Flexural Design of a Reinforced Concrete T-Beam

Given a simply supported T-beam with a length of 20ft and a factored uniform load of 6.5 kips/ft (includes self-weight) that has the following dimensions and material properties:

\[ f'c = 3000 \text{ psi}, \]
\[ f_y = 60 \text{ ksi} \]
\[ b_f = 23 \text{ in.} \]
\[ d = 18 \text{ in.} \]
\[ b_w = 14 \text{ in.} \]
\[ h_f = 4 \text{ in.} \]

Required: Determine the required area of steel. Choose reinforcement and draw detail of final section.