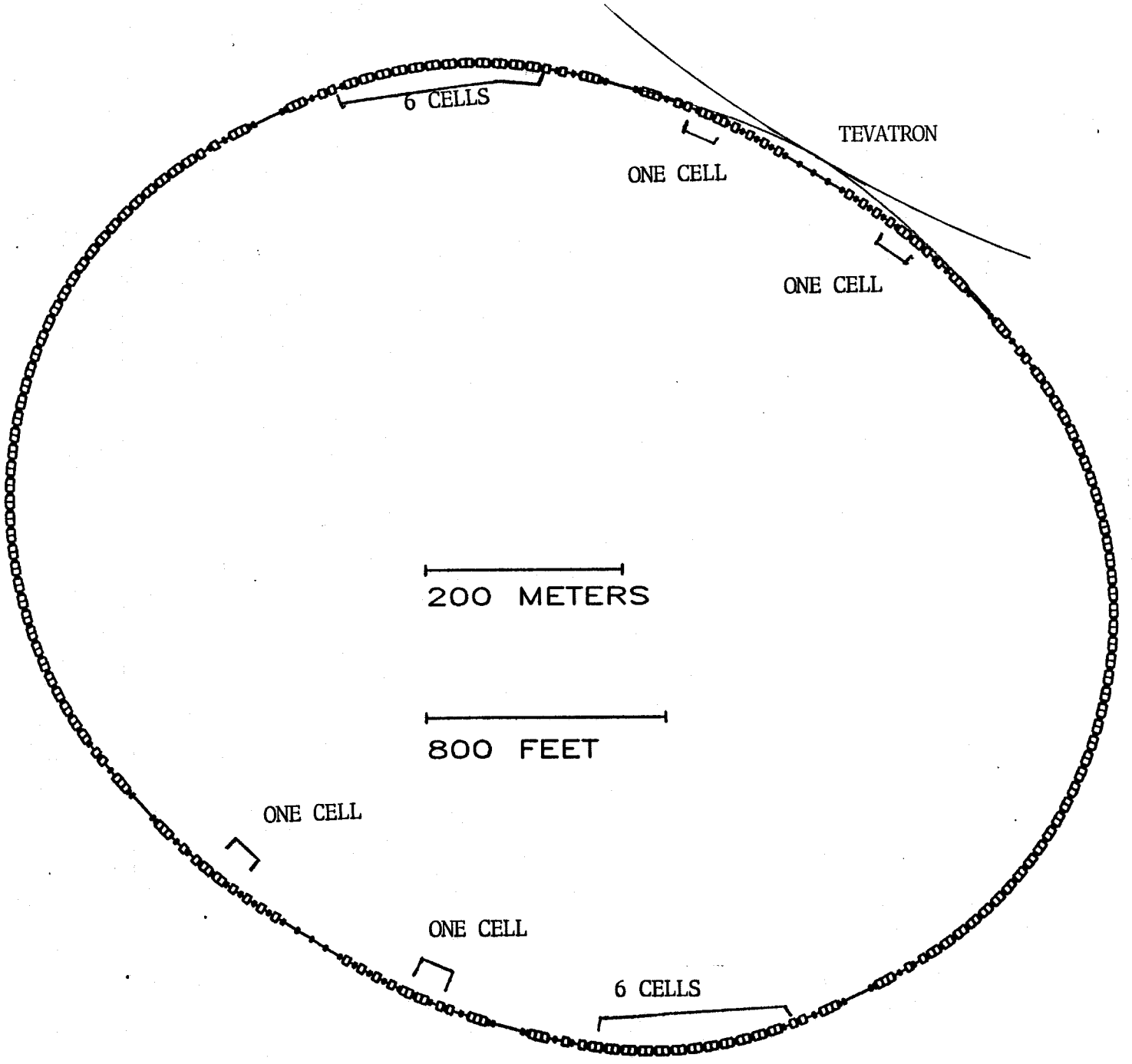


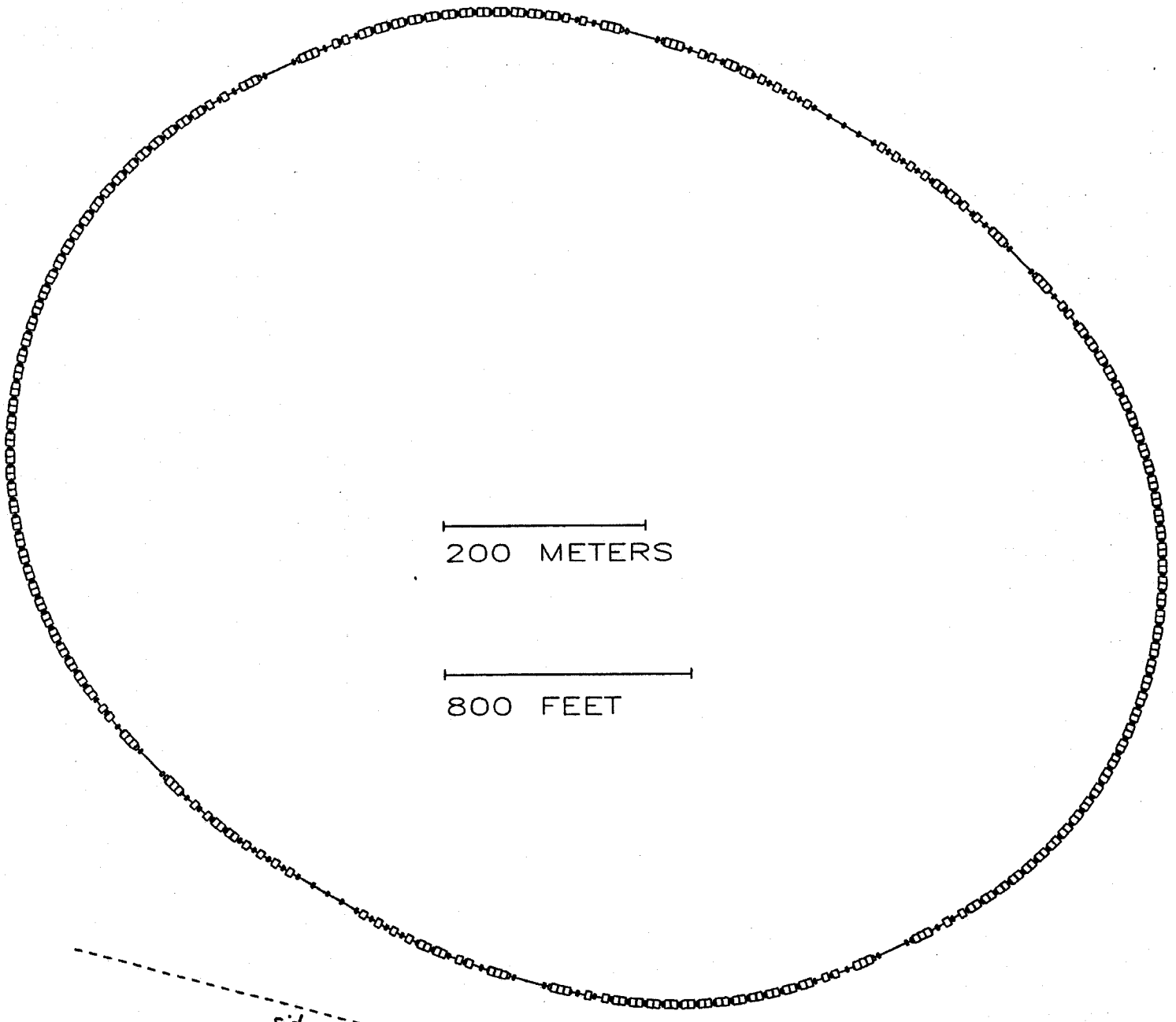
Figure 2: Magnet Placement in Design MI_14


7 CELLS
TEVATRON
NO CELLS
NO CELLS
200 METERS
800 FEET
2 CELLS
2 CELLS
5 CELLS

MI_11.2 6/28/89


6 CELLS
TEVATRON
ONE CELL
ONE CELL
200 METERS
800 FEET
ONE CELL
ONE CELL
6 CELLS

MI_14.1 8/20/89



MI_14.1 8/20/89