Prob. 1 – The elevation view of a wall is shown below with the attributed service level loads (lateral wind and gravity). The concentrated load shown for the gravity loads is actually uniformly applied over the width of the wall at the story elevations. For this problem, concrete is $f'_{c}=4000$ psi and ASTM A615 Grade 60 reinforcing steel are to be used in the design. The architect requests that the maximum wall thickness be set to 10 in. Reinforcing is fully distributed with #4’s at 18 in. on-center vertically and #5’s at 18 in. on-center horizontally. Shear walls are also located in the direction perpendicular to this wall so that the building is nonsway in and out of the plane of the wall. Lastly, the wall is restrained against rotation out-of-plane at the floor levels and foundation.

a) Ignore the lateral forces and assume the eccentricity of the axial compression load is 1 in. Determine the design axial strength of the wall as a bearing wall using the empirical method.

b) Ignore the lateral forces and assume the eccentricity of the axial compression load is 1 in. Determine the design axial strength of the wall as a bearing wall using the rational method.

c) Does the wall provide sufficient axial, flexural, and shear strength as a shear wall.

d) If this was the shear wall described in HW#6, does this wall provide sufficient lateral stiffness to make the column design of Prob. 6 a nonsway frame?