

Name: \_\_\_\_\_

CVEN 458 – Hydraulic Engineering  
Spring Semester 2008  
Dr. Kelly Brumbelow, Texas A&M University

Exam #2

**Open-book, Open-notes (9 pages {double-sided}, 3 questions); Time allowed: 90 minutes**

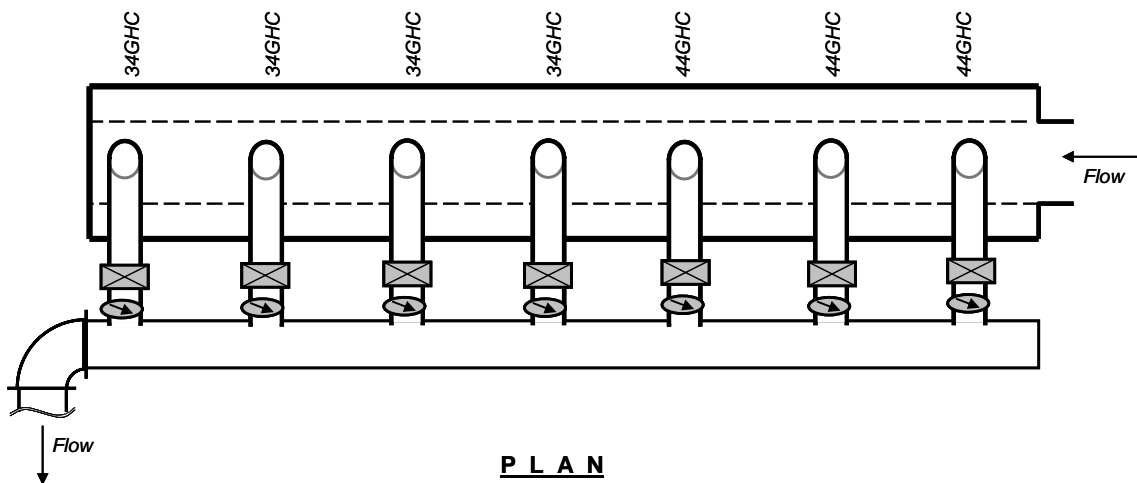
1. A pump station will include a trench-type wet well intake as shown in the drawings below. The station will include 4 pumps of model Goulds VIC 34GHC (20.938 inch impeller, 505rpm) and 3 pumps of model Goulds VIC 44GHC (26.312 in impeller, 440 rpm). Performance curves for both pump models are attached. The design maximum and minimum water surface elevations are indicated on the section drawing below. Outflow from the pump station is carried through a ductile iron discharge line that is 72 inches in diameter and 1565 ft long (assume  $f = 0.009$ ). This line discharges to a reservoir with constant water surface elevation of 275.00 ft.

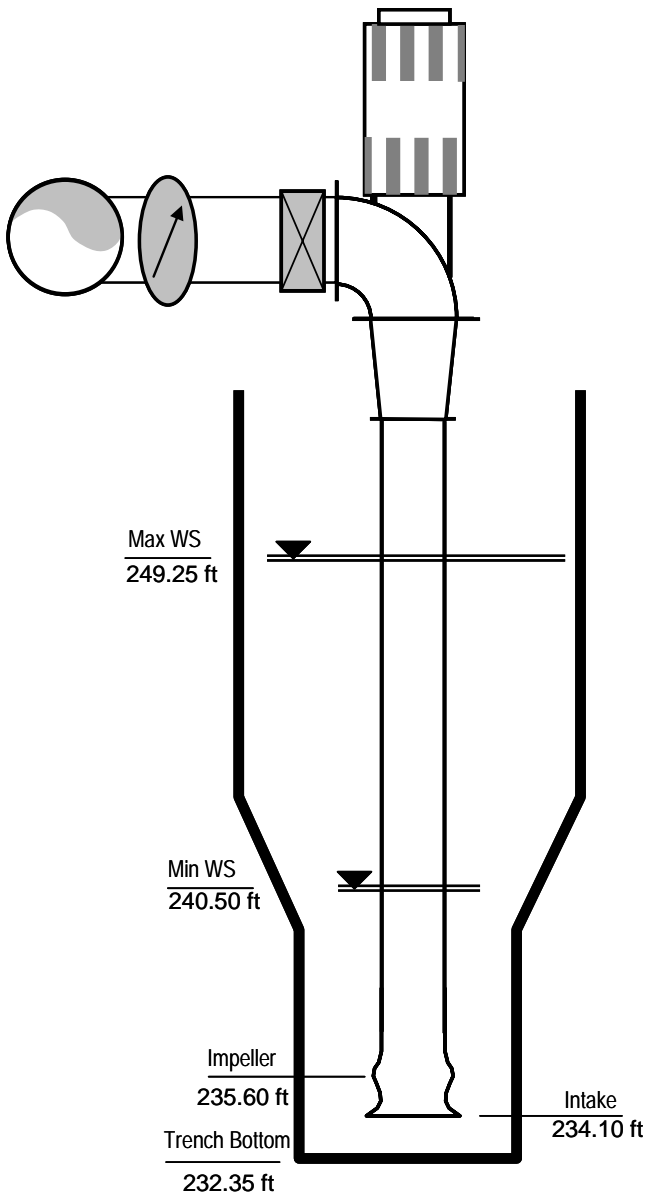
What will be the total station outflow for the following conditions?

