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1. Measuring and Mapping Space

1.1 Campus Size

Campus size (or area of campus) provides an indication of the size of an Institution's estate and is reported in hectares of total space occupied by all buildings (ie building footprint) and grounds. It is often requested in surveys for the purpose of comparing size of campuses, and the campus size (in hectares) should reflect what is used by the Institution to undertake its core activities. This may include rural properties such as field stations, however, if the field stations are not operational for day to day Institutional purposes, then they should be excluded from the campus total hectares count (a comment should be made to this effect on any report /survey), as it can skew any comparisons being made. Alternatively, field stations and remote properties could be included as a total as "Other Campus", but with an appropriate explanatory note.

The best approach is to:

- include buildings /grounds used for day to day core activities
- exclude huge tracts of land/field stations
- exclude investment properties and properties owned (ie bequeathed), which are normally only included in the Institutional whole property portfolio figure.

Sometimes there is confusion in what should be included in the campus area, especially around what is "owned/used/managed".

- TEFMA Survey requires reporting on "GFA maintained" and also "effective area of grounds maintained", as these figures feed into other benchmarking metrics, such as operating maintenance costs of the Institution. "Actively maintained" is interpreted as areas that are used on a day to day basis, have regular occupation, or have cleaning and/or other services provided to them, eg., grounds. The total campus hectare figure would exclude non-maintained Institutional buildings and possibly external areas (eg farms). As such the reported TEFMA figure may be lower than the campus size reported in a Go8 survey.
- Go8 Survey reporting of campus size does not make the distinction of whether the space is maintained or not, but for the same reasons given above, huge tracts of land and investment properties, etc, are excluded from the reported campus area figure.

Campus location can be described in relation to the main type of community it resides in:

- CBD: inner city (a metropolis or metropolitan area has a population usually over a 1,000,000; a city has over 100,000).
- Suburban: a residential area on the outskirts of a city.
- Urban: a commuter town is an urban population near a metropolitan area; urban has a lower population density than inner city.
- Rural: sparsely populated areas settled places outside towns and cities.

1.2 Buildings

A building is normally defined as a discrete structure, or more specifically, eg., as “a roofed enclosed facility” and therefore can include building plant and equipment. If a substantial building was constructed in stages, each stage may be treated as a separate building or as one, or multiple smaller buildings of similar vintage and construction may be grouped as a single building.

Institutional building information may include:

- building purpose (academic, administrative, services & infrastructure, residential, investment, etc),
- status (active, inactive, mothballed, tenanted, demolished),
- total building number.

The best approach to avoid a skewed or inconsistent reporting of a total building number:

- identify what are non-buildings and exclude from the building count. Examples of non-building structures, minor structures and small buildings are shown below.
- identify what should be excluded from reporting. The main consideration here is whether the building count is of the academic estate, or of the whole institutional property portfolio. TEFMA survey requires reporting on building/spaces that are maintained by the Institution. So the actual total building count (or space) owned by an Institution for Go8 reporting may be higher (and not match) the building count reported to TEFMA.

Typically, the academic estate includes only the first category of buildings listed below. Whereas, the total Institutional estate or property portfolio would include all categories below.

- Used for day to day core purposes
- Leased out for non-core purposes
- Investment
- Residential
- Not used because empty/derelict/bequeathed

Non-Building Structure

Based on NCC (National Construction Code) building classifications, these would fall under non-habitable Class 10b or non-building, and be excluded from a building count.



Minor Structures

Based on NCC building classifications, these would fall under non-habitable Class 10a, and be excluded from a building count.



Small Buildings

As for substantial buildings, small buildings are easily recognisable with structural features of walls (fully enclosed), roof, entries (doors/windows) and should be included in total building number. A space or building count survey may exclude small buildings, usually by setting a GFA m² threshold on what is to be excluded.

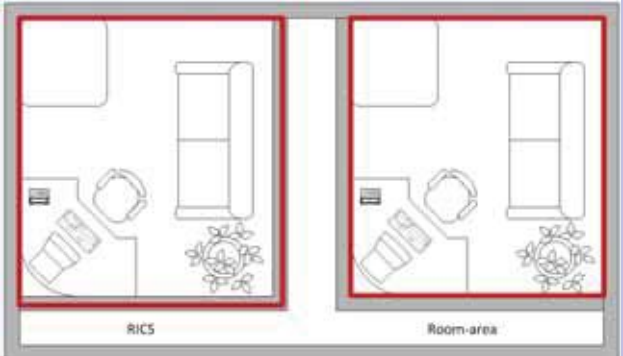


1.3 GBA & GFA, FECA & UCA, UFA & NUFA

These definitions are as recommended by TEFMA and align with (but are not exactly the same as) the Measurement of Building Areas as published by the Australian Institute of Quantity Surveyors, the Royal Australian Institute of Architects and BOMA (Building Owners and Managers Association).

