

# The Impact of Building Shape on Space Planning Efficiency

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- *What is the value of test-fitting a tenant into several prospective buildings?*
- *What variation can be expected in the amount of space needed for a given set of requirements in spaces of several different geometric shapes?*
- *How can these variations make a difference in the lease terms negotiated?*

## **EXECUTIVE OVERVIEW**

All of these questions were powerfully addressed in a case study prepared by our firm for a large corporate user that had the time and interest in studying a whole field of prospective buildings. Working very closely with our client's broker, we assembled the information necessary to perform critical "test-fits" of a hypothetical user profile in five finalist buildings.

The 200,000 square foot (rentable) requirement included a mix of open plan and private office spaces involved in general office functions (accounting, customer service, project management, executive and administrative, etc.). When we began the study, the intention was to merely test the aesthetic fit of these requirements within the buildings. However, as the work progressed, clear differences began to emerge. We focused on quantifying the differences, and as a result, found a variation in measured efficiency of almost 14% among the five buildings studied.

## **METHODOLOGY**

Any skilled designer can manipulate components of a design to achieve desired results. In other words, if you play loosely with the facts (allow minor variations between design solutions) it is possible to make any solution relatively attractive. Essential to the success of this study, however, was the employment of an "academic approach," wherein the user requirements were strictly adhered to in the comparisons. Office and workstation sizes were standardized to conform to corporate standards that would be used in the final, true schematic design. Although the temptation is to vary office and workstation sizes slightly to coordinate with available building bay depths (the dimension from core elements to the window wall), doing so will inevitably skew the results in an unpredictable and unfair manner—apples and oranges will be the bountiful result.



Because at 200,000 square feet the total requirement was so large, test-fits for the entire organization were both unwieldy and unnecessary for the purposes of the study. Only one typical floor from each building was tested, and the subject floor was divided into four user profiles—A) open office only, B) enclosed office only, C) a mix of open-plan and enclosed offices on the exterior, and D) another mix of open-plan and enclosed offices with the offices on the interior.

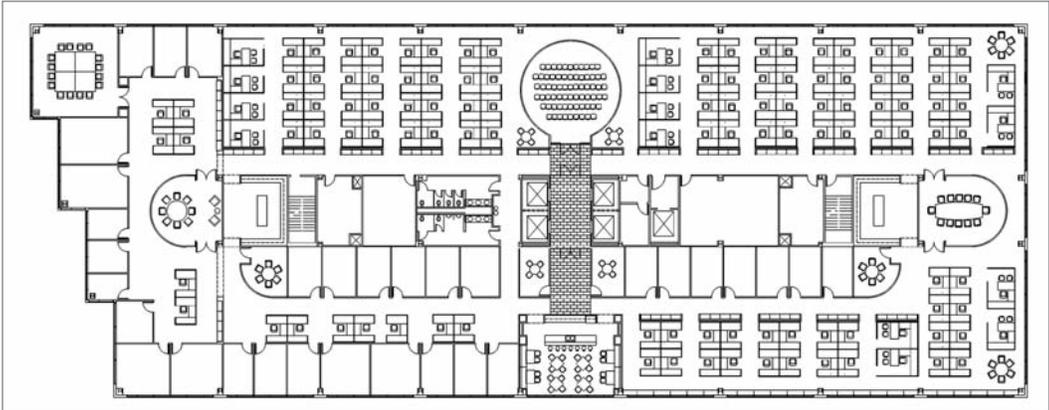
We standardized on two office sizes and two workstation sizes and applied them universally, regardless of the given environment. Nevertheless, we made every effort to use these in the most efficient manner.

The results, from a real estate deal-generation standpoint, were amazing.  
*\*\*Building Plans A through E have been altered to maintain building anonymity.*

**BUILDING A**

This building featured large typical bay depths of 43’ and a very clean, rectangular layout. At one end of the floor plate, the exterior wall was stair-stepped to create opportunities for more corner offices. In general, it has a simple and straightforward plan with relatively efficient planning parameters. The floor size, at 29,800 square feet of usable space, is rather large for a single floor.

In the layout illustrated below, the upper portion of the floor has been planned as a 100% open-plan environment. The left-hand portion is a wholly enclosed executive office area, while the bottom half of the plan has enclosed offices on the left and a mix of interior offices and workstations on the right.

