

How to Lay Out a Warehouse or Distribution Center



**Learn-by-doing Exercise:
New Facility Layout;
Relationship Charting
& Diagramming**

Mid-Continent Chemical Corporation

(Maintenance Warehouse Layout)

The Mid-Continent Chemical Corporation owns five separate plants within a radius of 35 miles, in and around Oklahoma City. The Company operates a maintenance depot where it stores its out-of-service equipment, its pipe, and its miscellaneous maintenance supplies. In addition, the Company also sells and supplies pipe and supply items to three other companies in related fields throughout the territory. The large equipment and pipe is stored outdoors, the miscellaneous maintenance and supply items are stored under roof in a dilapidated sheet-metal building.

It is planned to construct a new building for this purpose in the same site – more substantial than the present building though perhaps still of sheet metal or concrete block. The Vice-President of Operations has asked the Maintenance Supervisor to submit an ideal layout of what he would like to have for his new warehouse. He has been told that he should plan for requirements approximately three years ahead, but that he should plan little or no increase in space because the outside customers will be dropping off as the Company's own business increases.

Mid-Continent Chemical continued...

The present material handling methods are highly flexible. Three four-wheel push trucks are used to move all items with the exception of floor dry. The floor dry is in fifty-pound bags on pallets. A battery-powered, walkie, counter-balanced fork truck is used to stack and move these pallet loads of floor dry.

The Maintenance Supervisor has begun to follow the steps of Simplified SLP and has produced a Relationship Chart and developed his space requirements. These are shown on the accompanying sheets. However, he became seriously ill about four weeks ago and has not yet returned to work. You have been asked to take over the project.

Problem: Using the data supplied, work out an approximate overall plan showing the ideal arrangement of space, assuming that the new building would have approximately 50 feet clear span by four 20-foot bays. Use a scale of one inch equals 10 feet, or $\frac{1}{2}$ inch equals 5 feet. A contractor has proposed a dock on one side, but it can be placed with equal ease anywhere in the building. Assume the handling methods will remain the same. The present steel stock racks and shelving are highly flexible, so you will not need to spend time fitting the arrangement of racks and shelves into each storage area.

RELATIONSHIP CHART

Plant (Company) Mid-Continent

Project Maint. Whse.