Space Measurement	Definition
Gross Building Area (GBA)	GBA (m²) Total floor area inside the building envelope, includes the total enclosed (FECA) and the total unenclosed (UCA) areas at all building floor levels, includes the external walls, balustrades, balconies, supports, voids but excludes the roof. GBA is essentially a measure of the volume of a building. <i>Measured between the normal OUTSIDE of any enclosing walls, balustrades and supports.</i>
Gross Floor Area (GFA)	GFA (m²) Total floor area inside the building envelope, includes FECA and UCA, excludes voids, open balconies, external walls and the roof. <i>Measured as the sum of FECA and UCA.</i>
Fully Enclosed Covered Area (FECA)	FECA (m²) Total floor area fully enclosed and covered at all building levels, includes floored roof spaces, basements, attics, lift shafts, garages, enclosed porches, staircases and attached enclosed covered ways alongside buildings and all other fully enclosed spaces. Excludes open courts, light wells, connecting or isolated covered ways, lobbies, interstitial spaces, etc., which extend through the floor being measured. <i>Measured from the INSIDE face of exterior walls, ignoring any projections such as plinths, columns, piers etc which project from the normal INSIDE face of exterior walls.</i>
Unenclosed Covered Area (UCA)	UCA (m²) Total floor area unenclosed but covered at all building floor levels, includes roofed balconies, verandahs, porticos, undercrofts, access galleries, etc., attached open covered ways alongside buildings that are trafficable areas of the building. Excludes eaves, overhangs, shading/awnings where these do not relate to clearly defined trafficable covered areas. And excludes connecting or isolated covered ways. <i>Measured as the area between the INSIDE face of the enclosing walls/balustrades (excluding the wall/balustrade thickness) to the edge of the pavement/cover.</i>
Usable Floor Area (UFA)	UFA (m²) Total floor area inside the building envelope related to the primary function of the building, excludes the external walls, and excludes the roof. (Special inclusions are those areas which fulfil a primary functional requirement, eg covered external play area in a Child Care Centre; open, covered hydraulics modelling laboratory). <i>Measured from the general INSIDE face of walls of all interior spaces at each floor level.</i>
Non-Usable Floor Area (NUFA)	NUFA (m²) Total floor area inside the building envelope that is supplementary to the primary function of the building, may include FECA and UCA, excludes the external walls, and excludes the roof. Non-habitable service and common use areas are types of Non-Usable Area.
UFA = FECA less (SA + NHA+ CUA)	<i>Another method of calculating UFA takes all the fully enclosed space (FECA) and deducts Service Areas, Non-Habitable Areas and Common Use Areas (ie., deducting all areas supplementary to the primary function of building).</i>
Service Area (SA)	(m²) All areas set aside for building plant and associated services (eg., mechanical plant and equipment rooms, electrical equipment and switch rooms, tank rooms, lift motor rooms, meter cupboards, telecommunication switch rooms, refuse collection area).
Non-Habitable Area (NHA)	(m²) Areas occupied by internal columns and other structural supports, internal walls and permanent partitions, lift shafts, service ducts and the like. For the purposes of calculating UFA, areas deemed non-habitable such as derelict buildings, spaces with low floor to ceiling heights (eg. car parks) or no floors (eg. sheds) may be totally excluded from the UFA (and GFA) measure.
Common Use Area (CUA)	(m²) Floored areas in the building used for circulation and standard facilities provided for the common use of occupiers, tenants and/or public, such as lobbies, foyers to entrances, stairways and lifts, landings and fire escapes, verandahs and balconies, corridors and passages, toilets and rest rooms, cloak and locker areas, cleaner's rooms including stores and cupboards, kitchenettes and similar amenities areas.

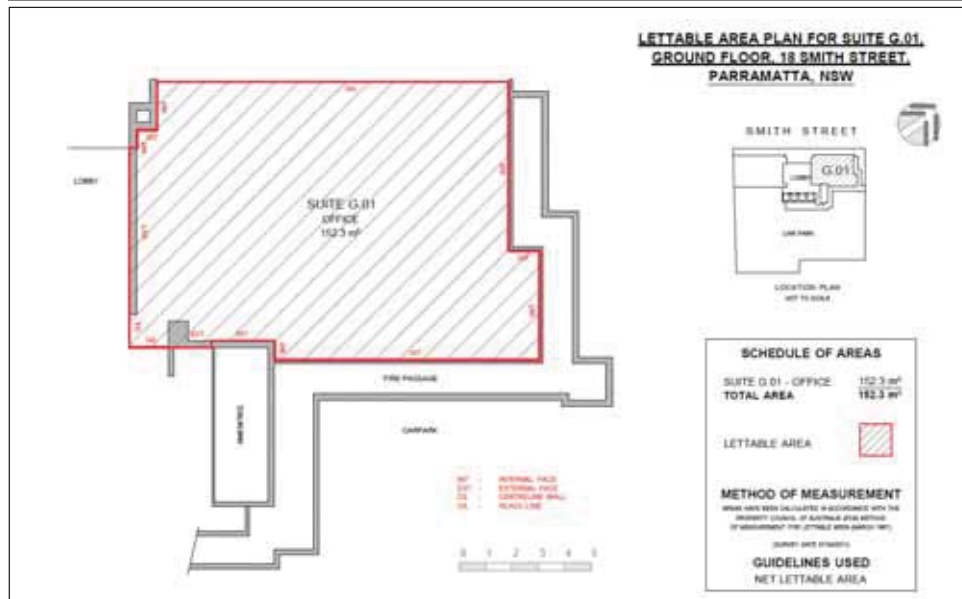
Other Space Related Items used in Reporting

Space Term	Definition
Net Lettable Area (NLA)	<p>In instances, where space is leased in or out, the commercial measurement of space (lettable area) may be applied. NLA is the sum of all lettable areas within a building or floor, measured from the internal finished surfaces of permanent walls and from the internal finished surfaces of dominant portions of the permanent outer building walls, and including the area occupied by structural columns and engaged perimeter columns (in accordance with the Method for the Measurement for Lettable Area issued by the Property Council of Australia).</p> <p>Other measurement methods may use the the Code of Measuring Practice: A Guide for Property Professionals, published by the RICS (Royal Institution of Chartered Surveyors). This method involves the measurement of the internal room area <u>part way</u> into the width of internal walls and partitions. For commercial leases this may be the preferred measurement method and is demonstrated by the left-hand room in the diagram below.</p> <p>Excluded from NLA:</p> <ul style="list-style-type: none"> - All stairs, toilets, cleaners cupboards, lift shafts, escalators, and tea rooms where provided as standard facilities in the building. - Lobbies between lifts facing other lifts serving the same floor - Areas set aside as public space or thoroughfares, and not used exclusively by occupiers of the building (NOTE: Excludes any additional common areas resulting from subdivision of a whole floor to accommodate more than one tenant). Areas not leased to a particular tenant, but available for the use of all tenants and, usually, members of the public. - Areas set aside as plant and lift motor rooms of for the provision of facilities or services to the building and not for the exclusive use of an occupier or occupiers of the building - Areas set aside for use by service vehicles and for delivery of goods and access ways thereto - Areas set aside for car parking and access thereto - Areas where clear height is less than 1.5m 
Asset Replacement Value (ARV)	<p>The ARV is the best estimate of current cost of buildings, fixed equipment, services and systems, designing, constructing & equipping for its original use, a new facility providing equal service potential as the original asset & which meets currently accepted standards of construction & also complies with all contemporary environmental & other regulatory requirements. Includes the cost of all building services and associated plant, finishes and built-in furniture, all fees, approvals and other incidental expenditure associated with construction and initial occupation.</p> <p>Excluded from building ARV are student housing, cost of relocating into the building, cost of loose furniture and soft furnishings, laboratory, scientific, loose equipment and all equipment other than that required for the normal functioning of the building, costs normally included in the insured value such as demolition, site clearing and the provision of temporary accommodation.</p>

Examples of Polylined Lettable Areas



(a) Lettable area (hatched) excludes plant room, fire stairs, foyer, toilets, lifts and balcony, i.e., shared or general access areas or building services/structure. The kitchen is of sole use to the tenants on this floor and it is therefore included in the total lettable area.



