Conservation Management Plan

St Brendan's Community School, Birr

Queen's University Belfast & John McLaughlin Architects

June 2021

QUEEN'S UNIVERSITY BELFAST
John McLaughlin Architects
Getty Foundation

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Acknowledgements

Drawings by John McLaughlin Architects

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Contents

Executive Summary

The Conservation Management Plan (CMP) for St. Brendan's Community School, Birr (Co. Offaly) is developed from research conducted by Queen's University, Belfast and John McLaughlin Architects funded by the Getty Foundation's 'Keeping It Modern' grant, awarded in 2018.

It was produced in collaboration with a series of stakeholders including the then incumbent principal Ming Loughnane and other members of the school staff, members of the school management board, the Department of Education and Skills, representatives from the student body, and a series of expert consultants.

St Brendan's Community School, by architects Peter and Mary Doyle is an internationally recognised and unique exemplar of Irish modernism. Designed and built in the 1970s, it is still in use as a school by approximately 1,000 staff and students on a daily basis. Currently the building is suffering from on-going material degradation and thermal and environmental issues.

The aim of this CMP is to provide guidance to the owner on how to manage the significance of the place while dealing with the issues surrounding

the building's fabric and environmental performance. It proposes a means to reconcile the school's ongoing life as an educational facility with its cultural value as an icon of Irish modernist architecture and symbol of an innovative and democratic approach to education in the Irish State.

It is divided into five sections:

Section 1 presents an understanding of the place through analyses of key aspects of the building: its history, present condition, how it is used by its occupants, and its environmental performance including costs and energy usage.

Section 2 provides further interpretative analysis on less immediately tangible and wider aspects of the school and its working and social life presented through a series of maps, diagrams and other new representations.

Sections 3, 4 and 5 draw upon these data sets to present findings and recommendations.

Section 3 contains the 'Statement of Significance' (SoS). This highlights which parts of St Brendan's School are the most important. In turn the SoS

promotes a closer examination of the building's fabric to determine the 'tolerance for change' of each of its elements.

Following from this Section 4 defines the building's key vulnerabilities and threats and outlines a series of policies designed to address both physical conditions in the building as well as proposing developments in how it might be managed and operated.

Section 5 proposes a series of key strategic interventions into the building's spaces, fabric and servicing. The pros and cons of each of these are appraised in turn along with an analysis of their potential social, technical and aesthetic value to the school through matrices measuring cost against potential impact. This is followed by suggestions on how, for economic and operational reasons, the phasing of measures and works could be carried out according to short, medium and long term timeframes. It also specifies how certain works may be interdependent and should be grouped together. Finally, potential opportunity for the development and use of new, alternative energy sources for the school are considered.

The production of the Conservation Management Plan represents an extremely valuable and unusual opportunity to holistically and comprehensively examine and evoke the series of cultural, social, technological and environmental conditions that contribute to the uniqueness of St Brendan's School.

The principle recommendation of this Conservation Management Plan is simply that the school board and community adopt it. As a central aspect of a strategy to ensure that St Brendan's remains not only a successful working school, an icon for an enlightened approach to education and an international beacon for twentieth-century Irish modernism, it will also help it to become a paradigm for a sustainable future in education and elsewhere, the challenge of the twenty-first century.

Introduction

Project Background

This Conservation Management Plan (CMP) is developed from research funded by the Getty Foundation's 'Keeping It Modern' grant, awarded in 2018. The grant recognises modern architecture as 'one of the defining art forms of the 20th century' that now face challenges of degradation and lack of care. The grant is aimed at raising awareness of key buildings and to protect them into the future. St Brendan's Community School was one of 11 international projects recognised with this award in 2018 and, to date, is the only Irish building to have received the award. The research team was led by Queen's University Belfast working with John McLaughlin Architects.

Existing School

St Brendan's Community School in Birr, County Offaly, by architects Peter and Mary Doyle is an internationally recognised and unique exemplar of Irish modernism. Paradigmatic of a seminal cultural shift in Irish education, it was designed as a flexible and adaptable building, described by the architects as ideally having 'no fixed form'. In their efficient use of a cheap, mass-produced portal-frame structure, the Doyles realised a carefully articulated series of generous social spaces. In continuous use since its opening in 1980, generations of students have benefited from the intimate relationship between the culture of the school and the architectural form and fabric which facilitates it. It is these relationships between the technical and the social – so central to the architects' original vision – that this grant aims to conserve and continue.

Managed by a Board of Management, the school is owned by the Department of Education and Skills. Approximately 1,000 students and staff use the school on a daily basis. Currently the building suffers from on-going material degradation and thermal and environmental issues. Through investigative surveys of history, use, material and environment, we have examined and revealed the varying ways in which the technical and social overlap and influence each other in the building. These enquiries relate to the building's origins, its current use, and to its future with the aim of sustaining its vibrant community by addressing its material and thermal inadequacies. The aim, effected through a team of experts of diverse specialisations is to deepen the understanding of the building and its significance and accordingly inform the priorities to be set out in the Conservation Management Plan. The opportunity is for the school to continue as a successful paradigm for 21st century education by proposing the means by which its learning environment and energy use can be improved and optimised in a manner consistent with the core design concepts of the architects and the integrity of their built design.

Conservation Management Plan

A Conservation Management Plan (CMP) is a document that guides the building owner in how to manage the significance of a place. It starts by first establishing the history and current condition. From this it develops a 'Statement of Significance' that highlights what parts of the building are most important. From this the CMP develops policies to guide the owner in the future management of the place.

While each building is different and therefore each Statement of Significance varies, consideration of the values are made across a number of key headings. Some of these headings include:

- Fabric: what the building is made of; what parts are original, how do we measure their significance?
- Function: what is the use of the building? how does this contribute to its significance?
- Form: this considers the overall shape, and organisation of the building and how these aspects contributes to significance.
- Intangible: this relates to the elements that add significance to the building but may not be apparent or visible; for example rituals and events or natural occurrences.

Once the Statement of Significance is established a detailed examination of the fabric is considered along with an assessment of their tolerance for change. These set the groundwork for the policies which then allow the building owner and users to plan more effectively for the future of the building.

A key part of the study is also in its 'Interpretation', that is, communicating the story of the school to a wider audience. Without a shared understanding of the values of the school building it is difficult to build a broad consensus among the numerous stakeholders involved and implement positive change. For this reason we organised an exhibition and symposium on St. Brendan's and its related issues.

Section 1
Understanding the Place

Stage 1

Surveys:

Survey 1 Historical	Survey 2 Condition	Survey 3 Social	Survey 4 Environmental

Stage 2

Synthesis & Analysis

Stage 3

Outputs: Symposium, Exhibition & Report

1.1 Work Methodology

Overview

The research methodology has brought together historical, fabric, social and environmental analysis to understand the school's daily performance, programmatically, socially and environmentally, within the context of its architectural significance and its material vulnerabilities. Mapping and recording this broad picture of the school was necessarily complex. It included: archival research, oral histories, condition surveys and opening up work, considerable environmental data modelling and monitoring and social surveys of behaviour and use. Typical classroom and breaktime spaces were monitored with regards temperature, relative humidity and air quality to understand the daily fluctuations in use. In addition, sound analysis, thermography, air pressure testing and thermal bridge and condensation risk analysis help us understand the performance of the spaces. This layered approach surveys how the school is used, and critically, how the building is perceived by its users.

Stage 1 : Surveys

This stage gathered baseline information on the school, considering its history, current condition, its social and its environmental performance. This baseline information sets up the further 2 stages and is key to developing the statement of significance and the policies. There were 4 distinct surveys. These are listed below along with the team members or consultants who conducted them. Section 1 describes each of the surveys in greater detail on the following pages.

Survey 1 Historical Research.
Principal Investigator: Aoibheann Ní Mhearáin with Gary A. Boyd and John McLaughlin.

Survey 2 Condition Survey.
Building Drawing and Condition Survey, David Maher and Associates, Conservation Engineer
Window Condition Survey by Lambstongue.
Opening up works by Frank Murray Builders.

Survey 3 Social Research Methods.
Principal Investigator: Tara Kennedy with Ros Kavanagh photographer.

Survey 4 Environmental.
Thermography and Air Pressure Testing by Greenbuild;
Acoustic Testing by iCAN Acoustics;
Monitoring and Desk Top Analysis by Andrew Lundberg, Passivate
with thanks to Aengus Byrne in St Brendan's Community School.

Stage 2 : Synthesis and Analysis

This stage takes the raw data collected in stage 1 and starts to cross reference it. It visualises the data received and assesses the values emerging from this. The output of this work is the Statement of Significance which underpins the development of the Conservation Management Plan.

Section 2 and 3 of this report relate to stage 2.

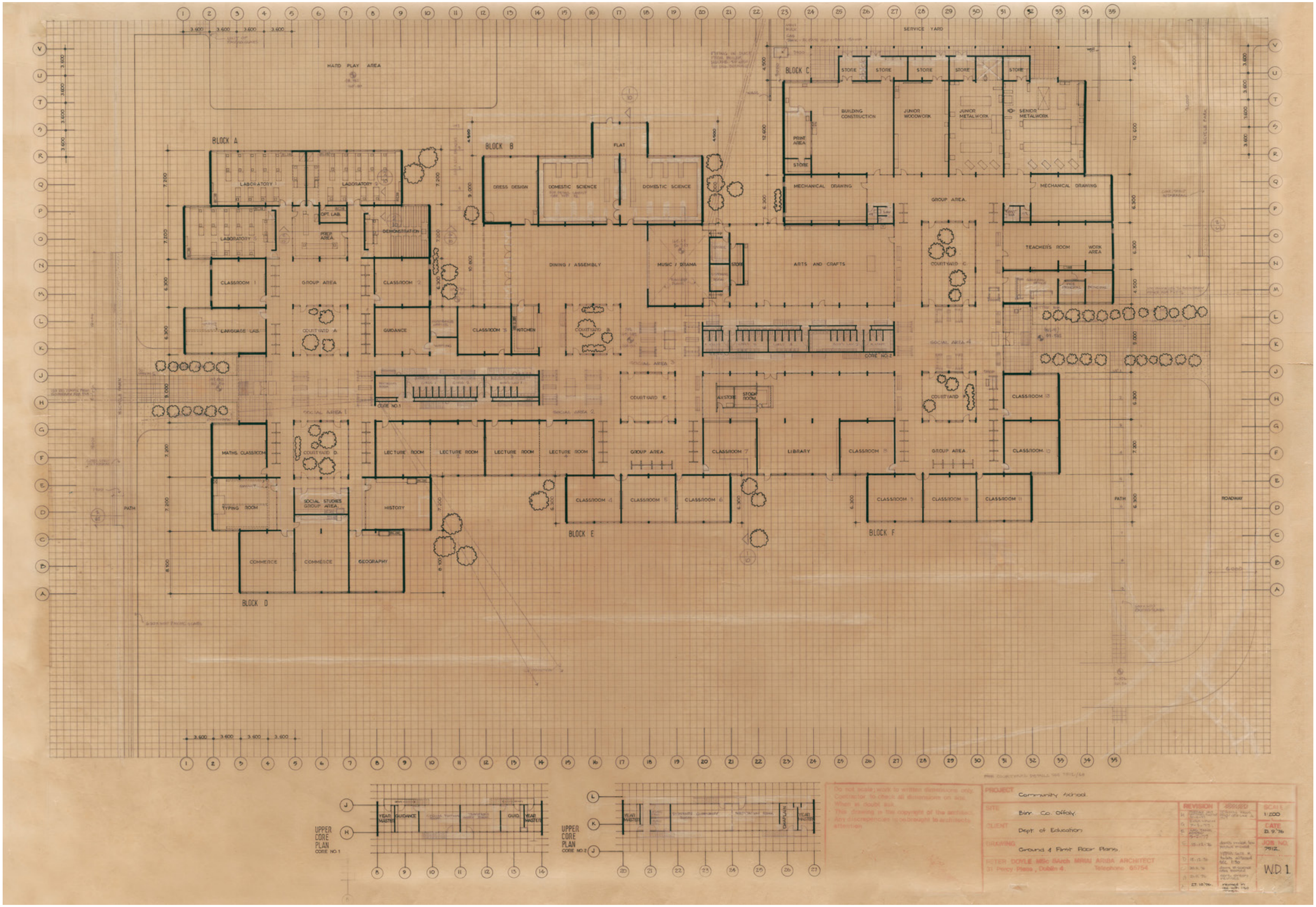
Stage 3 : Outputs

This stage communicates the project to a wider audience, a key part of the process, so that the story of the building and its value can be communicated. In that way, a shared vision for the school is developed across all stakeholders, allowing for cohesion in the developing and implementing of any future works that may arise.

Specifically, the output in this stage include:

- Exhibition: 'Keeping Ireland Modern' in Irish Architectural Archive, Dublin, November 2019. This exhibited the photography, drawings, films and archival material that emerged through stage 2 and presented these to an interested public. The exhibition was opened by the Minister of State for Higher Education Mary Mitchell O'Connor and was attended by key figures from the school community along with the family of Peter and Mary Doyle.
- Symposium: 'Keeping Ireland Modern' 8th November 2019, Irish Architectural Archive. This symposium brought together key experts on the conservation of 20th century architecture, including Wessel deJonge of Wessel deJonge Architecten and Catherine Croft of Twentieth Century Society, along with Ellen Rowley, a leading researcher based in Dublin. In addition, Tara Kennedy and Aoibheann Ní Mhearáin presented the findings on the research on St Brendan's and Thomas Pearson of Arup presented their work on Stirling and Gowan's Leicester University Engineering Building.
- Exhibition: 'The Streets of St Brendan's' January 2020, St Brendan's Community School Birr. The exhibition moved to the school and became part of a wider celebration on 40 years of the school. The exhibition was opened by the Minister for Education, Joe McHugh.
- Conservation Management Plan: Completion of this followed the above events.

The appendix also includes additional publications - press and academic - that have featured the research grant and its output.


HARD PLAY AREA
SERVICE YARD
BLOCK A
LABORATORY 1
LABORATORY 2
LABORATORY 3
OPT. LAB.
PREP AREA
DEMONSTRATION
CLASSROOM 1
GROUP AREA
CLASSROOM 2
LANGUAGE LAB.
COURTYARD A
GUIDANCE
CLASSROOM 3
KITCHEN
BLOCK B
DRESS DESIGN
DOMESTIC SCIENCE
FLAT
DOMESTIC SCIENCE
DINING / ASSEMBLY
MUSIC / DRAMA
STORE
ARTS AND CRAFTS
BLOCK C
STORE
STORE
STORE
STORE
STORE
BUILDING CONSTRUCTION
JUNIOR WOODWORK
JUNIOR METALWORK
SENIOR METALWORK
PRINT AREA
STORE
MECHANICAL DRAWING
GROUP AREA
MECHANICAL DRAWING
COURTYARD C
TEACHER'S ROOM
WORK AREA
CORE NO.1
CORE NO.2
SOCIAL AREA 1
SOCIAL AREA 2
SOCIAL AREA 3
SOCIAL AREA 4
COURTYARD E
AV STORE
STOCK ROOM
COURTYARD
CLASSROOM 13
MATHS. CLASSROOM
COURTYARD D
LECTURE ROOM
LECTURE ROOM
LECTURE ROOM
LECTURE ROOM
GROUP AREA
CLASSROOM 7
LIBRARY
CLASSROOM 8
GROUP AREA
CLASSROOM 12
TYPING ROOM
SOCIAL STUDIES GROUP AREA
HISTORY
CLASSROOM 4
CLASSROOM 5
CLASSROOM 6
CLASSROOM 9
CLASSROOM 10
CLASSROOM 11
BLOCK E
BLOCK F
COMMERCE
COMMERCE
GEOGRAPHY
BLOCK D
PATH
PATH
ROADWAY
UPPER CORE PLAN CORE NO.1
YEAR MASTER
GUIDANCE
GUID.
YEAR MASTER
UPPER CORE PLAN CORE NO.2
YEAR MASTER
COURTYARD
YEAR MASTER
Do not scale; work to written dimensions only. Contractor to check all dimensions on site. When in doubt ask. This drawing is the copyright of the architect. Any discrepancies to be brought to architects attention
PROJECT Community School.
SITE Birr. Co. Offaly.
CLIENT Dept. of Education
DRAWING Ground & First Floor Plans.
PETER DOYLE MSc Switch MRIAI ARIBA ARCHITECT
31 Percy Place, Dublin 4. Telephone 65754
REVISION
ISSUED
SCALE 1:200
DATE 21.9.76
JOB NO. 7912.
W.D. 1

1.2 Survey 1: Historical Introduction

Introduction & Methodology

The historical research is aimed at gaining the fullest picture possible of the origins of the building. This work precedes the other surveys in stage 1 as it sets the baseline for understanding the key aspects of the original design. The aim of the historical research is to understand, as fully as possible, the intent of the original design, the elements of the fabric that are original and the key participants in its genesis. The methodology for this survey included archival research, on site analysis of the existing building fabric, site visits to exemplary 20th century buildings and oral histories conducted through interviews.

An overview of each of the sections of historical research is given here, with more detail on the following pages.

Archival Research

The Irish Architectural Archive in Dublin holds the collection of Peter and Mary Doyle Architects including many of their competition and working drawings for the Community School in Birr.

Examining these documents in greater detail, it was possible to put a clear picture together of the original fabric and specification. This allowed the comparison with details on site, to see if any changes had occurred. It clarified particular construction details that are not visible from the exterior.

Site Visits

A series of international post-war projects were selected for site visits based on a number of factors. These included their use as educational buildings, the similarity in design or conservation problems and the conservation interventions that have been applied to them. The full list of the buildings visited is below and further details and findings on key buildings are on the following pages.

Precedent Project Visits

- Free University of Berlin, Candilis, Josic, Woods, Berlin, 1963; refurbishment Foster and Partners, 2005
- University of Leicester Engineering Building, Stirling & Gowan, Leicester University, Leicester, 1963; refurbishment ARUP 2017
- Hunstanton School, Alison and Peter Smithson, Hunstanton, Norfolk, 1954
- University of East Anglia, Denys Lasdun, et al, Norwich, East Anglia, 1963
- Van Nelle Factory, Brinkman and van der Vlugt, Rotterdam, 1931; refurbishment Wessel de Jonge Architecten, 2004
- TU Delft Aula, Van den Broek and Bakema, TU Delft, Delft, 1966
- Open Air School, Jan Duiker, Amsterdam, 1930; refurbishment Wessel de Jonge Architecten, 2010
- Willemspark School, Herman Hertzberger, Amsterdam, 1983

Oral History

Interviews were conducted in 2018 with the following participants.

Interviews:

- Peter Twamley (audio recording)

Architect working with Peter and Mary Doyle during tender and construction phases of the project

- John Meagher

Architect working with Peter and Mary Doyle during competition stage of the project

- Brother Denis Minehane & Tom Foley (audio recording)

Former Principals, St Brendan's Community School

- Ming Loughnane (audio recording)

Principal, St Brendan's Community School and teacher in the school since its opening.

- Ann Doyle

Daughter of Peter & Mary Doyle

Frame details

fig. 1.2a

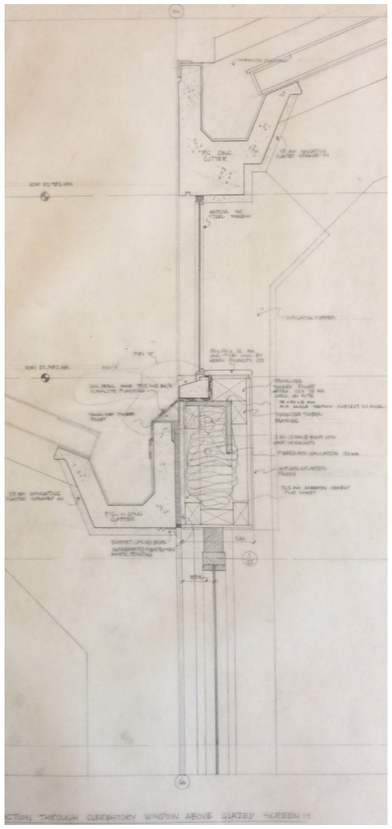


fig. 1.2b

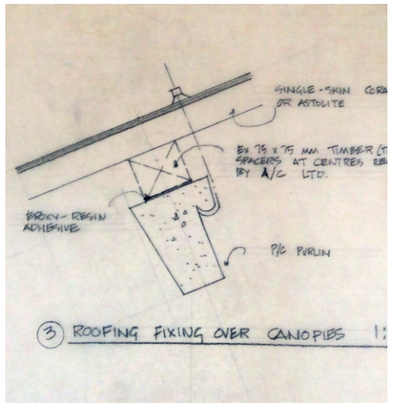


fig. 1.2.c

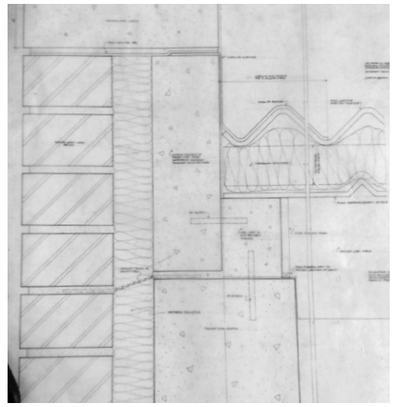


fig. 1.2.f

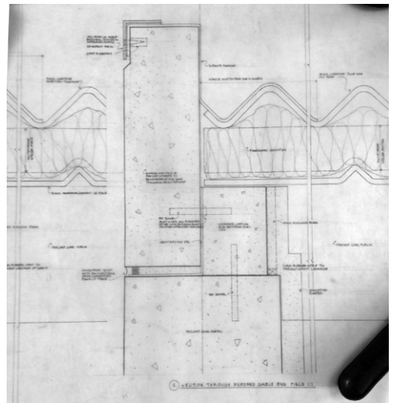
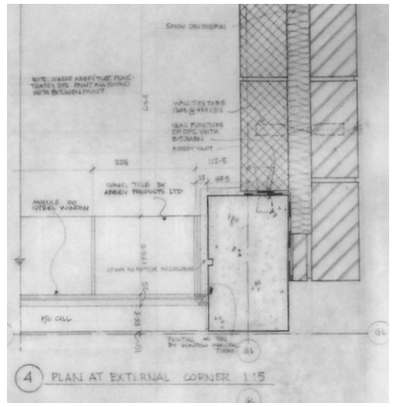


fig. 1.2.g

External Wall Details



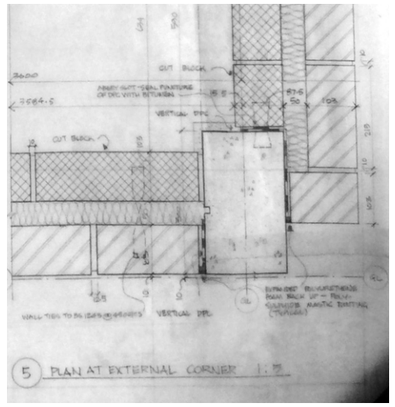


fig. 1.2.h & i

Window Detail

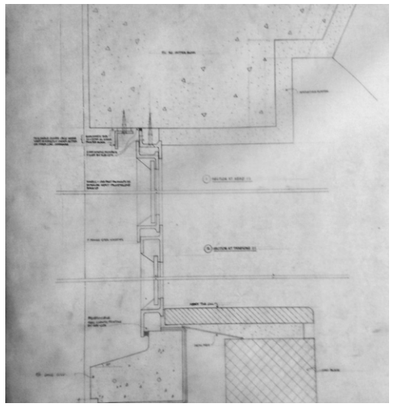


fig. 1.2.d

Planometric Showing Construction Sequence

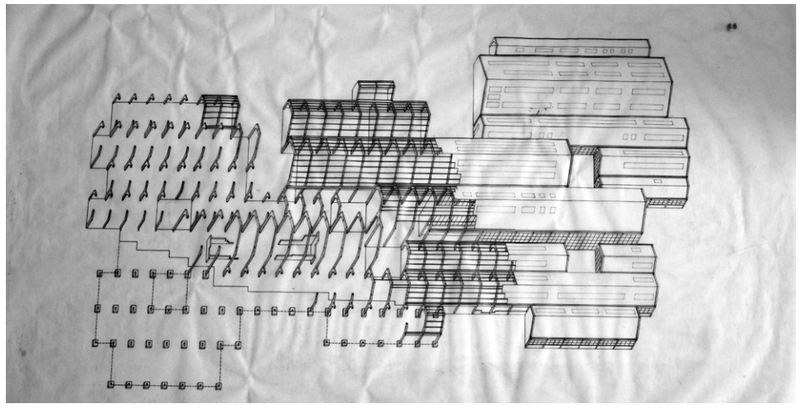


fig. 1.e

Competition Plan for Extension

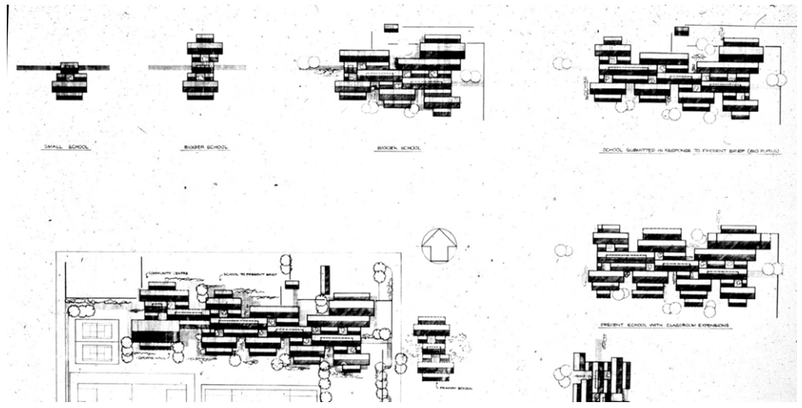


fig. 1.2.j

Courtyard Plan

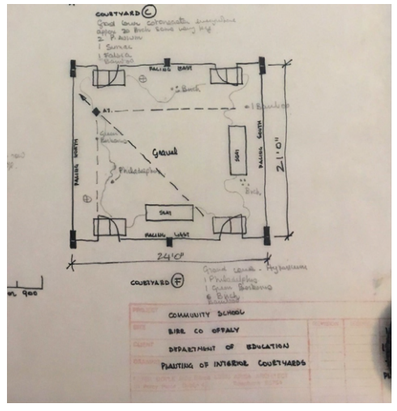


fig. 1.k

1.2 Survey 1: Historical Archival Research

Methodology

As stated, The Irish Architectural Archive holds the collection of Peter and Mary Doyle Architects including many of their competition and working drawings for the Community School in Birr.