- (a) Water surface elevation at maximum design value and all pumps operating.
- (b) Water surface elevation at minimum design value and only 34GHC pumps operating.

A sheet of graph paper is attached for your convenience.

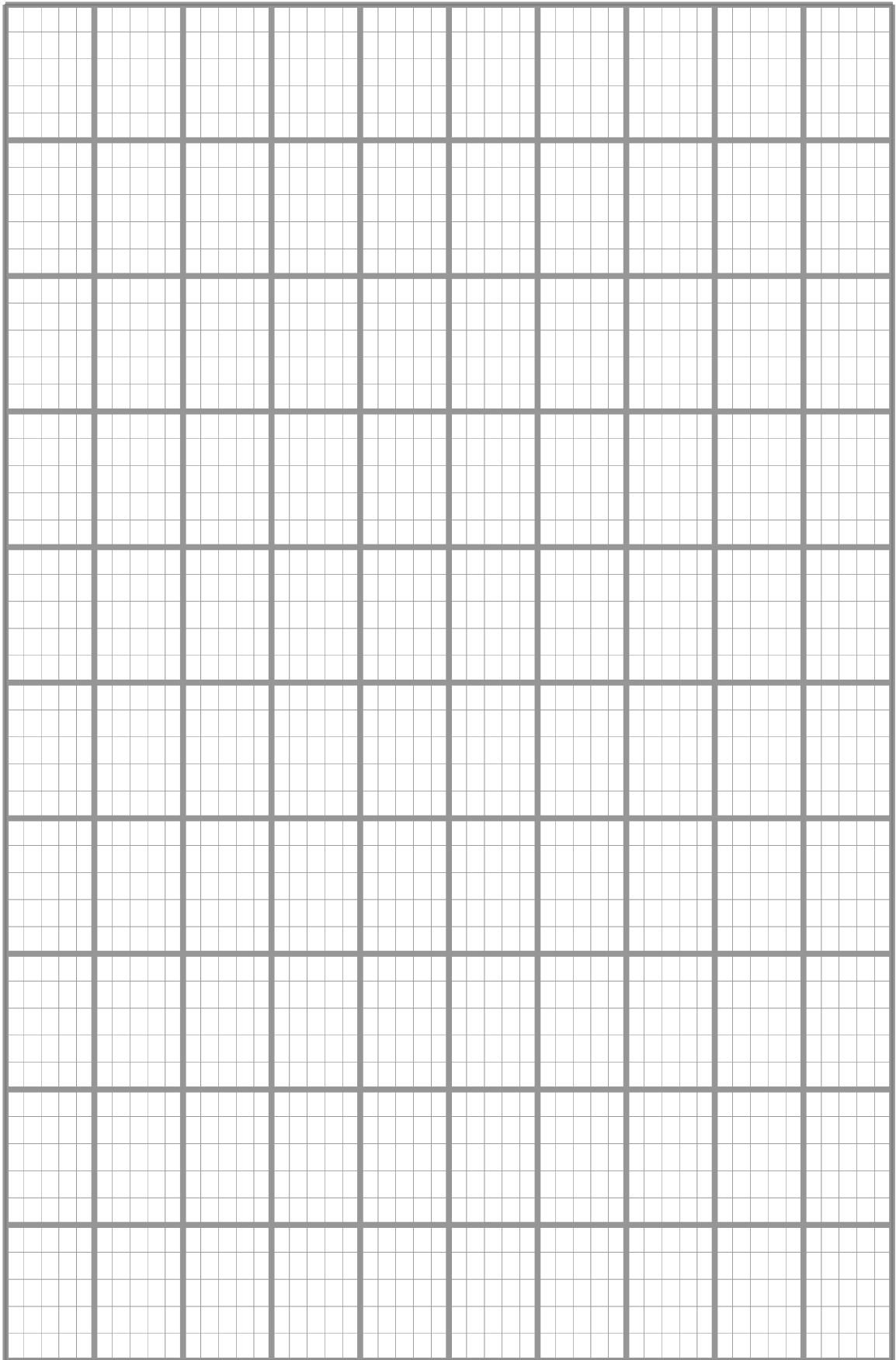
(40 points)





