UK4

Refurbishment and Remedial Works, George Tomlinson School, Bolton, Lancashire, United Kingdom

1 Photo

Figure 1: George Tomlinson School

2 Project summary

The school is a 'small' secondary school taking children from 11 to 16 years of age. The current official capacity of the school is 610 pupils. The number of pupils on roll in January 2003 was 613 which has increased from 450 in 1998. It is considered that following the Surplus Place Removal contract which reduced capacity from 1050 to 610 pupils the school is now at full capacity and will remain so for the next few years when it is anticipated that numbers of pupils moving from primary schools in the area may decrease. Considerable effort is made to form links with local primary schools through events, visits, open days and sampling in order to sustain the pupil population.

The school was self governing (Grant Maintained Status) from 1993 to 1999 and in that time undertook extensive remedial and refurbishment work. Some of the work resulted in improved energy efficiency and this is considered further below. Since 1999 to 2003 the school status has been changed to a Foundation school which has still a large degree of autonomy but capital works are no longer centrally funded but prioritised locally by the Local Education Authority, Bolton Metropolitan Education Authority.

2.1 Project objectives

The following defects were identified in 1993.

i. Extensive roof leakage.
ii. Spalling insitu concrete with corroding reinforcement.
iii. Badly weathered and cracked brickwork.

iv. Defective windows and doors.
v. Corroded guttering and steel cladding.
vi. Life expired boilers.
vii. Life expired heating mains.
viii. Life expired items of building services such as lighting.
ix. Defective floor coverings.
x. Life expired kitchen equipment and health and safety problems in the kitchen.
xi. Defective internal fixtures and fittings.
xii. General health and safety issues such as extensive areas of glazing which were not safety glass and inadequate provision of fire exits.

This backlog of repairs is not unusual. Local Authorities have been short of funds and have only been able to 'make do and mend' to keep buildings operational.

Work has been done since 1993 to address these defects but work still remains to be done.

A number of building contracts have been undertaken since 1993. These have been specified around the defects identified above but there have been energy saving elements within the work. Below, the works which have been undertaken are listed together with the energy saving elements of the work.

Year	Cost £	Main Contract Works	Energy Saving Elements
1994	4,230	Replacement hot water boiler for gymnasium changing rooms	Replacement of life expired boiler. Energy saving only as a result of updated equipment.
1995	240,000	Renewing areas of roof waterproofing, concrete repairs and minor work on heating and ventilation.	Warm deck insulated roof waterproofing specified to meet current standards. This improved roof insulation in the limited areas done in this contract.
1995	100,000	Replacement boiler plant and controls.	Original 1950's boiler plant replaced with a modern range of modular gas boilers and controls. Plant more efficient.
1997	178,000	Full refurbishment of kitchen and dining room, further replacement of waterproofing to roofs, minor health and safety work.	Replacement kitchen equipment more efficient than original equipment. Roofs insulated as above.
1997	648,000	Surplus Place Removal. Removal of some buildings and refurbishment of some internal areas. Further flat roof waterproofing works.	Removal of buildings in worst condition reduced energy consumption. Energy saving lighting used in refurbished areas. Roof insulation upgraded.
1998	95,000	Replacement of life expired heating mains. (Heating had been lost on two occasions as a result of burst pipes.)	The original mains ran the full length of the school and were uninsulated. New mains insulated to current standards.

In addition to the above work which was funded with Capital Grants the school has continued to spend money on other improvements. £35,000 has been spent on essential repairs and maintenance and £60,000 on internal refurbishment and improvements. This latter figure includes for some plastic framed double glazed windows but the energy saving from this is insignificant.

