



*IFMA 94: The Force Behind the Business
Strategy*

**OFFICE BUILDINGS ARE
NOT CREATED EQUAL**

**New Methods for Calculating
Occupiable Floor Area**

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TODAY'S OBJECTIVE

- **Learn how to determine occupiable floor area**
 - **using CAD measurement**
 - **using quick estimation method**
- **Understand how the two methods compare**
- **Identify potential gains by acquiring this knowledge**
- **Learn how to contribute to this process**



Who developed and tested the methods?

- **John Gray invented this method while at the International Centre for Facilities, with Gerald Davis and Francoise Szigeti**
- **Carroll Thatcher led the team that tested, refined and validated it, using CAD/CAFM technology and data from field measurements**
- **Over 100 years of combined knowledge**
- **Initially tested on 25 buildings**




Standardization

- **Estimation method now passed by main committee at ASTM**
- **Will be an ASTM standard by 15th February, 1995**



How do these methods fit with BOMA?

- **BOMA *usable* is the beginning point for CAD method**
- **The estimation method also uses BOMA *usable* in the calculation**



How do these methods fit with IFMA?

**IFMA is developing a Proposed New Standard
Classification for Building Floor Area
Measurements**



Building features that impact occupiable floor area

■ **Building core and service area**

- **includes major vertical penetrations, interior parking, enclosed loading docks, building related basement storage areas, rooftop mechanical penthouses, and floors containing only mechanical space**



Building features that impact occupiable floor area

■ Primary circulation

- that portion of a building that is a public corridor or lobby, or is required for access by all occupants on a floor to stairs, elevators, toilet rooms, and building entrances
- determined by identifying the *reasonable minimum circulation* connecting building elements



Building features that impact occupiable floor area

- **Space that cannot be used**
 - that portion of the usable area which contains columns, building projections (perimeter convectors, pilasters, baseboard heating units, radiators) or other building elements that prevent the use of space they occupy for furniture, circulation or other functions



Building features that impact occupiable floor area

- **Space that cannot be used effectively**
 - **determined by shape of usable area, dimensions and proportions of space, non-integration of systems and building elements, windowless areas, ventilation, and floor loads**



Example of CAD method

CAD summary table

<u>Item</u>	<u>Loss (sq.ft)</u>	<u>Area (sq.ft)</u>
Rentable		17,730
Usable		16,313
Remove primary	-504	15,809
Remove columns and projections	-667	15,142
Remove other building loss features	-1,465	13,677

Therefore the total loss is 2,636 sq.ft.

The occupiable floor area is 13,677 sq.ft.



Quick estimation method

- **most features are measurable**
- **some require a judgement call**



Estimating the building loss percentage

How to use the table:

- **Identify which statements are true**
- **Circle each applicable negative or positive percentage number**
- **Complete calculation at end of table**



Estimating the building loss percentage

Open vs rooms:

- **The table contains columns “open” and “rooms”**
- **Use “open” column if required *capability* is to plan for mostly open space**
- **Use “rooms” column if required *capability* is to plan for mostly closed space**



Estimating the building loss percentage

A note to remember:

**If window glass is more than 50% of dominant portion of outside wall
measure from face of glass, not face of wall**

Columns, projections and obstructions

<u>Features that REDUCE usable area</u>	<u>Open</u>	<u>Rooms</u>
1A Wide columns, e.g. 400-600 mm (1.3-2.0 ft)	- 1%	- 1%
OR - very wide columns, over 750 mm (2.5 ft)	- 2%	- 2%

Columns, projections and obstructions

<u>Features that REDUCE usable area</u>	<u>Open</u>	<u>Rooms</u>
1B Projecting convectors or pilasters (on grid) or other obstructions to placing furniture or equipment total <u>less</u> than 1/3 of wall:		
- projections average 100 mm (4 in)	- 1%	- 1%
OR - projections average 150 mm (6 in)	- 2%	- 2%
OR - projections average 200 mm (8 in)	- 3%	- 3%
ADD - if projections are <u>not</u> on same grid as interior columns		- 1%
ADD - if projections total <u>more</u> than 1/3 of wall	- 1%	- 1%
OR - measure actual loss due to projections	- __%	- __%



Columns, projections and obstructions

<u>Features that ENHANCE usable area</u>	<u>Open</u>	<u>Rooms</u>
1B No projections, or average projection is negligible, e.g. less than 30 mm (1.2 in)	+ 1%	+ 1%