(b) Lettable area (hatched) excludes lobby, fire passage, plant room, amenities and car park ie., shared/general access areas or building services/structure.

These floorplans show (highlighted in blue) net lettable areas (NLA) on 5 different levels of a Go8 University building. The total NLA is given in the table. Areas typically excluded from NLA are not highlighted on the floorplan and include stairs, toilets, common room, mainframe computer room, store room, and plant room. The ground floor lobby is not part of the NLA because it is accessible to all who enter the building, unlike the other floors where the circulation space (NLA, highlighted in blue) is for the sole use of the tenants.



NET LETTABLE AREA STUDY ENGINEERING & MATHEMATICS SCIENCES	
FLOOR LEVEL	CALCULATED NLA (m ²)
GROUND FLOOR	365.53
FIRST FLOOR	612.89
SECOND FLOOR	720.57
THIRD FLOOR	740.26
FOURTH FLOOR	623.79
TOTAL	3066.04

NOTE:
- ALL NLA VALUES ARE CALCULATED ON THE BASIS THAT GROUND FLOOR ALLOWS FOR MULTIPLE TENANTS THROUGHOUT THE BUILDING. ALL OTHER FLOORS ARE CALCULATED ON THE BASIS THAT THERE IS ONE TENANT PER FLOOR.
- ALL CALCULATED NLA VALUES ARE APPROXIMATE AND ARE BASED ON THE PROPERTY COUNCIL OF AUSTRALIA METHOD OF MEASUREMENT - FOR LETTABLE AREA - COMMERCIAL - GUIDELINES. THE GUIDELINES HAVE BEEN APPLIED TO UQFA ARCHITECTURAL RECORD DRAWINGS WHICH MAY VARY FROM ON SITE CONDITIONS.
- ALL CALCULATED NLA VALUES ARE FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR LEGAL DOCUMENTATION. ALL NLA VALUES SHOULD BE VALIDATED WITH AN ON SITE SURVEY.

Measuring Methods

GBA Measurement of buildings or spaces are mapped and quantified by a number of methods. GBA is drawn as one continuous polyline around the OUTSIDE face of the external walls of the building and it includes all spaces within the building including voids, perimeter wall thicknesses, external projections, loading bays and garages. But excludes open-sided balconies, fire escapes, canopies, and roof terraces, and as such the GBA total m² measurement essentially provides the building volume.

Another space term sometimes used is that of a building perimeter line which also includes the non-structural protrusions, including eaves, cornices, canopies, awnings, sills, ledges, gutters, shutters, attached electrical or mechanical systems or decorative projections.

GFA GFA is the predominant and most consistent measure used for space comparisons in the tertiary education sector. GFA of a building or space can be mapped and quantified by a number of methods, and variations of these methods are used across the Go8.

Variation 1 is the simplest approach with minimal CAD drawing required as only a single continuous polyline is drawn for the GFA. The GFA line must exclude voids (except at ground level) and may need bridging lines across building/floor features to maintain a continuous line. There is a possibility of inaccurate GFA measurement if voids, UCA, etc are overlooked at the CAD drawing stage, and if the space management system does not capture any separate information on these spaces.

Variation 2 involves more CAD work as both FECA and UCA spaces are separately polylined. The FECA line must exclude voids and bridging lines across building/floor features may be required. The m² figures FECA and UCA are field entries in the Archibus Group Tables view and GFA total m² is automatically (system) generated from the sum of all FECA and UCA polylines for that floor. (Another slightly different approach is where FECA/UCA are separately polylined, these areas are exported and GFA automatically generated and reported in one Archibus GFA field. No separate FECA/UCA fields in Archibus, however FECA/UCA m² areas are indicated on the CAD drawing).

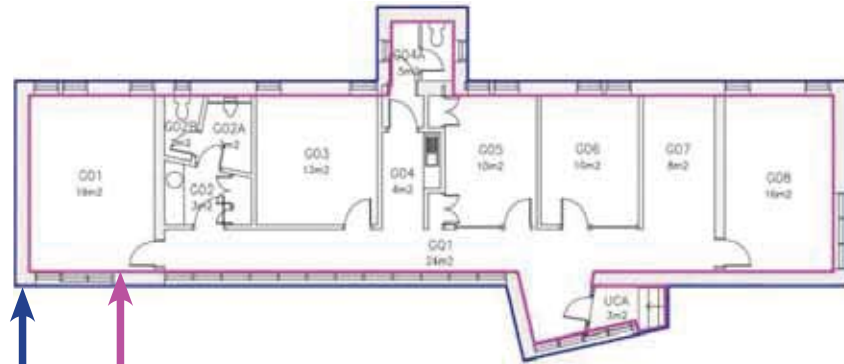
Variation 3 as for Variation 2, involves more CAD work in polylining FECA and UCA spaces separately, but also requires an understanding of the space super-category feature in Archibus. The super-category method is applied to space terms eg., gross internal and gross external areas, by applying rules to different space categories eg to exclude/subtract voids from total GFA m². As for Variation 2, this method provides a number of different m² figure field entries as either calculated values or via the Archibus Group Tables view, giving the advantage of an automated (system generated) GFA and other specific total m² calculations. Using the super-category functionality does provide more quantifiable granularity of different space categories (which can be customised by the space system users), however consideration needs to be given to the interpretation of the terms and rules used in this advanced method.

The following pages provide details on each of the GFA measurement variations described above, as well as photo examples of FECA and UCA spaces.

In addition, at the end of this section there is a brief description on how total UFA m² and non-UFA m² are derived for Go8 and TEFMA reporting.

It is important whether using the polylining or summing method that voids are excluded from GFA or FECA polylines and calculations to avoid overstating m² GFA area on all floor levels.

Variation 1 - GFA polyline only and summing room areas



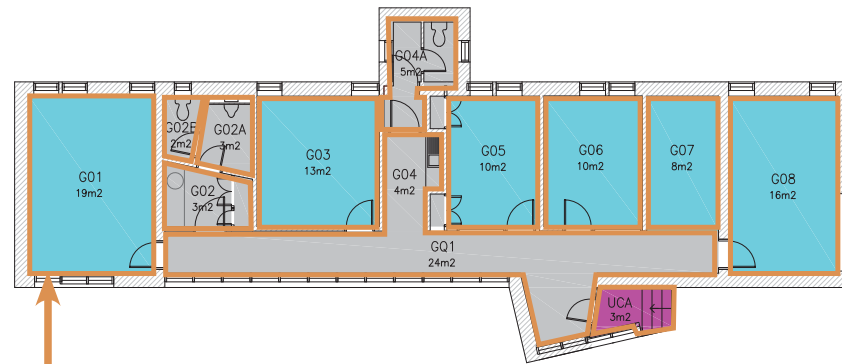
GBA - This figure is the enclosed and unenclosed area of the building at all building floor levels measured between the normal OUTSIDE face of any enclosing walls, balustrades and supports.

