4.6. Dead Load Effects

The dead load effects on the pier cap beam and columns were obtained by first applying the self-weight of the superstructure plus the 20 lb/ft^2 allowance for construction tolerances and construction methods as uniformly distributed loads on the superstructure [Brown, 1993]. The 20 lb/ft^2 allowance was turned into a uniformly distributed load by multiplying it with the width of the superstructure, which is 528.375 in. for the WB bridge and 676.25 in. for the EB bridge. This analysis didn't produce accurate dead load effects on the pier cap beam and the columns, because the rigid link only connected the midpoint of the superstructure to the midpoint of the pier cap beam, and therefore it produced erroneously high axial loads on the middle column and erroneously low axial loads on the leftmost and rightmost columns. So, to get more accurate results, the axial load on the rigid link due to the self-weight of the superstructure and the 20 lb/ft^2 allowance was divided by the number of steel girders for the superstructure, which was five for the WB bridge and six for the EB bridge. An analysis was performed on the pier structure, in which the pier cap beam was subjected to as many point loads as the number of the number of steel girders for the superstructure, plus the self-weight of the pier cap beam and the columns. This is shown in Figure 4.10.

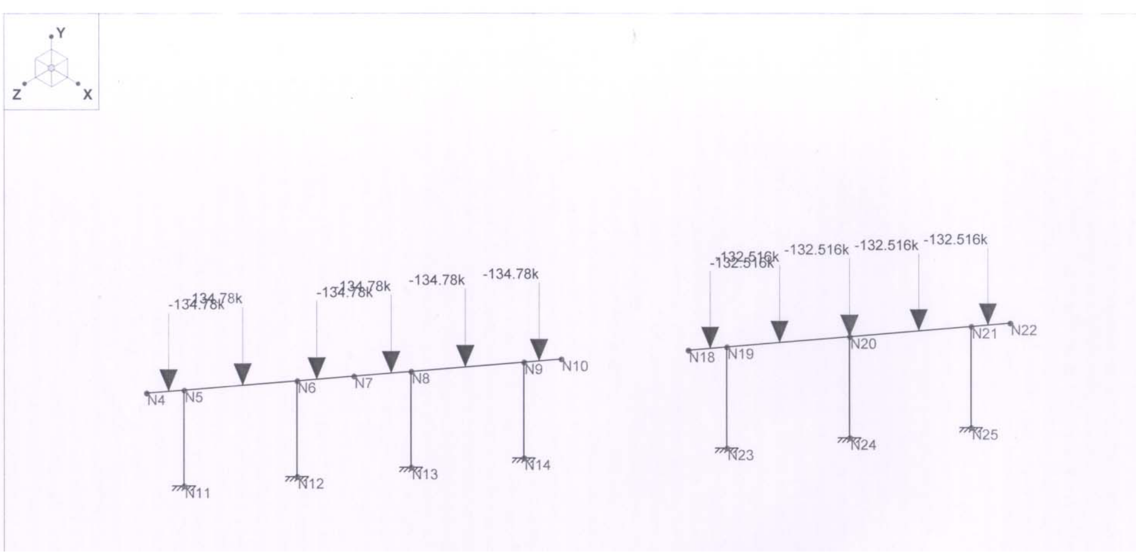

Figure 4.10. The loading on the pier performed to get more accurate dead load effects on the pier cap beam and columns. The numbers shown are not the results of any calculation.

4.7. Live Load Effects

The live load effects were found by adding the maximum effects from the three moving live load cases to the lane load effects. The three moving live load cases and the lane load are shown in Figure 4.11, which is similar to Figure 3.11, except that the units in the Figure have to be converted to the US Customary units. The lane load is the 9.3-N/mm (640-lb/ft) distributed load. The case that always controlled was the third, which was the two-truck case. Each of these moving live load cases was run along the superstructure, and the largest produced axial load on the rigid link was used to run an analysis on the pier similar to that for the dead loads. The same procedure was also used to get the lane load effects.

The maximum effects of the three moving load cases, which was always the two-truck case for this bridge, was combined with the lane load effects by using the

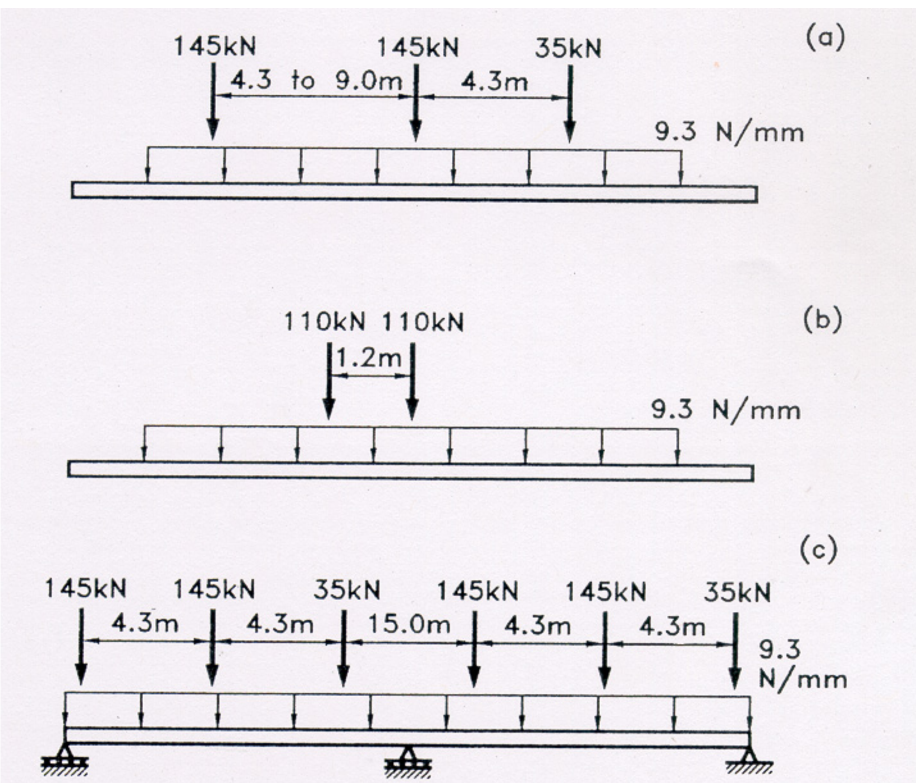

Fig. 4.1 The AASHTO design loads.

Figure 4.11. The three moving live load cases and the lane load [Barker and Puckett, 1997].