March 2010 Puzzle

Joe Mathematician has a valuable rug that was severely damaged by his 3 year old son. The rug is rectangular with dimensions 12 feet by 9 feet. Joe’s plan is to cut out an 8 foot by 1 foot rectangular section from the center of the carpet where the damage was (see the figure to the right). Joe will then cut the rug into two pieces that will fit together perfectly in order to make a square rug with a length of 10 feet per side. Of course Joe will not want to turn over either piece of the carpet. How will Joe cut the carpet to achieve this?

In the figures to the right, each grid box has dimensions 1 ft by 1 ft. The top figure shows where the cuts are to be made (along the white lines). The two shades of grade have been used to clearly show the two pieces that the carpet is cut into. The bottom figure shows the reassembled rug.