Use the GRLWEAP program and do a drivability analysis. Let us assume that the contractor will drive the piles with a Vulcan 040 air hammer. See the hammer tables in appendix - ECH stands for external combustion hammer (i.e. air hammer).

This is a concrete pile 24" x 24". The design load is 200 tons. Assume that the required ASD factor of safety is 3.0. This will require you to perform a static analysis to establish a pile length before doing the drivability analysis. The easiest way to accomplish this would be to use the static analysis option inside the GRLWEAP program – choose the "Soil Type" (ST) method. This is a very simple analysis but should get us into the "ballpark". You will iterate until you determine a pile length for which the ultimate static resistance is 600 tons (1200 kips).

Assume a soil profile consisting of 35 ft of stiff clay underlain by dense sand. The water table is at a depth of 3.0 ft. For simplicity, let's assume that scour and setup are not issues – make sure to set the Resistance Gain/Loss Factors to 1.0/1.0 on the main input screen. The pile will have a concrete compressive strength of 5.5 ksi and an effective prestress after losses of 0.7 ksi. You will need to choose a plywood cushion that is thick enough to control the driving stresses. Choose a "used plywood cushion" for input values. We do this in an attempt to model a stiffer cushion at end of drive. Calculate the allowable tensile and compressive stresses as given in the structural aspects and specification chapters 10 & 11.

The penetration length MUST be less than the pile length on the "main input" screen. The depth modifier menu “D” indicates the depths at which a drivability analysis is run. These depths must be L.E to the pile length. Be sure to show the gain/loss factors on main screen to be 1.0/1.0. Be sure to set the setup factor =1.0 for each soil layer on the “Resistance Distribution Input” menu.
Provide a summary table with GRLWEAP output and allowable stresses and blow count and clearly indicate:

1. The required pile length
2. plywood cushion thickness
3. estimated driving time at a rate of 50 blows/minute
4. blow count at ultimate capacity
5. maximum compressive stress from output
6. maximum tensile stress from output
7. max allowable tensile stress (from specifications)
8. max allowable compressive stress (from specifications)
9. range of allowable blow counts at ultimate capacity (from specifications)
10. rated energy, rated stroke, and ram weight for this hammer

Please include your name in appropriate input fields for the GRLWEAP runs so that I see it on the output.