

## Complex Engineering Problem (CEP)

### Structural Analysis-I, 4<sup>th</sup> Semester Spring 2020

#### Department of Civil Engineering, UET Peshawar

A bus stop is required to be analysed and designed as a reinforced concrete (RC) plan frame. Detail of the bus stop are shown below. The plan frame which supports 6" thick RC slab comprises three 12"x12" RC columns and one 12"x18" RC continuous beam. The connections between beam and columns are rigid. Columns are supported on isolated footings. The RC slab is subjected to a live load of 30 lb/ft<sup>2</sup> and superimposed dead load of 60 lb/ft<sup>2</sup> in addition to self-weight of the frame. The modulus of elasticity of concrete is 3000 ksi. To estimate self-weight of beams, slabs and masonry parapet walls, the unit weights of concrete and masonry equal to 150 lb/ft<sup>3</sup> and 120 lb/ft<sup>3</sup> respectively shall be used.

Students are required to:

1. Estimate uniformly distributed and concentrated load on beam of the frame.
2. Make the analysis model of the plane frame from the given information, showing the support conditions and load on the structure.
3. Determine static and kinematic indeterminacy of the structure.
4. Analyse the frame model to determine support reactions and member end forces.
5. Draw shear force and bending moment diagram of the frame. Also sketch the elastic curve.

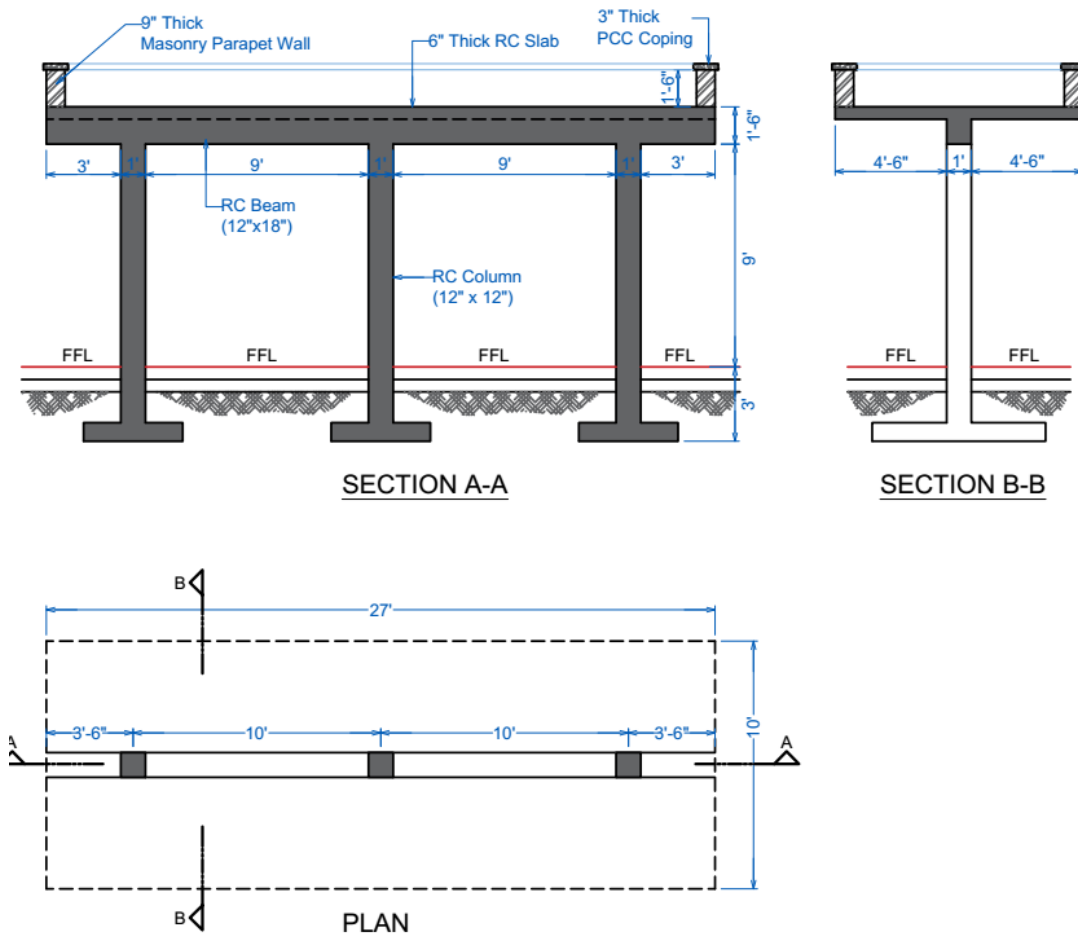


Figure 1, Detail of a bus stop