

1.) COMPLETE THE DEPT LAYOUT WITH RESPECT TO AFFINITY DIAGRAM:

AFFINITIES:  $B \overset{\checkmark}{\equiv} C$ ,  $D \overset{\checkmark}{\equiv} E$ ,  $B \overset{\checkmark}{=} A$ ,  $C \overset{\checkmark}{=} D$ ,  $A \overset{\checkmark}{-} C$ ,  $A \overset{\checkmark}{-} D$ ,  $A \overset{\checkmark}{-} E$ ,  $C \overset{\checkmark}{-} E$ ,  $B \overset{\checkmark}{\neq} E$

B	B	A	A	A	D	E
C	C	C	C	D	D	E
C	C	C	C	E	E	E

$$\sum_{i=1}^n \sum_{j=1}^n f_{ij} a_{ij} = 500(1) + 250(1) + 200(1) + 150(0) + 900(1) - 400(0) + 300(1) + 100(1) + 700(1) = 2950$$

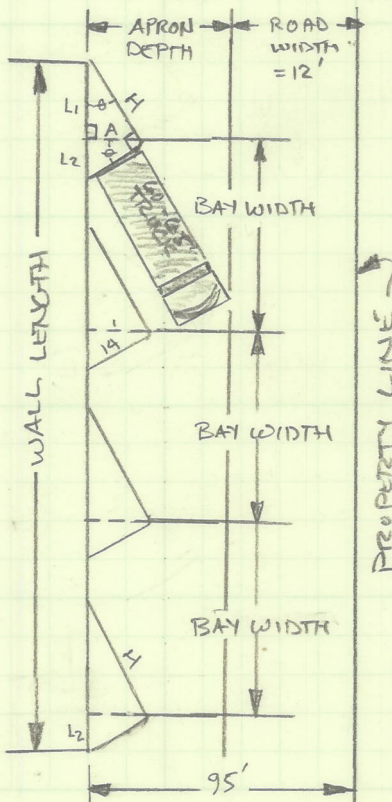
2.) CONSTRUCT AN IMPROVED LAYOUT BASED ON THE AFFINITY DIAG.

AFFINITIES:  $B \overset{\checkmark}{\equiv} C$ ,  $D \overset{\checkmark}{\equiv} E$ ,  $B \overset{\checkmark}{=} A$ ,  $C \overset{\checkmark}{=} D$ ,  $A \overset{\checkmark}{-} C$ ,  $A \overset{\checkmark}{-} D$ ,  $A \overset{\checkmark}{-} E$ ,  $C \overset{\checkmark}{-} E$ ,  $B \overset{\checkmark}{\neq} E$

C	C	B	B	A	E	E
C	C	C	A	A	E	E
C	C	C	D	D	D	E

$$\sum_{i=1}^n \sum_{j=1}^n f_{ij} a_{ij} = 500(1) + 250(1) + 200(1) + 150(1) + 900(1) - 400(0) + 300(1) + 100(0) + 700(1) = 3000$$

3.) FIND MINIMUM WALL LENGTH AND SKETCH DESIGN:



$APRON + 12' \leq 95' \Rightarrow APRON \leq 83'$   
 $\Rightarrow$  FINGER ANGLE =  $30^\circ (= \theta) \Rightarrow$  BAY WIDTH =  $64'$   
 USING SIMILAR TRIANGLES:  
 $L_2 = 14' \sin(30^\circ) = 7'$   
 $A = 14' \cos(30^\circ) = H \sin(30^\circ) \Rightarrow H = (14') \frac{\cos(30^\circ)}{\sin(30^\circ)}$   
 SINCE  $L_1 = H \cos(30^\circ)$  WE GET:  
 $L_1 = \frac{(14') [\cos(30^\circ)]^2}{\sin(30^\circ)} = 21'$   
 SINCE WALL LENGTH ONLY MUST ACCOUNT FOR 4 LOADING DOCKS (AND BAY WIDTH IS THE DISTANCE BETWEEN ADJACENT LOADING DOCKS), WE HAVE:  
 $WALL LENGTH = L_1 + 3(BAY WIDTH) + L_2$   
 $= 21' + 3(64') + 7'$   
 $= 220'$