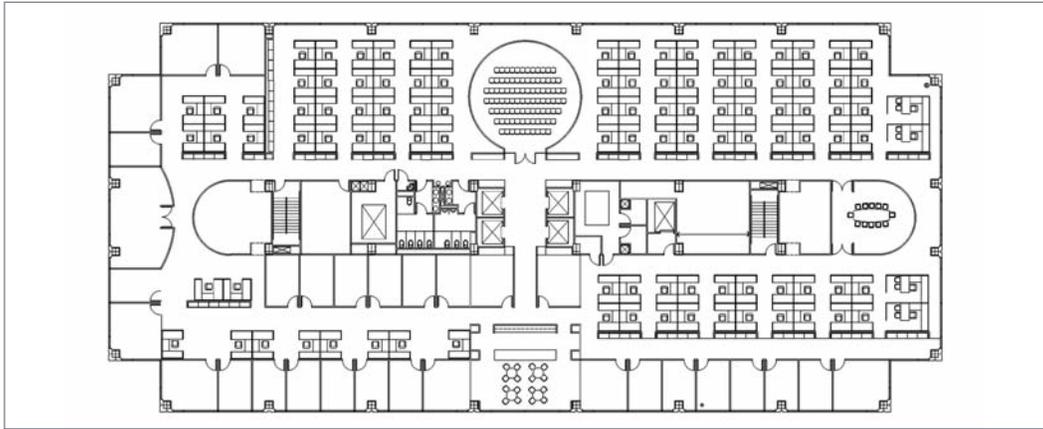


*Building A Plan*

## BUILDING B

Also a new structure, Building B exhibited similar rectangularity but had a smaller floor size of 24,660 square feet of usable space and slightly larger typical bay depths of 46'. Each corner of the floor was notched to double the number of corner offices per floor.

Building B utilized the same user profile for the layout as did Building A, and the similarities are obvious due to the comparative geometric characteristics. If anything, the study shows that large bay depths can increase efficiencies for users with a large amount of open-plan workstations (see the results in Table 2, following).

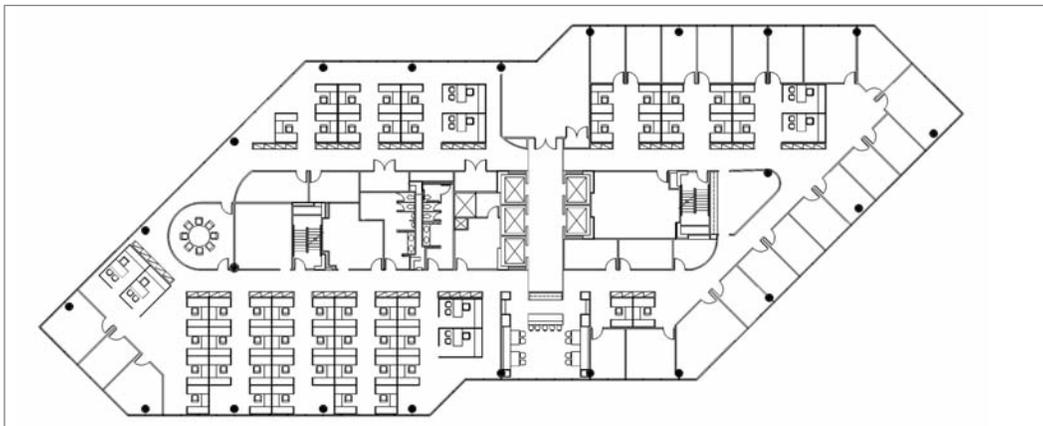


*Building B Plan*

## BUILDING C

Constructed in the "boom years" of the early 80s when angled floor plate layouts were fashionable (if not expected), this floor is relatively small in area at less than 18,000 square feet per floor, and its bay depths vary between 30' and 40'.

The combination of varying bay depths, small floor size, and geometric irregularity can have a major deleterious impact on efficiency as Table 2 illustrates.



*Building C Plan*



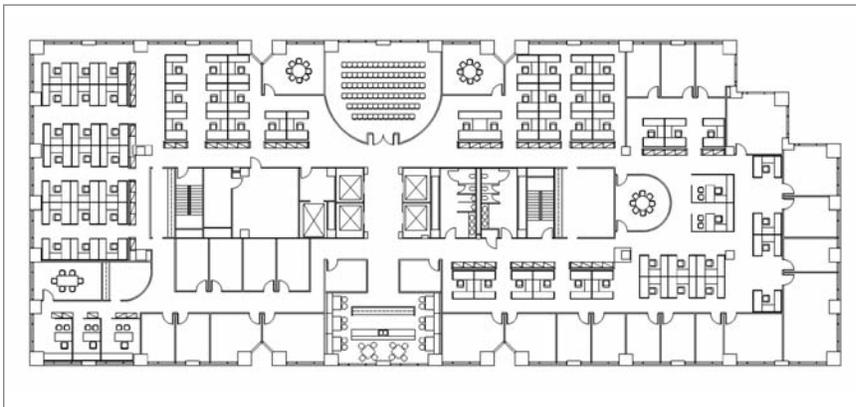
### BUILDING D

Consisting of a large “double-floor” which has two sets of restrooms, three sets of stairs and one elevator lobby, this plan has a relatively large amount of internal core space available.