The recent condition survey report in June 2003 identified:
Priority 1 work worth £8,000 work to fire rated doors and to mend a surface water drain causing internal flooding
Priority 2 work worth £704,000 including:
New external surfacing required due to major defects £172,000
Flat roofs have extensive problems; severe water penetration; effective maintenance not possible £391,400
Priority 3 work worth £449,000 including:
Work to external walls, windows and doors £233,000
Redecorations £112,000

Priority 1 work is urgent work that will prevent immediate closure of premises; and/or address an immediate high risk to the health and safety of occupants; and/or remedy a serious breach of legislation.
Priority 2 work is essential work required within 2 years that will prevent serious deterioration of the fabric or services; and/or address a medium risk to the health and safety of occupants; and/or remedy a less serious breach of legislation.
Priority 3 work is desirable work required within 3 to 5 years that will prevent deterioration of the fabric or services; and/or address a low risk to the health and safety of occupants; and/or remedy a minor breach of legislation.

3 Site

The site is in Northern England at Ordnance Grid Ref SD 744 048, latitude: 53°35' N., longitude: 2°25' W. It is situated some 30km from the West Coast and is at an altitude of 105m above sea level. The building has a fairly open aspect to the west which is the direction of the prevailing winds.
Climate: Temperate (Northern England).

4 Building description /typology

The building is steel and concrete framed with large areas of glazing. It also has areas of lightweight cladding. There are limited areas of cavity brickwork to gables and low level spandrels. The school is mainly single storey and spread out over the site. It has an area of first floor accommodation which is shown on the plan.
Typical of its age, the building has no insulation incorporated into the construction. Windows are single glazed metal framed and opening lights do not fit well. The roof has a woodwool deck and was finished with felt. Ventilation is by natural means through opening lights.
When the school became self governing in 1993 the building had suffered from a prolonged period without maintenance. It had problems relating to most elements of the fabric, structure and building services. A survey undertaken in 1993 identified remedial work in excess of £1,000,000 which needed to be done to prevent further significant deterioration of the building fabric.

4.1 Typology / Age

Typology/Age	Pre 1910	1910-1930	1930-1950	1950-1970	1970-
The side corridor school				●	
The central school				●	
The comb-shaped school				●	

4.2 General information

Year of construction: 1955
The school was built in the 1950's and was extended in the 1960's. Some of the original buildings and extensions have now been removed in a Surplus Place Removal contract which reduced the capacity from 1050 to 610 pupils. On the plan the dotted outlines indicate buildings which were removed.

Year of renovation (as described here): 1994 to 1998 with some minor work continuing up to the present day.

Total floor area (m^2):
The gross floor area is some 6,200 m^2 with some 5,000 m^2 of flat roof. It has a gross wall area of some 4,200 m^2, most of which is glazing or steel cladding.