GFA - This figure is the enclosed and unenclosed area of the building at all building floor levels measured between the normal INSIDE face of any enclosing walls, balustrades and supports.

GBA & GFA

GFA polyline (pink) includes FECA and UCA spaces but does not polyline these areas separately.

GBA polyline (blue) includes FECA and UCA spaces but does not polyline these areas separately.



UFA - The sum of the floor areas measured at floor level from the general inside face of walls of all interior spaces related to the primary function of the building.

NUFA - All floored areas in the building used for circulation and standard facilities provided for the common use of occupiers such as lobbies and fire escapes, verandahs and balconies, corridors and passages, toilets and rest rooms areas, cleaner's rooms including stores and cupboards, tea making facilities and service areas.

UCA - The sum of all such areas at all building floor levels, including roofed balconies, open verandahs, proches and porticos, attached open covered ways alongside buildings, undercrofts and usable space under buildings and any other trafficable covered areas of the building which are not totally enclosed by full height walls.

FECA & UCA, UFA & NUFA

Polylines (orange) measure individual Room Areas from the inside face of the internal walls. Room Type codes then define the spaces as:

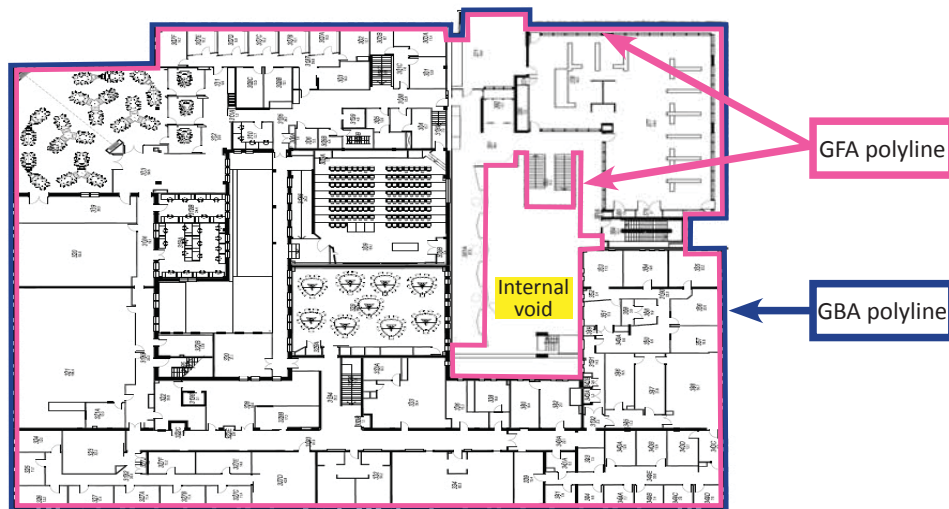
- UFA = 100 - 700 Room Type codes
- NUFA = 800 - 900 Room Type codes
- UCA = may be designated a UCA prefix/suffix in conjunction with a Room Type code, typically a 800 series Room Type (e.g. 839-Balcony).

Accounting for Voids

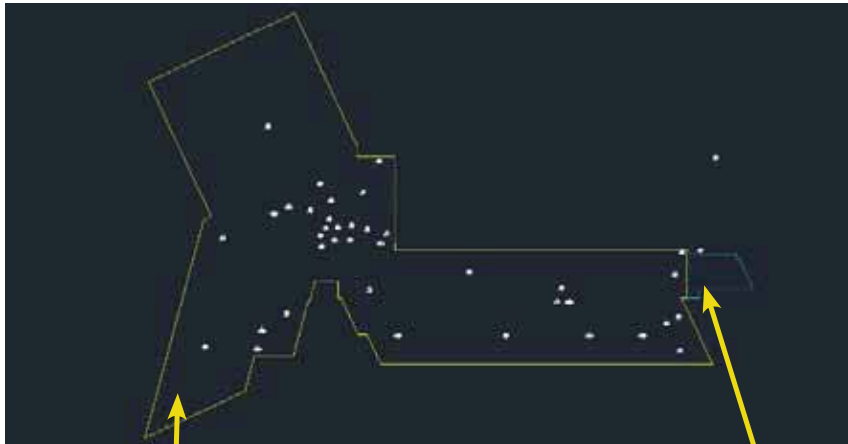
In the CAD drawing to the left, the GBA polyline is a continuous polyline (blue), drawn around the outside face of the building's external walls. The GBA polyline includes the large internal void space on this floor level, as GBA essentially provides a measure of the building volume.

The GFA polyline is a continuous polyline (pink), drawn around the inside face of the external walls. It includes the internal walls, FECA and UCA areas, but would exclude columns which project from the exterior spaces and also excludes the internal void. Both GBA and GFA polylines would include any UCA spaces as these are not polylined separately.

Note: in some buildings or floors 'bridging' GBA (and GFA) polylines may need to be drawn across small structural voids on the ground floor to maintain a continuous polyline.



Variation 2 - Polylines and Archibus fields for FECA and UCA



(a) Level 2 CAD drawing



(b) Level 2 view and Level 1 UCA



(c) Level 2 UCA space



(d) Level 1 cafe area

FECA and UCA Polylines

(a) in this example, the CAD drawing shows two separate polylines for Level 2 of this building - a yellow FECA polyline and a blue UCA polyline. Total GFA for this floor level is the sum of the areas covered within both polylines.

$$\text{GFA m}^2 = \text{FECA m}^2 + \text{UCA m}^2$$

The GBA polyline would be drawn in the same manner as in Variation 1 (not shown for this example) and would be a continuous polyline encompassing both the FECA and UCA areas.

(b) shows a view of Level 2 of this building towards the "pointy end" and the UCA space on Level 1 that houses a café.

(c) shows the UCA space (as per blue polyline in CAD drawing) for the covered entrance on Level 2 of this building. The UCA polyline would measure the area between the enclosing walls, balustrade i.e. from the inside face of the UCA excluding the wall (or balustrade thickness) to the edge of the covered area.