Examining these documents in greater detail, it was possible to put a clear picture together of the original fabric and specification. It allowed the comparison between construction drawings and the built artefact on site to see what changes may have occurred from design to construction and in the intervening years. It clarified particular construction details that are not readily visible.

Findings

Illustrated overleaf are a series of images taken from the archive. A full complement of these is available also in the Appendix. These images highlight some key points related to the construction and significance of the school building. Of note are:

Frame details (fig. 1.2. a-c,f-j)

The concrete frame is evident in the archival images through images of its construction (fig. 1.2.(a)) which clearly shows the connection of column and rafter and also the relationship between the columns of the portal frames. Furthermore, fig. 1.2.(e) also indicates the sequence of construction of the portal frames with foundation, then column, then rafter being put in place. Figure 1.2.(j) shows a series of plans from the time of the competition. It indicates alternative plan configurations for the school using the portal frame system which was deployed by the designers as a construction method that could yield many different plan types. The section through the clerestory lights (fig. 1.2.(b)) shows the pre-cast concrete gutter in section that is an integral part of the portal frame system. The pre-cast purlins that run between the main frames are detailed in fig.1.2.(c) and these are shown with a curved section which accommodates hanging services and blinds in other locations.

External Wall Details (fig. 1.2.f,g,h,i)

The portal frame is shown in each of these drawings, indicating its relationship to the external wall and roof materials. Figures 1.2.(f) & (g) indicate two different end conditions of the frame. Figure 1.2.(f) indicates the end gable elevations where the brick goes past the frame, as seen in many of the end gables, whereas figure 1.2.(g) indicates the detail where the end of the portal frame is exposed, as in the courtyard. Both these sections show the insulated black, twin-skin coratone roof that was originally used in the school. The original roof lights where made in a translucent version of this coratone material. The corner details (fig.1.2.(h)&(i)) show how the portal frame column is exposed at the corners, with the brick of the gable being deliberately held back from the edge. Figure 1.2.(h) shows the gable relationship with the window and Fig 1.2.(i) shows the corner with wall on both sides. In both details the cold bridge that is created by the column of the portal frame is evident as the column goes from exterior to interior with no insulation or thermal break. The plan details also show the concrete brick to the external leaf, a 50mm insulated cavity and the exposed blockwork to the inner face.

Window Details (fig.1.2.b,d,h)

The classroom windows are indicated in fig.1.2.d. They are noted as Module 100 steel windows. These are single glazed with 4mm glass. The window casement is sitting on a pre-cast concrete cill. Internally the cill is lined with tile (noted as 'Abbey tile'). A tile cill is used as it can accommodate condensation dripping from the window without deteriorating. At the head the concrete eave is lined with '25mm insulating sprayed on plaster'. Fig.1.2 (b) shows the clerestory window, also a Module 100 steel window sitting on a pre-cast concrete cill. Internally a concrete tile from Abbey Tile is noted, dimensioned 150 X 150 X 16mm. Below this concrete tile cill there is a boxed out build up with insulation to the interior and plaster to outside. This section is above the timber internal screens.

Courtyard & Landscape Plans

A planting scheme for the 6 courtyards was developed by Peter and Mary Doyle Architects. The Archive has copies of this original landscaping proposed for the school, detailed in plan layouts with annotation of each courtyard. These plans indicate the location of seating and drainage, the surface materials of each courtyard and the planting. Planting included:

Courtyard A - gravel, 2 seats, 4 doors
- Birch (6)
- Bamboo
- Malus Floribunda
- Viburnum Bunkwoodii

Courtyard B - gravel, 2 seats, 3 doors
- Weeping Willow (1)
- Ceaonathus
- Bamboo
- Birch (6)
- Pyracantha (1)

Courtyard C - paved, 2 seats, 4 doors
- Birch (20)
- Sumac (1)
- Fatsia (1)
- Bamboo
- Prunus Avium

Courtyard D - gravel, 2 seats, 4 doors
- Birch (6)
- Pyracantha (1)
- Forsythia (3)
-

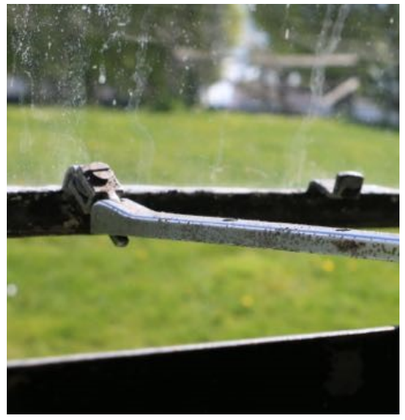
Courtyard E- gravel, 2 seats, 4 doors
- Birch Tree
- Bamboo Tree
- Weeping Ash
- Choisya tenata (1)
- Pyracantha

Courtyard F - gravel, 2 seats, 4 doors
- Birch (6)
- Green Bamboo
- Philadelphus (1)

Condition survey

Window survey

Opening up works



1.3 Survey 2: Condition

Introduction

Personnel

The drawing survey was conducted by David Maher who co-ordinated the opening up works which were carried out by Frank Murray builders. The window survey was conducted by Lambstongue, specialists in steel window conservation and restoration.

Aim

The aim of the survey is to understand and document the existing fabric of the school building, to assist in future decision making on the built fabric.

Why conduct a survey?

The drawing, condition and window surveys are needed to ascertain, accurately, what is on site. This forms a baseline for all the future analysis and study, most particularly the environmental, as well as the conservation analysis. The surveys identify variance from the design, if they exist, as well as additions and changes that have occurred over time. The condition survey identifies problems with the fabric, locating these on plan. The window survey accurately documents what is on site, which is a pre-requisite for any conservation work. It identifies any specific problems with the windows and gives options for remedial action. These documents form the basis of the developed proposals in this CMP.

Methodology

This survey is composed of 4 parts:
- drawing survey
- condition survey
- opening up
- window survey

The drawing survey involves an accurate on site measuring of the entire building and its translation to CAD drawings.

The condition survey was conducted at the same time as the drawing survey and identified areas where the fabric of the building had deteriorated. These were marked on the survey.

The opening up works included:
- opening up the cavity to assess extent of insulation
- exposing the foundations to assess their depth and construction
- locally coring a ground slab to determine the floor construction

The window survey involved a site visit, measuring of the existing windows and an appraisal of their condition. 4 window types were identified, accurately measured and documented. These window types reflect all the window types in the school, and include:
- classroom window (D4)
- clerestory window
- courtyard window (courtyard E)
- entrance gable (southern entrance)

In each case Lambstongue describe the existing glazing and its condition, illustrated with drawings and photographs. Information supplied in this report is based on information provided by John McLaughlin Architects and gathered on three site visits:
- 30th January 2019
- 16th April 2019
- 25th April 2019

On all three days the weather was fine.

Findings

Drawing Survey

The drawing survey produced a series of drawings (CAD and PDF) drawn at 1:200 scale that include:

- 18D/30/ 901Ground Floor Plan
- 18D/30/ 902 First Floor Plan
- 18D/30/ 903 Roof Skeleton Plan
- 18D/30/ 904 Roof Plan
- 18D/30/ 911 Current Sections
- 18D/30/ 921 Current Elevations

These drawings accurately document the construction on site and in particular identify:
- typical construction
- new extensions
- location of M+E services including radiators and light fittings
- location of rooflights
- roof structure
- furniture layouts

Opening Up

The opening up works confirmed that the cavity was constructed. It measures 50-65mm and is filled with approximately 30mm of rockwool type insulation, though this has likely deteriorated in performance over time. The slab is identified as 100mm thick, without insulation beneath. This is constructed on 150mm hardcore which is assumed to run throughout the entire building. The works also established that the foundations to the building are sound.

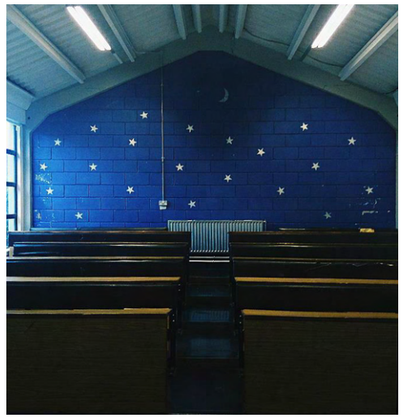
Condition Survey

The principal findings of the condition survey include:
- the structural frame, including purlins and edge beam are structurally intact
- rainwater penetration at eaves beam is concentrated at the locations where valley lengths are longest, principally along the main circulation areas
- this water ingress is causing plaster to spall and decay to adjoining timbers
- unbroken thermal path from inside to outside are caused by the concrete frame, eaves beam and tiled cill
- It is unclear what condition all the wall ties are in as they remain inside the cavity, but steel lintols at A2 (south facade) have partly corroded and need replacement

The full text of the condition report is available in the Appendix. The findings of the condition survey are indicated on the survey drawings. These also identify all the main service runs.

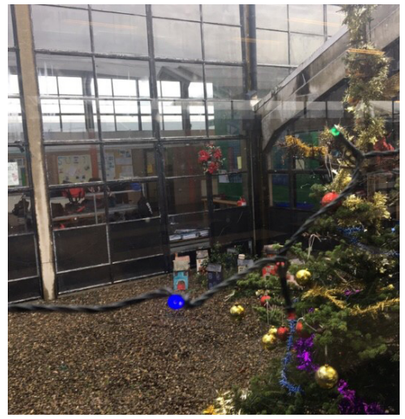
Window Survey

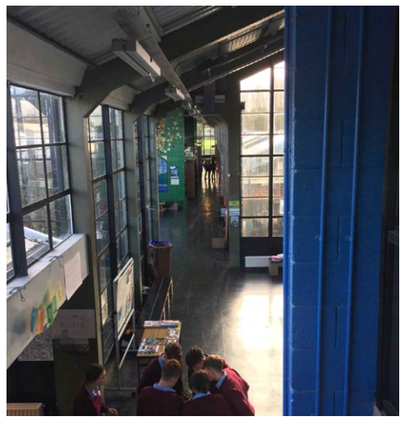
The window survey identified local damage to each of the 4 types of windows surveyed but in general found these to be in good condition. The survey demonstrates rehabilitation method and tests replacement options, should these be desirable. The full text of the window survey report is available in the Appendix.

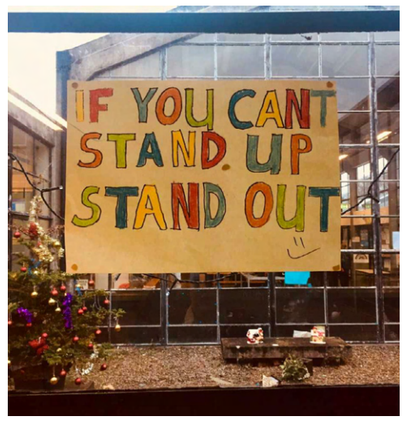


‘Spirit of’

‘Like look of’

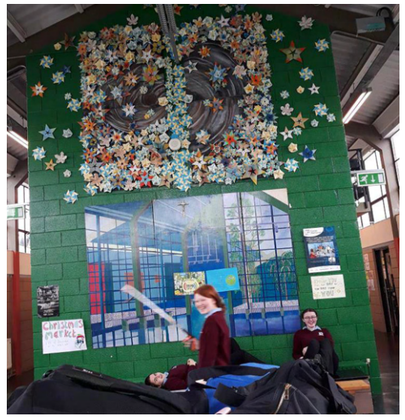


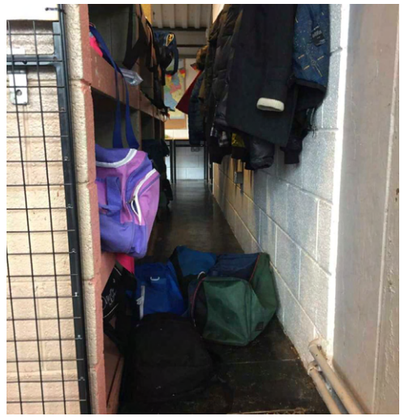


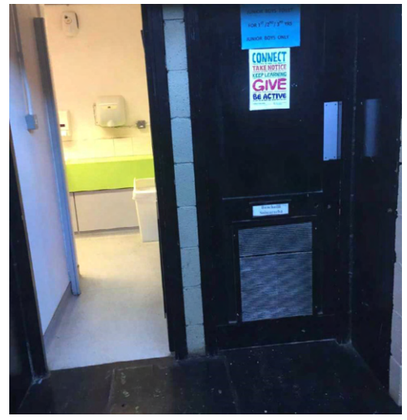


Interviews

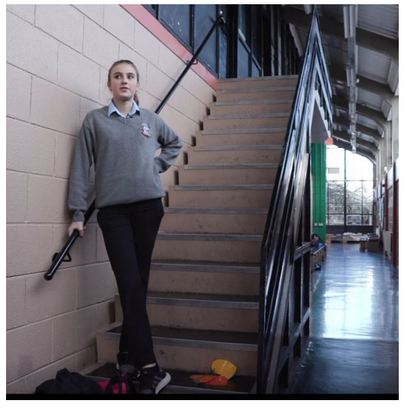
‘Uncomfortable in’







Filmic



1.4 Survey 3: Social

Introduction

Personnel

The social survey was designed and implemented by Tara Kennedy of John McLaughlin Architects, with thanks to Sharon McConnell of St Brendan's Community School, Birr and the participating students. The photography and filming was undertaken by Ros Kavanagh.

Aim

The aim of this survey was to understand how the school building is used day to day and also, critically, how the building is perceived by its users. This qualitative data when read alongside other quantitative information aims to draw out how the technical performance and social life of the building overlap, how the technical might impact on the social (and vice versa).

Why survey the social life of the school?

The importance of surveying the social life of the school was twofold. Firstly it was important to understand how the original social ideals embodied in the Doyle's design were experienced in the continued life of the school. Secondly, the social survey provided invaluable insight from school users on priorities for the future of the building that could inform the development of priorities for the Conservation Management Plan.

This survey is by its nature subjective rather than purely scientific and aims to collect and represent softer data about how the building is used and perceived. Combining this qualitative survey with other quantitative surveys, subjective data alongside objective data, is necessary to be able to conserve and continue the technical and social significance of the school.

Methodology

Three overlapping survey methods were used to generate outputs that map the social life and ongoing inhabitation of the school. The methodology included observational survey, consultation based survey, and user driven survey.

1: Observational Photography & Film: A series of 'Then and Now' photographs were produced, with John Donat's original photos from 1980s being re-photographed by Ros Kavanagh. Timelapse photography of the main social spaces was created to show occupancy over the course of the day. Walkthrough films moving along 'the street' were produced to describe the variety of spaces at different times during the day.

2: Walking Interviews: Interviews were conducted with a cross section of the school population including two teachers and five pupils to understand their use of the building, their daily routine and their relationship to the spaces. Participants were chosen to represent a variety of viewpoints including: a teacher who is new to the school; students across a range of year groups; a student who is new to the school; a second generation student, and a teacher who is a former student. The interviews were filmed and the interviewer accompanied the interviewees around the school, tracing their movements.

3: Student Photography: Students were tasked with photographing the school under five different categories: Places they 'like the look of'; 'feel represents the spirit of school'; 'feel comfortable in'; 'feel uncomfortable in' and 'like to spend time in'. This allowed the students to provide personal feedback on the school and its spaces. The aim here is to get a set of user opinions on aesthetics, comfort / perception of comfort as well as identifying significant spaces and student priorities.

Findings

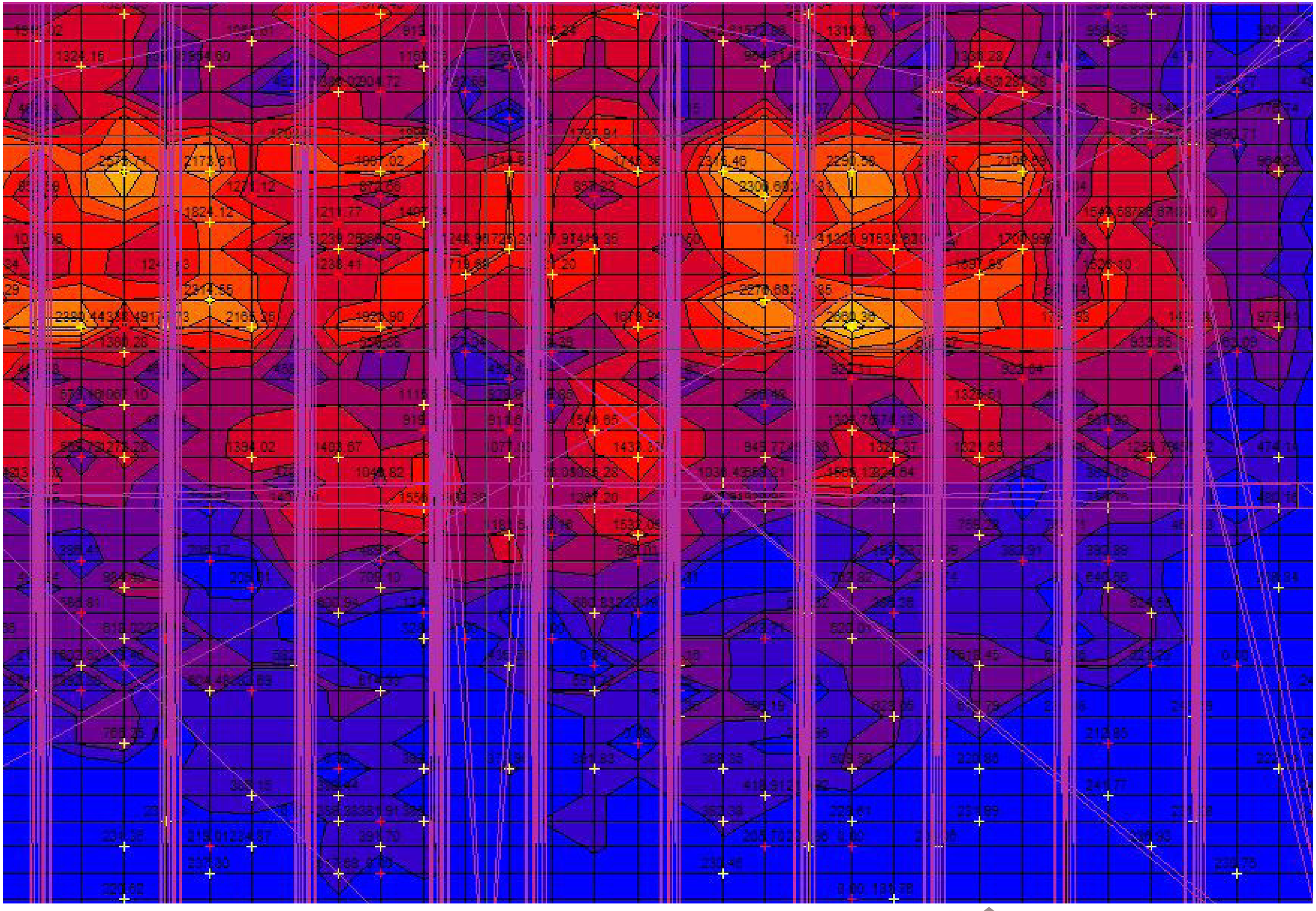
The findings of the social survey support the view that the conservation of function alongside fabric should be prioritised. Some points on the everyday life and perception of the school by its users:

- Imagery and descriptions of the school highlight the value given to social spaces, particularly the social 'street', which for the school community represents the spirit of the school.
- Benches form the centre of social life hosting everything from homework to birthday parties.
- Original painted timber and blockwork benches lining the social 'street' are the most sought after, prized based on their proximity to daylight, shops and toilets.
- 'Then and Now' images are analytic documents to understand the life of the school across 40 years.
- Mapping the student photographs shows a concentration of images on the social spaces. The spaces the students 'spend time in, feel comfortable in and feel represents the spirit of the school' centre on the social 'street'.
- The canteen is a place people feel comfortable in and spend time.
- Service spaces e.g. lockers and toilets are uncomfortable.
- Elevated views – Recurring high view from the stairs looking through school.
- Courtyard views - Recurring 'spirit of school' view through courtyards.
- School in landscape – Expansive views out to wider landscape.
- Not an object – The students do not try to capture the school in elevation.
- The spirit of the school is represented in messy active spaces as well as indoor outdoor relationships.

1.4 Survey 3: Social

Indicated here are two examples of the comparative photography taken by Ros Kavanagh in 2019. These photos replicate the original iconic photos by John Donat. The photos serve as a record of the building today, while the original photos are an important archival source. The comparison of the 'then and now' highlights the changes and similarities between the two periods. From the point of view of fabric changes we can easily identify additions and omissions. From the point of view of the social life of the spaces, we can see the similarities in occupation between now and then.

Additional photos can be see also in the Appendix.



1.5 Survey 4: Environmental Overview

Introduction

The environmental analysis conducted was of 3 types:

- on site testing
- on site monitoring
- desk-top analysis

On site testing included: thermography, air pressure testing and acoustic testing. The thermography was taken inside and out and concentrated on the classroom space. The air pressure testing was conducted in a classroom to identify the air leakage overall and particularly leaky areas. The sound analysis was conducted mainly in classroom spaces and tested the reverberation times in the classroom, the sound transfer from classroom to corridor space and the internal noise levels to understand the key parameters in the school design that affect the space.

On site monitoring included the installation of sensors collecting data on temperature, relative humidity and air quality over a period of eight weeks. Key areas in the building were identified, to allow for a range of information across the typical spaces. These included 2 main social spaces, 3 typical classrooms - one in an exposed location, one in a sheltered location, and one new classroom. In addition one technical classroom was measured. The air quality monitor identifies key parameters affecting air quality including particulates ($PM_{2.5}$), Volatile Organic Compounds (VOCs), and most notably CO2, which is of particular relevance to teaching spaces.

Desk-top analysis was made possible following the comprehensive building survey. Computer models were generated to assess key thermal bridge assessments, condensation risk analysis and a Passive House Planning Package (PHPP) Model was built to test dynamically not only the performance of the building but also a series of possible interventions.

Sound Testing

Sound Testing in Progress

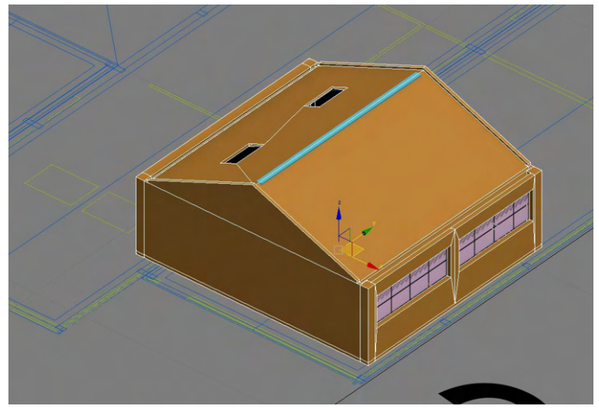
Air Gap between Wall & Beam

File	Room	Measured Tmf	Room Type	TGD-021-5
1	Classroom D4	1.6 seconds	Classroom	≤0.6 seconds
2	Classroom F4	1.0 seconds	Classroom	≤0.6 seconds
3	Classroom F1	1.2 seconds	Classroom	≤0.6 seconds
4	Classroom G3	1.2 seconds	Classroom	≤0.6 seconds
5	Classroom C4	0.9 seconds	Woodworking Room	≤0.8 seconds
6	Classroom F7	0.8 seconds	Classroom	≤0.6 seconds
7	Main Hall B10	2.1 seconds	General Purpose Room	≤1.5 seconds
8	School Canteen	1.6 seconds	Non-Teaching Space	≤1.5 seconds

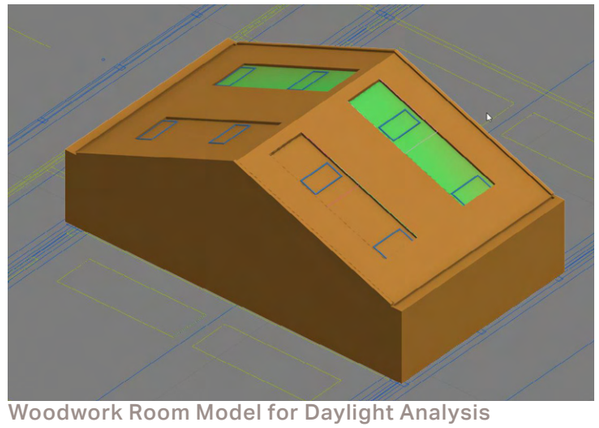
Table 14: Summary of the measured reverberation times measured on site.