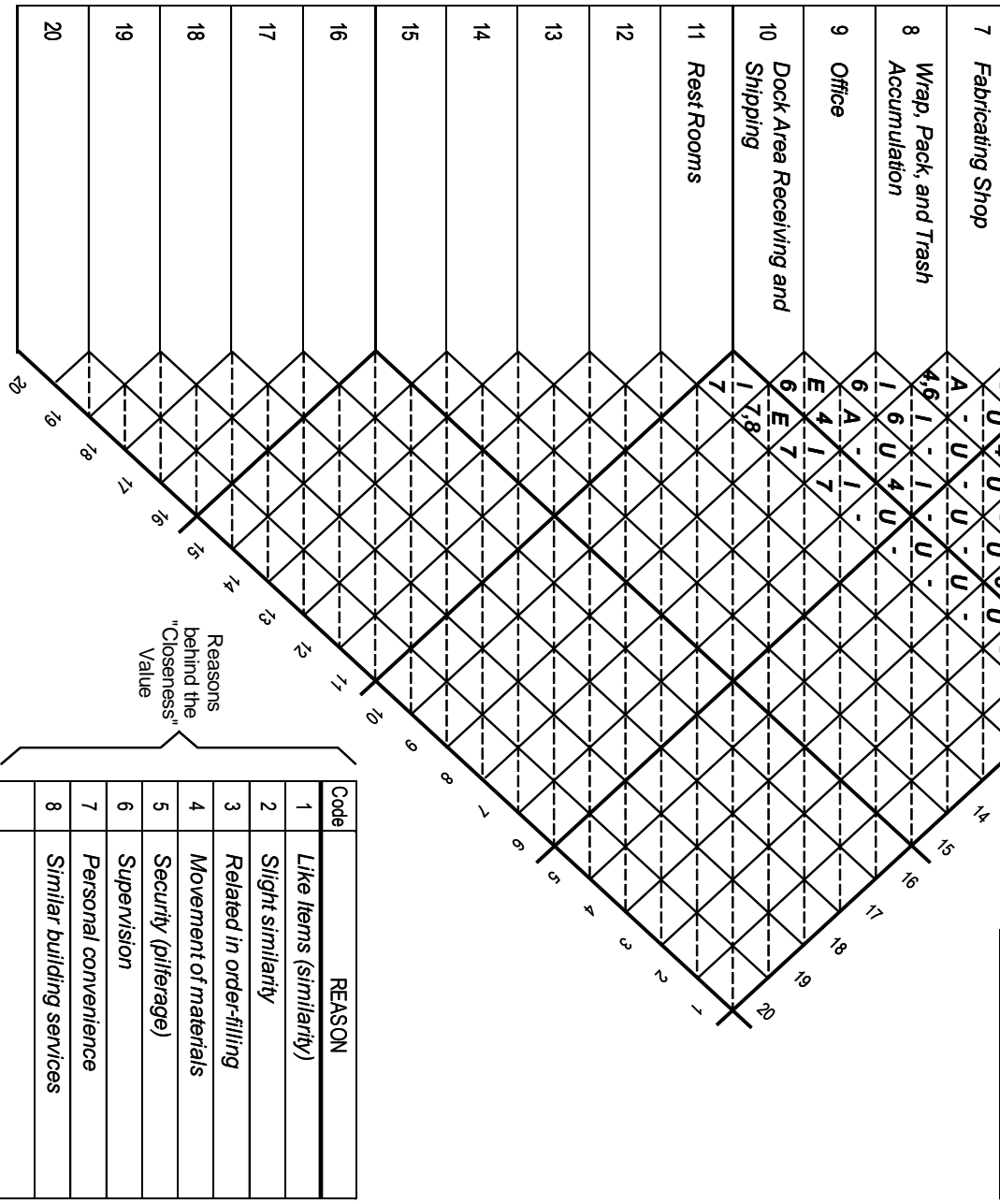
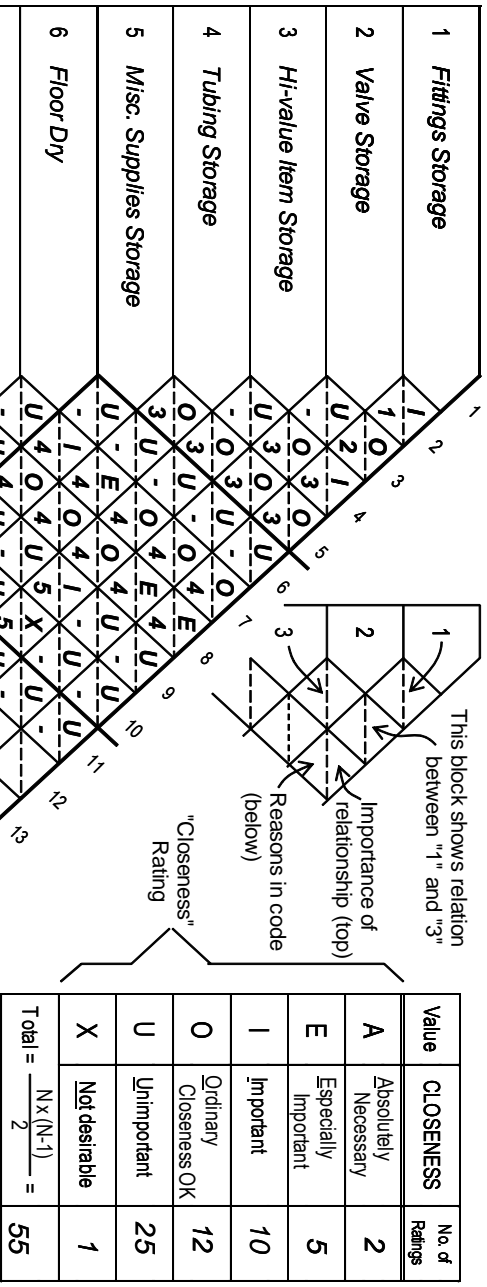
Chartered by RLD

