Davis Langdon
An AECOM Company

Davis Langdon were commissioned to undertake a study to provide a detailed comparison between Light Gauge Steel (LGS) Frame construction and H+H UK Ltd thin-joint masonry construction using aircrete units. The study focused on a comparison of costs, together with speed of build, programme, robustness, thermal mass and other benefits of masonry over framed construction.

The Thin-Joint Construction Cost Advantage

The 12.4% cost saving building method*†

Davis Langdon, An AECOM Company, is a global construction consultancy, providing managed solutions for clients investing in infrastructure, property and construction.

Specialist cost managers, project and program managers and strategic consultants provide a range of services focused on reducing client risk, improving value and assuring outcomes on projects in market sectors as diverse as commercial property, education, health, sports, leisure and residential. Davis Langdon aims to work with clients from the earliest possible opportunity – the first people clients come to when investing in the built, natural and social environment. The goal is to work with clients through every stage of the development process, as well as post completion, extending into the operational life cycle.

Globally Davis Langdon has over 2,500 staff in more than 75 offices worldwide and is the recipient of a number of industry awards including 'Top International Construction Consultant' for 18 successive years.

The Study

The study took place in December 2010 and embraced two building types:

- A two storey school teaching block with a gross internal floor area (GIA) of 1,500m^2, constructed in 7 weeks.
- A six storey student accommodation block with a gross internal floor area (GIA) of 6,000m^2, constructed in 14 weeks.

Elevations used were facing brick for both building types. The detail of the studies was from a frame completion and waterproofed roof starting point to a completed internal finish.

Rationale

A detailed elemental cost analysis for each building type was prepared from previous benchmark studies. This allowed for a realistic elemental breakdown and total build cost for each building type.

External Walls and Internal Wall and Partitions were studied in more detail to arrive at cost differentials between Thin Joint masonry wall construction and modern LGS. Supply and install rates were calculated from labour and material build-ups and checked for accuracy against rates from Spon's Architects' & Builders' Price Book and current tenders.

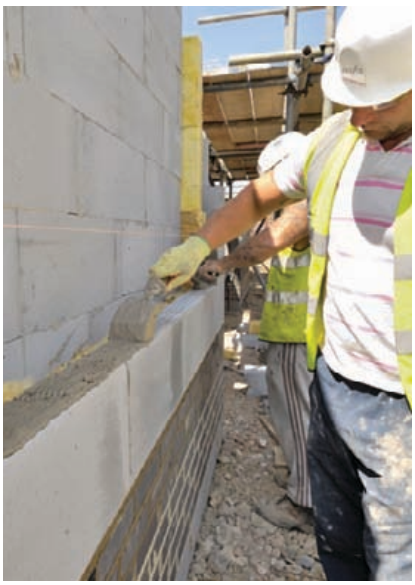
Specifications for each form of construction were kept as simple as possible to indicate the principle differences between the two forms of construction.

* When compared to Light Gauge Steel (LGS) Frame construction methods.

† Figures taken as an average over all percentages shown.

H+H Product Factsheet 12

Thin-Joint Masonry Construction -vs- Light Gauge Steel



Programming

The blockwork element is carried out early in the structural programme as it is principally a wet trade and sometimes plays a part in structural support for some following elements. It closes/creates room compartments normally before screeding.

Thin joint masonry has an improved level of dimensional tolerance. Service drops are usually face fixed, or alternatively can be chased in to the wall with ease. Subsequent wall linings should be thick enough to adequately cover any faced fixed items. Thin Joint masonry also gives the option of starting the internal walls before the building is waterproofed because it is not affected by the weather.