Reverberation Time

Daylight

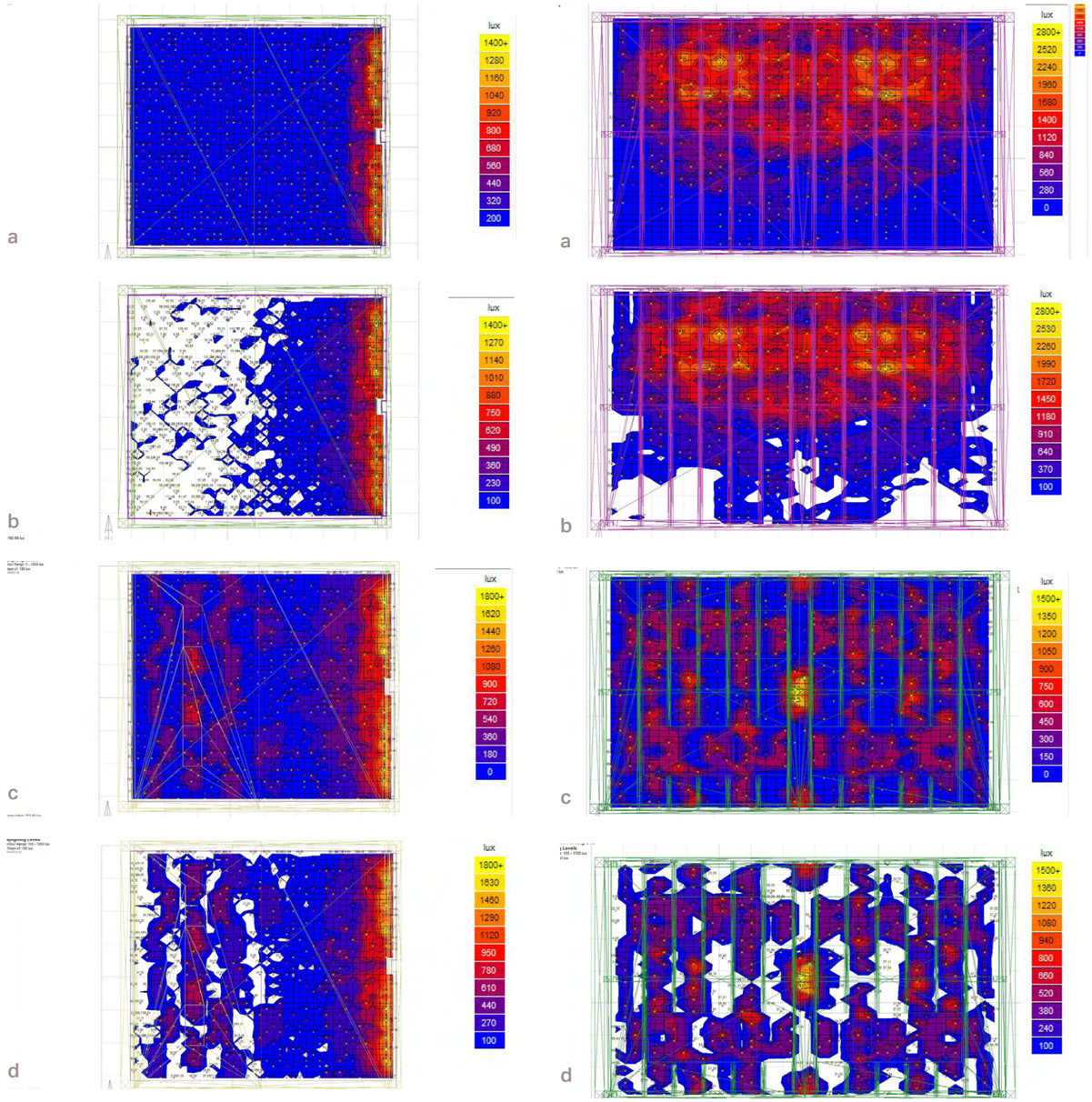


Typical Classroom Model for Daylight Analysis



Woodwork Room Model for Daylight Analysis

Woodwork Room



Daylight Modelling Classroom
a. Contour Range 200-1400 lux in steps of 140 lux
b. Contour Range 100-1400 lux in steps of 140 lux
c. Contour Range 0-1800 lux in steps of 180 lux
d. Contour Range 100-1800 lux in steps of 180 lux

Daylight Modelling Workroom
a. Contour Range 0 - 2800 lux in stpes of 280 lux
b. Contour Range 100-2800 lux in steps of 280 lux
c. Contour Range 0-1500 lux in steps of 150 lux
d. Contour Range 100-1500 lux in steps of 150 lux

1.5 Survey 4: Sound & Daylight

Sound

Personnel

This survey was conducted by Diarmuid Keaney of ICAN acoustics.

Aim

The aim of the sound testing is to identify issues related to sound transfer within the school.

Why test sound in school?

Issues with sound can be problematic for example, in the classroom space, if a teacher can't be clearly heard by a pupil or if there is excessive noise entering the classroom from an external source. TGD-021-5 Acoustic Performance in Schools, by DoES sets minimum acoustic standards that should be met.

Methodology

We determined key locations that reflected the different sound qualities in the school, including typical classrooms, both from the original design (D4) and extensions (F3&10) as well as one larger classroom (C4) the canteen and B10. The on site measurements tested for:

- The sound insulation performance between classrooms and corridors and classrooms.

This tests airborne noise resistance between rooms in the building, in this case between the corridor and classrooms (F4 & C4) and between classrooms (F3 & F4; D3 & D4)

- Indoor Ambient Noise Levels

The indoor ambient noise level in an un-occupied space includes noise contributions from external sources and building services. Classrooms F3 & F10 were tested for ambient noise levels.

- Reverberation time

This test establishes the reverberation time in the room; which is used as a metric to assess the likelihood of teacher-student speech intelligibility. Where there is a long reverberation time, intelligibility is adversely affected. The locations for the testing were: Classrooms D4, F4, F1, G3, C4, F7 as well as B10 and the canteen.

Findings

- Horizontal Airborne Sound

Measurements show that the airborne sound insulation performance between corridors and classrooms tested do not meet the minimum airborne requirements between classrooms stipulated in TGD-021-5. In situations where teaching was to take place when the corridors were in use by other students, then sound insulation performance is likely to be more critical between that space and another teaching space. However if all classes break at similar times, then the noise sensitivity should be removed for the times between classes. Notwithstanding that, it was also found that sound insulation between classrooms was low. In summary, sound insulation performance in the rooms tested, in all cases, falls below the minimum requirements defined in the Irish Department of Education's TGD-021-5 guidance document.

- Indoor Ambient Noise Levels (IANL)

This was measured in two classrooms and found to only marginally exceed the upper limit of 35dB by 1~3dB in one case. However during that measurement there was heavy rain and a noisy clock ticking in that classroom. Measured Indoor Ambient Noise Level (IANL) were met in one of the rooms was examined and were found to marginally exceed the minimum requirements in one of the classrooms.

- Reverberation time

Measurements show that the rooms tested do not meet the minimum reverberation times specified in the Irish Department of Education's TGD-021-5, Acoustic Performance in Schools (November 2015). Reverberation measurements show that all of the rooms examined were longer than desirable for all classrooms and other spaces.

This text is extracted from the ICAN Acoustics report, the full report is accessible in the Appendix.

Daylight

Personnel

The daylight analysis was conducted by ARC consultants under the direction of Bill Hastings.

Aim

The aim of the daylight analysis is to assess issues with the current daylighting in the classrooms.

Why assess the daylight?

Good lighting is essential for learning. Ideally the light level should be uniform and not produce glare. Where lighting can be provided by natural light, the colour rendering is better and it is suggested the learning environment is better too. Reducing reliance on artificial light also reduces energy usage. Light levels are measured in lux and an appropriate level of daylight on a desk for reading is around 500 lux, with levels of up to 1000 lux required for art rooms and workshop areas.

Methodology

The daylight analysis was conducted using software that models the existing condition in the school and tests for daylight. For the purposes of the study 2 different learning spaces were identified:

1. A typical classroom (D4)
2. A larger learning space (C4)

These classrooms represent the typical learning environments in the school, in terms of daylight. Analysing the social spaces was not a priority as a varied light level across these spaces was considered beneficial. In addition to desktop analysis, visual analysis was made of the existing condition relative to the original design intention and best practice and the findings are reported here also.

Findings

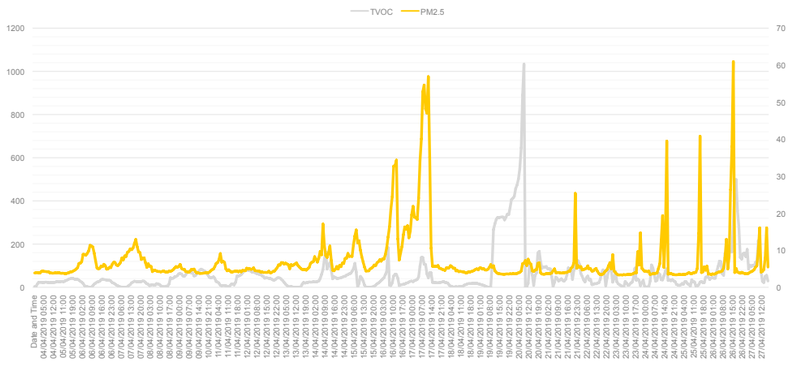
The replacement roof, built in mid-2000s, introduced new rooflights which are typically larger than the original, with fewer openings. This has introduced excessively strong lighting below these roof lights with too much contrast with the darker areas of the classroom. The original design had smaller rooflights that were more dispersed. In future, when a new roof is being installed a new design solution should be devised to provide suitable lighting for a learning environment.

In the classroom's original design the side light from the windows was balanced by the rooflights deeper into the plan. In the current situation the roof lights do not provide sufficient daylight deep into the classroom. Again, this can be addressed when a new roof is installed. Additional design measures such as light shelves can assist in improving even spread of light across the classroom.

The social spaces show a considerable amount of variance in their daylighting due to the extent of glazing in some parts, including clerestory, and lower areas that are not well lit. It is considered that this variety of lighting qualities in these spaces should be retained as they offer a contrast to the classroom spaces as well as visual stimulation to the viewer. An even distribution of light in these spaces is not required, or beneficial. No change to daylighting is proposed in these spaces. Original artificial light fittings have been removed and replaced with non-coomplimnetary light fittings. A new services and artificial lighting strategy should be developed as part of the overall intervention strategy.

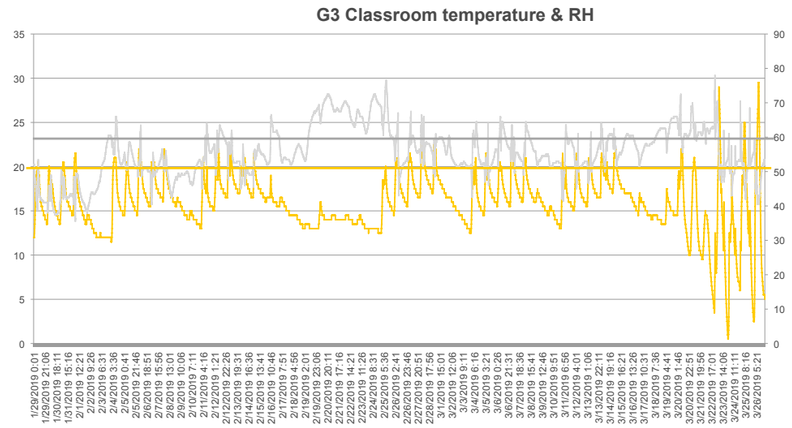
TVOC & PM2.5 Monitoring

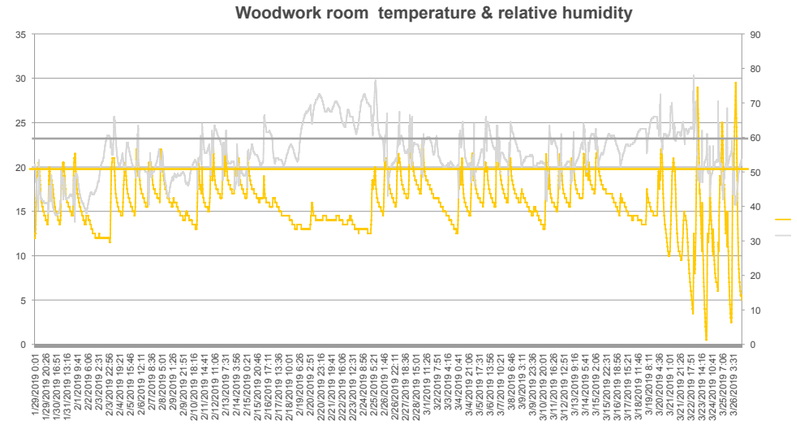
The yellow line indicates PM2.5 and the grey line TVOC. The X axis shows time in 7 hour intervals from 04.04.19 to 27.04.19. The Y axis (LHS) shows the metric for PM2.5 measured in particles per billion (ppb). Levels below 220 are good/excellent, between 220-660 is considered moderate, from 660 -2200 is problematic and above 2200 is a significant issue.
Graph produced by Andrew Lundberg, Passivate



Temperature & Relative Humidity (RH) Monitoring

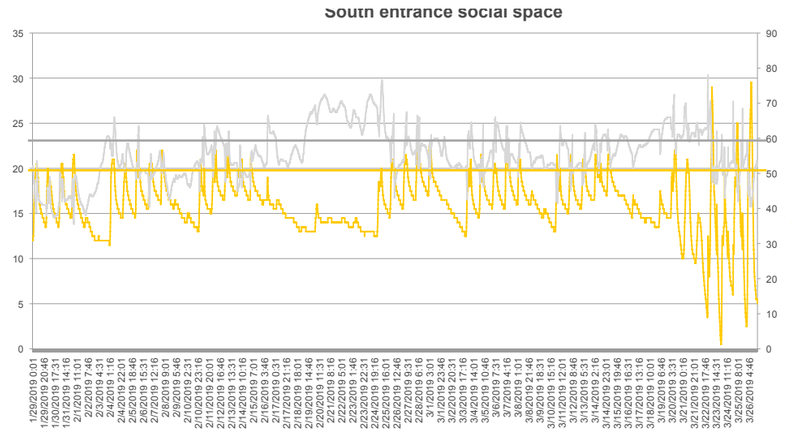
The X-axis indicates time indicated in one day increments from 29/1/19 to 26/3/19. Measurements were taken at 5 minute intervals. On the Y-axis on LHS is temperature in degrees Celsius. On the Y-axis on RHS Relative Humidity percentages are shown.
The fluctuating lines indicated the on site measurements (yellow for temperature and grey for RH). The horizontal yellow and grey lines indicate ideal temperatures and %RH. By identifying the difference between and the actual and ideal temperatures and relative humidity, we can assess how far off ideal the internal temperatures are, we can identify when this occurs and begin to examine why this is occuring at these points in time.

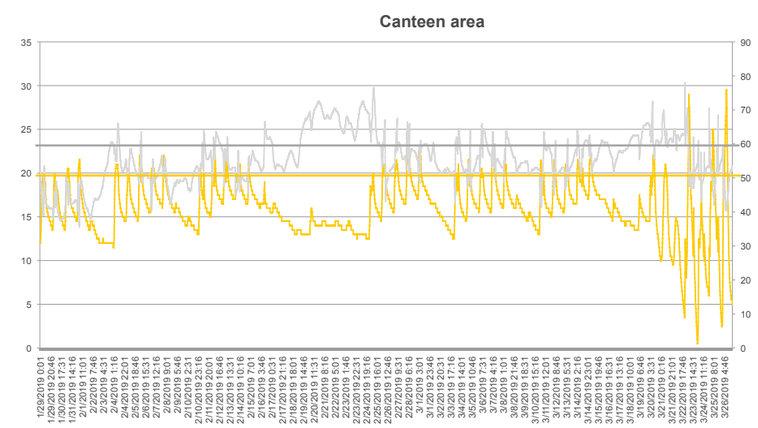




CO2 Monitoring

Below is a screenshot of the uHoo interface, indicating the CO_2 levels in classroom D4 on 9th April 2019. On the X axis is the time, in minutes, starting at 9:00am until 9:59am. This period relates to a class period. On the Y axis is the measurement of CO_2 in ppm indicated in uHoo's traffic light system of green, amber and red. What is noticeable is that the levels move from acceptable to problematic within 10 minutes of the classroom being occupied and by 9:24 the CO_2 levels are in the red zone.





1.5 Survey 4: Air Quality, Temperature &RH

Air Quality

Personnel

The air quality monitoring was co-ordinated by Andrew Lundberg of Passivate with the help of Aengus Byrne from St Brendan's Community School.

Aim

The aim of the testing was to establish the indoor air quality in the school building.

Why test for (indoor) air quality?

Indoor air quality (IAQ) is important for our health and well being. The first step in treating any issues with air quality is understanding what pollutants could be in the air. By monitoring the air we can identify any pollutants and establish when they emerge. Also important in the design of any ventilation system or strategy is an understanding of whether pollutants are generated within the building, or whether they enter the building from outside via infiltration (gaps or cracks in the building fabric) or via any ventilation openings.
Typical internal sources of IAQ markers include temperature changes from heating systems, occupants & processes, CO_2 production from occupants, CO generation from any fossil fuel burning within the building, and VOC's from manufactured items or materials brought into the building.
Other gases can typically enter from the external environment, such as NO_2 and PM2.5 from industrial processes, transport etc.

Methodology

A uHoo IAQ monitor was located in 3 key locations in the school, classrooms D4, F1 & F4, in each case for 4 weeks at a time. The monitors test for: Nitrogen Dioxide; NO_2; PM2.5; tVOC; Ozone O_3; Carbon Dioxide CO_2; Carbon Monoxide CO.

- CO_2

Findings

Acceptable CO_2 levels are essential for the classroom setting. With elevated CO_2 levels, in particular, the ability to concentrate is reduced, the student can start to feel sleepy and, at the upper level get a headache. CO_2 levels are measured in parts per million (ppm) and the uHoo IAQ monitor gives the measurement a traffic light system with <800ppm as green and acceptable, between 800-1500ppm as amber and considered problematic, >1500ppm is red and considered unacceptable. The DoES in their guidance on new classroom design (TGD 033) includes a traffic light CO_2 monitoring system also. These show slightly different bands with green below 1500ppm, amber 1500-2000ppm, and red above 2000ppm.

Using the uHoo metrics, within 10 minutes the classroom was in amber and within 24 minutes was in the red zone and remained in that zone for the remainder of the class. This identified a clear issue with CO_2 levels that needs to be addressed by improving ventilation. This is considered further in section 5 of this report.

- tVOC & PM2.5

These were monitored in classroom D4 in April 2019 and showed average rates that were acceptable. There were, however, noticeable spikes in PM2.5 across the weeks. These are assumed to relate to times when cleaning or spillage occurred. Cleaning products may release significant PM2.5 tVOCs only reached high levels at one time over these weeks. To establish what is causing these spikes the user of the room would need to monitor activity and relate these to the data in the monitor. If cleaning products are causing the issue, the school can examine alternative cleaning products.

Temperature & RH

Personnel

The temperature and relative humidity (RH) monitoring was co-ordinated by Andrew Lundberg of Passivate with the help of Aengus Byrne from St Brendan's Community School.

Aim

The aim of the testing was to establish the range of temperatures and relative humidity, across a period of days in the school building. This establishes the patterns on site and informs how to intervene.

Why test for temperature and relative humidity?

Temperature and relative humidity are key factors in our comfort and wellbeing in an indoor setting. Too low or two high a temperature can cause discomfort, equally, RH that is too high or low can cause bacteria, viruses and mould to increase, as well as exacerbating asthma and allergic infections. The two metrics are dynamically connected, hence it is important to measure them both in the same location. The 'comfort zone', where temperature and RH are at acceptable levels for comfort is considered to be in the region of 20-27 degrees Celsius and 40-60% RH.

Methodology

Temperature and RH sensors were installed in varied locations around the school in an attempt to capture the variety of different conditions present, at the same time. They were in situ for an 8 week period commencing 29th January 2019. The locations of the sensors included:

- Southern (student) entrance hall
- Main central circulation area
- G3 new classroom
- C4 woodwork

Findings

Temperature

Across the different rooms the required comfort temperature of 20 degrees is achieved each day. This is as a result of the heating being turned on, it seems sometimes in the middle of the night. Consistently across the day the temperatures drops, from highs of up to 24 degrees down to 15 or 16 degrees by the end of the school day and as low as 2 degrees during the night. While the school can reach the required temperatures it is clear it cannot maintain them, evident in the rapid fall off of temperatures once the heat is turned off. The inability to retain heat is a function of the poor insulating properties of the built fabric.

Relative Humidity

There does not appear to be an issue with abnormally high or low relative humidity levels in the school, which is a positive finding. This explains why there is no mould growth visible in the building. The information from logger 4 (overleaf) indicates this as the temperature and RH never pass the dew point, when condensation, - an environment suitable for mould growth - occurs. Any change to the internal environment to improve airtightness and mechanically ventilate the space may have an effect on this and impacts on RH and subsequent condensation risk needs to be consideredas part of the design of any new built intervention.

Air Leakage & Airtightness testing

Air Pressure Testing Underway

1. Floor
Anenometer shows a reading of 1.0m/s at floor and wall junction to F1

2. Holes in Concrete Columns
Holes in concrete column (F1) show an air leakage reading of 4.66m/s

3. Column Junctions
Junctions of column with other construction show areas of air leakage. Here is junction with wall plate in F4 showing an air leakage of 2.04m/s.

4. Window Junctions
Many air leakages were identified in the windows themselves. Here a reading of 4.10m/s is shown in the opening sash of window in F1.

5. External Door
The exit door at D4 has considerable air leakage problems. Shown here is a reading at the head of the door showing 4.85m/s air leakage.

7. Wall Plate
Some of the wall plate to roof junctions showed leakages; here is a reading from F4 showing a leak of 3.11m/s.

8. Leakage to Hall (F4)
Large gap identified at top of blockwork wall in F4.

9. Fireseal
Small gaps were identified in this seal, here shown in F1 reading 1.98 m/s.

10. Roof Panels
Generally the roof was well sealed but some air leakage was detected in each room, here shown in F4 at 1.74m/s.

11. Rooflight
Generally these were well sealed, though some air leakage was identified, below shown in F1 at 1.89m/s.

1.5 Survey 4: Air Pressure

Introduction

Personnel

The air pressure testing was conducted by Gavin Ó Sé of Greenbuild.

Aim

The aim of an air pressure test is to understand how airtight the building fabric is. The more airtight a building, the less heat it loses from draughts and air leakage.

Method

Airtightness testing measures air leakage, air permeability and air changes per hour. Air leakage relates to draughts (air convection) at defined points in the building and it is tested using an anemometer, which reads the air flow in m/s. Air leakage and air permeability relate to air leaving the building through the built fabric and these are tested using an air blower test. This pressurises the room to a standard pressure and then measures the rate of reduction in air pressure over time to assess the air leakage, measured in air changes per hour (ach) and air permeability, measured in $m^3/(hr.m^2)$ in the room. This was conducted by Greenbuild in December 2018 and it examined 3 classrooms:

- F1
- F4
- D4

These classrooms were chosen as they cross over with testing of temperature, RH and IAQ. Equally, it was not possible to conduct an air blower test on the larger social spaces.

The tests were undertaken in accordance with the provisions of the standard I.S. EN ISO 9972:2015 - Thermal performance of buildings - Determination of air permeability of buildings - Fan pressurization method - Method 2 (equivalent to older Method B), and all variables were within acceptable limits.

Findings

The pressure test results are as in the table below:

Result @50Pa	Air Changes (n50)	Permeability $m3/(hr.m^2)$ (q50)	EQLA@ 50Pa(cm^2)
F1	10.10	7.96	620 (1)
F4	18.53	14.67	1130 (1.9)
D4	7.47	6.328	642 (1)

The equivalent area (EQLA) measures the air leakage relative to an A4 page in a wall, the number in brackets shows the area of the air leakage relative to one A4 page.

Specific areas of the fabric tested and leakage identified are listed below:

1. Floor

A small number of leakages were located at the floor to wall junction, on both external and internal walls. They were small and overall relatively insignificant and for the most part, though not exclusively, were found where there was a noticeable defect or repair to the floor at the floor/wall junction. If a 'best case' airtightness project were undertaken, the floor to wall junction could also be examined, as in other rooms not tested the effect of this junction may be more than what was observed in the 3 sample rooms.

2. Hole in Concrete Column

The concrete columns have ca 40mm holes that penetrate the entire column. Many of these holes which were accessible during the testing were filled or otherwise air-sealed. However, a number of the holes were open to the adjoining spaces. Some of these holes throughout the school will be on a column at the end wall, so that it is reasonable to assume that number of these leak air to the outside also.