**SECTION**

(Work space for #1)

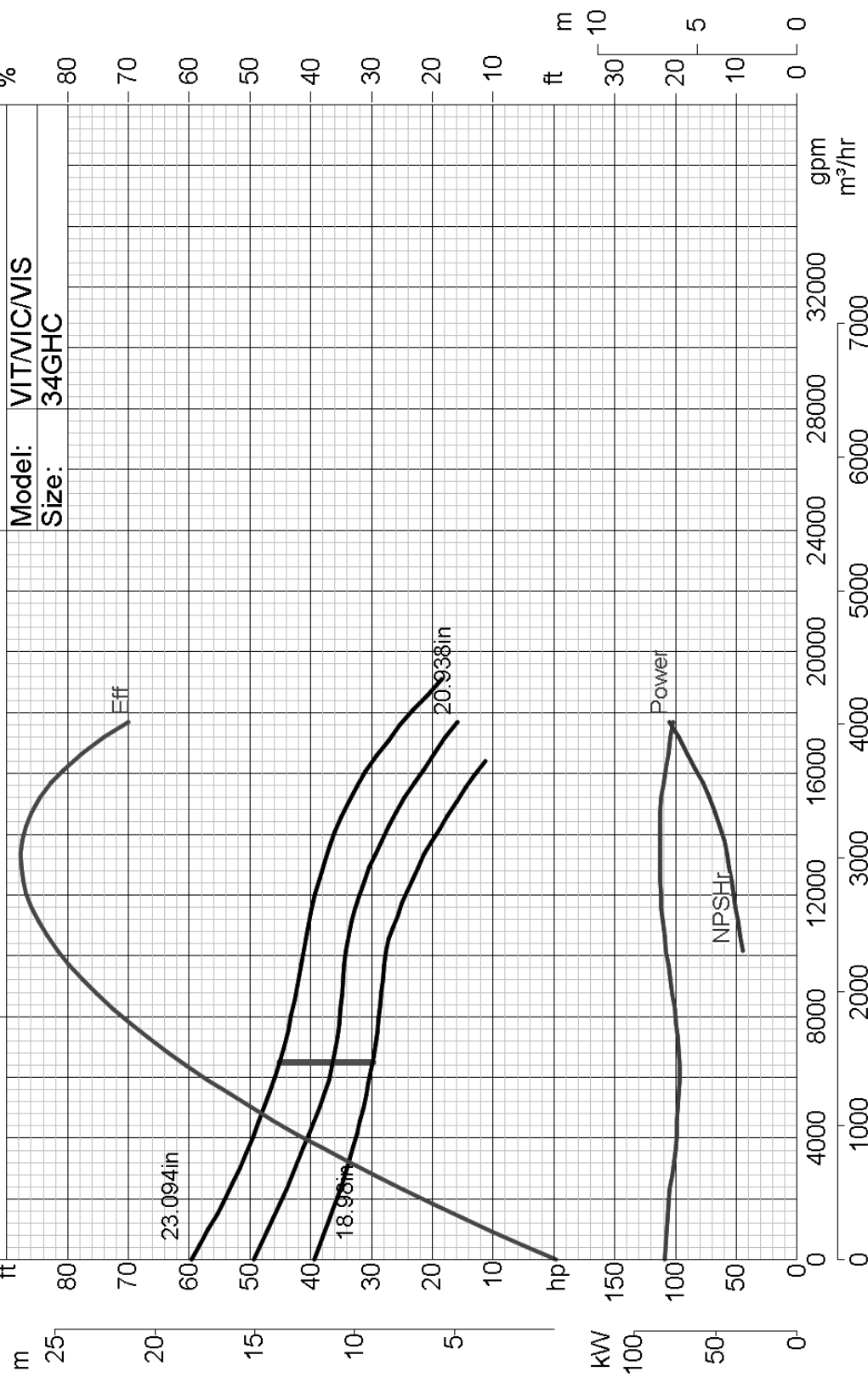


Based on CDS E6534GAPC1-1

**RPM 505**

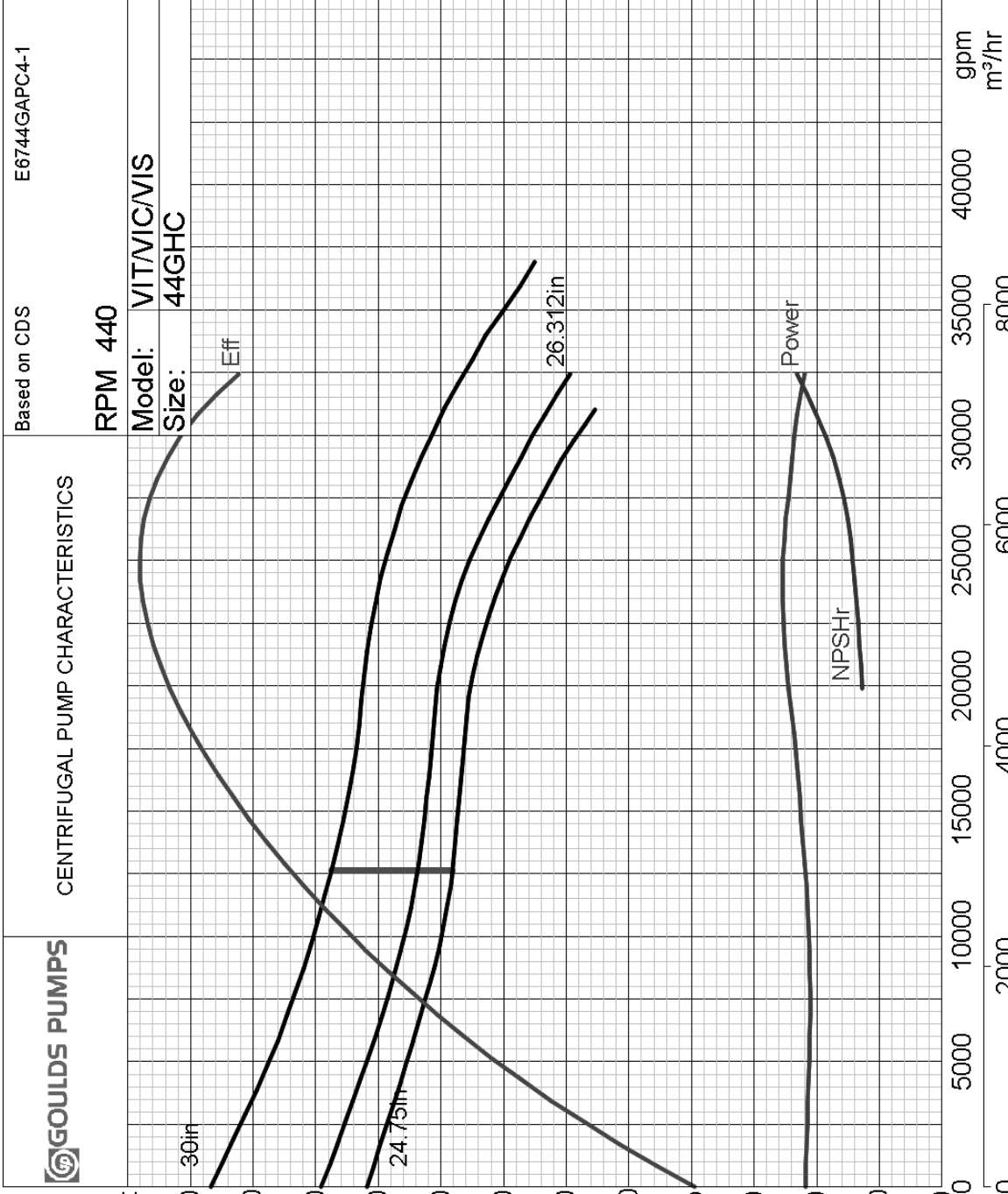
Model: **VITMIC/VIS**

Size: **34GHC**



Item No: ITEM 001  
 Service:  
 Rated Flow: 15,000.0 gpm  
 Rated TDH: 25.0 ft  
 Imp. Diam.: 20.9375 in





Item No: ITEM 001  
 Service:  
 Rated Flow: 30,000.0 gpm  
 Rated TDH: 25.0 ft  
 Imp. Diam.: 26.3125 in