With -

Date 5/18

Sheet 1 of 1

Reference _____



ACTIVITIES AREA & FEATURES SHEET

Plant Mid-Continent Chemical
 Project New Maint. Warehouse
 By RLD With -
 Date 5/18 Page 1 of 1

No.	Name	Area in Sq.Ft.	Physical Features Required											Requirements for Shape or Configuration of Area (Space)
			O'Head Clearance	Max. Overhead Supported Load	Max. Floor Loading	Min. Column Spacing	Water & Drains	Steam	Compressed Air	Foundations - or Pits	Fire or Explosion Hazard	Special Ventilation	Special Electrification	
		Total: (C) 3,925	Enter Unit and Required Amount under each				Relative Importance of Features					Enter Requirements for Shape or Configuration and Reasons therefore		
			ft.	#Sq.ft.		A - Absolutely Necessary	O - Ordinary Importance							
						E - Especially Important	- Not Required							
						I - Important								
1.	Fittings Storage	550	12	250		--	--	--	--	--	--			
2.	Valve Storage	600	12	250		--	--	--	--	--	--			
3.	Hi-Value Item Storage	500	10	150		--	--	--	--	--	--	(a)		
4.	Tubing Storage	250	12	150		--	--	--	--	--	--			
5.	Misc. Supplies Storage	800	12	150		--	--	--	--	--	--			
6.	Floor Dry	300	12	200		--	--	--	--	--	--			
7.	Fabricating Shop	400	14	200		E	--	E	--	--	O	I		
8.	Wrap, Pack and Trash Accumulation	200	12	150		--	--	--	--	--	--			
9.	Office	150	9	150		O	--	--	--	--	--	(b)		
10.	Dock Area Receiving & Shipping	100	12	250		--	--	--	--	--	--	Min. 10 feet wide 10 feet clear inside doorway		
11.	Rest Rooms	75	9	150		A	--	--	--	--	O	--	(b) Min. 6 feet wide	
12.														
13.														
14.														
15.														