(d) shows the UCA space on Level 1 of this building. A UCA polyline would be drawn to the edge of the covered area of the café space, but would not include the additional eating area (although this area would be included as part of the café lease agreement).

UCA & FECA Fields in Archibus

Variation 2 differs from **Variation 1** in that separate polylines are drawn for UCA and FECA, and the FECA and UCA m² figures are represented in Archibus data fields (Space Inventory / Building Performance /View Building Performance Analysis) as per the screenshots below.

Top Screenshot: UCA Group Configuration

Group Code	Building Code	Building Name	Floor Code	Floor Name	Group Num.
0047A					
1836	0047A	Sr James Foote Building	1	Sr James Foote Building Level 1	
1837	0047A	Sr James Foote Building	2	Sr James Foote Building Level 2	
1838	0047A	Sr James Foote Building	2	Sr James Foote Building Level 2	
1839	0047A	Sr James Foote Building	3	Sr James Foote Building Level 3	
1840	0047A	Sr James Foote Building	4	Sr James Foote Building Level 4	
1841	0047A	Sr James Foote Building	5	Sr James Foote Building Level 5	
1842	0047A	Sr James Foote Building	6	Sr James Foote Building Level 6	
1843	0047A	Sr James Foote Building	7	Sr James Foote Building Level 7	
1844	0047A	Sr James Foote Building	8	Sr James Foote Building Level 8	
1845	0047A	Sr James Foote Building	9	Sr James Foote Building Level 9	

Group Code: 1837
 Floor Code: 2
 Group Std. Code: UCA
 Department Code:
 Area m²: 98.24

Building Code: 0047A
 Group Number:
 Division Code:
 Private: NONE
 Group Description:

Bottom Screenshot: FECA Group Configuration

Group Code	Building Code	Building Name	Floor Code	Floor Name	Group Num.
0047A					
1836	0047A	Sr James Foote Building	1	Sr James Foote Building Level 1	
1837	0047A	Sr James Foote Building	2	Sr James Foote Building Level 2	
1838	0047A	Sr James Foote Building	2	Sr James Foote Building Level 2	
1839	0047A	Sr James Foote Building	3	Sr James Foote Building Level 3	
1840	0047A	Sr James Foote Building	4	Sr James Foote Building Level 4	
1841	0047A	Sr James Foote Building	5	Sr James Foote Building Level 5	
1842	0047A	Sr James Foote Building	6	Sr James Foote Building Level 6	
1843	0047A	Sr James Foote Building	7	Sr James Foote Building Level 7	
1844	0047A	Sr James Foote Building	8	Sr James Foote Building Level 8	
1845	0047A	Sr James Foote Building	9	Sr James Foote Building Level 9	

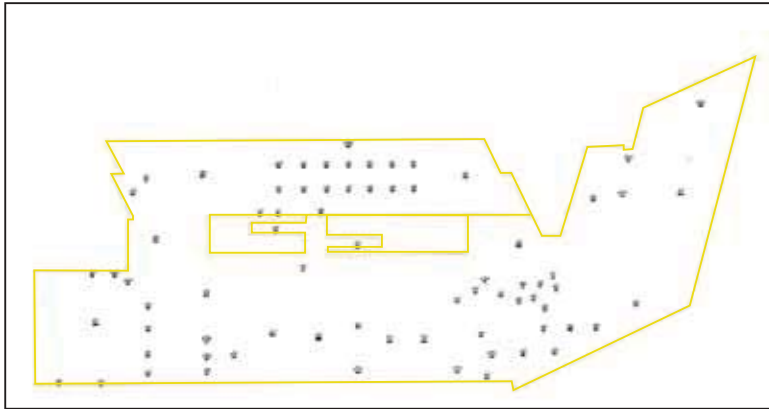
Group Code: 1838
 Floor Code: 2
 Group Std. Code: FECA
 Department Code:
 Area m²: 1,066.05

Building Code: 0047A
 Group Number:
 Division Code:
 Private: NONE
 Group Description:

Accounting for Voids

For level 4 of this same building:

- (a) and (b) show one continuous FECA (yellow) polyline which excludes the void in the centre of the building and the void spaces associated with the stairs on that level.
- (c) stairs are polylined and given a room number (eg 467) on each floor. The method for polylining stairs is detailed in another section of the playbook.
- (b) and (c) each different space has a room number, including stairs (Room 467), service risers (Rooms 432/431), corridor (Room 448).
- (d) photo of internal stairs (Room 467) within a circulation space and with void space above the stairs. The circulation space also has a void space above, on the next level.



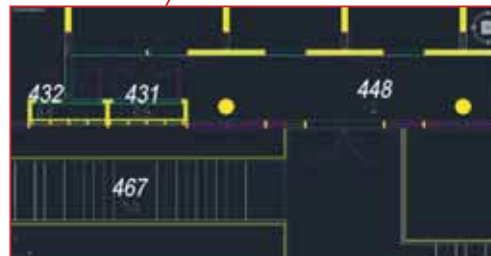
(a)



(b)

CAD drawings (a, b, c) show room elements:

- pink lines = doors/windows;
- green/blue line = individual rooms;
- yellow thick line = solid wall;
- yellow thin line = continuation of internal GFA (FECA) line.



(c)



(d)

Variation 2 - example polylines for GFA, UCA, FECA, voids and stairs

The following pages show CAD drawings (a) to (f) with GFA/FECA/UCA polylines for three floors of a building, and also photos of some relevant building features that influence where these polylines are drawn. The ground floor location of the photos numbered (1) to (8) are shown on the ground floor CAD drawing.

Of note, this building has two main wings, and a lecture theatre across two levels in one corner of the building. The main open entrances are at ground level at the top and at the right of the building as per the drawing orientation. There is a canopy roof over the central connecting thoroughfares, and covering the main entrances, but this canopy is not fully enclosing. There is a circular stairwell near the large lecture theatre.