The commencement of LGS partitions is usually after load bearing wall and roof coverings are completed. It is not deemed a wet trade. It can be progressed to leave walkways between partitions until the last minute, giving freer circulation for other trades. Partitions are normally erected in three stages:

1. Framing and plasterboard to one side
2. Internal weight bearing patresses and supports, service drops and insulation
3. Second side plasterboard taping and joining

Summary Information

Teaching Block	**Thin Joint Masonry construction**	**LGS build cost**
Total building cost Cost per m^2	**£1,899,783** **(£1,267/m^2)**	£1,924,455 (£1,283/m^2)
External walls Cost per m^2	**£100,836** **(£140/m^2 of wall area)**	£110,312 (£153/m^2 of wall area)
Internal Walls and Partitions Cost per m^2	**£77,903** **(£72.00/m^2 wall area)**	£93,099 (£86.04/m^2 wall area)
Student Accommodation	**Thin Joint Masonry construction**	**LGS build cost**
Total building cost Cost per m^2	**£7,370,170** **(£1,228/m^2 GIA)**	£7,493,589 (£1,249/m^2 GIA)
External walls Cost per m^2	**£465,427** **(£134/m^2 of wall area)**	£529,261 (£152/m^2 of wall area)
Internal Walls and Partitions Cost per m^2	**£392,018** **(£68.13/m^2 wall area)**	£459,179 (£79.80/m^2 wall area)

January 2012
CI/SfB Ff4

Analysis of the Results – the savings

Two Storey Teaching Block

Substructure, frame, upper floors, roof, stairs, finishes and services were deemed identical irrespective of walling choice.

External Walls	Total Cost	
Thin-Joint Masonry Construction	£100,843.00	8.6% SAVING
Light Gauge Steel Construction	£110,312.00	

Internal Walls	Total Cost	
Thin-Joint Masonry Construction	£77,903.00	14.3% SAVING
Light Gauge Steel Construction	£93,099.00	

For the study, an overall construction period of 7 weeks was used for the walls and partitions, the same for each build option.

Student Accommodation

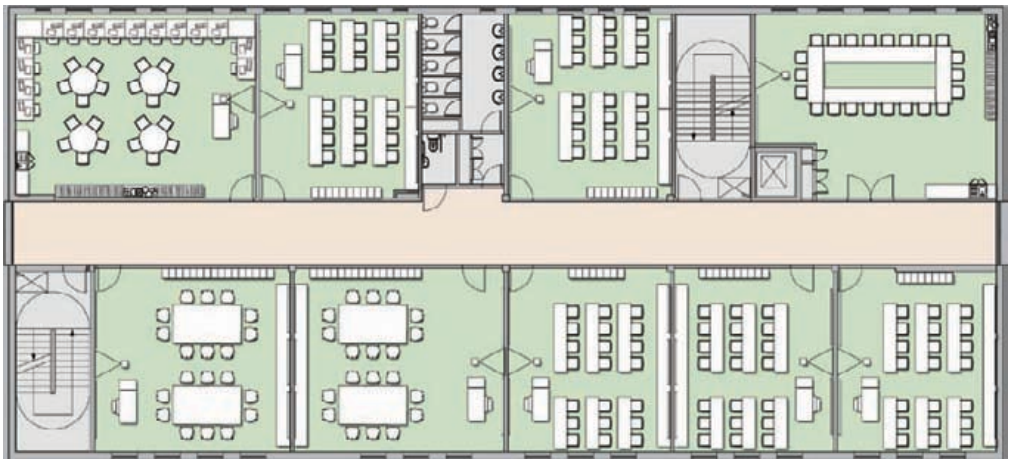
As with the Teaching Block, Substructure, frame, upper floors, roof, stairs, finishes and services were deemed identical irrespective of walling choice.

External Walls	Total Cost	
Thin-Joint Masonry Construction	£465,427.00	12.1% SAVING
Light Gauge Steel Construction	£529,261.00	

Internal Walls	Total Cost	
Thin-Joint Masonry Construction	£392,018.00	14.6% SAVING
Light Gauge Steel Construction	£459,179.00	

The overall construction period for both the masonry and LGS option is 14 weeks.