3. Column Junctions

The concrete vertical columns are a separate part of the structure to the walls and the roof. The joint between the columns therefore and the rest of the structure can be prone to small gaps and cracks appearing. Also, the column appears to have a cantilever section for the roof, which then join to an upper section for the roof. In most cases, these are internal, but at the end gables, these form part of the external envelope, with a possible air leakage path between the upper section and the vertical section of column.

4. Window Junctions

For air movement/draughts, the window sashes were found to be generally poor, with some additional leakage around the perimeters where they are built into the structure. This peripheral leakage is much less than that through the opening sashes.

5. External Door

The emergency exit door in D4 showed significant air leakage for the perimeter of the frame to wall junction. There is a metal frame, on the inner side of which at the reveal is a timber surround. Neither of these elements appears to be sealed into the reveal. Additionally, the opening leaf did not have a good airseal to the frame.

6. Wall Plate

This type of insulated, corrugated roof panel can be seen in many non-domestic building types, and very often the peaks of the corrugations at the wall plate are leaky as they are not fully filled. This is not the case in any of the 3 rooms tested here, as the seal from the wall plate up into the corrugations is really quite good. However, the metal rail that holds this sealant material is itself not particularly well sealed at the junction between it and the wall below. Numerous leakages were located, some quite significant.

7. Internal Leakage (F4)

There is a much greater overall air leakage rate from F4, compared to the other two zones, despite being similar in size. This extra leakage is due largely to a gap at the top of the internal wall adjoining the hall. As the tops of all the other walls were sealed with what appeared to be a fire-seal material, it should be reviewed if this wall also requires a similar type of seal.

8. Fireseal

The fireseal layer at the top of the wall to roof junction was generally seen visually to be complete. However, a significant number of small gaps were found on closer inspection, which allow air movement, from outside and from adjoining spaces.

9. Roof Panels

The roof panels are joined along their lengths. As important as airspeed readings can be 'zero' readings, indicating the absence of air movement. For the roof panels, the anemometer probe head simply could not get consistently into the tiny gap space to give a reliable reading or zero reading. However, despite this drawback, an airspeed reading could be obtained in a small few places where visually the panels were well joined. Also, anywhere that there appeared visually to be any level of defect or damage to the joint there was a larger gap, allowing a reliable airspeed or zero reading to be obtained. As there was fairly consistent leakage in these locations in all 3 rooms, this type of leakage has been marked as 5*. At the ridge of each room, no leakages were detected using this method. Also, at the screw penetrations for the fall protection system, over the 3 rooms, no air leakages were noted. These leakages were present in the 3 rooms.

10. Rooflights

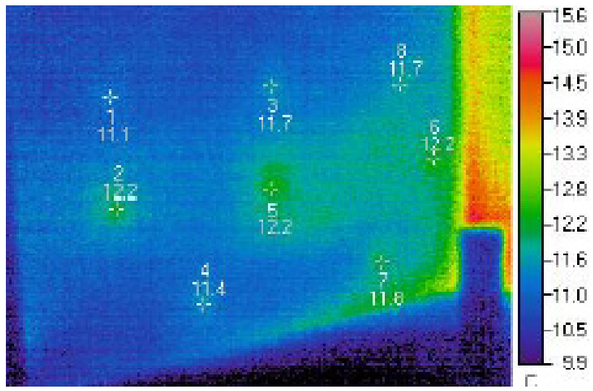
In general, the roof windows in F1 were found to be well sealed in place and to be fairly airtight in the unit itself. Small leakages were noted at the corners of the units.

11. Thermal Imaging & Airtightness

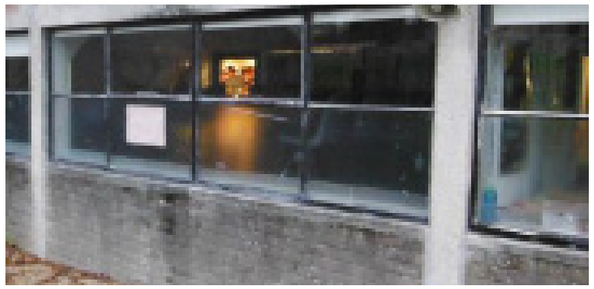
In all three of the rooms the thermal imaging camera was setup on a tripod prior to the depressurization test, and an image was obtained. Following the depressurization, a second image was obtained of the same location. Unfortunately, in only one room were the images directly comparable due to minor camera movements in the other rooms.

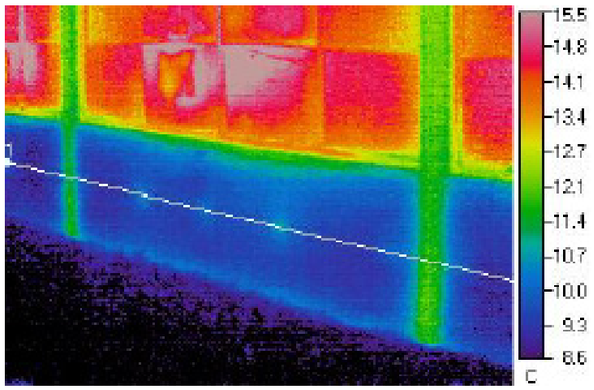
Thermography

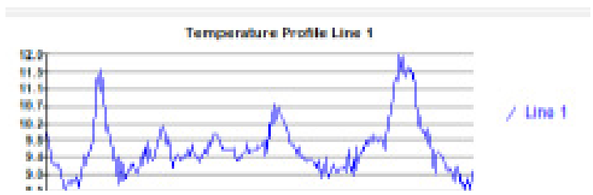
1. Spots on Brickwork
Externally shown here on wall at F1 - at least 8 spots visible on wall. Internally these are visible on gable of D4.

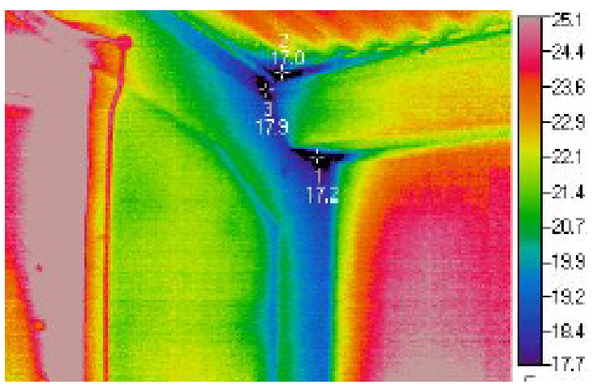


2. Concrete Columns
Note change in temperature from wall to column externally (F4). Internally the column is noticeably cooler than the wall (D4).

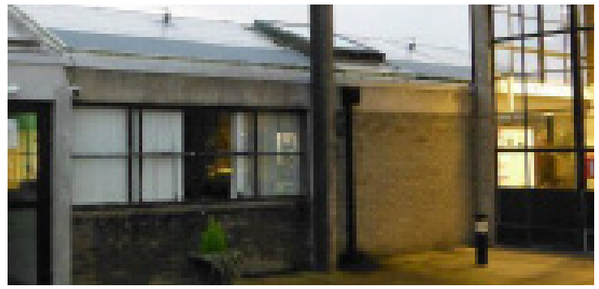


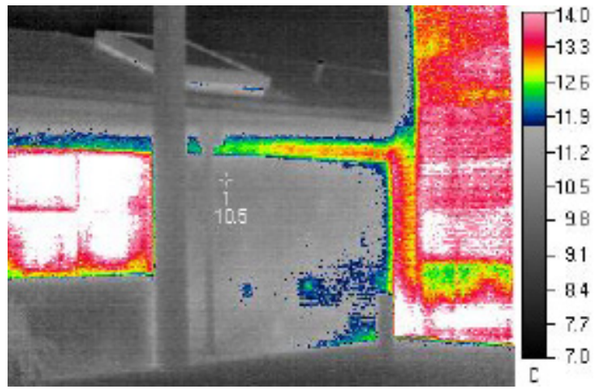


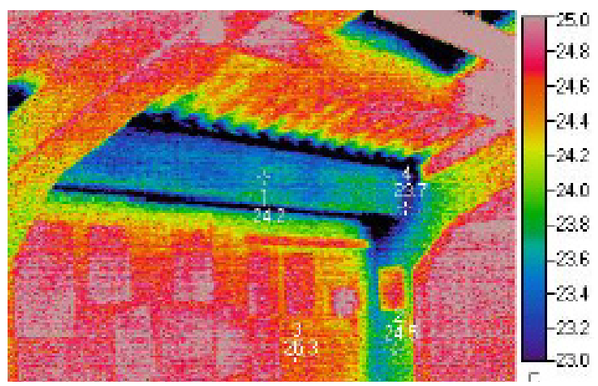




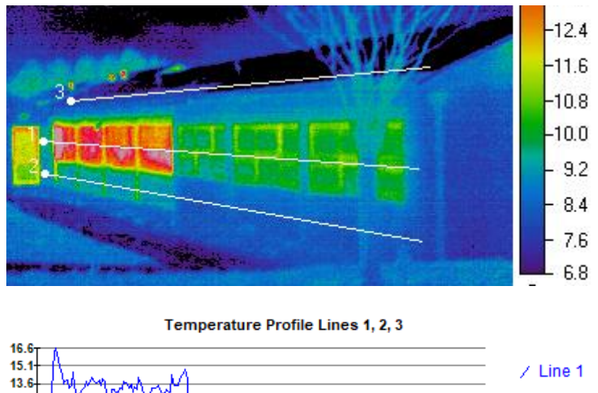
3. Wall Plate
Elevated heat loss through wall plate is evident in a number of locations, shown externally and internally here on F1.

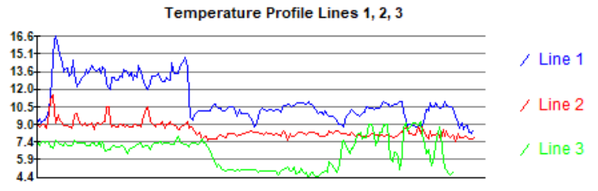






5. New Vs Old Construction
These images compare the exterior or adjoining original 1970s contruction and new extensions from 2010s.





Line 1 (blue) - Window: As with roofs, windows must be treated with caution in thermal imaging, due to the danger of reflections from elsewhere. However here, as we are comparing windows to windows and the patterns are relatively even, we can be reasonably confident in saying there is a several degree surface temperature difference between the older and newer windows.

Line 2 (red) – Lower Walls: A clear temperature drop averaging about 1C is evident at the old/new junction, and the spikes for the columns are not evident in the newer section.

Line 3 (green) – Roof: Roofs must be treated with caution in thermal imaging survey due to condensation and other factors providing a layer to allow reflections from elsewhere appear as if it is the pattern on the roof itself. Here, a similar pattern is found at several view angles, indicating that the effect is not just a reflection from elsewhere, and therefore the different roof build up on the new section would appear to be better insulating.

1.5 Survey 4: Thermography

Introduction

Personnel

The air pressure testing was conducted by Gavin Ó Sé of Greenbuild.

Aim

The thermal imaging aims to locate additional heat loss patterns not evident from visual inspection, or to give an indication of the severity of heat loss from various parts of the building.

Thermal Imaging

A number of thermal images are shown in the report. These show the levels of heat loss in the given area. The camera operator can vary the colour schemes and the temperatures required. Greenbuild reports typically implement a scheme where the coldest spots are black and then the colours move towards white, which are the warmest points on the image. The temperature scale on the right hand side of the image will guide you as to what is relatively cold and hot.

Methodology

A thermal imaging survey was undertaken on 3 spaces:

1. F1
2. F4
3. D4

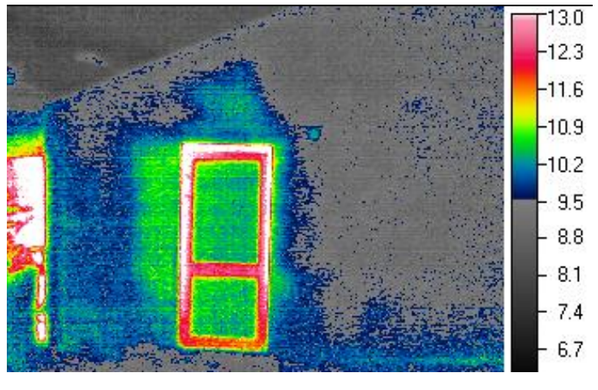
in 3 discrete situations:

1. On arrival, from outside
2. In each space from the inside
3. In each space from the inside, post airtightness depressurization test. This should allow any extra leakage locations to become apparent.

Conditions for the survey were as follows:

- External temperatures to min 6˚C overnight, averaging 8.5 ˚C at the time of survey. Overcast all night and the day before, so very little solar gain to consider, breeze force 2 to 3 max. to the gable ends of D4.
- Heating on overnight in the school. Thermometers placed on desks in the middle of the classrooms read the following after ½ hour stabilization time: F1: 20.6 ˚C; F4 22.6 ˚C; D4: 21.3 ˚C.

4. End Door D4
Additional heat evident - most likely due to heat pipes running around the wall.



Findings

External imaging identified:

1. Spots on brickwork

One of the main items of note in each of the areas surveyed externally were thermal spots on the brickwork. These were present in several locations. In D4 they correspond to a certain degree with what appeared to have been repairs or other work to the brickwork. In a cavity wall, the appearance of this type of spot would often be associated with thermal bridges caused by either wall ties themselves, or mortar buildup on those wall ties.

2. Concrete columns

The concrete columns that support the roof are internal at the roof stage, except where they form part of end gable walls. At the wall level they span the gap between inside and outside, making them 'repeat thermal bridges' – i.e. like the wall spots they are patterns of elevated heat loss that is repeated over and over. However, the effect of the columns is far more significant than the wall spots for heat loss, as the areas concerned are larger, and the heat loss demonstrated is greater.

3. Wall Plate

Elevated heat loss patterns could be observed in some locations of the wall plate.

4. End emergency exit door in D4

The emergency exit door at D4 shows an interesting thermal pattern more or less around the perimeter of the door. On visual inspection there is no evident defect here. Therefore, this pattern is more likely due to additional heat production in the area, insulation anomalies, airtightness weakness, or all of the above. Two of these 3 items were shown during the survey – heating pipes at temperatures of up to about 60c run around the perimeter of the door from the inside, and at the airtightness test, the frame to reveal junction internally was very weak for airtightness.

5. New Vs Old Construction

To give an idea of the difference between the newer and the older sections, overviews were taken in a couple of locations. The heating was on in the school overnight, but internal temperatures were not taken in those rooms that did not form part of this survey directly. Therefore, it cannot be guaranteed that the internal temperatures were equivalent to those in the rooms being surveyed. However, according to staff on the day, there is no mechanism to regulate the temperatures in each room, so we assume here for the sake of simplicity that the other rooms captured in these images are heated to a similar level as the test rooms. (see photos overleaf)

Internal Imaging identified:

1. Concrete columns

The patterns visible from outside of elevated heat loss via the concrete columns is evident also from inside. Note the cooler pattern in the columns and beams and to the gable of D4.

2. Wall spots

The wall spots noted from the external imaging survey were in general not evident from the internal survey as the majority of the areas in question were behind radiators. However, the end gable wall of D4 showed some patterns.

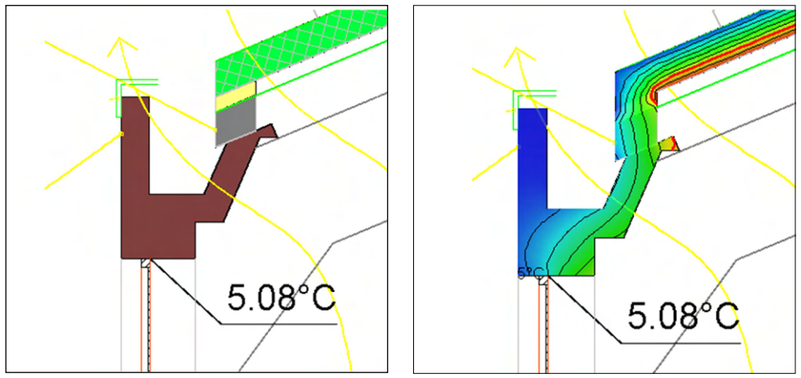
3. Wall plate

The heat loss pattern from the wallplate was not as evident as might be expected. As the radiators were in general placed on external walls, then the heat rises and warms the wall plate level, washing them with heat and masking the heat loss pattern somewhat. However, some patterns of elevated heat loss were evident especially where wall plate and concrete columns meet.

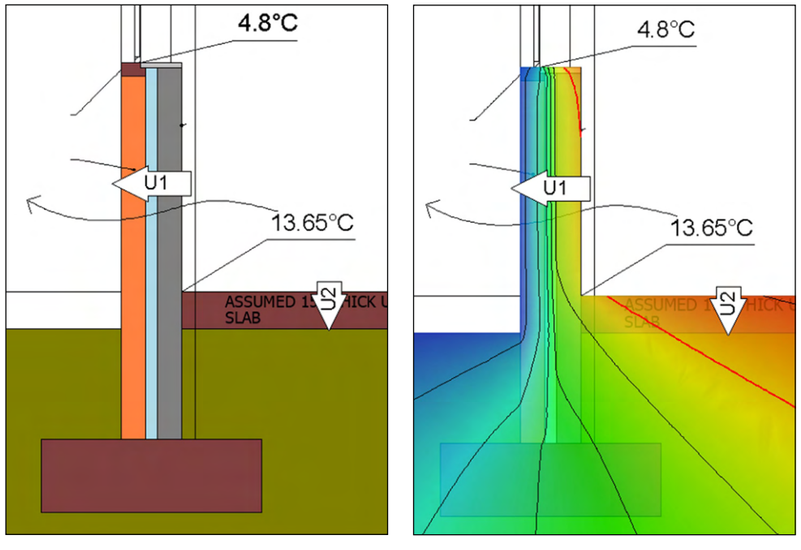
Thermal Bridge Analysis

Existing Condition

Eaves Detail
fRsi value 0.25 - fail
linear psi value 2.079 W m/K

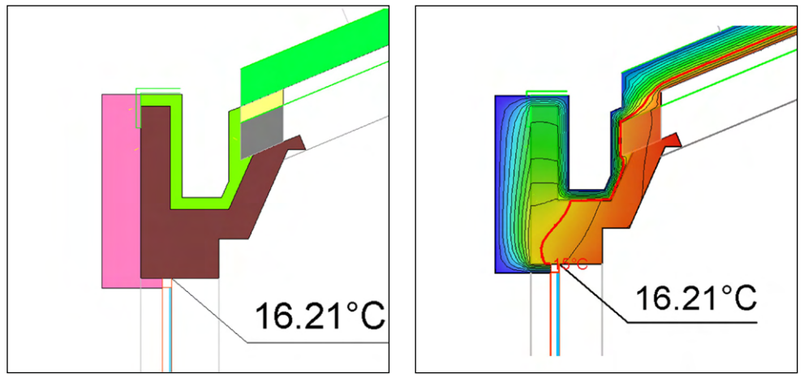


Floor/Foundation Perimeter Detail
fRsi value 0.24 - fail
linear psi value 0.385 W m/K

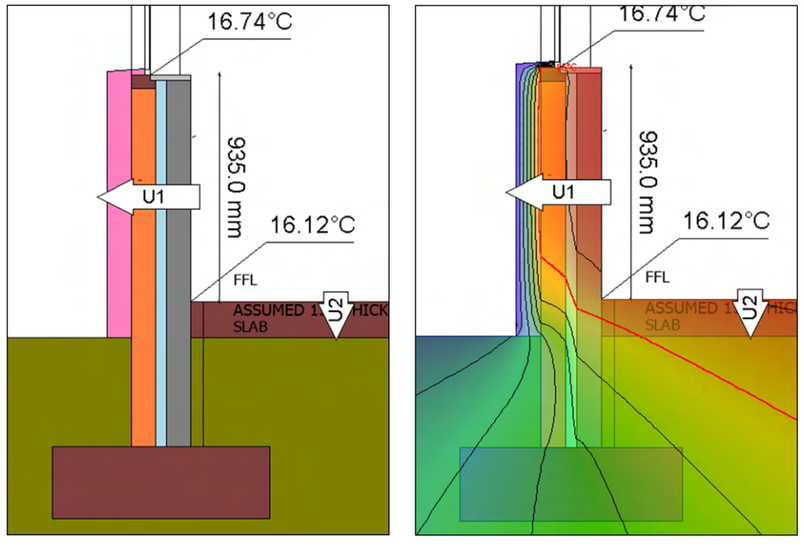


Intervention - External Insulation

Eaves Detail
fRsi value 0.81 - pass
linear psi value 0.527 W m/K

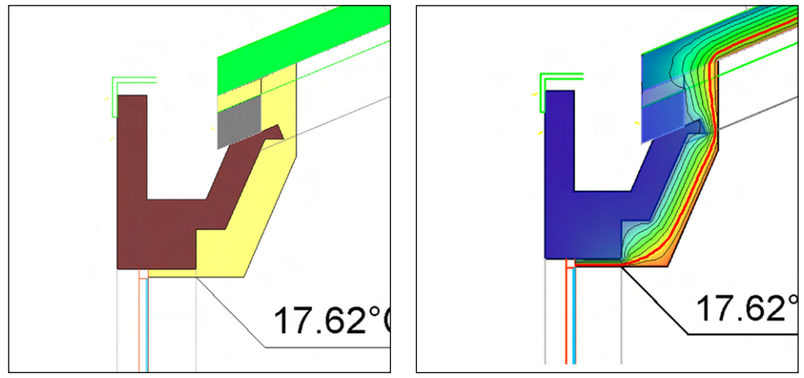


Floor/Foundation Perimeter Detail
fRsi value 0.61 - fail
linear psi value 0.128 W m/K

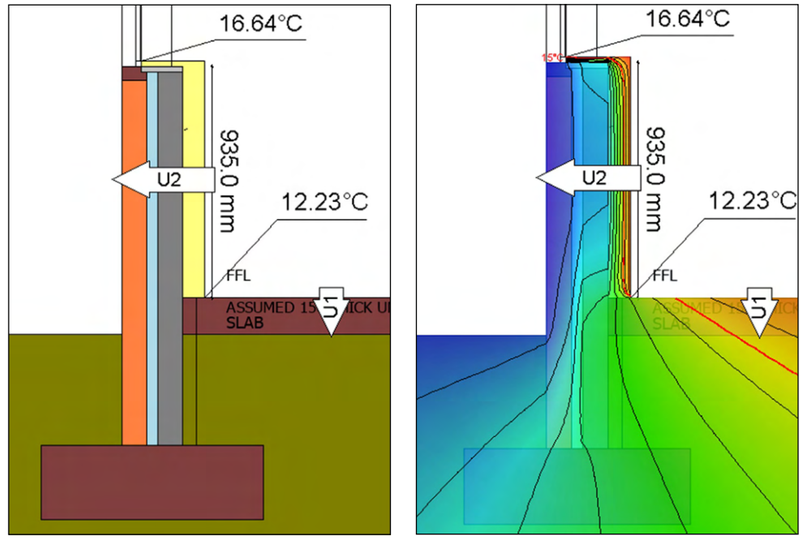


Intervention - Internal Insulation

Eaves Detail
fRsi value 0.88 - pass
linear psi value 0.244 W m/K



Floor/Foundation Perimeter Detail
fRsi value 0.61 - fail
linear psi value 0.286 W m/K



1.5 Survey 4: Thermal

Introduction

Personnel

The thermal bridge analysis was conducted by Andrew Lundberg of Passivate.

Aim

The aim of the thermal bridge analysis is to determine the extent of the cold bridges at key points in the existing fabric. This quantifies the heat loss in specific locations and allows for modelling of interventions.

Why measure thermal bridging?

A thermal bridge is an element of the building that has higher heat transfer than the building fabric around it. By measuring the thermal bridging at key points we can accurately identify the heat loss through these locations. For a room to be comfortable the internal surfaces need to be of even temperature. Where a thermal bridge occurs, the internal temperature surface can drop locally, which leads to discomfort. Local cold spots can lead to mould growth under the right conditions, and in some cases condensation on surfaces.

The fRSI, or temperature factor, is the figure that relates to this internal surface temperature as a function of mould growth risk. The temperature of surfaces are indicated in the thermographic sections. fRSI values lie between 0 and 1, representing the temperature difference between the lowest surface temperature and external air, as function of the overall internal/ external temperature difference (dT). Schools must achieve an fRsi value of 0.75, meaning the lowest acceptable internal surface temperature is 15°C, based on internal temperature of 20°C and external of 0°C. Understanding this fRsi is important in advance of undertaking any remedial works. Psi value measures the rate of heat loss through a junction, called linear thermal transmittance, the rate of heat flow, per degree temperature difference and unit length of a thermal bridge. It is measured in W/mK.
The thermal bridge analysis is conducted using

Methodology

the construction details inspected on site, and modelled via numerical modelling software in accordance with BR497 & IS EN ISO 10211. For the purpose of this study, two key junctions were identified for analysis:

1. Eaves Detail
2. Floor/Foundation Perimeter detail, including window cill

As the school is a system building the eaves and perimeter detail modelled here apply throughout the whole school, they are considered linear thermal bridges and so deal with a significant amount of heat loss through the built fabric.

Following the modelling of the existing condition 2 scenarios with internal and external insulation were modelled. These are done independently of feasibility or conservation considerations, but as an initial model to determine if either approach provides thermal results.