Number of pupils: 613 (January 2003)
2 storey building
Number of classrooms: 32

4.3 Architectural drawings

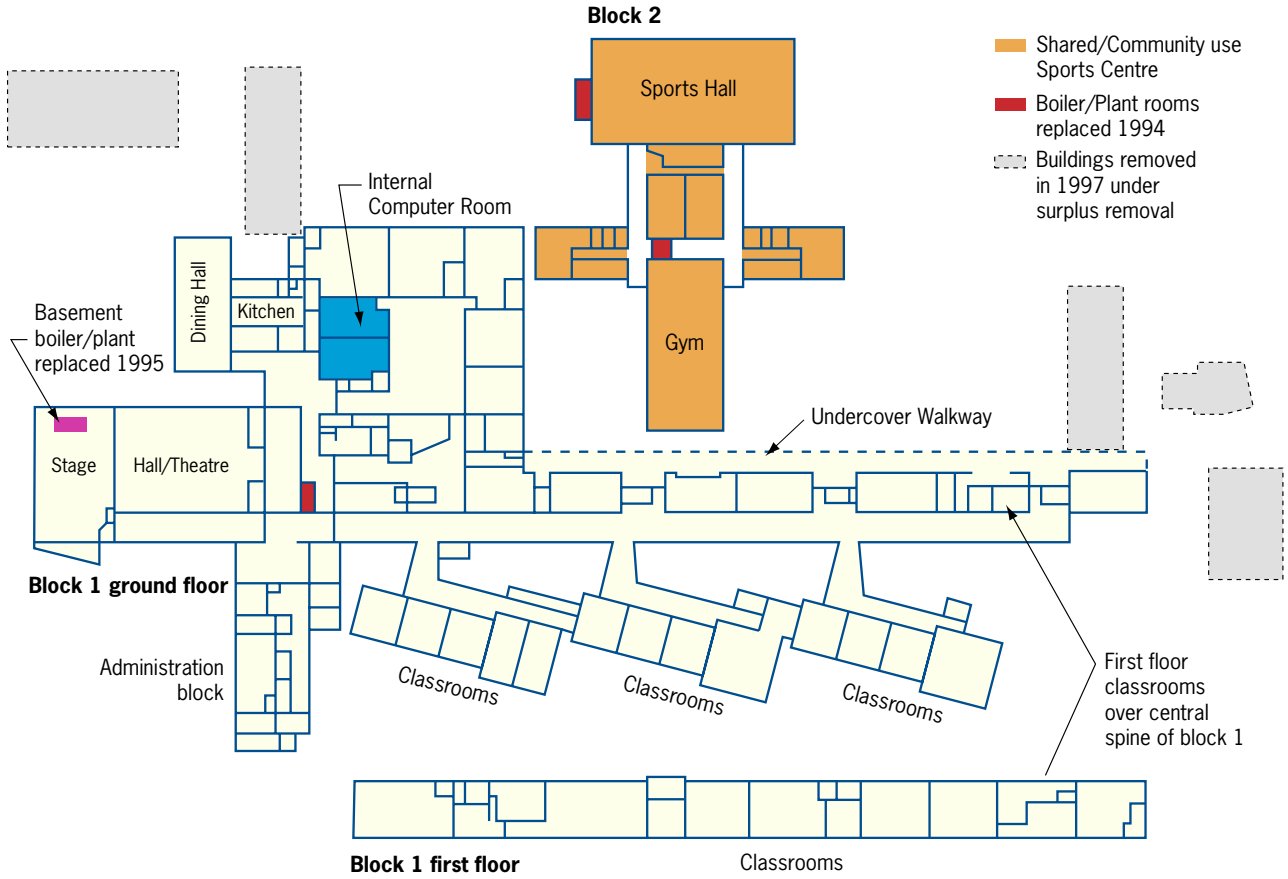

Figure 2: School layout

5 Previous heating, ventilation, cooling and lighting systems

6 Retrofit energy saving features

6.1 Energy saving concept
By replacing plant and equipment with up to date specifications energy has been saved.

6.2 Building
[insulation – improvement of U-values, building integrated solar solutions, daylighting, etc] There are a number of serious building defects which are being addressed by the school and local education authority. A condition survey has been completed in June 2003 by Bolton Metro, Corporate Property Service which outlines the extent of remedial work required. This is currently being discussed with the school and local authority. See section 2.1.

6.3 Heating
New Gas fired boilers were fitted in 1995. No major changes to the space and water heating systems have taken place since 1998. Problems of heating classrooms at the extremity of the heating mains has led to the connection of "temporary" electric convector heaters to supplement the heating system. When budget will allow, remedial work on the heating system will lead to a reduction in energy consumption. It is not possible at this stage to estimate the energy savings which will accrue as a result of the upgrade/ replacement/repair of heating mains and radiators.

6.4 Ventilation:
Strategy and systems; natural; Mechanical extract is only present in areas where it is required for health and safety reasons, eg. laboratories, Design Technology areas and the computer room described below.

comfort cooling:	No
dehumidification:	No

One major change in building use has occurred since 1998 with the introduction of computers. The computer room sized 79 m^2 which houses 40 computers and the network system servers is in the centre of the school buildings. Extract ventilation has been installed within the last two years but problems still exist with overheating and noise from the system. The rooms have a flat roof and have skylights which, through solar gain, add to the problem. The ventilation system is run extensively during the day and evening to provide comfort conditions. When priorities and budgets allow, air conditioning could provide a more suitable solution to the overheating and poor comfort conditions in this area.