(1)



(2)



(3)



(4)



(5)



(6)



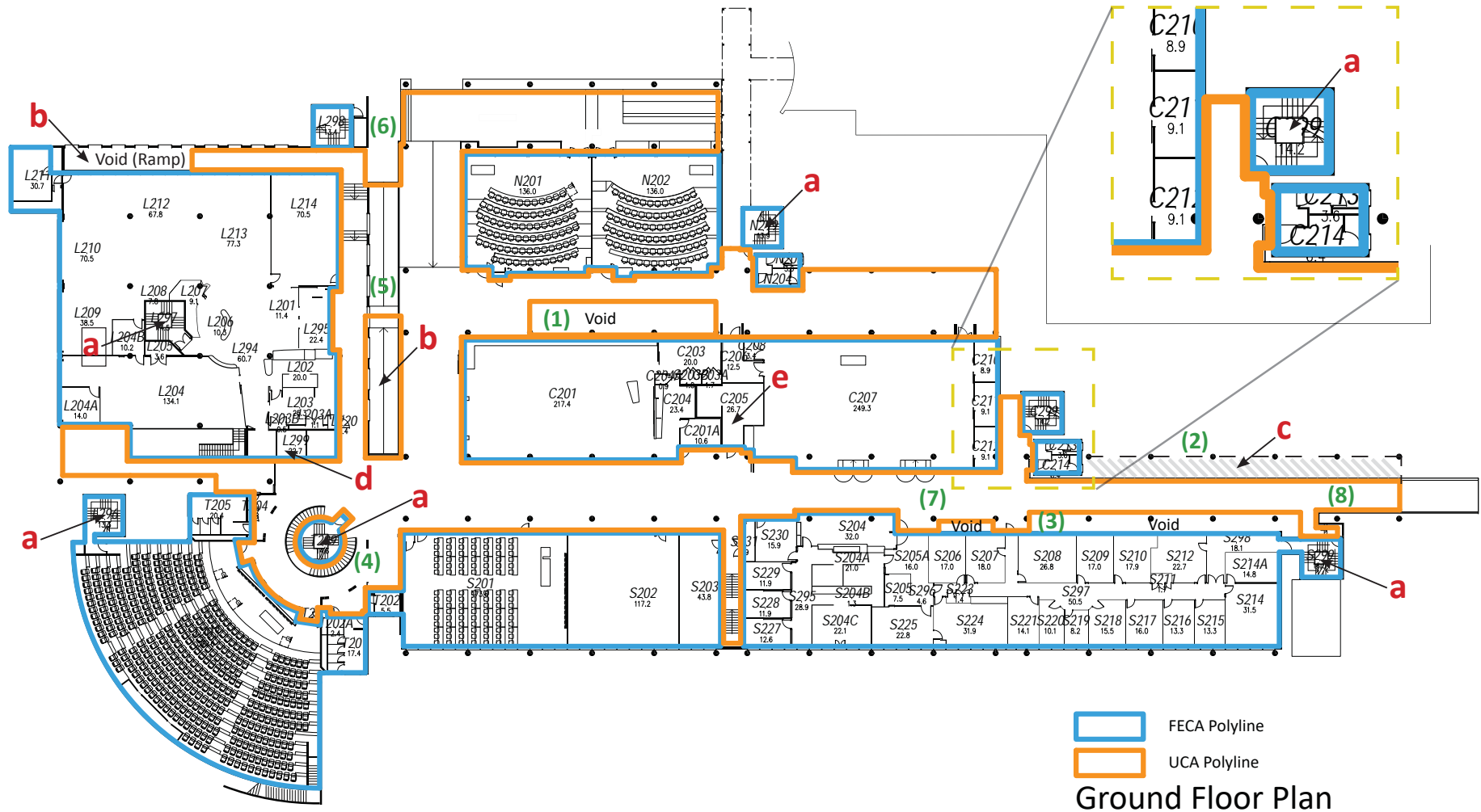
(7)



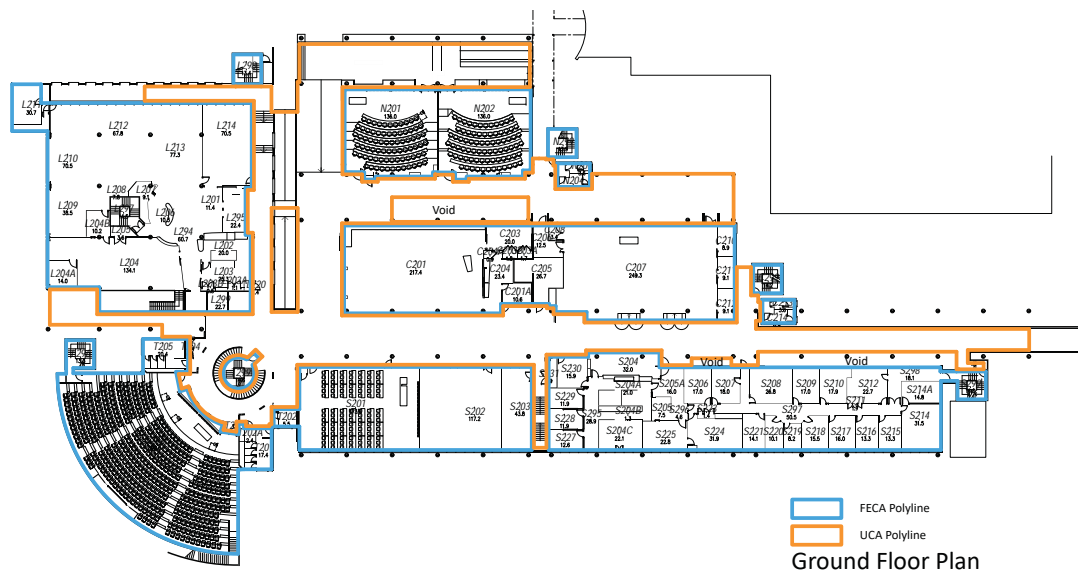
(8)

GFA measurement considerations:

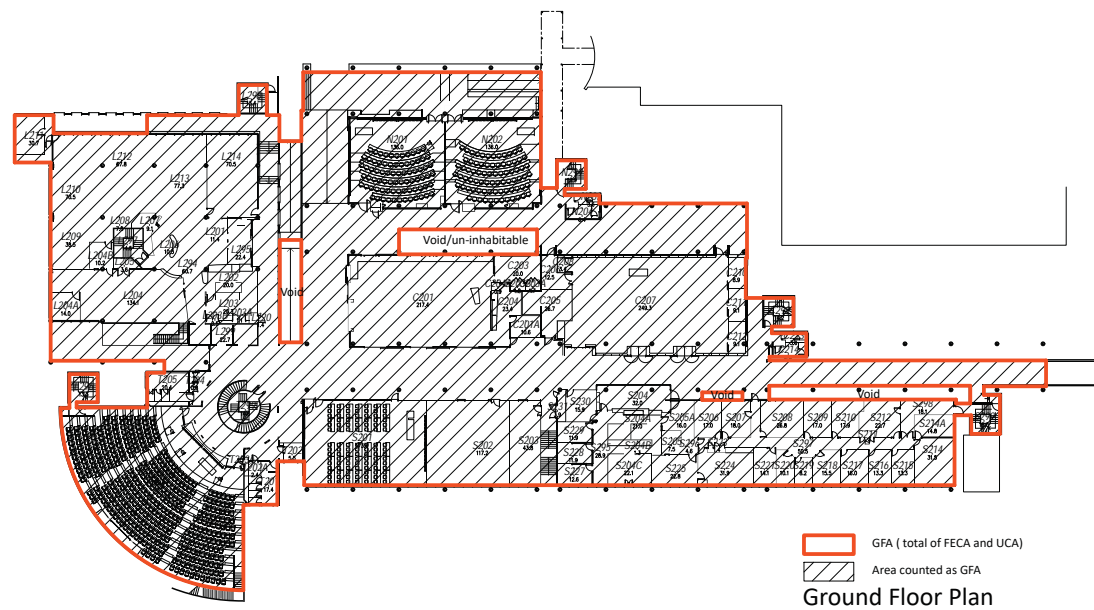
- Minor voids in the staircases are included.
- Ramp is calculated half size of the GFA for the connecting floor and half size is considered as void.
- Covered but not paved/floored area is excluded.
- Lift well is considered as fully enclosed, and a verticle penetration. Lift is counted only once (not on all floors).
- FECA is measured from inside face of exterior walls of a space, which means internal columns, and partitions will be included.



Ground Floor Plan



(c) The ground floor level now includes significant levels of UCA, mostly void spaces. The ramp that extends from ground level down to the lower level (photo 6) is calculated half size of the GFA for the connecting floor and half as void. Half the tiered lecture theatre is counted as FECA on this level. Lift core is considered as fully enclosed.



FECA Polyline

UCA Polyline

First Floor Plan

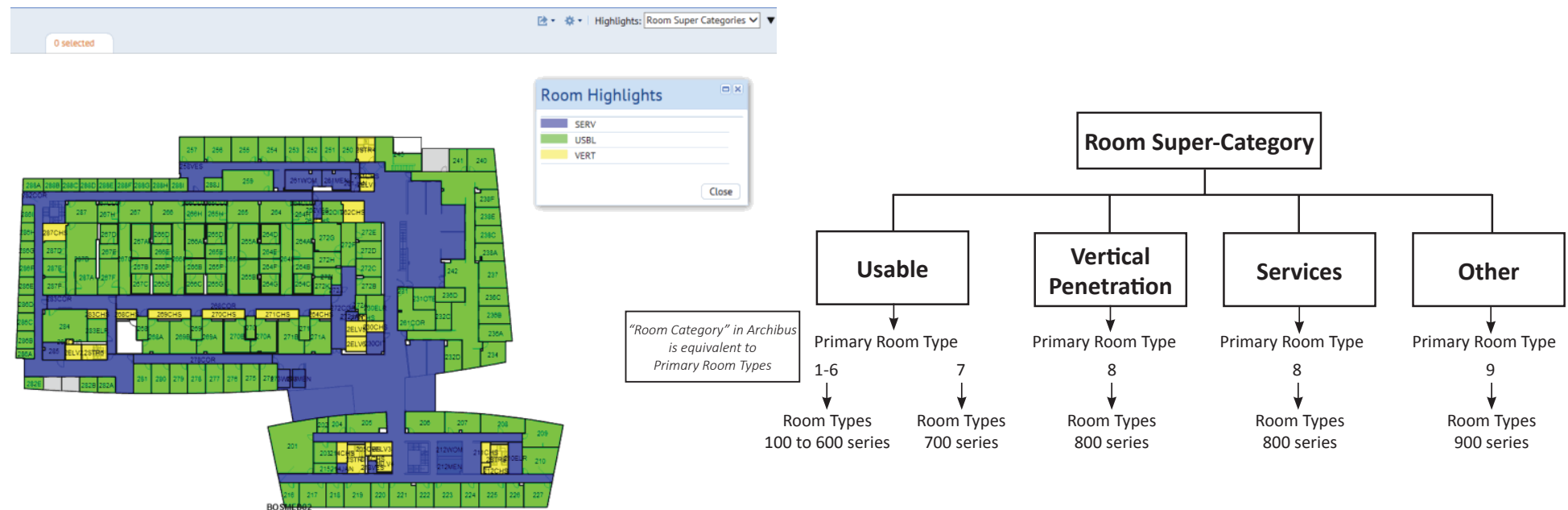


GROUP
OF EIGHT
AUSTRALIA
UNIVERSITIES

Variation 3 - Polylines and Super-Categories

Many sites measure and account for their space according to guidelines developed by BOMA and IFMA. Using the super-category feature of Archibus provides a way to account for all spaces according to IFMA (International Facility Management Association) and BOMA-defined conventions, by adopting an additional layer of room categories with their associated m² calculations and room counts, that don't interfere with the true space measurements and true room totals.

Not all space on a floor can be used to house personnel and furniture because a floor typically has vertical penetrations (shafts, stairs, pipe shafts) and service areas (rest rooms, lobbies, mechanical rooms); personnel do not occupy these areas. The super-category approach still draws FECA and UCA polylines, but all areas are also assigned to a higher level space category (super-category) that indicates whether the space is occupiable or non-occupiable. These different space categories are flagged and rules are set in Archibus in how these spaces are used or not used in space calculations. An Archibus drawing can be generated (see below left) that highlights how the floor is divided by super-categories without the need to detail the space types within the super-categories. In this case, the areas have been assigned one of three super-categories: Usable Areas (**USBL** - occupiable), Vertical Penetrations (**VERT** - occupiable or non-occupiable), Service Areas (**SERV** - non-occupiable). A user defined super-category of Other (occupiable or non-occupiable) is assigned for other space types (eg workstations).



So primary circulation areas, mechanical closets, toilets, etc., are still recognised Room Types in Archibus, but are assigned a room super-category of Service, which indicates to the space management system that they do not house personnel and furniture. Similarly, stairs, atriums, etc., can be assigned a room super-category of Vertical Penetration. The super-category fields provide a useful and quick view of the total m² figures for vertical penetration, for example, within a building. Using the rules defined for each super-category allows an automatic (system) generated calculation of GFA, although the total m² figures require some interpretation because the different space terms employed in the super-category approach do not make some m² totals and calculations immediately obvious.