Columns, projections and obstructions

<u>Features that REDUCE usable area</u>	<u>Open</u>	<u>Rooms</u>
1C Sheer walls or utility walls in open floor area, e.g. between selected columns	- 1%	- 1%
1D Ducts through floor, or openings in floor, or access to telecom rooms or closets, or large openings to floor ducts for cables, if constrain layout within usable area	- 1%	- 1%
ADD - if cause inefficient layout, more than just constraint	- 1%	- 1%
OR - measure actual area loss due to these features	- __%	- __%

Dimensions and proportions of space

Features that REDUCE usable area

Open Rooms

2A Floorplate dimensions and aisle positions or irregular perimeter wall cause cramped or wasteful layouts of workstations and rooms; or otherwise wasteful layouts; or dimensions are not multiples of standard workstation sizes and aisle widths; or need single-loaded or “extra” aisles or corridors:

- in some areas, say about 10-20% of the floor

- 1% - 1%

OR - in large areas, say about half the floor

- 3% - 3%

OR - in most or all areas of the floor

- 5% - 5%

Dimensions and proportions of space

<u>Features that ENHANCE usable area</u>	<u>Open</u>	<u>Rooms</u>
2A Floorplate dimensions and aisle positions are well-suited to standard workstation and room sizes and configurations, and aisle widths:		
- over entire floor, within a wide range of layout options	+ 3%	+ 3%
OR - in at least 3/4 of the floor area, within a wide range of layout options	+ 2%	+ 2%
OR - in at least 1/2 the floor area within a wide range of layout options	+ 1%	+ 1%

Dimensions and proportions of space

<u>Features that REDUCE usable area</u>		<u>Open</u>	<u>Rooms</u>
2B	Ceiling grid dimensions vary in different directions and are not standard, e.g. not multiples of 600 mm or 1.5 m (2 ft or 5 ft)		- 2%
<u>Features that ENHANCE usable area</u>		<u>Open</u>	<u>Rooms</u>
2B	Ceiling grid is same in both directions and is standard, e.g. 1.2 m or 1.5 m (4 ft or 5 ft)		+ 1%

Dimensions and proportions of space

Features that REDUCE usable area Open Rooms

2C	Ceiling grid changes direction, e.g. part of ceiling grid is rotated 45 degrees, or is rotated relative to perimeter walls, which constrains where partition walls and workstations can be placed	- 1%	- 2%
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Features that ENHANCE usable area Open Rooms

2C	Ceiling heights and construction above hung ceiling in some locations allow for special facilities, such as large conference rooms, which require high ceiling, e.g. 3.2 m (10.5 ft) or more, and space for extra air ducts	+ 1%	+ 1%
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Dimensions and proportions of space

<u>Features that REDUCE usable area</u>	<u>Open</u>	<u>Rooms</u>
2D Columns badly spaced, e.g. very close to each other or to other fixed structure, such as perimeter walls or building core; or less than 4.5 m (15 ft) apart; or not spaced at a multiple of workstation dimensions	- 3%	- 3%
OR affects less than 10% of floor	- 1%	- 1%

Shape of usable area

<u>Features that REDUCE usable area</u>		<u>Open</u>	<u>Rooms</u>
3A	Complex shape floorplate, many sub-areas with different shapes and sizes	- 3%	- 3%
	OR - some sub-areas cause inefficient layouts	- 1%	- 1%
	ADD - floorplate forces layouts with many angles other than right angles	- 3%	- 3%
	ADD - usable areas are very long and narrow, e.g. 45 m (150 ft) by under 10 m (30 ft) wide; or are more than 30 m (100 ft) deep	- 3%	- 3%



Shape of usable area

<u>Features that ENHANCE usable area</u>		<u>Open</u>	<u>Rooms</u>
3A	Uninterrupted spaces with regular shape, approximately square	+ 1%	+ 1%
	ADD - in buildings with central core, variation in distance between core and external walls gives different sizes and proportions of regular-shaped sub-areas	+ 1%	+ 1%

Integration of systems and building elements

<u>Features that REDUCE usable area</u>		<u>Open</u>	<u>Rooms</u>
4A	Ceiling grid and window grid not aligned		- 2%
	ADD - in-floor ducts not aligned with ceiling or wall grids		- 1%
	ADD - partitions can only be located on grids (no lateral tolerance without serious interference with windows, lights or ventilation, etc. and changed only at great expense)		- 2%
	ADD - internal columns not aligned with ceiling grid or not aligned with window mullions, or both	- 1%	- 1%
	ADD - window bays of more than 1.5 m (5 ft) and windows cannot be subdivided between two rooms because no window mullion		- 2%

Integration of systems and building elements

<u>Features that ENHANCE usable area</u>	<u>Open</u>	<u>Rooms</u>
4A “Wide grid”, i.e. partitions can be located in a wide range of positions and not limited to exact alignment with ceiling systems grid lines or vertical mullions in the outside wall, e.g. wide space of solid wall panel between windows		+ 2%
ADD - no internal columns	+ 1%	+ 1%

Location of exits, WCs ...