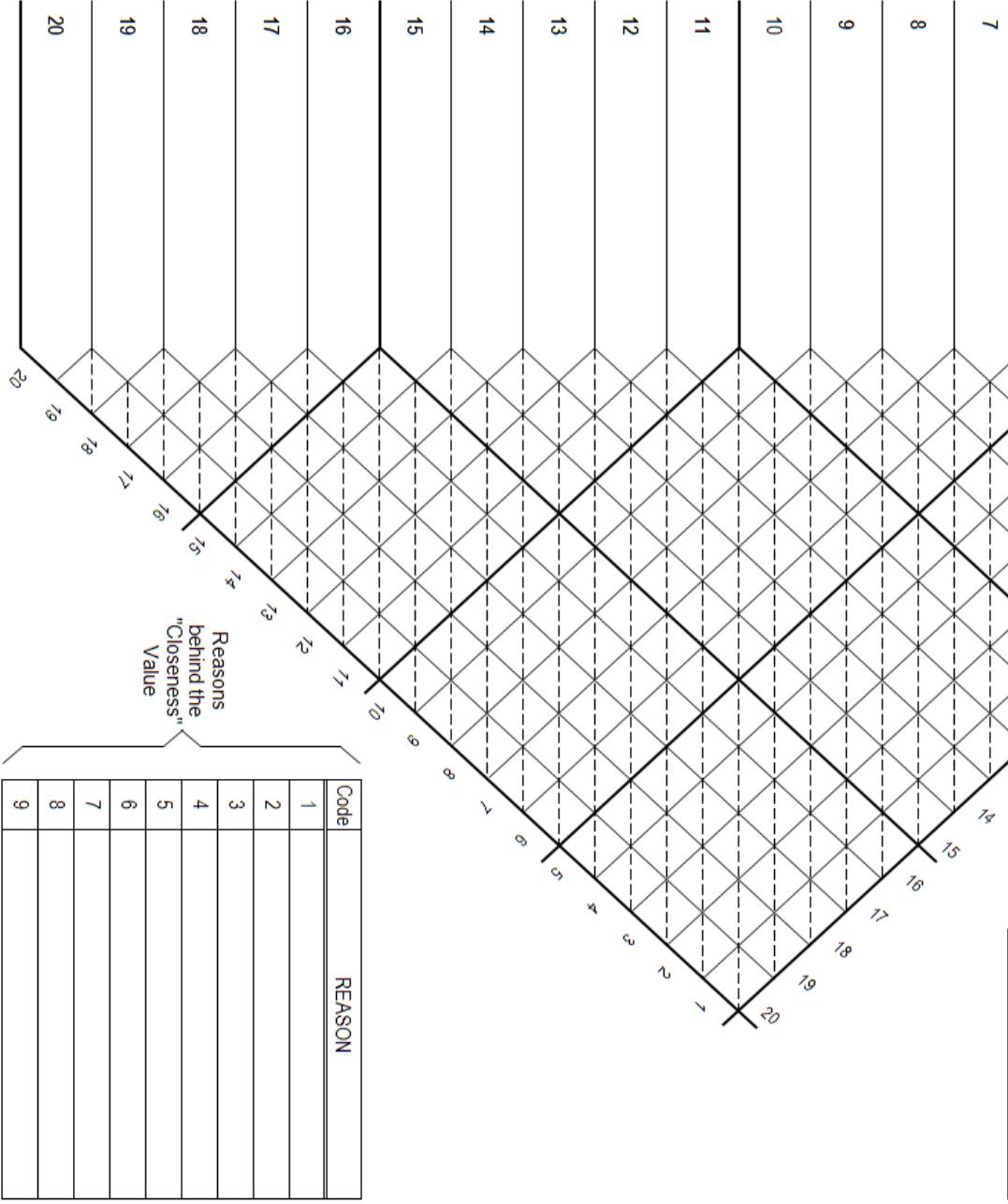
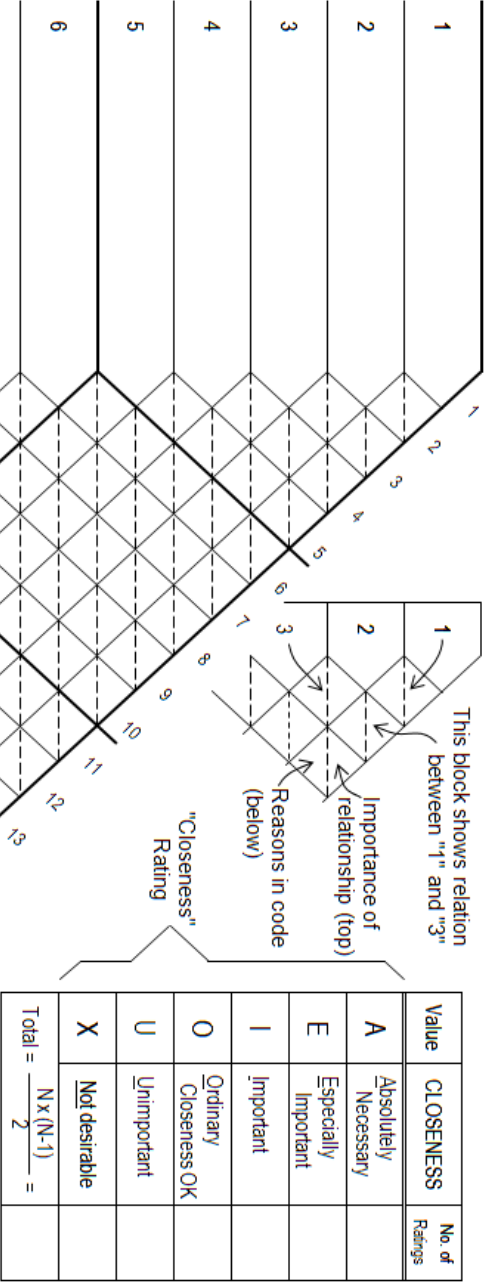
a Wire mesh fenced-off area