Teaching Block Cost Analyses



Key criteria

Two storey building
Gross floor area: 1500 m^2
External walls: Facing brickwork

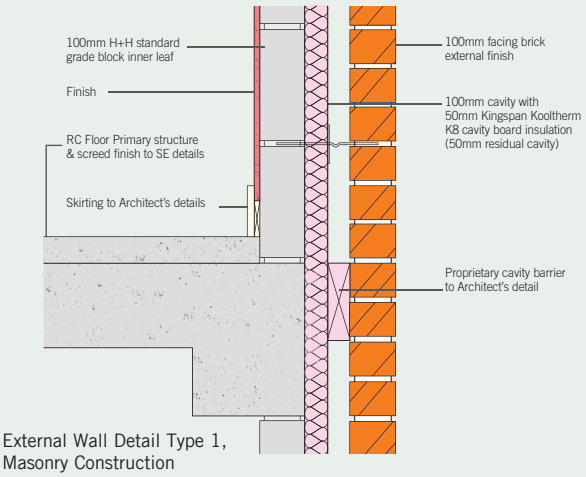
Table 1: School Teaching Block Detailed Analysis - External Walls

Detailed analysis: External walls; Masonry

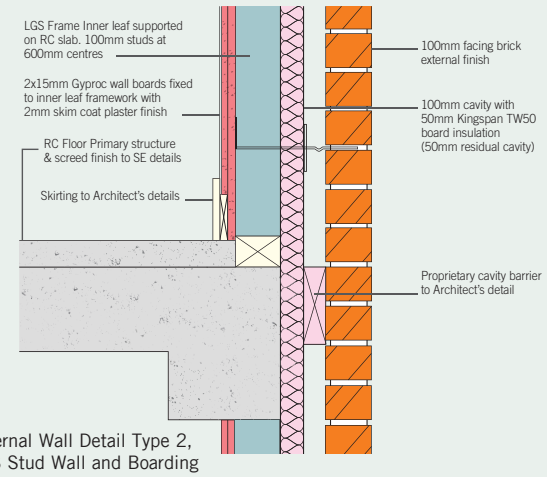
	Quantity	Unit	Rate/unit	Cost
Facing brick; form cavity	720	m^2	£62.14	£44,741
Insulation	720	m^2	£17.05	£12,276
Block 100mm	720	m^2	£22.26	£16,027
Plasterboard dry lining and skim coat	720	m^2	£16.35	£11,772
Cavity lintels @ 1.5m	72	nr	£55.70	£4,010
Cavity lintels @ 2.4m	4	nr	£118.86	£475
Wind posts, stainless steel	50	nr	£207.90	£10,395
Dummy frames	76	nr	£15.00	£1,140
				£100,836

Detailed analysis: External walls; LGS

	Quantity	Unit	Rate/unit	Cost
Facing brick; form cavity	720	m^2	£62.14	£44,741
Brick support channels and insulation	720	m^2	£29.01	£20,887
LGS framing - 100mm studs	720	m^2	£35.60	£25,632
Internal plasterboard (2 layers) & skim coat	720	m^2	£20.49	£14,753
Lintels @ 1.5m	72	nr	£25.00	£1,800
Lintels @ 2.4m	4	nr	£40.00	£160
Dummy frames	76	nr	£15.00	£1,140
Access towers for LGS				£1,200
				£110,312



External Wall Detail Type 1, Masonry Construction



External Wall Detail Type 2, LGS Stud Wall and Boarding

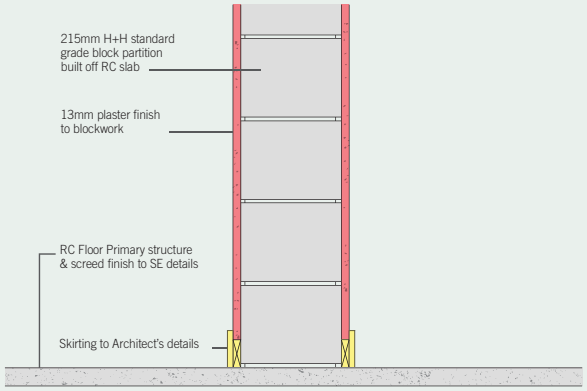
Table 2: School Teaching Block Detailed Analysis - Internal Walls and Partitions