Findings

Existing Condition

1. Eaves Detail

The eaves detail is a significant cold bridge in the building as there is no insulation on the concrete that goes from inside to out. The model of the existing condition clearly shows this, with a surface temperature at window head of 5 degrees Celsius, continuing across much of the eaves precast element up to the roof line.

2. Floor/Foundation Perimeter detail

The internal junction of floor to wall was modelled and the internal temperature is higher than that at the eaves, reaching 13 degrees Celsius. This is still colder than the internal temperature. There is some insulation in the cavity but it's unclear if this goes below the floor slab. The thermal mass built up underneath the slab, over time, helps retaining heat at this location also.

Modelled Intervention 1: External Insulation

1. Eaves Detail

This scenario shows insulation to the front face of the eaves beam as well as the interior of the beam. The heat loss is significantly reduced and the surface temperature at the window head has increased significantly to 16 degrees. This is compliant with new build and renovation requirements for schools.

2. Floor/Foundation Perimeter detail

External insulation is indicated on the exterior of the wall. The external insulation is shown to the base of the internal floor slab. These calculations show a jump in temperature at the floor junction from 13 to 16 degrees Celsius. In particular the temperature difference at window cill level has improved greatly from 4 - 16 degrees.

Modelled Intervention 2: Internal Insulation

1. Eaves Detail

Again the thermal performance of the eaves detail is greatly improved with the introduction of internal insulation with the window head detail reaching 17.6 degrees Celsius. However it must also be considered how this is affected at column at junction with eaves.

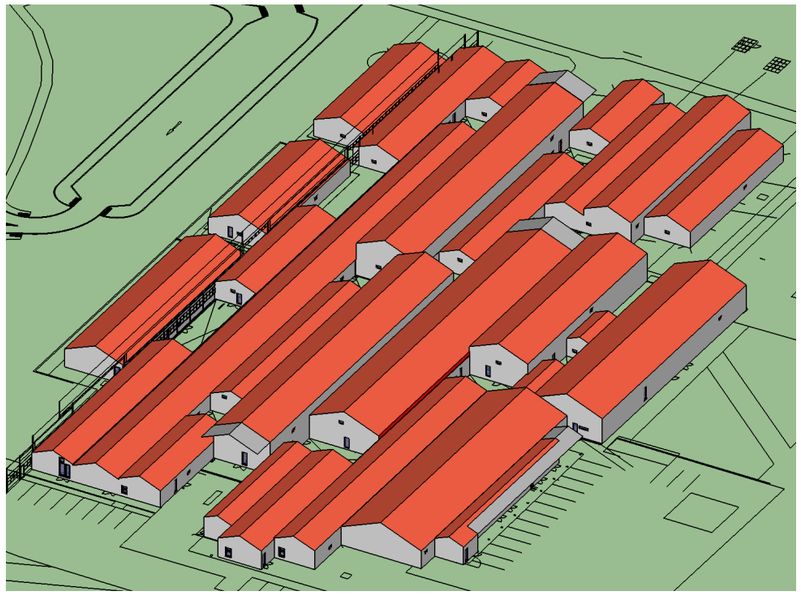
2. Floor/Foundation Perimeter detail

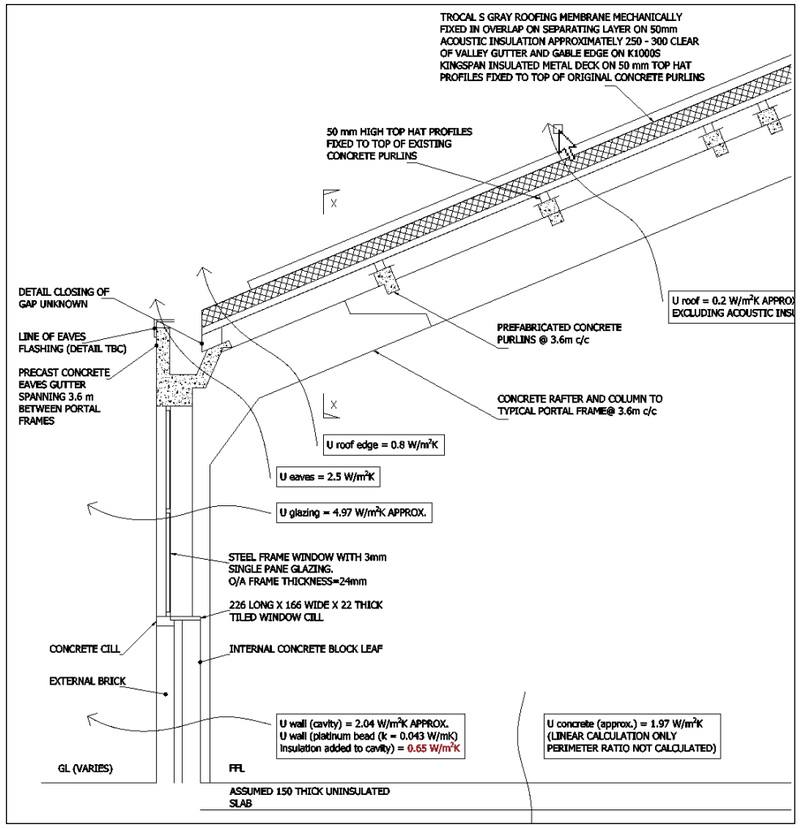
Internal insulation is shown on the inside face of the external wall. This again shows a marked improvement at the window cill level but not so at the floor. This could be improved by the introduction of perimeter insulation to the exterior of the building.

Summary

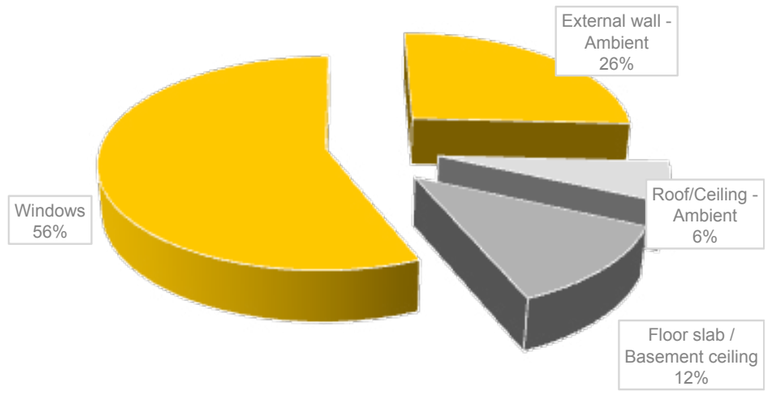
While the above insulation modelling shows marked improvements in the thermal bridge calculations, which are helpful in reducing energy usage and increasing comfort, they have been modelled without considering construction feasibility or suitability from a conservation perspective. In both these regards there are significant limitations to both scenarios. These are dealt with in greater detail in section 5 of this report. In addition, any thermal improvements here should take into account the full calculations in this report.

Existing School





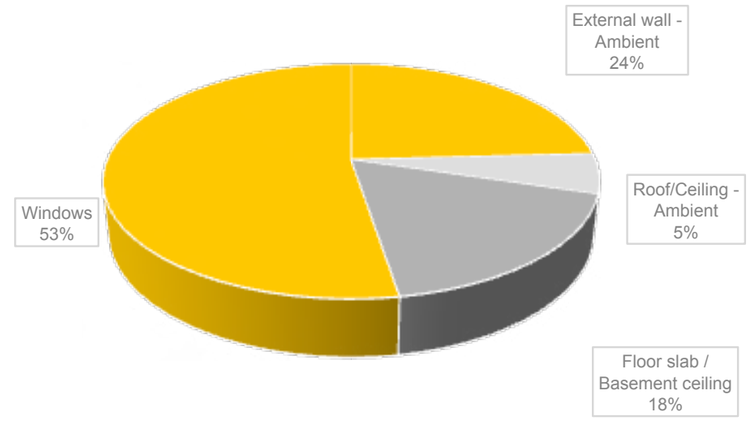
Heat Losses (heat load) - W



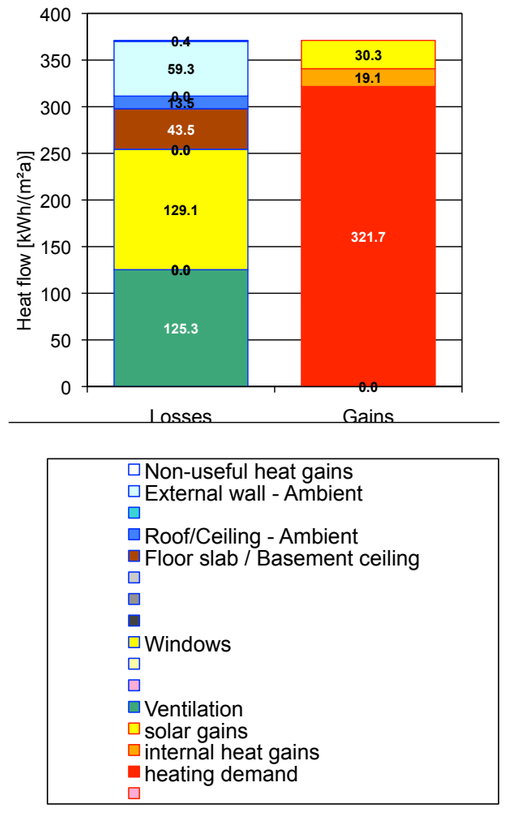
Summary of Heat Balance

Element	Losses/gains
Transmission losses	1,557,357
Ventilation losses	795,181
Total losses	2,352,537
Solar gains	192,471
Internal heat gains	121,194
Total gains	311,065
Annual heat demand (kWh/annum)	**2,041,473**

Heat Demand (kWh/annum)



Energy Balance Heating (monthly method)



1.5 Survey 4: PHPP

Introduction

Personnel

The PHPP model and calculations were produced by Andrew Lundberg of Passivate.

Aim

To establish the current building performance levels with regard to fuel consumption, system sizing requirements, ventilation heat losses, overheating risk, primary energy consumption as well as carbon emissions (where sufficient input values are available)>

What is PHPP and what does it measure?

The Passive House Planning Pack (PHPP) is a validated building design tool produced by the Passivhaus Institute, Germany in 1995, with updates published up to present day. The PHPP has been validated in independent studies to measure primarily the following building performance indicators:

- Annual heat demand (kWh/m2.annum)
- Heat load (W/m2)
- Ventilation Requirements
- Ventilation & infiltration heat losses (kWh/m2.annum)
- Overheating (% of year over 25oC)
- Cooling load and cooling demand
- Primary Energy Consumption (kWh/m2.annum)
- Carbon Emissions (kgCO2/m2.annum)

The PHPP can be used to optimise building designs, and readily used to determine optimal glazing layouts, glazing specification, building orientation, air-tightness, U-values etc.

Methodology

A full model of the building was constructed in SketchUp and exported to the PHPP software (v9.6) using DesignPH plugin. The windows were entered manually in PHPP due to significant computational issues caused by extent of glazing.

The model was produced using the section of the original classroom with a construction of:

- Cavity wall consisting of inner leaf block on 40mm void/cavity on outer leaf brick
- Roof consists of 50mm acoustic insulation on Kingspan KS1000 roof panels
- Floor consists of c. 150mm concrete slab
- Windows consist of single glazed steel frame windows without thermal break

U-values in W/(m²k) of the different elements are:

- Roof - 0.126
- External Wall - 1.785
- Floor - 3.791
- Glass - 5.682
- Window Frames - 5.877

U-values measure the insulation properties of materials. The higher the U-Value the higher the heat loss through the element. From the figures above the roof is performing adequately while all the other elements fall significantly below the current building standards.

For the purposes of calculations air-tightness is assumed at level of 10ac/h @ 50Pa based on values achieved by Greenbuild Ltd. and estimated in Gavin O'Sé's report. The ventilation supply requirement c.14,250m3/hr is based on 950 occupants (914 students, estimated c. 35 staff). (Note: this supply requirement is highly unlikely to be currently delivered). The ventilation extract requirement of c.1,500m3/hr based on 5 fumehoods/extracts, 38 WC's & kitchen extract. All ventilation assumed to be natural & without heat recovery.

Findings

Heat Load Vs Heat Demand

Annual heat demand is normally the figure of most interest in building energy analysis, as this determines the amount of fuel required by the building to maintain a comfortable temperature of 20°C in its given location, based on input building data, and climate data specific to the location. A breakdown of heat demand by building element allows the design to be optimised, or in the case of retrofit measures, identifies where the greatest losses are occurring, and allows easier financial appraisal of retrofit proposals.

The estimated annual heat demand for the school is 255kWh/m2.annum final/delivered energy. To put this in some context, a new-build Passive House school would have an annual heat demand of 15kWh/m2.annum.

The heat load calculation is used to size the heating plant based on design conditions, in this case 20°C internal and -2°C external temperatures. It is important to ensure that any installed plant can sufficiently bring the building up to temperature and maintain this at the coldest average time of year. This calculation also helps ensure plant is not installed which is significantly over-sized, which can result in inefficiencies in operation. The calculated heat load for the building is 97W/m2, or system size of 618kW. By comparison, a Passive House school may have a heat load of 10W/m2, or total system size of 63kW. The annual heat demand and heat load calculations show that the fuel requirement per annum is c. 17 times higher than a new-build school, with a heating system of almost 10 times capacity required.

It is common for contributions to overall heat loss and heat demand to be relatively comparable between building elements, however differences in internal heat gains, thermal mass effects, solar gains etc. mean they are not identical.

In St. Brendan's, due to the extent of glazing and its poor performance, it contributes c. 55% to overall heat loss. The roof, being of relatively modern construction by contrast contributes c. 5%.

Despite being uninsulated, the extent of the floor slab and relatively efficient overall shape means that the floor slab only contributes c. 15% of heat loss, due to thermal mass effects of the ground.

The external wall heat losses are estimated at c. 25% of overall fabric heat losses.

With regard to heat losses from convection/ventilation/air infiltration, this is difficult to predict in a building of this volume without carrying out pressurisation testing on the entire building, while at the same time assuming that the ventilation provision for the school is adequte as per current ventilation guidelines under Building Regulations.

The PHPP calculates total heat losses from infiltration & ventilation as 33% of total heat losses. However, IAQ monitoring suggests the building is not sufficiently ventilated for the number of occupants, whilst however having a relatively high infiltration losses due to gaps/cracks/leaks. It is likely that the estimated losses due to ventilation/infiltration are over-estimated in the current PHPP as it assumes adequate ventilation provision.

Intervention strategies developed from this analysis are indicated in section 5. The PHPP excel is accessible in the Appendix. This sheet also modelled potential savings form different intervention strategies.

Section 2
Interpretative Analysis

Introduction

Stage 2 'Interpretation' involved assimilating the range of information collated in Stage 1 'Understanding the Place'. Where Stage 1 set a baseline of information, Stage 2 interprets these findings, developing meaning and policies from them that lead to the outcomes in Stage 3.

Section 2, 'Interpretative Analysis' is the first step in understanding the information gathered. The aim of this process was to reveal otherwise unseen relationships in the school, to create connections between, usually separate, practices of social, historical and environmental analysis. This is important in particular in this school because of the social and technological values that formed the basis for its design in the 1970s. The analysis leads to a deeper understanding of the place, that then informs the development of the statement of significance, policies and intervention strategies outlined in sections 3-5.

Two principal methodologies were employed in this interpretative analysis: drawings and films. These are described in detail here and in the coming pages. The drawing work was undertaken by John McLaughlin Architects with Professor Gary A. Boyd. The films are made by Ros Kavanagh in consultation with the research team.

Drawings

The means of exploring connections between the 4 separate surveys of stage 1 was through interpretative and exploratory maps, including:

- network map
- location map
- chrono-mapping
- social heat map
- photography map
- environmental mapping

Each of these maps is described in greater detail in the following pages. These drawings connect the hard and soft data , showing maps and plans overlayed with less tangible aspects place, such as time, networks, experience, temperature. In this way the many layers of life of the building are made apparent and connections are made between parts that are normally separate.

Film

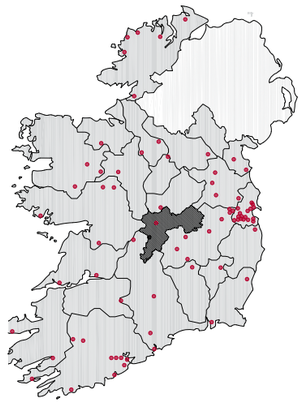
In addition to the drawings a series of films by Ros Kavanagh were commissioned. These brought another series of perspectives to the understanding of the building developed in stage 1. These films included:

- Walking: a film shot while walking from North to South of the internal street, to recreate the spatial experience of occupying this central space. These were produced by the photographer walking with a mounted camera, to recreate an individual's experience. The film is in colour and the school is not inhabited by pupils during filming.

- Tracking films: a number of tracking shot films were taken in carefully selected locations across the plan. In each instance the camera moves East West across the building. This gives an impression of the scale of change across the section as well as changing light as the camera moves from courtyard, to corridor, to street. The camera was mounted on a set of tracks, to provide the continuous and uniform quality of the shots.

These films demonstrate the qualities of the school building that we wished to underline, including the dynamic social life of the central street, the spatial richness of the changing section and the incredible qualities of light. Film as a medium ilm becomes an accessible way to communicate the values embedded in the school building, while also acting as a record of the structure as it now stands.

Holy Family Community School	Mixed	INTER DENOMINATIONAL	423	525	**948**
Pobailscoil Iosolde	Mixed	INTER DENOMINATIONAL	312	430	**742**
Ballinteer Community School	Mixed	INTER DENOMINATIONAL	159	249	**408**
Cabinteely Community School	Mixed	INTER DENOMINATIONAL	201	256	**457**
Scoil Phobail Chuil Mhin	Mixed	INTER DENOMINATIONAL	472	557	**1,029**
Blakestown Community School	Mixed	INTER DENOMINATIONAL	234	221	**455**
The Donahies Community School	Mixed	INTER DENOMINATIONAL	232	249	**481**
Portmarnock Community School	Mixed	INTER DENOMINATIONAL	415	516	**931**
Malahide Community School	Mixed	INTER DENOMINATIONAL	604	611	**1,215**
Holy Child Community School	Mixed	INTER DENOMINATIONAL	119	137	**256**
St Marks Community School	Mixed	INTER DENOMINATIONAL	405	419	**824**
Tallaght Community School	Mixed	INTER DENOMINATIONAL	347	442	**789**
Old Bawn Community School	Mixed	INTER DENOMINATIONAL	457	455	**912**
Kilinarden Community School	Mixed	INTER DENOMINATIONAL	234	243	**477**
St Aidan's Community School	Mixed	INTER DENOMINATIONAL	213	242	**455**
Hartstown Community School	Mixed	INTER DENOMINATIONAL	562	609	**1,171**
Pobalscoil Neasáin	Mixed	INTER DENOMINATIONAL	288	483	**771**
St Tiernan's Community School	Mixed	INTER DENOMINATIONAL	165	178	**343**
Rosmini Community School	Mixed	INTER DENOMINATIONAL	48	90	**138**
Bailieborough Community School	Mixed	INTER DENOMINATIONAL	319	323	**642**
Tullow Community School	Mixed	INTER DENOMINATIONAL	342	323	**665**
Community School	Mixed	INTER DENOMINATIONAL	262	284	**546**
Leixlip Community School	Mixed	INTER DENOMINATIONAL	286	331	**617**
Scoil Mhuire Community School	Mixed	INTER DENOMINATIONAL	566	607	**1,173**
St Kilian's Community School	Mixed	INTER DENOMINATIONAL	200	258	**458**
Ballincollig Community School	Mixed	INTER DENOMINATIONAL	408	386	**794**
Beara Community School	Mixed	INTER DENOMINATIONAL	156	162	**318**
Carrigaline Community School	Mixed	INTER DENOMINATIONAL	538	539	**1,077**
Millstreet Community School	Mixed	INTER DENOMINATIONAL	158	148	**306**
St Peter's Community School	Mixed	INTER DENOMINATIONAL	184	189	**373**
Douglas Community School	Boys	INTER DENOMINATIONAL		536	**536**
Bishopstown Community School	Mixed	INTER DENOMINATIONAL	151	147	**298**
Mayfield Community School	Mixed	INTER DENOMINATIONAL	108	186	**294**
Carndonagh Community School	Mixed	INTER DENOMINATIONAL	520	533	**1,053**
Rosses Community School	Mixed	INTER DENOMINATIONAL	175	223	**398**
Pobalscoil Chloich Cheannfhaola	Mixed	INTER DENOMINATIONAL	238	216	**454**
Pobalscoil Ghaoth Dobhair	Mixed	INTER DENOMINATIONAL	211	210	**421**
Scoil Phobail Mhic Dara	Mixed	INTER DENOMINATIONAL	49	37	**86**
Scoil Phobail	Mixed	INTER DENOMINATIONAL	209	205	**414**
Portumna Community School	Mixed	INTER DENOMINATIONAL	206	217	**423**
Dunmore Community School	Mixed	INTER DENOMINATIONAL	116	178	**294**
Mountmellick Community School	Mixed	INTER DENOMINATIONAL	257	215	**472**
Heywood Community School	Mixed	INTER DENOMINATIONAL	346	393	**739**
Ramsgrange Community School	Mixed	INTER DENOMINATIONAL	212	227	**439**
Moyne Community School	Mixed	INTER DENOMINATIONAL	315	320	**635**
Ardee Community School	Mixed	INTER DENOMINATIONAL	404	485	**889**
St Caimin's Community School	Mixed	INTER DENOMINATIONAL	353	395	**748**
Kilrush Community School	Mixed	INTER DENOMINATIONAL	211	225	**436**
St Ciaran's Community School	Mixed	INTER DENOMINATIONAL	119	508	**627**
Ballyhaunis Community School	Mixed	INTER DENOMINATIONAL	320	276	**596**
Ballinrobe Community School	Mixed	INTER DENOMINATIONAL	331	321	**652**
St Brendan's Community School	Mixed	INTER DENOMINATIONAL	452	461	**913**
Gorey Community School	Mixed	INTER DENOMINATIONAL	754	782	**1,536**
Castlerea Community School	Mixed	INTER DENOMINATIONAL	150	158	**308**
St Louis Community School	Mixed	INTER DENOMINATIONAL	299	284	**583**
Ashbourne Community School	Mixed	INTER DENOMINATIONAL	448	584	**1,032**
Community School	Mixed	INTER DENOMINATIONAL	312	333	**645**
Cashel Community School	Mixed	INTER DENOMINATIONAL	412	446	**858**
Gort Community School	Mixed	INTER DENOMINATIONAL	397	419	**816**
Kinsale Community School	Mixed	INTER DENOMINATIONAL	503	551	**1,054**
Loreto Community School	Mixed	INTER DENOMINATIONAL	390	396	**786**
Moate Community School	Mixed	INTER DENOMINATIONAL	410	400	**810**
John The Baptist Community School	Mixed	INTER DENOMINATIONAL	508	544	**1,052**
Pobalscoil Inbhear Scéine	Mixed	INTER DENOMINATIONAL	249	245	**494**
Scoil Phobail Sliabh Luachra	Mixed	INTER DENOMINATIONAL	188	195	**383**
St Wolstan's Community School	Girls	INTER DENOMINATIONAL	772		**772**
Coláiste Cholmcille	Mixed	INTER DENOMINATIONAL	313	304	**617**
Boyne Community School	Mixed	INTER DENOMINATIONAL	154	625	**779**
BLACKWATER COMMUNITY SCHOOL	Mixed	INTER DENOMINATIONAL	383	391	**774**
St Colmcille's Community School	Mixed	INTER DENOMINATIONAL	350	371	**721**
Pobalscoil Chorca Dhuibhne	Mixed	INTER DENOMINATIONAL	187	194	**381**
St Attracta's Community School	Mixed	INTER DENOMINATIONAL	323	348	**671**
Pobalscoil na Trionóide	Mixed	INTER DENOMINATIONAL	460	492	**952**
GLENAMADDY COMMUNITY SCHOOL	Mixed	INTER DENOMINATIONAL	211	169	**380**
GALLEN COMMUNITY SCHOOL	Mixed	INTER DENOMINATIONAL	161	207	**368**
SKIBBEREEN COMMUNITY SCHOOL	Mixed	INTER DENOMINATIONAL	418	417	**835**
ATHBOY COMMUNITY SCHOOL	Mixed	INTER DENOMINATIONAL	251	342	**593**
Ballinamore Community School	Mixed	MULTI DENOMINATIONAL	159	169	**328**
KILDARE TOWN COMMUNITY SCHOOL	Mixed	MULTI DENOMINATIONAL	452	455	**907**
MOUNTRATH COMMUNITY SCHOOL	Mixed	INTER DENOMINATIONAL	359	391	**750**
Ballymakenny College	Mixed	MULTI DENOMINATIONAL	346	324	**670**
Celbridge Community School	Mixed	MULTI DENOMINATIONAL	167	229	**396**