<u>Features that REDUCE usable area</u>	<u>Open</u>	<u>Rooms</u>
5A In buildings with a <u>single central core</u> that includes the elevator lobby, and <u>no</u> remote stairs, the access to service closets and rooms for services, is from “usable” areas	-1 %	- 1%
OR - in buildings with a <u>single</u> core at <u>perimeter</u> of office areas: main aisles change direction or go at an angle across the space	- 2%	- 2%
ADD - in buildings with elevators that open directly into “usable” space:		
- if one or two elevators	- 1%	- 1%
- if three or four elevators	- 2%	- 2%
- if five or six elevators	- 3%	- 3%

Location of exits, WCs

<u>Features that ENHANCE usable area</u>	<u>Open</u>	<u>Rooms</u>
5A In buildings with a <u>single central</u> core, and no remote stairs, access to all closets and rooms for services is from the public zone, i.e. <i>not</i> through occupant's reception or operational zones	+ 1%	+ 1%
OR - in buildings with a <u>single</u> core at <u>perimeter</u> of office area, there are no restrictions on the location of main aisles	+ 2%	+ 2%

Locations of exits, WCs

Features that REDUCE usable area

Open

Rooms

5B In buildings with two cores at perimeter, or central core plus remote core, e.g. elevators plus fire stair at one place and toilets plus second fire stair at another, estimate area of shortest primary (main) circulation route 1.5 m (5 ft) wide, to connect toilets, elevators and stairs.

What percent is this of total floor area? - ___% - ___%

Distance to windows or atrium

Features that REDUCE usable area Open Rooms

6A Proportion of usable floor area that is more than 15 m (50 ft) from windows to outside, or to atrium:

- more than 30%

- 2%

- 2%

OR - more than 0% but less than 30%

- 1%

- 1%

Features that ENHANCE usable area Open Rooms

6A Portion of usable floor area no more than 2 workstations (6 m, 20 ft) away from windows is:

- 100%

+ 2%

+ 2%

OR - 70%

+ 1%

+ 1%

Floor loads

Features that REDUCE usable area Open Rooms

7A For on-floor storage, e.g. heavy files in shelves, floor loading requirements are that:

- storage must be located in a specific part of the floor

- 1% - 1%

ADD - if no area on-floor, for heavy loads, then shelves and files must be spaced apart, with wide aisles to distribute the load

- 3% - 3%

Calculate the percentage of loss

	<u>OPEN</u>	<u>ROOMS</u>
Sum of all REDUCTIONS	- ___ %	- ___ %
Sum of all ENHANCEMENTS	+ ___ %	+ ___ %
BUILDING LOSS	=	<hr/> ___ % ___ %

This is the percent to deduct from usable area

Applying the method

- ① **develop space requirement to include personnel, meeting and training, support and circulation**
- ② **add an assumed building loss factor of 10% to space requirement**
- ③ **find spaces on offer to match requirement**
- ④ **for each space, calculate *occupiable floor area* using CAD or quick estimation table**
- ⑤ **for each space, compare space requirement in step 1 to the *occupiable floor area*
identify space that matches requirement**

Comparison of the two methods

<u>CRITERIA</u>	<u>Using CAD/CAFM</u>	<u>Using Building Loss</u>
Speed	Medium	High
Skill Level	Medium	Medium
Cost to Calculate	Medium to High	Low
Validation	High	Medium
Reliability	High	Medium High



Advantages of each method

USING CAD/CAFM

- **Validates amount of usable area on offer**
- **Electronic file available upon acceptance of space on offer**
- **Accuracy**

USING BUILDING LOSS

- **Quick**
- **Enables building features comparison**
- **Supports early detailed analysis**



Disadvantages of each method

USING CAD/CAFM

- Length of time
- CAD file may have to be created
- CAD file may be inaccurate

USING BUILDING LOSS

- Estimation only
- Variance may occur between estimators
- Relies on accuracy of usable floor area as stated in lease documents



IFMA Standards Committee

**You are welcome to
participate**

**Join the IFMA Standards
Committee on Area
Measurement**



*Office buildings are not
created equal*

Thank you