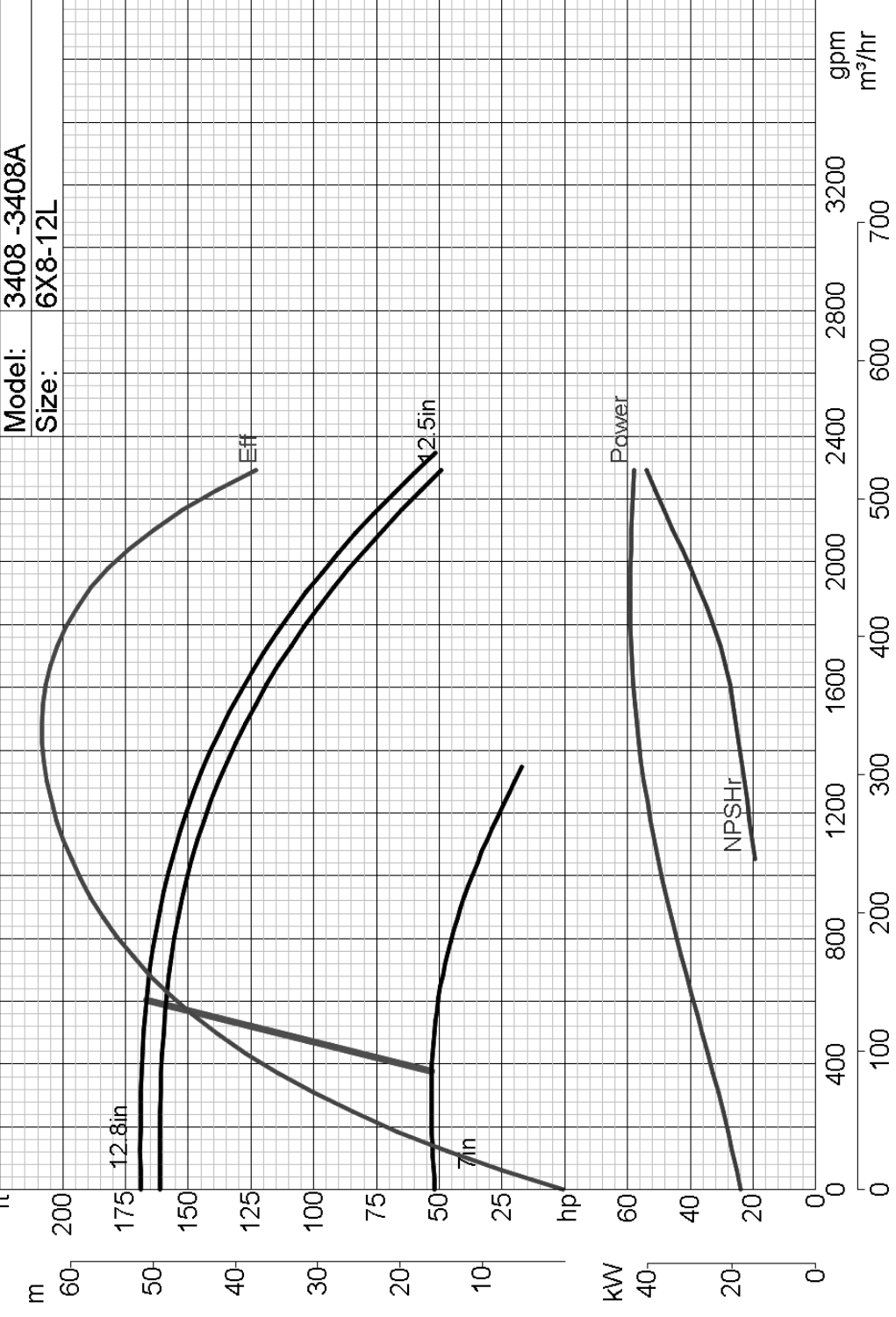


2. What will be the power consumption of the pump station (in kW) for cases (a) and (b) in Problem #1? Assume motor efficiency is 70%. (20 points)

3. A model 3408A pump (6x8-12L, 1780 rpm, 12.5 in impeller) will be placed 8.3 ft above its suction-side reservoir, and the suction line to the pump will be 6 inch diameter cast iron (assume  $f = 0.020$ ). If the pump is operated at its best efficiency point, *what will be the maximum length of the suction line possible without violating NPSH guidelines?* Performance data for the pump is attached. (40 points)



Based on CDS A-8025-7  
**RPM 1780**  
**Model: 3408 -3408A**  
**Size: 6X8-12L**



Item No: ITEM 001  
 Service:  
 Rated Flow: 1,000.0 gpm  
 Rated TDH: 150.0 ft  
 Imp. Diam.: 12.5000 in