Moate Community School

County Westmeath
Mixed
810 Students

Gallen Community School

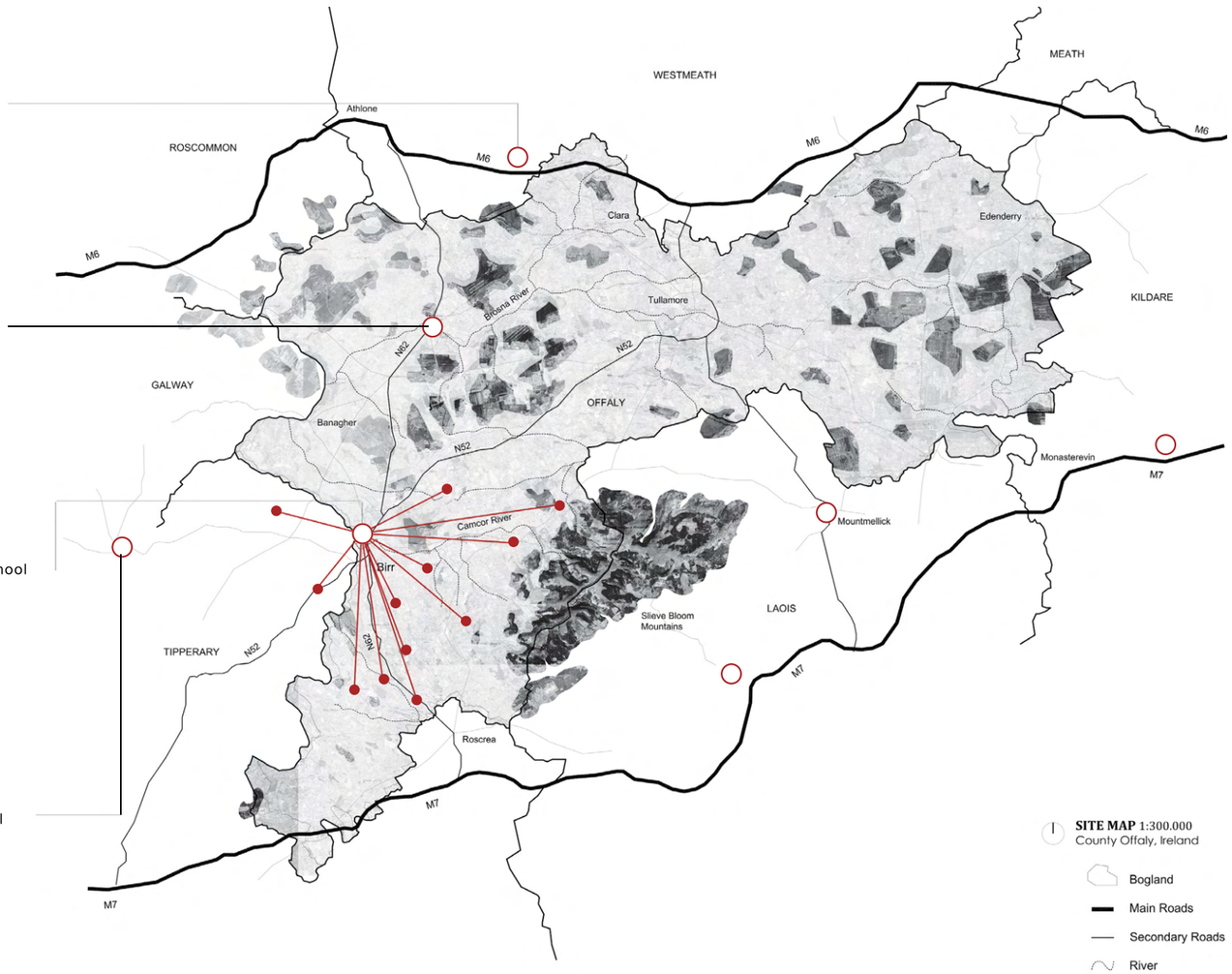
County Offaly
Mixed
368 Students

St Brendan's Community School

County Offaly
Mixed
913 Students

Portumna Community School

County Galway
Mixed
423 Students



2.2 Map: Network

This map shows the location of the school in Co. Offaly and situates it within a wider education network. The red lines emanating from the school show the spatial reach of the school cohort. Each red circle indicates a school on the map. The grid to the left hand side of the page lists the community schools in Ireland.

This map demonstrates how the school's spatial impact is wider than just its immediate location, but is related to the whole network of schools in the country, through the associated organisation of the Department of Education and Skills. In this way we understand that the building's reach is more than spatial, it is connected to policy at the government level, and to other schools in disparate locations, because of their shared organisation. The map shifts the idea of place as being solely connected to a location, but instead shows it as a series of relationships in a network and in that sense, open to change.


brosna river
st. brendan's
community school
killaun
bogland reserve
camcor river
CO. TIPPERARY
BIRR
CO. OFFALY

2.2 Map: Location

This map shows the physical location of the school in Co. Offaly, locating it in relation to the town of Birr and situating it within a wider landscape, in particular connecting it to the bogs in the county. The bogs are a significant aspect of Offaly's landscape and industry, dominating much of the visual impression of the county, while also being a significant employer in the 20th century. Our research connects the systematic, industrialised processes of peat extraction to the portal frame system developed for St Brendan's school, as both form a mechanised landscape that eschews a figurative or singular expression. By locating the bog and school on the same map and re-enforcing the striation of the extraction system on the bog, we are emphasising this connection.

Chrono-mapping

The chrono-mapping examined the changes in the building over time through two methods, comparative photography and plans that show the evolution from initial sketch plan to today. The original photographs taken by John Donat in 1980 were re-photographed by Ros Kavanagh in 2019 in order to compare these, to see what changes have occurred in the interim. The red colour on the 1980 photos indicates elements that have changed; the blue colour on the 2020 image indicates new elements.

1980 Photo : Original Fabric Removed

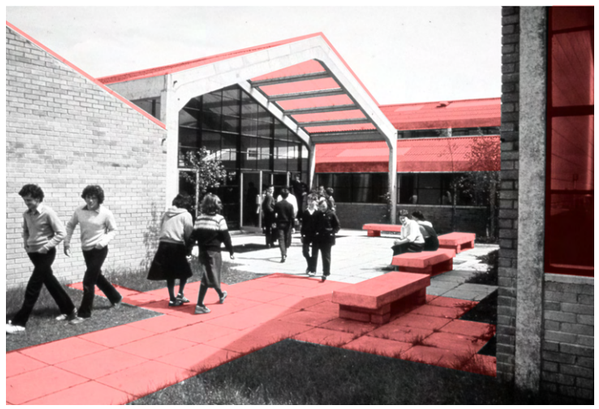
2019 Photo : New/Replacement Fabric Added

Arrival area 1980

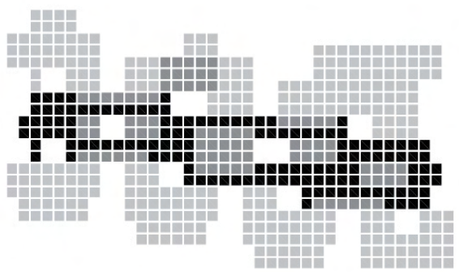
Arrival area 2020

Dining entrance 1980

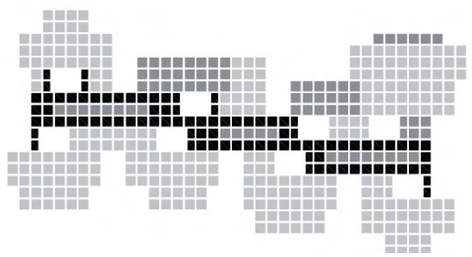
Dining entrance 2020



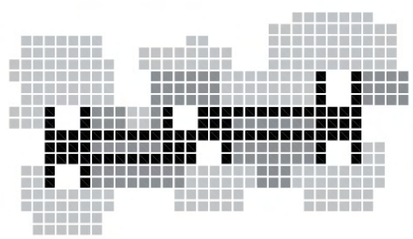
1974 - sketch plan



1974 - competition plan



1980 -constructed school



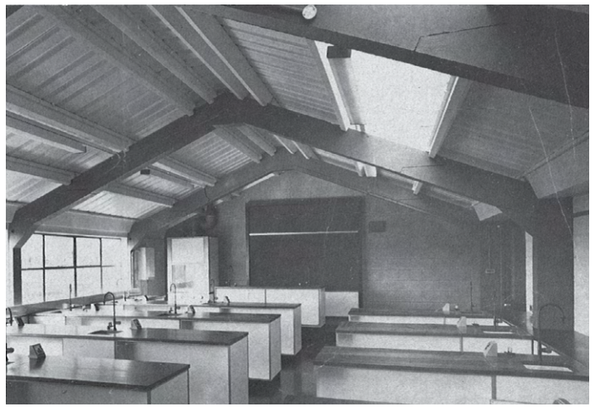
social space | ancillary space | classrooms | landscape | extensions

2.2 Map: Chrono-mapping

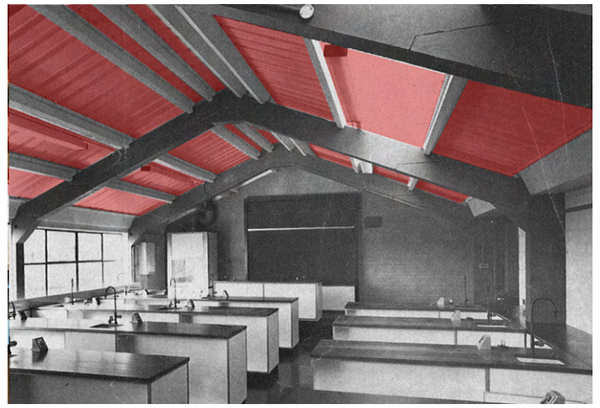
Social space 1980

Social space 2020

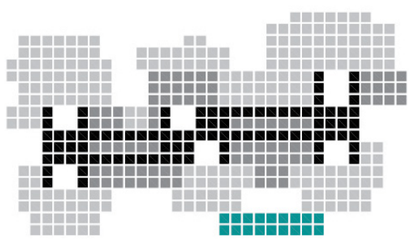
Science room 1980



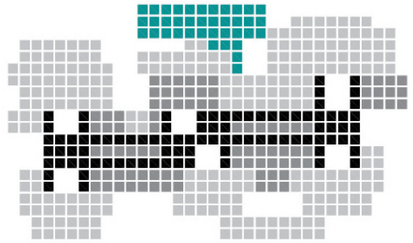
Science room 2020



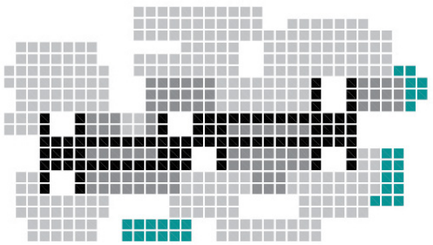
2010 - extension



2015 - extension



2020 - extensions 2016 & 17



2.2 Map :
Social ‘Heat’ Map

Benches form the centre of social life hosting everything from homework to birthday parties. Although generic furniture has been added to accommodate as many of the 900 strong student population as possible, original painted timber and blockwork benches designed by the Doyle’s lining the spaces of the social ‘street’ remain the most sought after.

Image overleaf: Social Occupation by John Donat 1980.

A1	classroom
A2	classroom
A3	science lab
A4	science lab
A5	science prep
A6	science lab
A7	demonstrators
A8	classroom
A9	computer room
D/P	guidance
ATD	rel
Shop	tuck
B1	Servery
B2	home economics
B3	home economics
B4	music
B5	art
B6	meeting room
B7	science room
B8	preparation room
B9	science room
B10	assembly room
C1	art
C2	mechanical drawing
C3	construction
C4	woodwork
C5	metalwork
C6	engineering
S	sickroom
STAFF	staffroom
O	offices
E1	classroom
E2	classroom
E3	classroom
E4	classroom
E5	classroom
E6	classroom
E7	computer room
E8	computer room
D1	history
D2	geography
D3	languages
D4	computer room
D5	classroom
D6	languages
P	principal office
D/P	deputy principal
CO	clerical office
Off	offices
S	stores
R	audio/visual room
T	toilets
G1	classroom
G2	classroom
G3	classroom
F9	classroom
F10	classroom

YEAR 5
Adam’s bench

My bench (…) there’s about 10 of us. I quite like this area. Out there it’s manic especially during break and lunch. When you come in here all you can hear is the noise.

I quite like this bench. I’ve been sitting here for nearly three years now. It’s quiet. The people beside us and across from us we all know each other. It’s like a little neighbourhood you could nearly call it at this stage.

YEAR 6
Colm’s bench

My bench is in the centre of the buildings. It’s nice and bright, a nice place to sit.

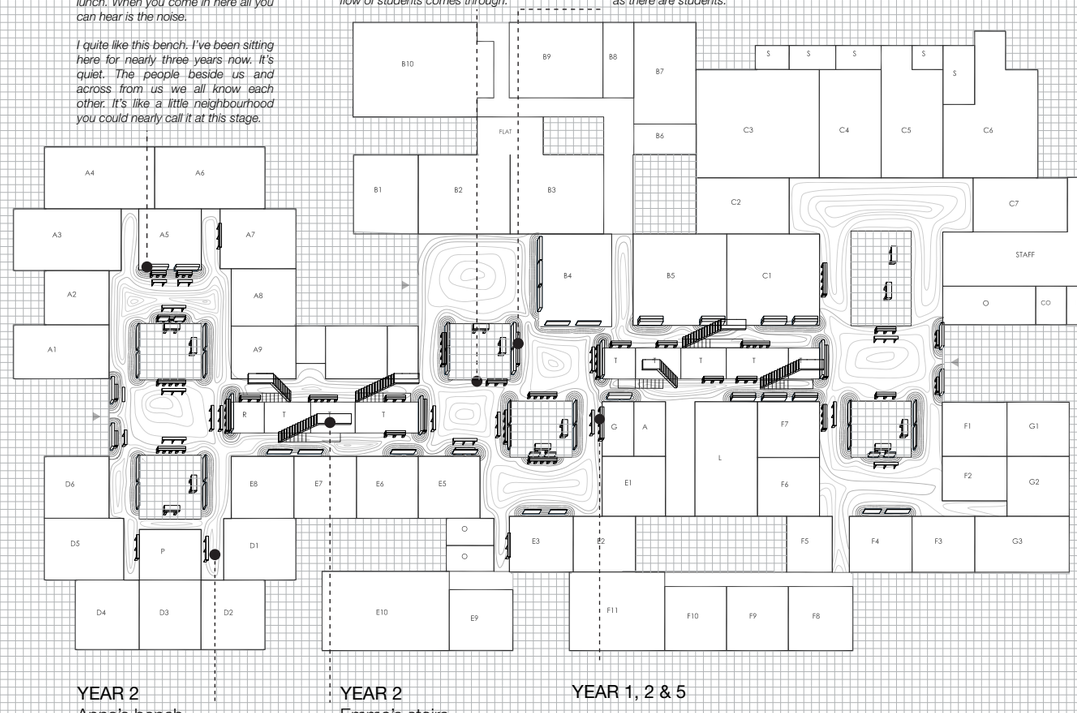
Between the two gardens here, especially during the summer it’s full of light.

This space is very communal I suppose … there’s people sitting everywhere. This is where the main flow of students comes through.

YEAR 5
Aoife’s bench

This is my bench … A bit messy at the moment, it was someone’s birthday. I like sitting here because there’s so much light in this area. And I’s close to the shop and the toilets, so it’s in the middle of the school. And there’s a radiator at the back… it does get cold sometimes.

A lot of people sit on the radiators because there’s not as many benches as there are students.



YEAR 2
Anna’s bench

This is the bench where my friends and I sit…its where we can always find each other.

It’s one of the darker spots in the school. Most of the more respected older students will get to sit in the brightest areas, the nicest benches in the school.

Areas full of light from the atriums are usually taken by the older students (…) That’s what everyone aspires to.

YEAR 2
Emma’s stairs

My group…we sit at the top of the stairs…for Christmas we are going to put tinsel up on the bars.

It’s near the bathrooms. You can see people walking by, and if they are friends that don’t sit on you stairs they can stop and say hi, there’s plenty of room for everyone.

We talk about everything (…) This is kind of our quiet space, but also noisy.

YEAR 1, 2 & 5

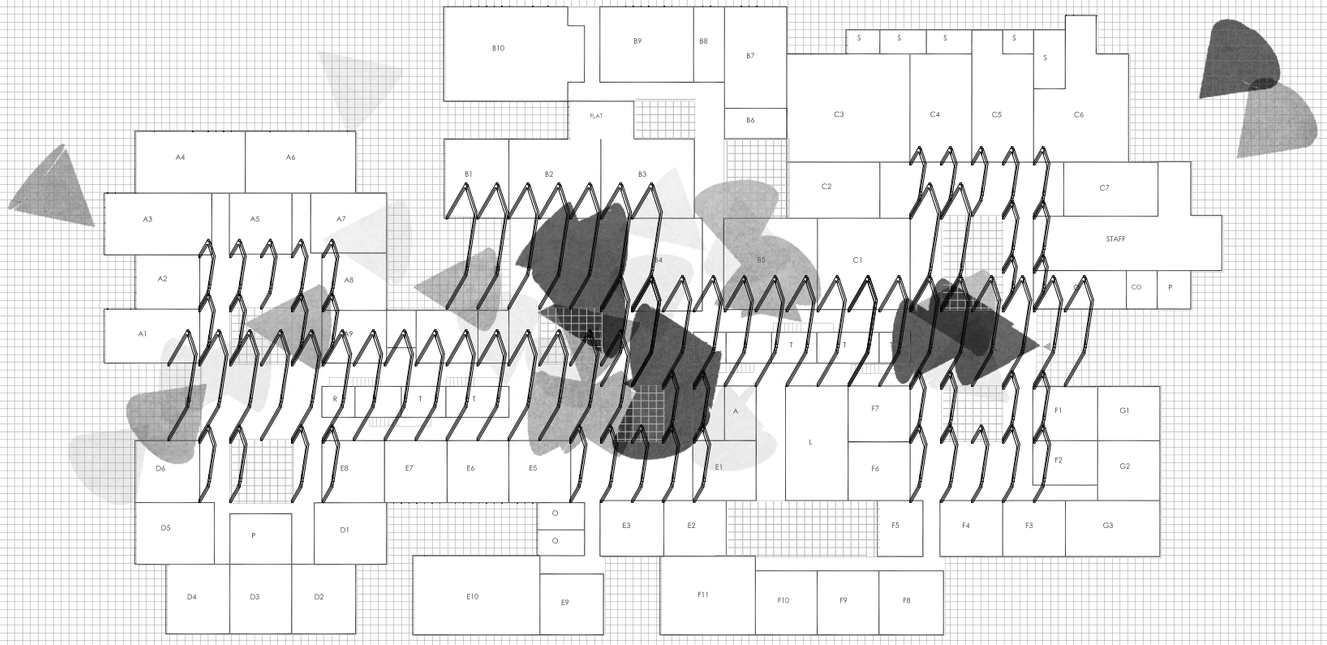
0 3.6 7.2 10.8 m

Plan 1:500

2.2 Map : Student Photography

Students were asked to make photographic responses to a set of questions about the school. The resulting images map a huge concentration on the social spaces. The spaces the students 'spend time in, feel comfortable in and feel represents the spirit of the school' centre on the social 'street'.

Image overleaf: Main social space by Ros Kavanagh 2019.



'Like look of'

'Feel comfortable'

'Spirit of'

A1 classroom
A2 classroom
A3 science lab
A4 science lab
A5 science prep
A6 science lab
A7 demonstration
A8 classroom
A9 computer room
D/P guidance
A10 tea
Shop tuck
B1 Servery
B2 home economics
B3 home economics
B4 music
B5 art
B6 meeting room
B7 science room
B8 preparation room
B9 science room
B10 assembly room
C1 art
C2 mechanical drawing
C3 construction
C4 woodwork
C5 metalwork
C6 engineering
S sickroom
STAFF staffroom
CO offices
F1 classroom
F2 classroom
F3 classroom
F4 classroom
F5 classroom
F6 classroom
L library
G1 guidance counsellor
E1 classroom
E2 classroom
E3 spes
E4 office
E5 classroom
E6 classroom
E7 computer room
E8 computer room
D1 history
D2 geography
D3 languages
D4 computer room
D5 classroom
D6 languages
P principal office
D/P deputy principal
CO clerical office
Off offices
S stores
R audio/visual room
T toilets
G1 classroom
G2 classroom
G3 classroom
E9 classroom
E10 classroom

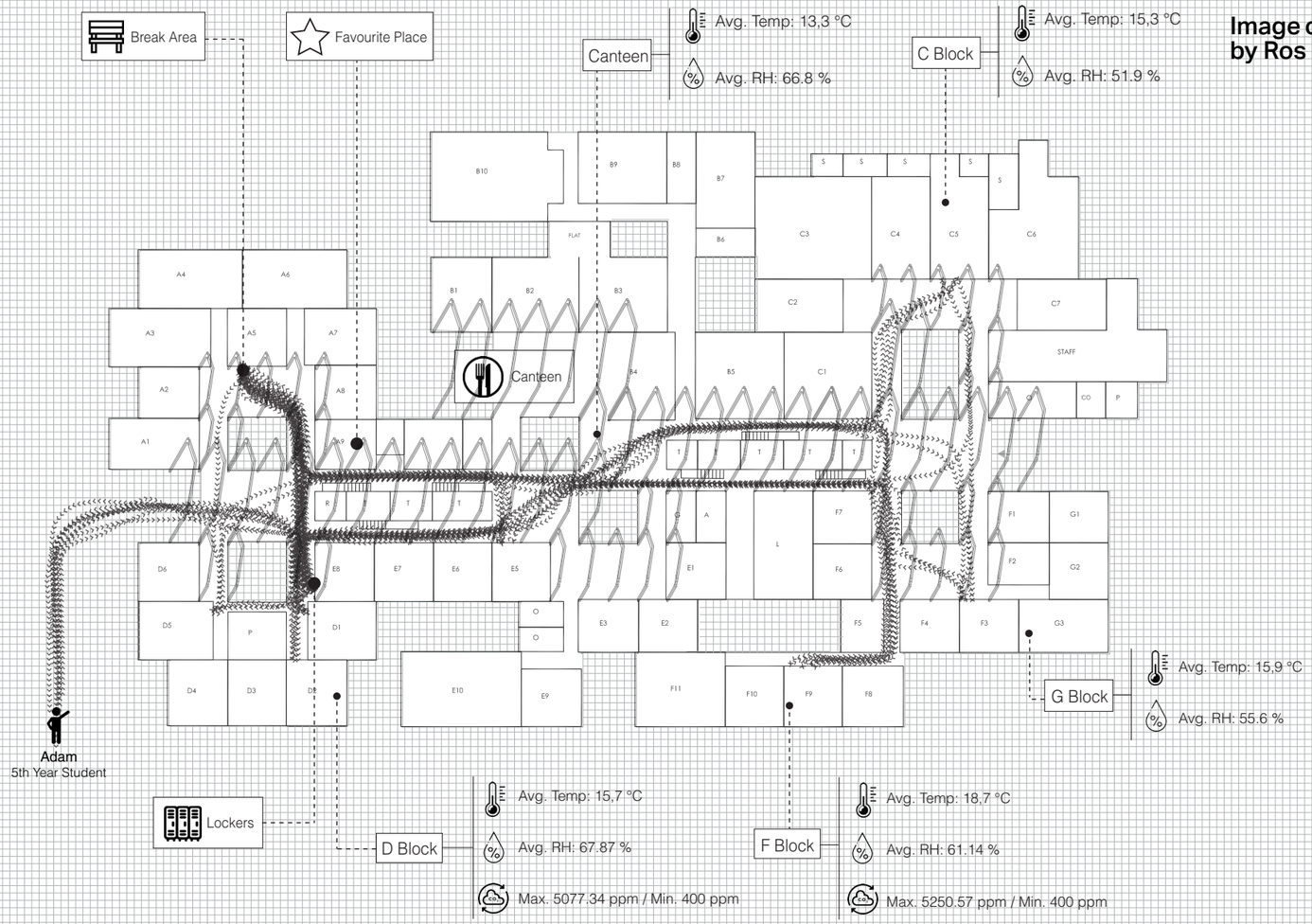
0 3.6 7.2 10.8 m

Plan 1:500

2.2 Map :
A Week in the Life

Through walking interviews a cross section of the school population described their week. This information was overlaid with the environmental data to give a complex picture of the school's daily flux.

Image overleaf: Still from filmed walking interview by Ros Kavanagh 2019.