Notation b Air-conditioned area

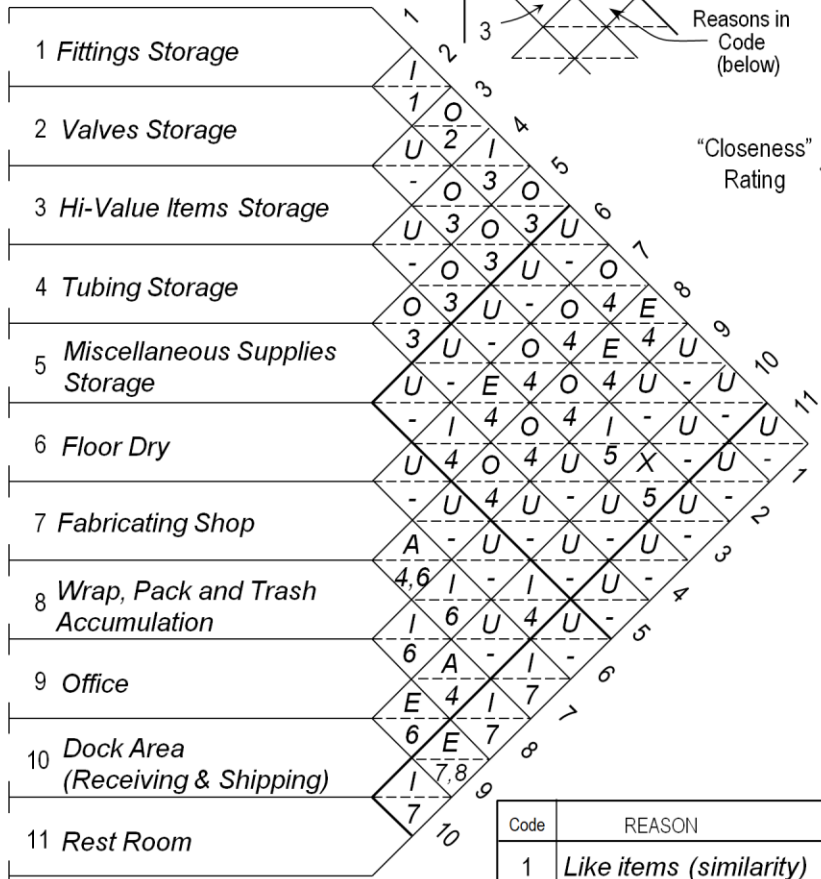
References c Space for each area is gross and includes an allowance for aisles