An advantage of Super-category space assignment is that it also readily identifies rooms into usable and non-usable categories, as the super-categories can be aligned with the Go8 Primary Room Types (1 through 9) and Room Types (100 through to 900 series codes), as shown in the chart above.

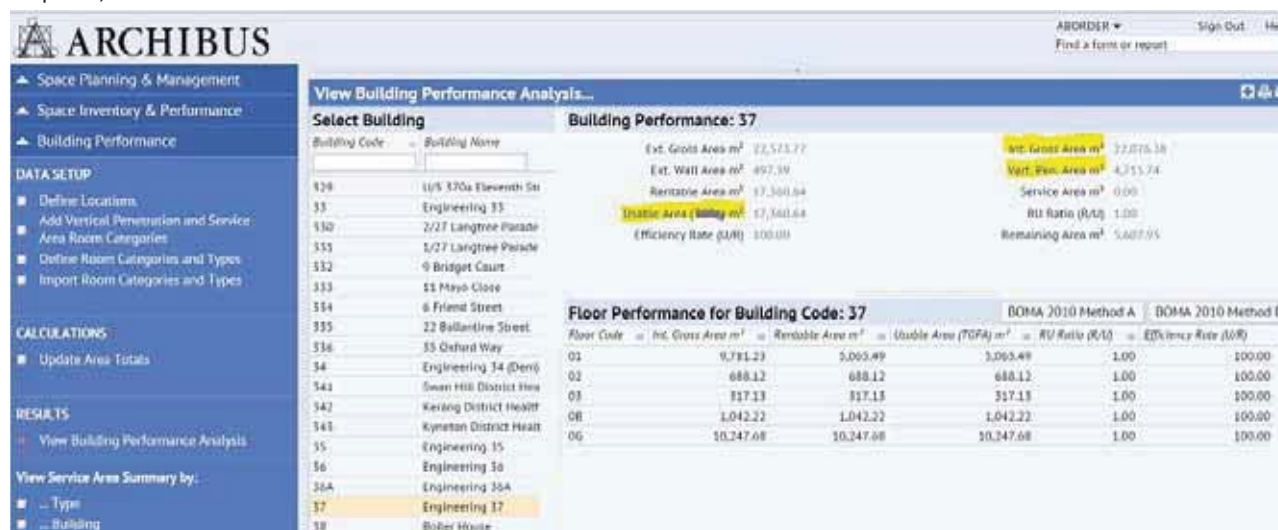
Accounting for Voids using Super-Categories

The following screenshots show space measurements using the super-categories approach, and in particular how the method accounts for voids.

Because of the way that Archibus handles different space types and the rules setup for space super-categories, additional space terms are used that may not be common terminology amongst users of the space management system. The legend below defines these space terms in order to understand the figures in the **Building Performance Analysis** view.

In this building example,

- there is 4,715.74 m² of **Vertical Penetration** space (voids, atria, service riser, etc) and no service areas (although some may be accounted in the void space figure)
- Ext. Gross Area of 22,573.77m² is the Int. Gross Area of 22,076.38m² (which include voids) plus external wall thickness of 497.39m²
- TEFMA GFA is the sum of Int. Gross Area (22,076.38m²) plus any UCA m² (manually captured and not shown in this view)
- Usable space of 17,360.64m² is the Int. Gross Area of 22,076.38m² less Vertical Penetrations and Service Areas of 4,715.74m². So Usable space represents the sum of remaining FECA (occupiable and non-occupiable) plus the Int. Wall thickness.
- Remaining area of 5,607.95m² is the Int. Gross Area less total FECA (occupiable and non-occupiable) space. It represents the sum of vertical penetration, non-occupiable service areas and any unaccounted for spaces, ie internal wall thickness.



Space Terms:

GBA = Ext. Gross Area plus UCA plus Remaining Area.

TEFMA GFA = Int. Gross Area (less Void plus UCA).

Ext. Gross Area = Int. Gross Area plus external wall thickness.

Ext. Wall Area = difference between Ext. Gross Area and Int. Gross Area.

Rentable Area = lettable area (if leased).

Usable Area = Int. Gross Area (less Vert. Penetration and Service Areas) and is equivalent to total FECA (occupiable and non-occupiable) plus Int. Wall thickness.

Int. Gross Area = floor area contained within a building measures to the internal face of the external walls, includes voids and internal wall thickness.

Vert. Pen. Area = voids, service risers, etc.

Service Area = circulation, toilets, etc.

Remaining Area = walls plus cavity areas (represents Int. Gross Area less sum of all FECA areas).

The **Define Room Category and Types** screenshot view below shows

- the user defined spaces included in the super-category **VERT** Vertical (elevation, pipes, shafts, stairs, vertical penetration, voids)
- Indicates the rule of **Calculation Used In - No Totals** which instructs Archibus to not include this space type in certain space total transactions eg., room totals. The rule sets “Vertical Penetration” as **not automatically** included in any space totals.
- **Vertical Penetration** field selected as the **Super-Category**, which creates another internal transaction rule that instructs Archibus to subtract Vertical Penetration space from the GFA.

This method allows voids to be identified specifically by a super-category AND the space to be automatically excluded from GFA m² figures.

The screenshot shows the ARCHIBUS web application interface for defining room categories. On the left is a navigation menu with sections like 'Space Planning & Management', 'Space Inventory & Performance', and 'Room Inventory'. Under 'DATA SETUP', 'Define Room Categories and Types' is selected. The main panel is titled 'Define Room Categories and Types' and contains a list of categories on the left and a form for editing a selected category on the right. The 'VERT Vertical' category is selected. The form shows the following details:

Room Category	Room Type
Room Category: VERT	
Description: Vertical	
Cost per Area: 0.00	
Occupiable: No	
Calculation Used In: No Totals	
Super Category: Vertical Penetration	
Highlight Pattern - Acad: 14 0 571 16744576	

UCA spaces



(a)
Unenclosed but covered at all building floor levels, including balconies, etc., attached open covered ways alongside buildings, and are trafficable areas of the building (TEFMA definition).



(b)
As in (a)



(c)
As in (a)



(d)
Unenclosed but covered at all building floor levels, including balconies, etc., attached open covered ways alongside buildings, and are trafficable areas of the building (TEFMA definition).



(e)
As in (a)



(f)
As in (a)



(g)
UCA would be measured in line with covered extension only - not to edge of steps (even though they are trafficable areas of this building).



(h)
Similarly, UCA measured to extended edge of the covered portion of the paved walkway (not to edge of pavement, this part is uncovered).