A1 classroom
A2 classroom
A3 science lab
A4 science lab
A5 science prep
A6 science lab
A7 demonstrators
A8 classroom
A9 computer room
A10 gal
Shop tuck
B1 Servery
B2 home economics
B3 home economics
B4 music
B5 art
B6 meeting room
B7 science room
B8 preparation room
B9 science room
B10 assembly room
C1 art
C2 mechanical drawing
C3 construction
C4 woodwork
C5 metalwork
C6 engineering
S sickroom
STAFF staffroom
O offices
F1 classroom
F2 classroom
F3 classroom
F4 classroom
F5 classroom
F6 classroom
L library
G guidance counsellor
E1 classroom
E2 classroom
E3 sped
E4 office
E5 classroom
E6 classroom
E7 computer room
E8 computer room
D1 history
D2 geography
D3 languages
D4 computer room
D5 classroom
D6 languages
P principal office
DP deputy principal
CO clerical office
Off offices
S stores
R audio/visual room
T toilets
G1 classroom
G2 classroom
G3 classroom
E9 classroom
E10 classroom

0 3.6 7.2 10.8 m

Plan 1:500

Weekly Temperature & Relative Humidity Map

Date/Time	Birr Temp.	Birr RH	D Block Temp.	D4 RH
08/04/2019 00:00	4.7	93	12.2	65.06
08/04/2019 01:00	4.9	94	12.3	65.36
08/04/2019 02:00	3.2	96	12.3	65.67
08/04/2019 03:00	3.3	95	12.4	65.7
08/04/2019 04:00	5.7	96	12.5	65.6
08/04/2019 05:00	6.3	96	12.5	65.44
08/04/2019 06:00	6.3	96	12.6	65.43
08/04/2019 07:00	6.6	96	12.6	65.32
08/04/2019 08:00	8.4	96	12.7	65.1
08/04/2019 09:00	10.6	87	12.7	64.82
08/04/2019 10:00	11.3	77	12.7	64.54
08/04/2019 11:00	12.8	72	12.7	64.13
08/04/2019 12:00	13.4	71	12.8	63.8
08/04/2019 13:00	13.1	70	12.8	63.64
08/04/2019 14:00	12.6	75	12.8	63.47
08/04/2019 15:00	10.6	88	12.9	63.29
08/04/2019 16:00	10.7	88	13	62.88
08/04/2019 17:00	10.9	86	13.1	62.43
08/04/2019 18:00	10.7	87	13.2	62.17
08/04/2019 19:00	10.1	88	13.3	61.75
08/04/2019 20:00	9.4	89	13.3	61.51
08/04/2019 21:00	8.2	92	13.4	61.42
08/04/2019 22:00	8.1	91	13.6	61.81
08/04/2019 23:00	7.7	92	13.8	62.22
09/04/2019 00:00	6.8	94	13.9	61.82
09/04/2019 01:00	6.5	96	14.1	61.04
09/04/2019 02:00	7.3	96	14.2	60.21
09/04/2019 03:00	7.7	96	14.3	59.06
09/04/2019 04:00	7.2	97	14.4	57.61
09/04/2019 05:00	7.1	98	14.6	56.7
09/04/2019 06:00	8	97	14.7	55.76
09/04/2019 07:00	8.5	97	14.9	54.73
09/04/2019 08:00	8.6	96	15	54.15
09/04/2019 09:00	9.2	94	15	55.28
09/04/2019 10:00	8.6	93	14.9	56.19
09/04/2019 11:00	8.7	92	14.9	56.52
09/04/2019 12:00	9.3	87	14.8	57.43
09/04/2019 13:00	9.9	82	14.9	58.16
09/04/2019 14:00	11.1	79	14.6	59.25
09/04/2019 15:00	10.9	77	14.4	60.27
09/04/2019 16:00	11.7	72	14.1	61.3
09/04/2019 17:00	11.4	69	14.2	61.63
09/04/2019 18:00	9.8	76	14.3	61.75
09/04/2019 19:00	8.3	80	14.3	61.9
09/04/2019 20:00	7.4	80	14.5	62.05
09/04/2019 21:00	6.1	84	14.6	62.08
09/04/2019 22:00	5.3	87	14.7	62.53
09/04/2019 23:00	4.1	90	14.9	62.95
10/04/2019 00:00	3.4	90	15	63.21
10/04/2019 01:00	2.8	93	15.2	63.38
10/04/2019 02:00	1.3	94	15.3	63.28
10/04/2019 03:00	1	96	15.5	63.43
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10/04/2019 05:00	-1.1	97	15.8	65.44
10/04/2019 06:00	-1	98	16.1	67.25
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10/04/2019 08:00	3	98	16.4	71.79
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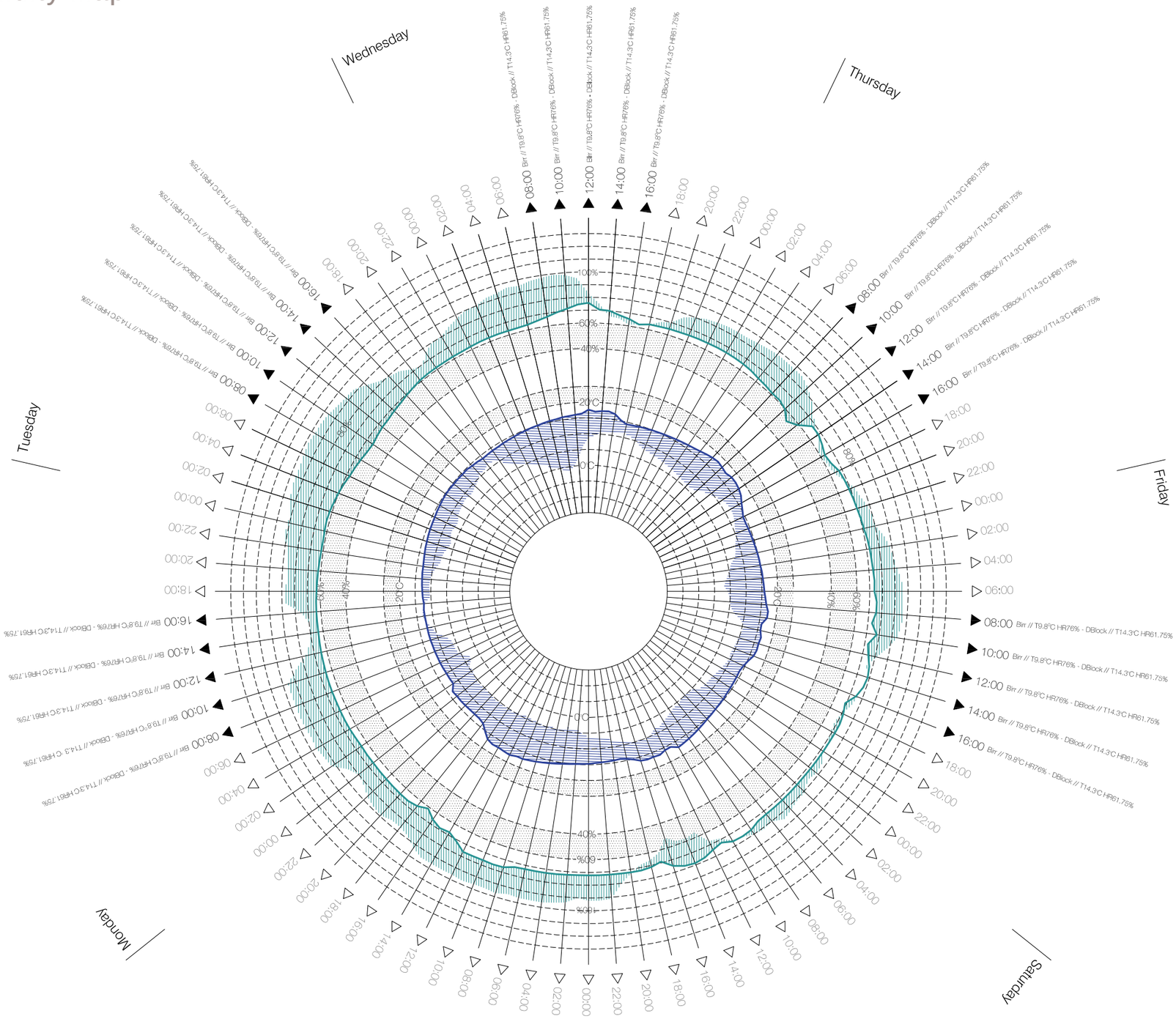


Key

- Internal Temperature
- Difference Internal /External Temperature
- Internal Relative Humidity (RH)
- Difference Internal /External RH

2.2 Map : Weekly Environmental

This diagram indicates the temperature, relative humidity and CO_2 levels in the school over the course of a week in April 2019. These are indicated against desired comfort levels.

The circle relates to time, with each radii equating to a two hour interval, moving clockwise in 2 hourly increments, through the full week. The recording of the week starts on Monday 8th April and continues to Sunday. The days are marked around the circumference of the circle. The school day is highlighted in bold text.

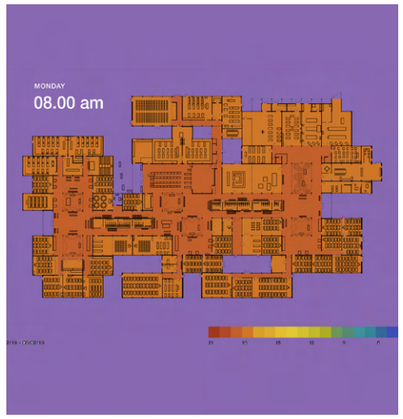
Relative humidity (RH) is indicated by the green line and hatch. The solid line indicates the RH recorded in classroom D4 across the week. The hatched area shows the difference between the internal RH and the external environment.

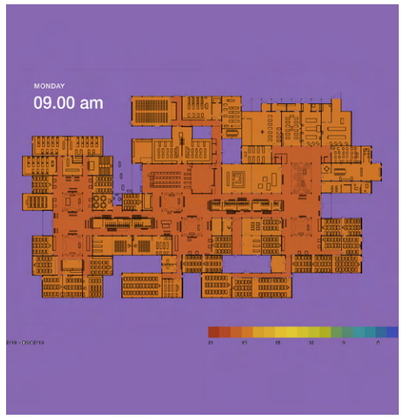
Temperature is indicated by the blue line and hatch. The solid line indicates the temperature recorded in classroom D4 across the week. The hatched area shows the difference between the internal temperature and the external environment.

The grey hatched areas indicate the desired comfort ranges for both temperature (20 -25°C) and relative humidity (40-60%).

By reading the recorded temperature and relative humidity (solid lines) against the desired comfort ranges we can see how often, or seldom they meet these ranges. By reading the difference between external and internal conditions we can see how these might affect each other and consider how much heating is required to address the temperature differentials.

During this week the external temperature varied from 0°C to 15°C, while the internal temperature never reaches the desired comfort level and on occasion the internal and external temperatures match. The relative humidity recorded internally is above the desired level, but below the RH externally.


MONDAY
08.00 am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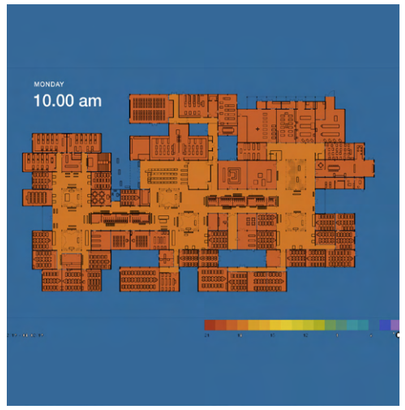
09.00 am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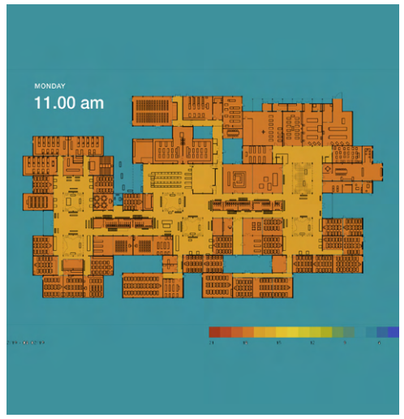
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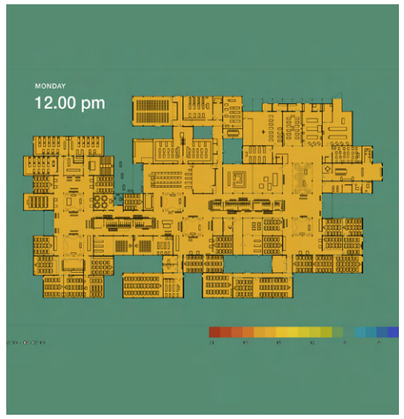
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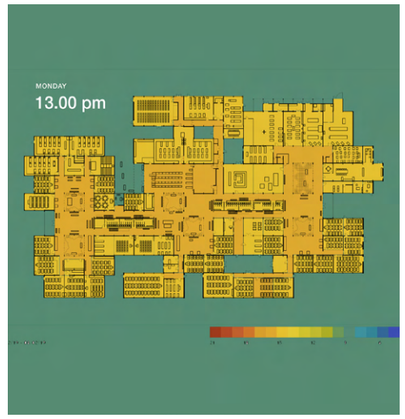
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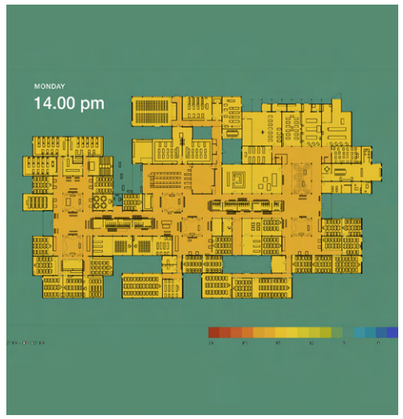
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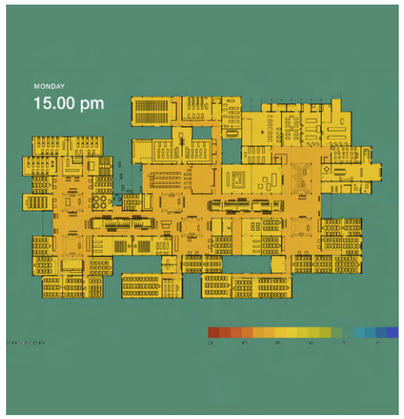
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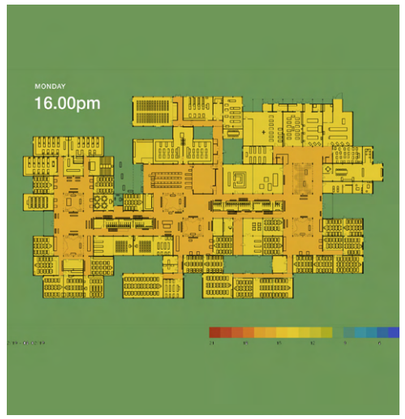
15.00 pm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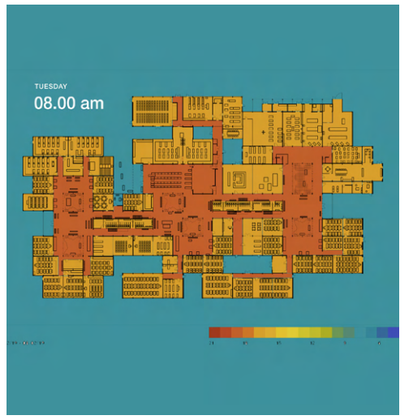
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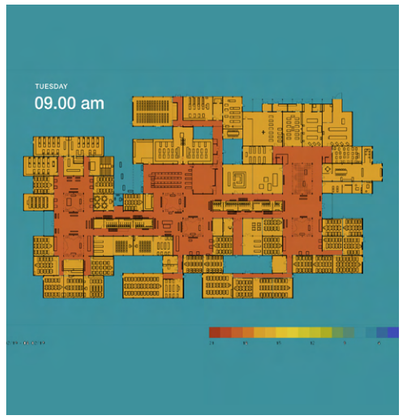
08.00 am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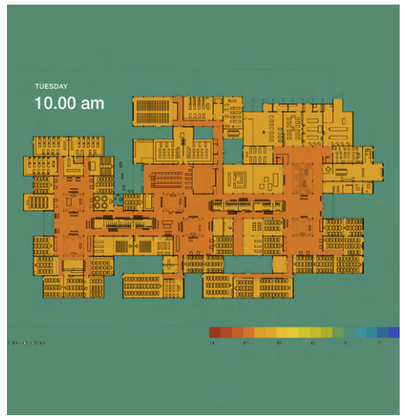
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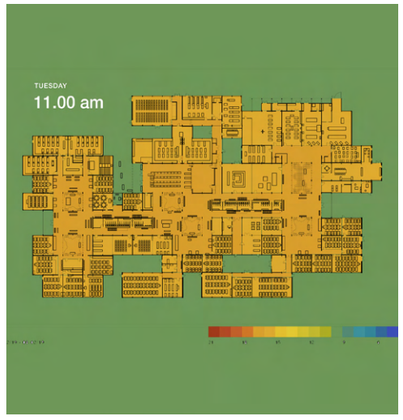
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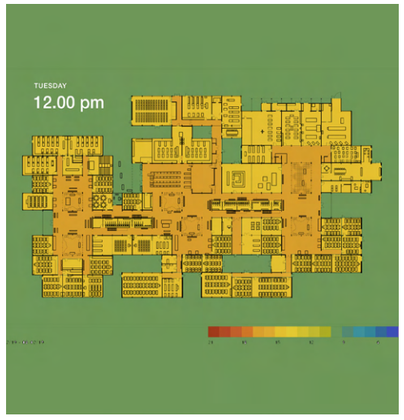
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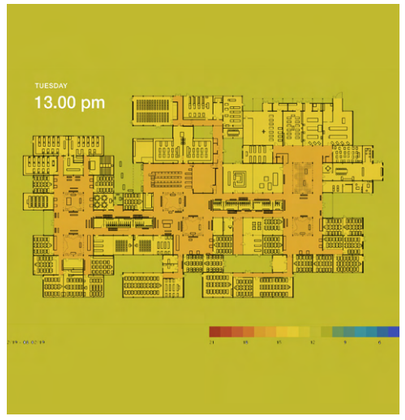
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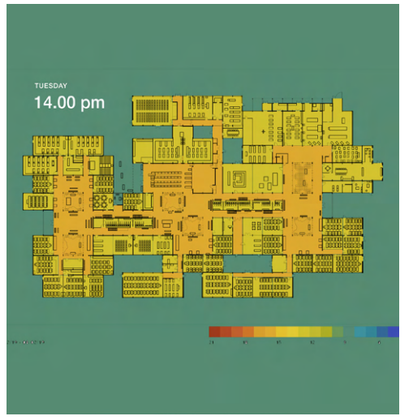
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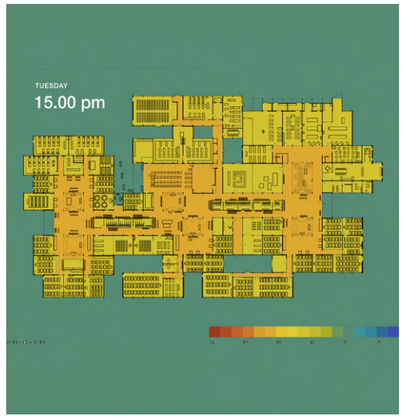
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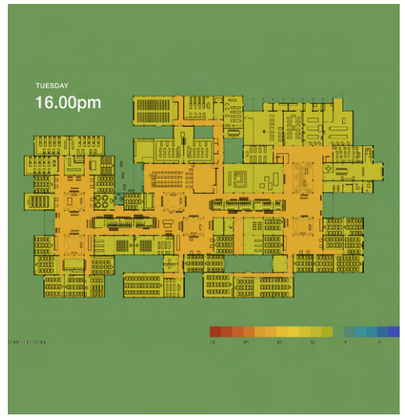
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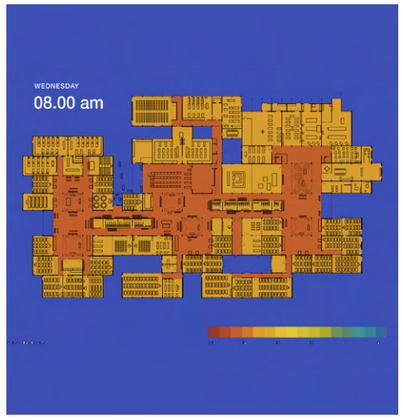
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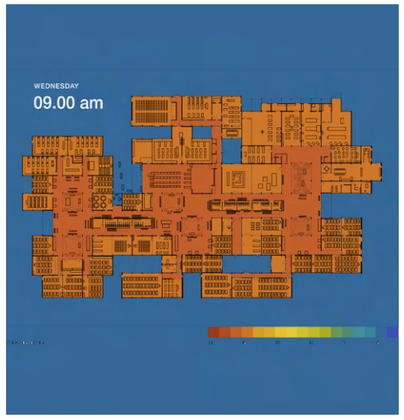
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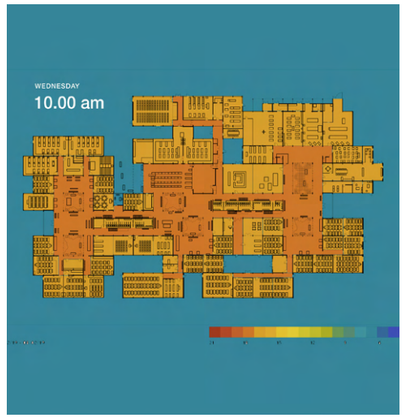
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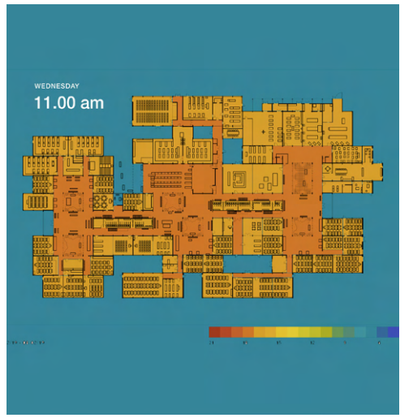
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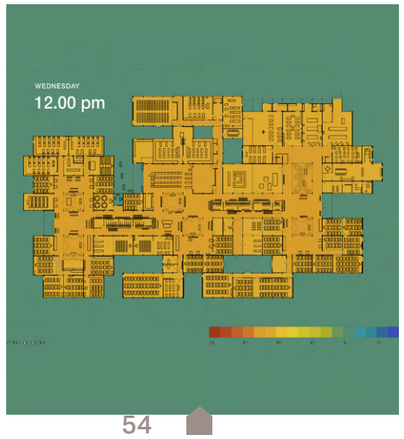
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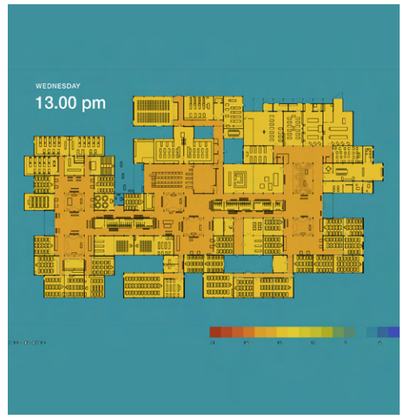
12.00 pm


WEDNESDAY
13.00 pm

2.2 Map :
Daily Environmental

These plans indicate the changing temperature of the school across the week, approximated from a classroom sensor and a social space sensor. The area outside the school is coloured to match the recorded external temperature for that given day. Each plan represents an hour in time across the school day, starting from 8:00 in the morning and finishing at 16:00. These images are extracted from a GIF that runs the images together sequentially so we can understand the relative changing temperature of the spaces. The colour bar indicates the temperature. Generally the warmer the colour the higher the temperature.

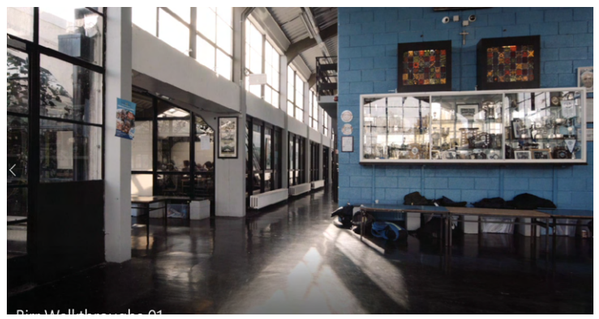
From examining the images it is clear that the temperatures in the building are hottest in the morning, and slowly lower in temperature across the day. The classrooms only reach the desired temperature of 20 degrees in the first hour or two of the morning. What becomes evident, though not anticipated, is that the central, social area is often at a higher temperature than the classroom; the contrasting colours make this evident.