6.5 Lighting
In all refurbished areas energy saving lighting was used. There is a continuous programme of repair and replacement of fluorescent lighting using up to date equipment including High Frequency luminaires and T8 lamps. Energy savings will accrue over time as new luminaires and lamps are installed. All lighting is controlled manually at present.

6.6 Other environmental design elements
Bolton intend to embark on partnering with a company to install water monitoring equipment which, if successful will help reduce consumption to the benchmark figure of 2.6 m^3/pupil/a. This will be on the basis of free

installation and sharing of consumption reduction costs. The school makes no cash input and merely benefits by benchmark improvement and shared savings.

7 Resulting Energy Savings

The total energy cost in 1993/4 was £49,876. This reduced to £40,372 in 1997/8. The savings resulting from the work to the heating mains in 1998 have not been evaluated.
Energy costs and consumption are at present recorded in a manual system. It has not been possible to carry out a detailed analysis of consumption and performance. The school is to be provided with the KULU computer programme and discussions are to be held with the local authority with a view to assist in creating an energy monitoring and management system.
Ongoing remedial and refurbishment work has not been done with the primary aim of saving energy but energy saving measures have been incorporated where possible.

8 User evaluation

No user evaluation

9 Renovation costs

No costs available

10 Experiences/Lessons learned

There is a noticeable, but modest, improvement in the comfort levels within the school. This has resulted from improved heating efficiency and improved insulation to roofs. Further extensive reroofing is imminent and will present an opportunity to increase the thermal insulation of the roofs concerned.
A further major improvement would come from treatment of the external walls. There are large areas of single glazing and uninsulated cladding which need replacement. This would require major expenditure. Some of this work is now identified in the condition survey as Priority 3 work desirable to complete in the next 3 to 5 years. However funding is not available yet.

The school was planning to undertake energy saving work in 1998 as funds permitted. These measures included:-

- Local control of space heating.
- Installation of energy saving lighting.
- Draughtproofing.
- Point of use water heaters.

Projects identified in the original report in 1998 with energy savings in mind are still a priority in 2003 and will be addressed when funds permit. The condition survey recently carried out highlights the need for major building refurbishment. Improvements to the heating, lighting and ventilation systems could also lead to additional energy savings over the longer term. Ongoing discussions between the school and local authority regarding repair and refurbishment budgets and priorities outlined in the condition report will lead to improvements in building conditions, internal conditions and consequential energy savings.

10.1 Energy use

As a result of numerous changes to the school buildings, their use, the number of pupils and access to energy consumption data, it was not possible to carry out an evaluation of the impact on energy consumption of energy saving

measures either direct or indirect since 1998. This information will be available following an *ActionEnergy* Survey which will be carried out by the local authority as part of their rolling programme of surveys for large users of energy.

10.2 Impact on indoor climate
No information available.

10.3 Economics
No information available.

11 General data

11.1 Address of project
George Tomlinson School, Springfield Road, Kearsley, Bolton, Lancs, BL4 8HY,

11.2 Project dates
Project initiation: 1993
Design completed: No information available.
Renovation construction completed: 1998 (but still ongoing)
Monitoring and evaluation completed: No information available.

11.3 Date of this report/revision no.
June 2003

12 Acknowledgements
The building surveyors for the school since 1993 have been Povall Flood & Wilson, Salford

The architects for the Surplus Place Replacement contract were Holford Associates, Manchester. Other professional services being provided by Povall Flood & Wilson.

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Report updated in June 2003 by W C Roberts, CREATE see www.create.org.uk following site visits and discussions with Mrs D Boardman, Bursor, Mr J Taylor, Site Supervisor and Mr B Colquitt from Bolton Metropolitan Education Authority.

13 References
Energy-efficient refurbishment of schools – the achievement of Good Practice Case Study GPCS381, 2000, from www.actionenergy.org.uk