RELATIONSHIP CHART

Plant (Company) Project
 Chartered by With
 Date Sheet of
 Reference

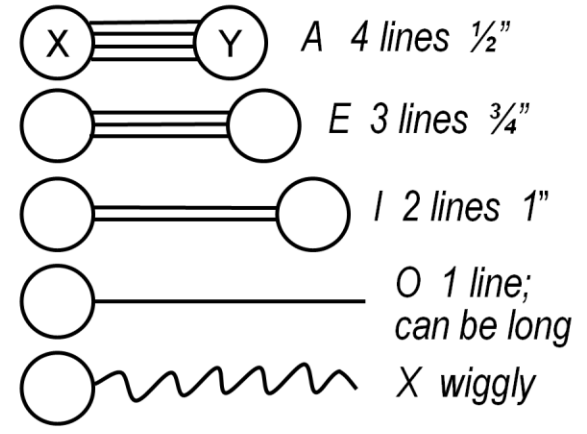


RELATIONSHIP CHART



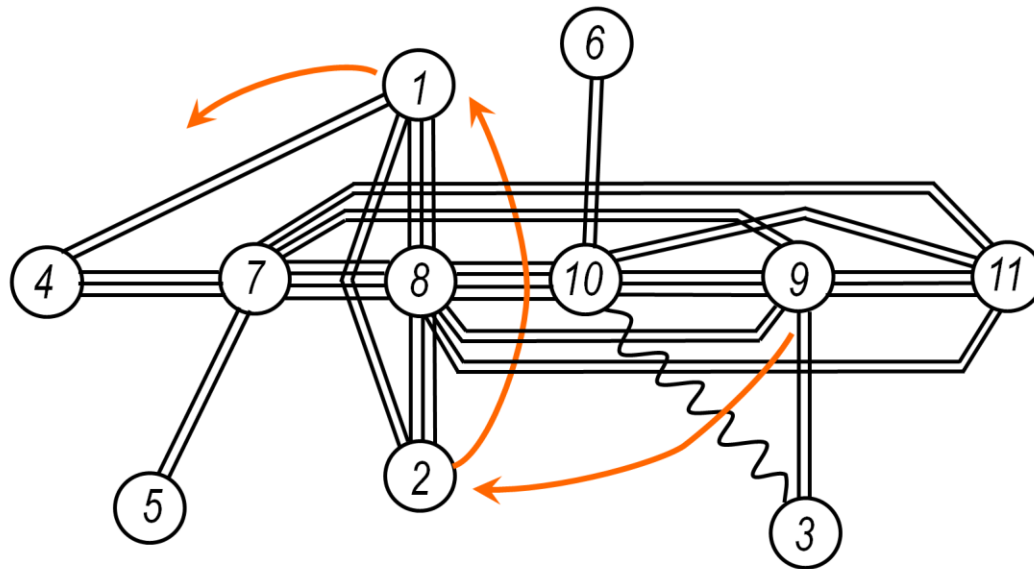
Mid-Continent Chemical Activity-Relationship Diagram

Value	CLOSENESS	No. of Ratings
A	Absolutely Necessary	
E	Especially Important	
I	Important	
O	Ordinary Closeness OK	
U	Unnecessary	
X	Not desirable	
Total = $\frac{N \times (N-1)}{2}$		



Problem: Using the data above for Mid-Continent Chemical, follow the SLP procedure to develop an Activity Relationship Diagram in the space provided on the right.

Code	REASON
1	Like items (similarity)
2	Slight similarity
3	Related in order-filling
4	Movement of materials
5	Security (pilferage)
6	Supervision
7	Personal convenience
8	Similar building services