Detailed analysis: Internal walls; Masonry

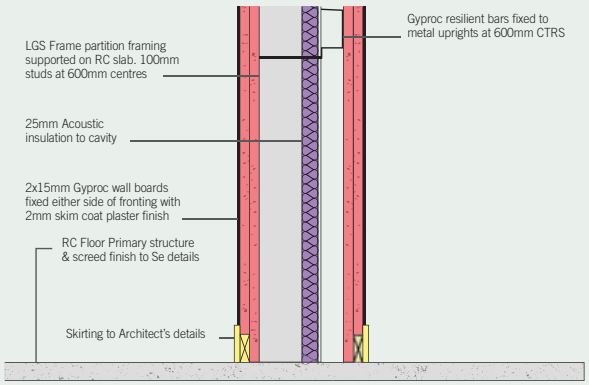
	Quantity	Unit	Rate/unit	Cost
Block 100mm	68	m2	£22.26	£1,514
Block 215mm	1014	m2	£46.12	£46,766
Two coat plaster finish	2164	m2	£12.65	£27,375
Lintels @ 1.5m	28	m2	£55.70	£1,560
Lintels @ 2.4m	2	nr	£118.86	£238
Dummy frames	30	nr	£15.00	£450
				£77,903

Detailed analysis: Internal walls; LGS

	Quantity	Unit	Rate/unit	Cost
LGS framing - 70mm studs	68	m^2	£22.08	£1,501
LGS framing - 100mm studs	524	m^2	£35.60	£18,654
Block 215mm	490	m^2	£46.12	£22,599
Plasterboard and skim; 2 layers each side	2164	m^2	£20.49	£44,340
Acoustic insulation	524	m^2	£11.46	£6,005
				£93,099



Internal Wall Detail Type 1,
Separating wall between Classrooms 45dB



Internal Wall Detail Type 2,
Separating wall between Classrooms 45dB

Note: The diagrams on pages 4 and 5 graphically illustrate the construction of the external and internal walls.
The table below (3) indicates the details in the construction of both separating walls and stairwells. The overall construction period for the walls and partitions is the same for each build option. It should be noted that although the programme shows a 7 week construction programme for walling starting from a waterproof roof and ending at a plastered finish for both options, there was a variance in the number of man hours involved for each option.

Table 3: Specification - Teaching Block

Masonry construction

Separating wall between classrooms (45 dB)

- 215mm H+H standard grade block
- 13mm plaster both sides

Stairwells

- 215mm H+H standard grade block
- 13mm plaster both sides

LGS stud wall and boarding

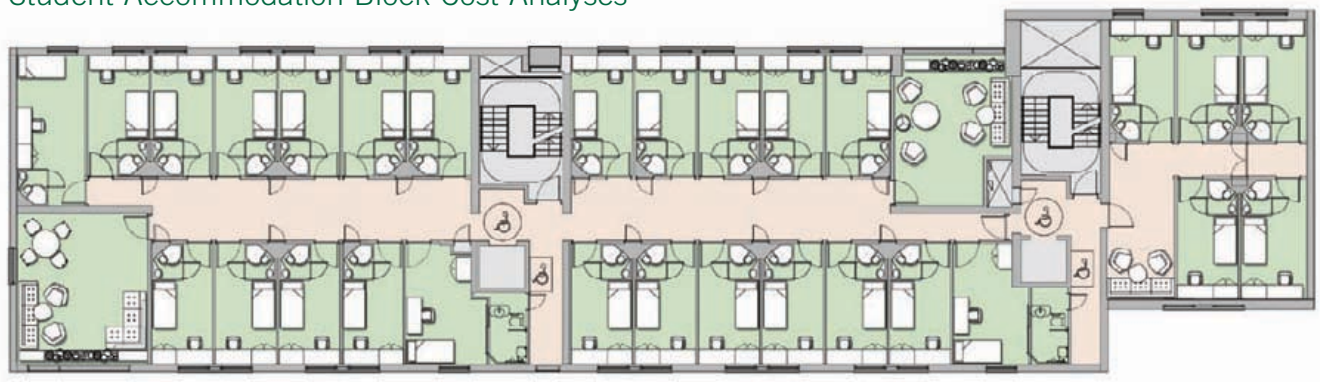
Separating wall between classrooms (45 dB)

