A simply supported beam has a 22 ft span and needs to carry a 50 k concentrated moving live load, a 2.0 k/ft uniformly distributed live load and 1.5 k/ft uniformly distributed dead load (in addition to the weight of the beam). The end reactions are to be transmitted to 8-inch thick concrete walls with a 28-day compressive strength of $f'_c=3,500$ psi. Design the lightest weight W section for the beam using A992 steel (see AISC p. 2-39). Check for flexure according to AISC Chapter F and for shear according to Chapter G. Design also the bearing plate for each end reaction with the restriction that there should be at least one inch space between the edges of the wall and the bearing plate (i.e. the length N of the bearing plate cannot be more than 6 inches long). Use A572 Grade 50 steel for the bearing plate. Check web yielding and web crippling according to AISC J10, concrete bearing strength according to AISC J8, and compute the required bearing plate thickness according to AISC Chapter F. If the web strength is not sufficient, design bearing stiffeners according to AISC J10.8. Note that bearing stiffeners are usually designed from plates that are approximately the same thickness as the web and are welded to the web on one side or both sides of the web. The width of bearing stiffeners should allow at least one inch space to the toe of the flange.

![Diagram of the beam and reactions](image-url)