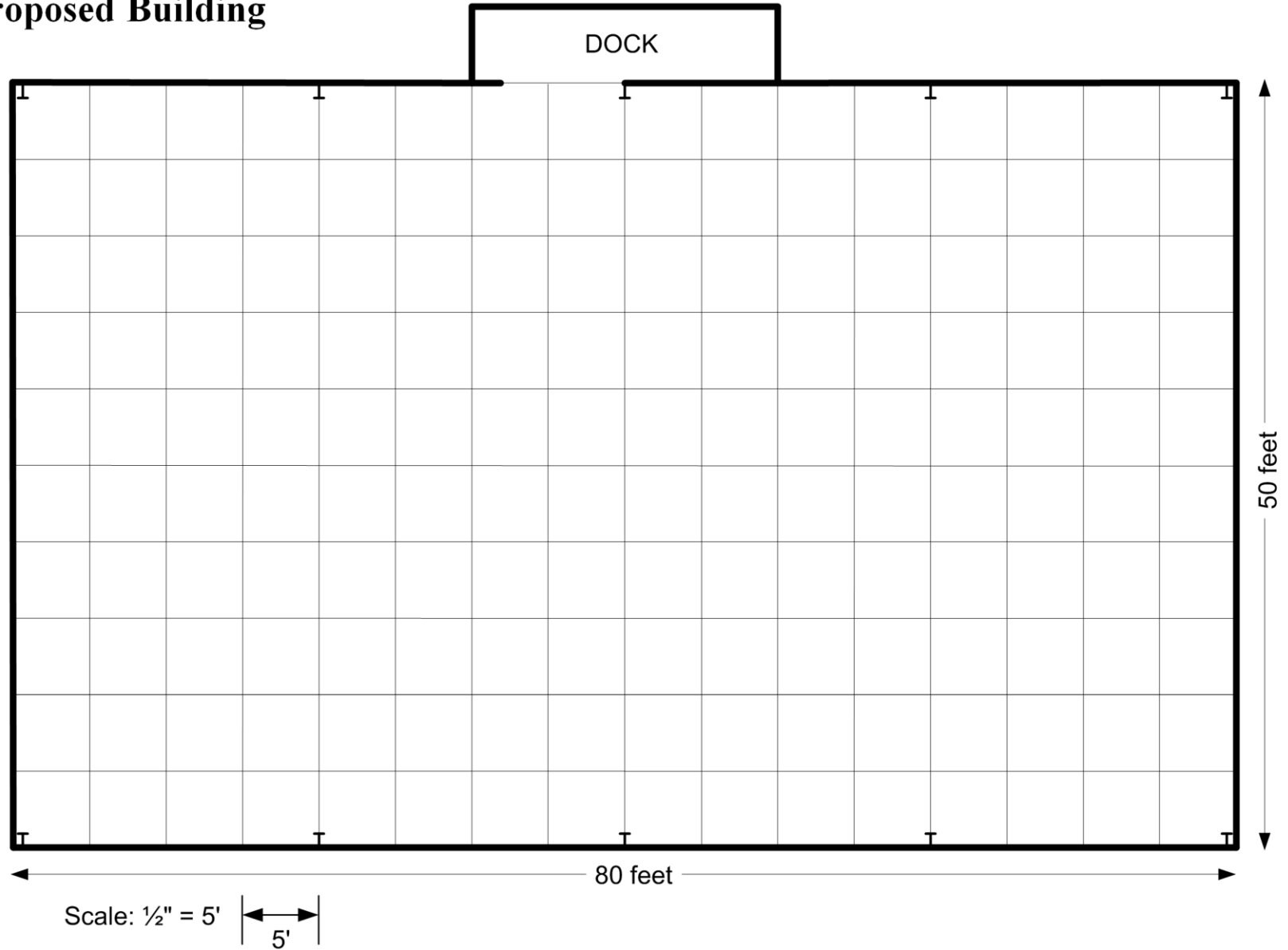
2 A's
5 E's
10 I's
1 X

*Re-draw for
best fit then add O's*

Mid-Continent Chemical Activity-Relationship Diagram

1. Please re-draw for best fit and then add O's
2. Convert space needed to number of squares at the scale of the drawing
3. Write the number of squares needed for each activity next to its symbol.

Mid-Continent Chemical Proposed Building



Here's What I Know

Question	Which Answer Is (Most) Correct	Got It
1. Which of these is <i>not</i> fundamental to layout planning?	A. Relationships B. Space C. Cost justification	
2. The rated-and-reason-supported Relationship Chart...	A. Uses a vowel-letter to rate relative closeness desired between each pair of activity areas. B. Uses "X" to denote activity-areas that need separation. C. Uses code numbers to record reasons for closeness. D. All of the above.	
3. Activity and space relationship diagrams show the ideal positions of activity areas with respect to one another, without regard for the actual location being planned.	A. True. B. False.	
4. Planners should define relationships and space using a single list of activity-areas	A. True. B. False.	

Here's What I Know

Question	Which Answer Is (Most) Correct	Got It
5. Which is <i>not</i> an attribute of space?	A. Amount B. Cost C. Kind D. Shape	
6. Physical features required in an area, and any minimum dimensions should be recorded on a worksheet..	A. True B. False	
7. For best results, two or more layouts should be evaluated in a formal way.	A. True. B. False.	
8. Planning time is saved by laying out and comparing two or more block layouts before laying out equipment in detail.	A. True. B. False.	

Summary

- Closeness desired can be rated, charted and visualized.
- The same activity list used for closeness rating should be used when determining space requirements.
- Both relationships and space should be known before developing a layout.
- For best results, two or more alternative layouts should be developed and compared in a formal way.
- Planning time is saved by comparing block plans before laying out equipment in detail.