- 100mm studs @ 600mm centres
- 25mm acoustic insulation
- Gyproc resilient bar
- 2 layers 15mm Gyproc wallboard each side and skim coat

Stairwells

- 215mm H+H standard grade block
- 13mm plaster both sides

Student Accommodation Block Cost Analyses



Key criteria

Six storey building
Gross floor area: 6000 m^2
External elevations: facing brickwork

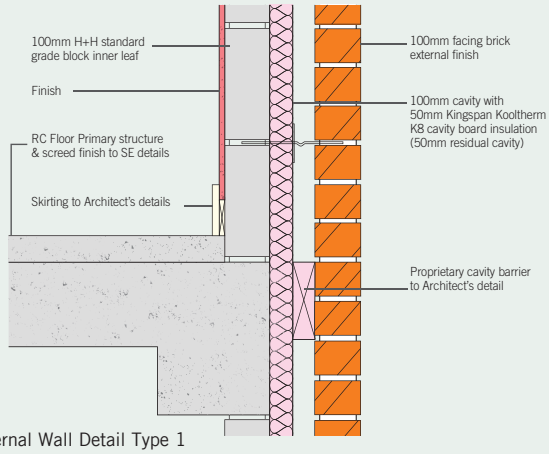
Table 4: Student Accommodation Block Detailed Analysis - External Walls

Detailed analysis: External walls; Masonry

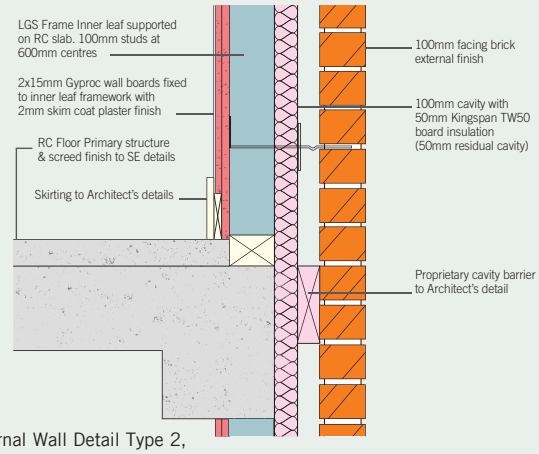
	Quantity	Unit	Rate/unit	Cost
Facing brick; form cavity	3474	m^2	£63.30	£219,904
Insulation	3474	m^2	£17.25	£59,927
Block 100mm - Hi-strength	3474	m^2	£25.92	£90,046
Plasterboard dry lining and skim coat	3474	m^2	£17.17	£59,649
Cavity lintels @ 1.5m	180	nr	£55.70	£10,026
Cavity lintels @ 2.4m	4	nr	£118.86	£475
Wind posts, stainless steel	108	nr	£209.63	£22,640
Dummy frames	184	nr	£15.00	£2,760
				£465,427

Detailed analysis: External walls; LGS

	Quantity	Unit	Rate/unit	Cost
Facing brick; form cavity	3474	m^2	£63.30	£219,904
Brick support channels and insulation	3474	m^2	£29.01	£100,781
LGS framing - 100mm studs	3474	m^2	£35.60	£123,674
Internal plasterboard (2 layers) & skim coat	3474	m^2	£20.49	£71,182
Lintels @ 1.5m	180	nr	£25.00	£4,500
Lintels @ 2.4m	4	nr	£40.00	£160
Dummy frames	184	nr	£15.00	£2,760
Access towers for LGS				£6,300
				£529,261