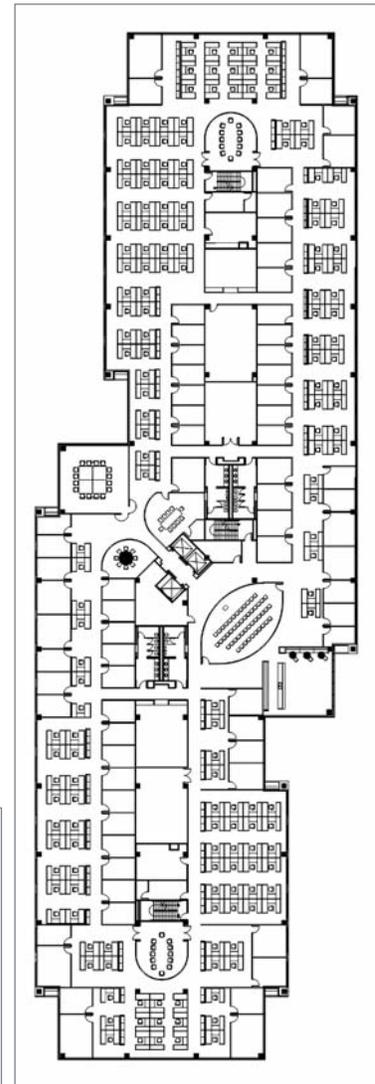
The building was only recently completed and represents some new thought with regard to speculative office user adaptability. However, these ideas did not offer benefits for a large single user. At 47,352 square feet of usable space per floor, the two halves of the floor plate were average in size, yet by sharing one elevator lobby, some efficiency was gained. The exterior line of the building had many variations to improve the corner office conditions, but the bay depths vary widely as a result—from 29’ at a minimum to 42’ at the widest points.

### BUILDING E

Although the fifth building was constructed in the early 1980s, it has a floor plate that is much more similar in concept to the newer Building A, i.e., a rectangular floor plan with one serrated edge to create more corner offices. It has a typical 36’ bay depth and the floor size, at 18,854 square feet of usable space, is comparatively small.



*Building E Plan*



*Building D Plan*

**TABULATED RESULTS FOR THE BUILDINGS**

As the tables below illustrate, the study yielded somewhat predictable results—the rectangular buildings were the most efficient and the exotic floor plates were the least efficient. We were furnished usable square footage area amounts for each floor plate, but we did not use them at face value since part of our analysis was to determine exactly what was available for our client, not merely what was represented. There were minor variations in these areas and we used our calculated values for all statistical analyses (instead of the Landlord’s values). From this Usable Area, we isolated all space that could be classified as “Employee Area” in the test-fits, meaning offices and workstations. The complementary space was classified as “Support Space” and included conference rooms, break rooms, file rooms, copy rooms, etc., shared by all users on the floor. Employee Area was in a very tight range between 81.78% and 82.72%, while Support Space fell within a range of 17.28% and 18.22%. The compelling tabulated results can be attributed to these tight variations.

Building	Full-Floor Usable SF* (K)	Full-Floor Usable SF (LL)	Employee Area (SF)	Employee Area (%)	Support Spaces** (SF)	Support Spaces (%)
<b>A</b>	29,800	29,800	24,650	82.72%	5,150	17.28%
<b>B</b>	24,660	24,660	20,200	81.91%	4,460	18.09%
<b>C</b>	17,837	17,813	14,625	81.99%	3,212	18.01%
<b>D</b>	47,352	46,198	38,852	82.05%	8,500	17.95%
<b>E</b>	18,854	19,520	15,419	81.78%	3,435	18.22%

*\* defined as Gross Area minus Vertical Penetrations and Core Areas*  
*\*\* defined as Conference Rooms, Break Rooms, File Rooms, Copy Rooms, etc. shared by all*

Building	Total Employees	Efficiency*** SF/Person	SF/Person Total USF	baseline comparison using SF/P USF
<b>A</b>	155	159	192	1.0291
<b>B</b>	132	153	187	1.0000
<b>C</b>	84	174	212	1.1366
<b>D</b>	225	173	210	1.1265
<b>E</b>	95	162	198	1.0623

*\*\*\* defined as Employee Area divided by Total Employees*

**EFFICIENCY**

The total number of employees housed in each scheme was counted and used as the reciprocal below the total Employee Area, resulting in a calculated Efficiency in square feet per person. This value ranged from 153 square feet per employee in the most efficient scheme to 174 square feet per employee in the least efficient scheme. The final calculated value represents these efficiencies placed over the entire usable area and these ranged from 187 total usable square feet per person to 212 square feet per person.

**IMPACT ON THE DEAL**

Building B was set as the benchmark against which all others were compared and indexed as 1.000. Building A was very close in efficiency, at 1.0291—or a 3% disadvantage with respect to Building B.

Building E came in at a competitive 1.0623, while the two other buildings, C and D, lagged far behind the others. They were about 13% less efficient than the benchmark building. This means that, all other things being equal (a BIG assumption, since it is not likely), for a ten year deal involving 200,000 square feet of space at \$20/SF/YR — a \$40,000,000 real estate transaction — the more efficient space would have a **\$5.2 million economic advantage**.

In the opinion of the broker involved, this turn of events would not have been possible without the comprehensive analysis, and of course, his own negotiating skills!

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