External Wall Detail Type 1
Masonry Construction



External Wall Detail Type 2,
LGS Stud Wall and Boarding

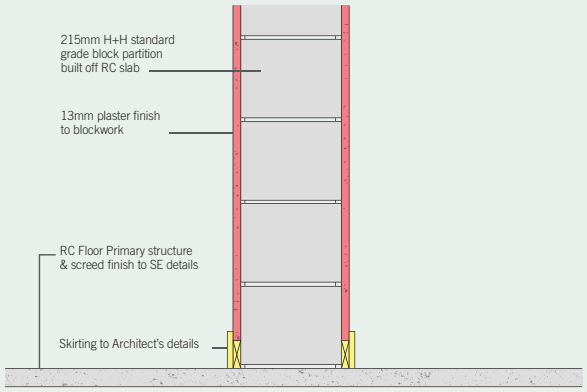
Table 5: Student Accommodation Block Details Analysis – Internal Walls and Partitions

Detailed analysis: Internal walls; Masonry

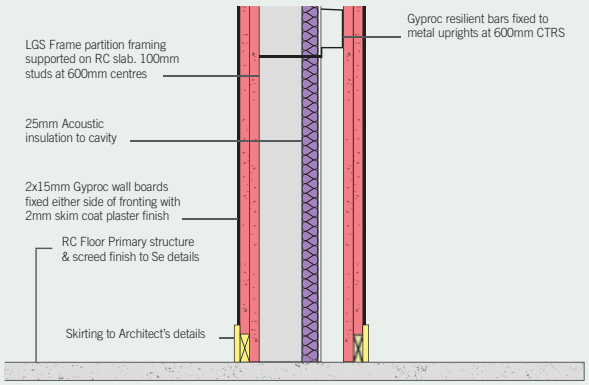
	Quantity	Unit	Rate/unit	Cost
Block 100mm	1890	m^2	£22.58	£42,676
Block 215mm	3864	m^2	£46.71	£180,487
Two coat plaster finish	11508	m^2	£13.28	£152,826
Lintels @ 1.5m	204	nr	£55.70	£11,363
Lintels @ 2.4m	12	nr	£118.86	£1426
Dummy frames	216	nr	£15.00	£3240
				£392,018

Detailed analysis: Internal walls; LGS

	Quantity	Unit	Rate/unit	Cost
LGS framing - 70mm studs	1890	m^2	£22.08	£41,731
LGS framing - 100m studs	3318	m^2	£35.60	£118,121
Block 215mm	546	m^2	£46.71	£25,504
Plasterboard and skim; 2 layers each side	11508	m^2	£20.49	£235,799
Acoustic insulation	3318	m^2	£11.46	£38,024
				£459,179



Internal Wall Detail Type 1,
Separating wall between Apartments 45dB



Internal Wall Detail Type 2,
Separating wall between Apartments 45dB

Note: The the diagrams shown on Pages 6 and 7 graphically illustrate the construction of the external and internal walls. The table below (6) indicates the details in the construction of separating walls, internal partitions and stairwells. The overall construction period for the masonry option was 14.25 weeks, and for the LGS option at 13.5 weeks.

Table 6: Specification (not shown above) - Residential Block

Masonry construction

Separating wall between apartments (43dB)

- 215mm H+H standard grade block
- 13mm plaster both sides

Internal partitions

- 100mm H+H standard grade block
- 13mm plaster both sides

Stairwells

- 215mm H+H standard grade block
- 13mm plaster both sides

LGS stud wall and boarding

Separating wall between apartments (43dB)

- 100mm studs @ 600mm centres
- 25mm acoustic insulation
- 2 layers 15mm Gyproc wallboard each side and skim coat
- Gyproc resilient bar (1 x side only)

Internal partitions

- 70mm studs @ 600mm centres
- 25mm acoustic insulation
- 2 layers 15mm Gyproc wallboard each side and skim coat

Stairwells

- 215mm H+H standard grade block
- 13mm plaster both sides