Walkthrough Film

2.3 Film

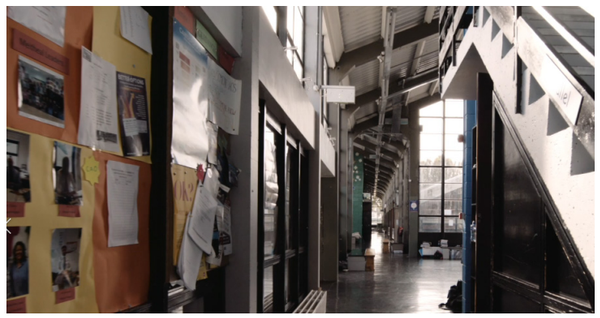
Tracking Shot 1

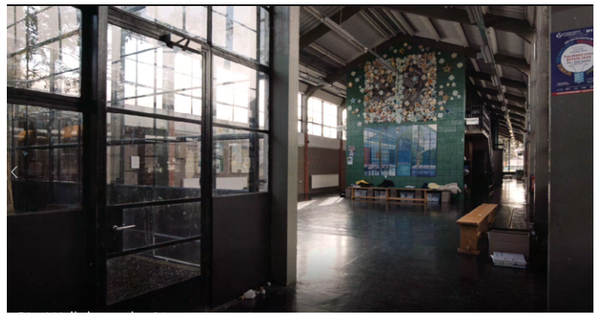
Tracking Shot 2

Expanding on timelapse and interview footage filmed as part of the initial Social Survey, a series of films describing the life of the school were produced for the 'Keeping Ireland Modern' exhibition. These films depict movement, light, and inhabitation across the course of a typical school day. Filmed by Ros Kavanagh, they provide a compelling and accessible description of the building in use. The films include:

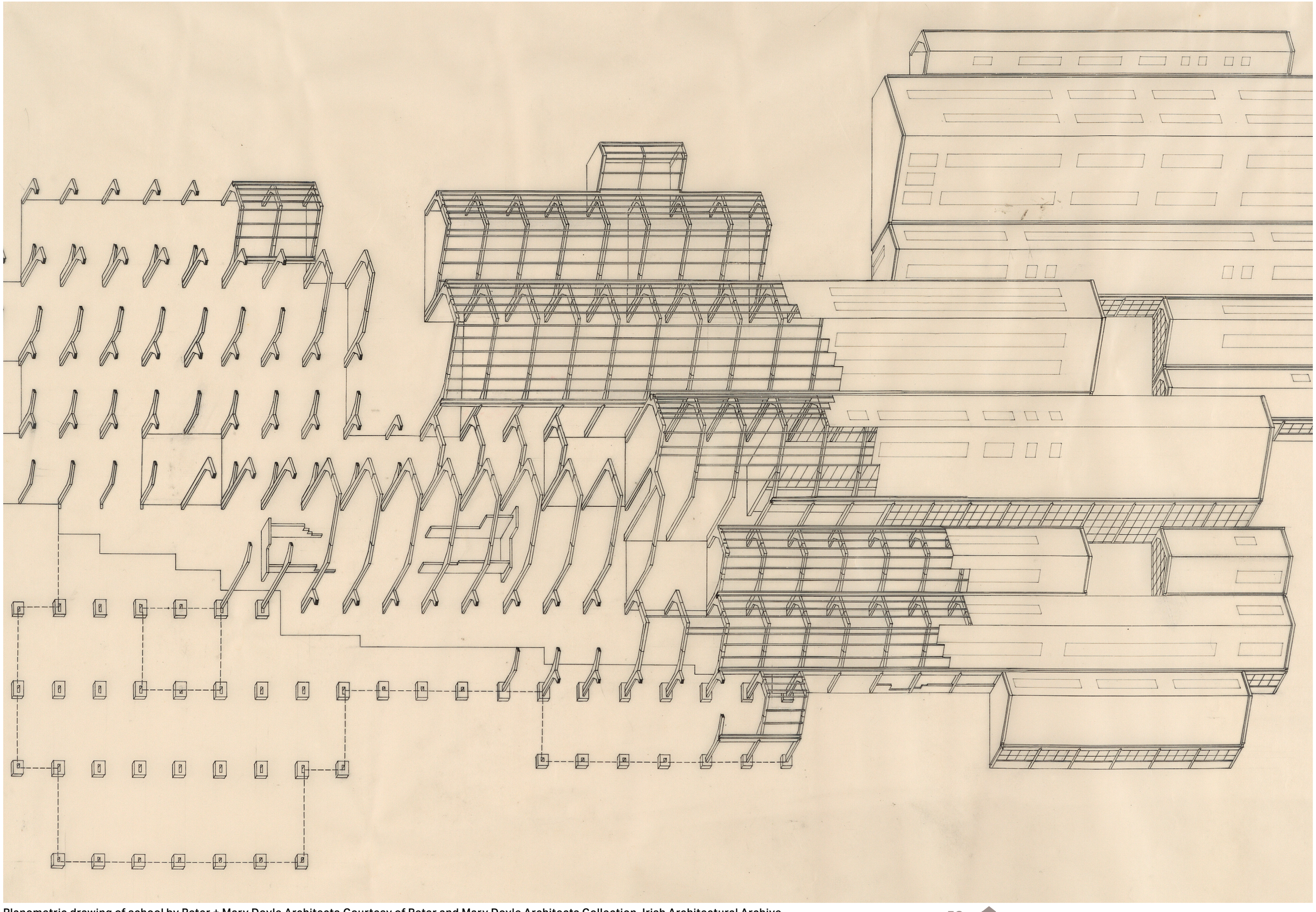
- Walking: a film shot while walking from North to South in the street demonstrates the changing spatial quality experienced in this central space. This film was produced by the photographer walking with a camera mounted at eye level, to recreate an individual's experience. The film is in colour and the school is not inhabited by the pupils during filming.

- Tracking films: a number of tracking shot films were taken in carefully selected locations across the plan. In each instance the camera begins looking through the glazing of a courtyard and moves to view the social space. This structure, as well as the choice of black and white photography, highlights the range of transparency and spatial depth in the plan, it shows the impact of the trees in the courtyard and the effect of the layering of views through spaces. The camera was mounted on a set of tracks, to provide the continuous and uniform quality of the shots. This provides a very steady camera movement which is counterposed by the active life of the occupied social spaces and the soundscape of the school.



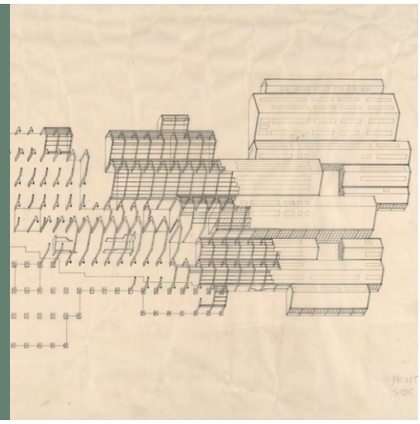


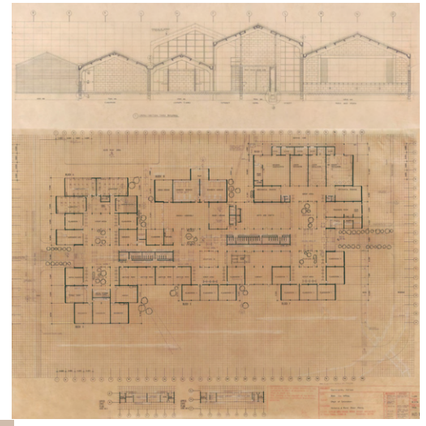
These films demonstrate the qualities of the school building that we wished to underline, including the dynamic social life of the central street, the spatial richness of the changing section and the incredible qualities of light throughout. The stills shown here give some indication of the film's impact. Film becomes an accessible medium to communicate the values embedded in the school building, while also acting as a record of the structure as it now stands.



Planometric drawing of school by Peter + Mary Doyle Architects.Courtesy of Peter and Mary Doyle Architects Collection, Irish Architectural Archive

Section 3
Assessment of Significance



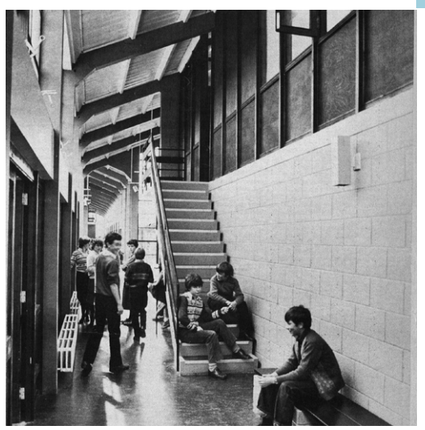


Landscape + Place

International

INFRA
ÉIREANN

Infrastructure and the
Architectures of Modernity
in Ireland 1916-2016



Social

3.1 Statement of Significance

Architectural

The school is an internationally recognised exemplar of post-war architectural modernism in Ireland and exhibits many of the hallmarks of this period. These include: the development of an innovative concrete portal frame system that provides a flexible and adaptable plan; technical detailing that expresses the means of construction and individual components; the use of off-the shelf, ordinary and inexpensive industrial materials; the qualities of transparency, created by the significant amount of glazing and the internal courtyards deep within the plan that blur the relationship between outside and inside.

Intimately connecting the programme of the school with the structural system, the plan realises a building that reflects the social agenda of the period, politically and architecturally. This is achieved through a sophisticated programming of teaching, social and courtyard spaces along with the concrete portal frame system that allows flexibility and variety. Together the social ambition and technical innovations create a democratic, non-hierarchical plan that accommodates a vibrant school.

The school design was one of the premiated entries in the 1974 Department of Education school's competition, It is considered the most significant, successful and progressive commission resulting from the competition. Significantly, it remains largely intact. The building received the RIAI's gold medal in 1989, the highest honour awarded by the institute, awarded 10 years after a building's construction.

International

The design reflects many influences and connections internationally, including that of Mies van der Rohe, whom Peter Doyle studied with in IIT. The design also reflects contemporaneous post-war structuralism (in particular the works of Herman Hertzberger and Aldo van Eyck). This is evident in its careful calibration of structure as a means to facilitate generous social space within the limitations and opportunities offered by a rural site in the centre of Ireland. The school expresses the situated modernism espoused internationally by Team X et al. and includes the adaptive interpretation of the open and flexible 'mat-plan' as exemplified in the Free University of Berlin, to realise a new paradigm for Irish education.

The building has been recognised internationally through exhibition in the Venice Biennale in Ireland's pavilion in 2014 and the awarding of the Getty Foundation's 'Keeping It Modern' grant in 2018. The building has been publicized widely, including at the time of its construction in the Architects' Journal, and more recently in the Architectural Review and Architectural Design (AD) along with the book 'Infra-Éireann: Infrastructure and the Architecture and of Modernity in Ireland 1916-2016'.

Social

The school is seen as representative of the culmination of the 1960s policies to 'democratise' education, and to realise a new school type, the community school. Its design is emblematic of progressive social policies and ambitions which were central to the modernisation of the Irish State.

The voluminous, transparent, highly glazed spaces of the social street are especially iconic of these policies and by extension the story of 20th-century Ireland.

The continuing strong stewardship of the school since its opening in 1980 along with its key role in the community has created a high degree of social value and capital in the school for its users. Its continuing use as a school is of high significance.

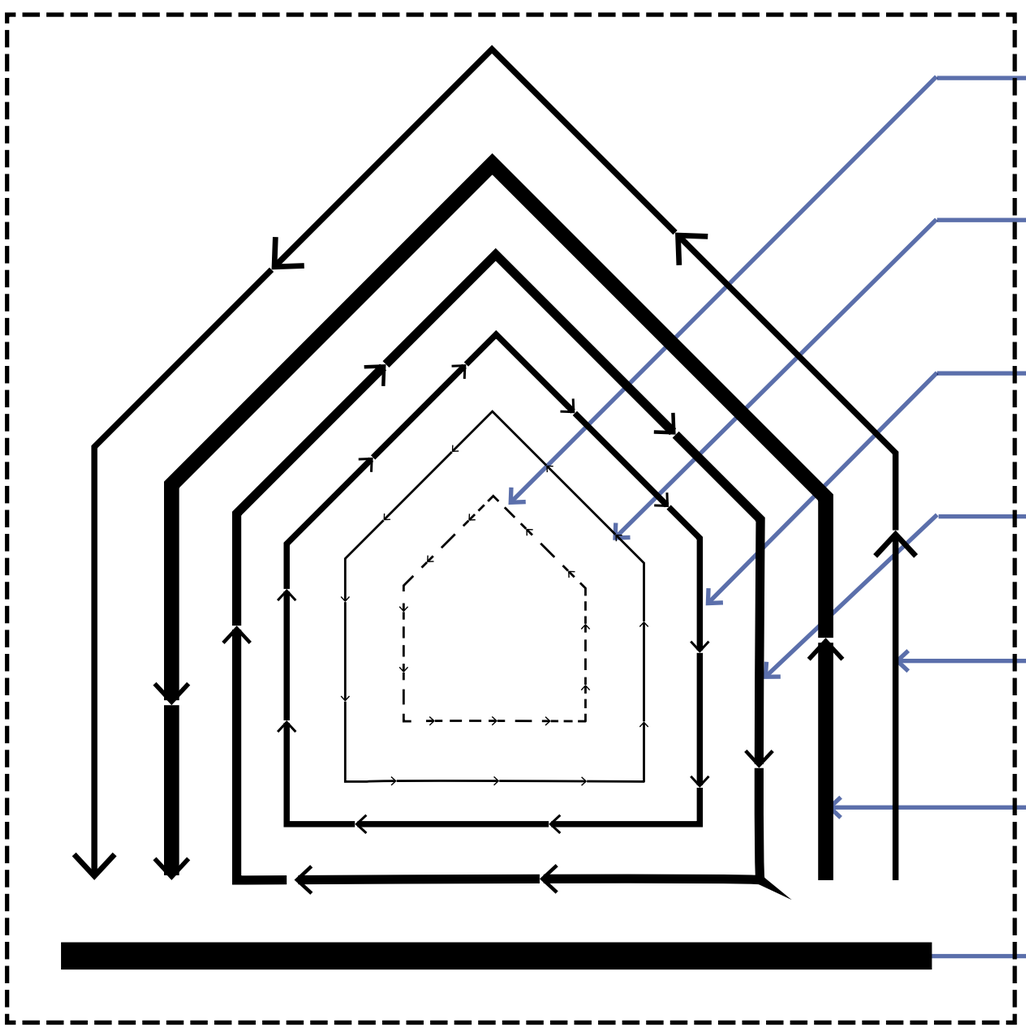
Landscape & Place

The school's design demonstrates a unique relationship to the vernacular of factory and agricultural construction seen widely in the industrialising landscape of rural Ireland in the 1970s.

While the competition entry had no specified site, the system-built construction and original peat-burning heating technologies embeds the school within the mass-produced landscape of the industrially harvested peat-bog as well as the agricultural lands of County Offaly.

The internal courtyards with the social 'street' aligned to it are integral to the successful social functioning of the school and are key to the intangible significance of the building.

Shearing Layers



Element

Stuff

Surfaces

Services

Space Plan

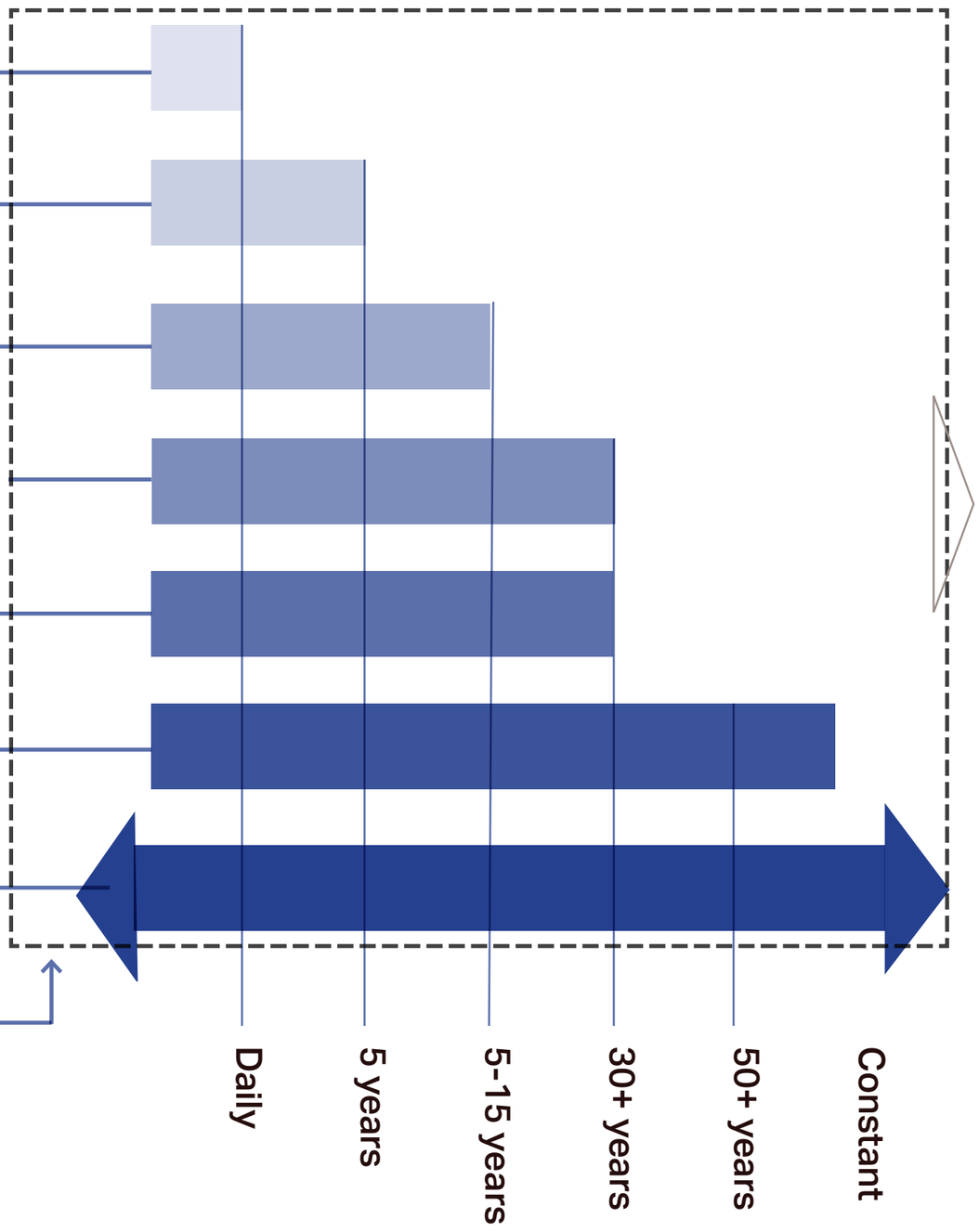
Skin

Structure

Site

Society

Change over Time



3.2 Shearing Layers

Introduction

To isolate the elements of the building we have used Stewart Brand's shearing layers[1], respectively: site, skin, structure, space plan, surfaces, services, stuff and the addition of the term 'society' for our purposes. The shearing layers include:

- Site
- Skin
- Structure
- Space Plan
- Surfaces
- Services
- Stuff
- Society

The shearing layers are represented in separate planometrics (section 3.2) and these planometrics are used, in the following pages, to show values (section 3.4).

While shearing layers represent the physical aspects of the building, they also relate to the aspect of time in buildings, ranging from 'site' as the most enduring element of a building to 'stuff' being ephemeral, often changing daily. If we consider the elements of the building in relation to their longevity, this forms part of the consideration of their value.

Brand's definitions of each of the 8 layers are described here alongside their relevance to the school.

On the facing page is Brand's diagram of the layers and an illustration of how these relate to time. Overleaf we have indicated, graphically, the elements that compose each of the shearing layers alongside an illustrative photo of the layer.

1. Stewart Brand, How Buildings Learn: what happens after they're built, Viking (London) 1994

Methodology

Taking each one of Brand's layers and adapting these to the building, we have identified 8 layers in total, described below. Each layer is composed of a number of elements. These elements are indicated on the planometrics, which form the basis of the 'value mapping' that follows.

Site

This layer includes the immediate site, as well as its wider context. It relates to the environmental conditions on the site that are independent of the building. This is the slowest element to change, it precedes the building and will outlast it. For the school in Birr we have identified 6 elements in this shearing layer:

- the bog
- location
- topography
- exterior planting
- views
- orientation

Skin

The skin relates to the exterior surfaces of the building, including the walls, windows and roofs. These elements typically have a medium life span, of 15-30 years, often being changed or replaced for technical reasons as their materials come to the end of their lifespan or as newer technologies provide greater improvements. For the school we have identified 6 elements in this shearing layer:

- courtyard elevations
- classroom windows
- perimeter & gable elevations
- clerestory windows
- roof
- rooflights

Structure

This layer relates to the primary structuring elements of the building. It is the least likely to change, therefore has the longest life of any element in the building. We have identified 3 elements in this shearing layer:

- portal frame
- purlin
- edge beam

Space Plan

Space Plan relates to the internal layout of the building, the spatial elements of the plan, including where the internal walls, ceilings and doors are placed and the enclosures, connections and sense of openness created by the disposition of elements. It also relates to the spatial aspect of the section and the impact of daylighting from these design decisions. Included also is a consideration of the programmatic organisation of the space. For the school we have identified 8 elements in this shearing layer:

- the grid
- the street
- programme arrangement
- daylight
- section
- stair/vertical elements
- inside/outside (courtyards)
- relationship to exterior

Surfaces

This layer relates to the surfaces that are closest to us; the surface of the wall and floor, their material and its impact. It is closely allied to the 'space plan' and 'stuff' layers. Surfaces can change quite regularly, though in this school they have remained fairly static, due to the continuation of the use as a school and the integrity of the materials they are made from (e.g. original timber glazed screens and blockwork internal walls). For the school we have identified 4 elements in this shearing layer:

- floor
- blockwork internal wall
- colour scheme
- internal glazed screens

Services

These are the components of the mechanical and electrical systems that bring heating, power, air and water to the building. These typically have a life span of anything from 5-30 years and are almost always upgraded in buildings. Where they are deeply embedded in the structure the change over of services can be costly and very intrusive. For the school we have identified 3 elements in this shearing layer:

- lighting
- heating
- water tower/ chimney

Stuff

This element relates to the most changeable elements of the building, including people's possessions, books, papers etc all the way to furniture that is used daily and often moved around. In that sense, this layer relates to the parts of the building that are used most by people. For the school we have identified 3 elements in this shearing layer:

- courtyard planting
- benches
- fitted furniture (clock)

Society

This layer was added by the team to reflect a combined layer that represents the ethos of the project as it embraced social change in Irish life in 20th century and continues to include the everyday social life of the school's staff and students. This is represented as a single layer, without elements.

Site

This shearing layer considers the aspects particular to the site and location, the longest lasting aspects of the project. The bog in particular is noted as of exceptional value relative to the school's social role. Though designed for an unspecified site, the location on the outskirts of Birr has been a key to its success.

Skin

This shearing layer considers all elements of the envelope and enclosure including the roof. Of highest value here are the courtyard elevations. These are significant socially, through the light and transparency they offer; technically, in the expression of the means of construction and aesthetically in creating the visual experience in the 'street'.

Structure

Core to the original project's design was the development of a pre-cast concrete portal frame structure that allowed for flexibility and adaptability in plan. The portal frame's expression and its impact on the spatial experience is of exceptional importance in the building.

Space plan

This shearing layer reflects the functional and intangible aspects of the spatial planning. In the school, the programmatic clustering around courtyards, connected by the spine of the 'street', underpinned by the grid, is of exceptional importance. This along with the considerable daylight and spatial experience allowed by the changing section and clerestory lighting creates a spatial plan centred on the street that is of exceptional value.

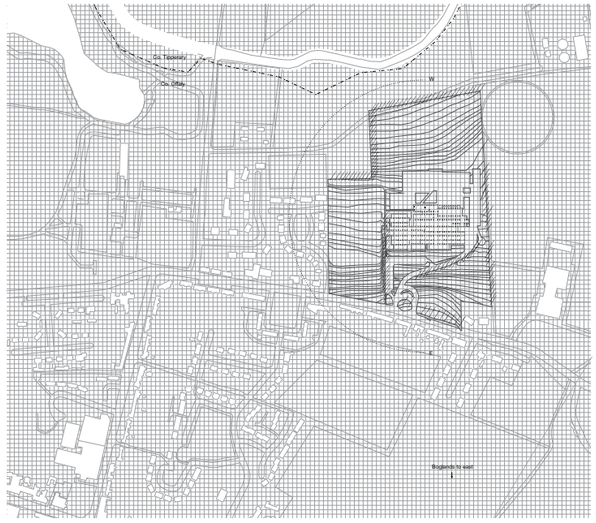
Elements:

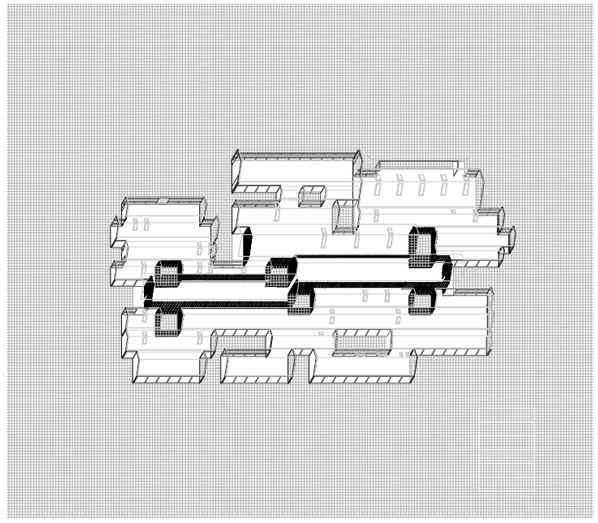
the bog / location / topography / exterior planting / views / orientation

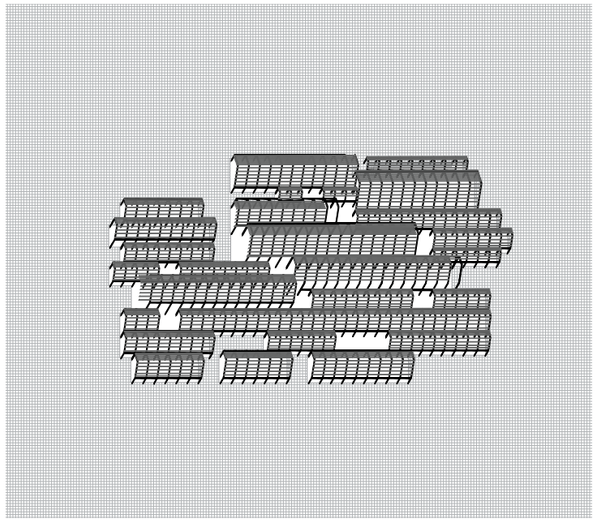
courtyard elevations / classroom windows / perimeter & gable elevations / clerestory windows / roof / rooflights

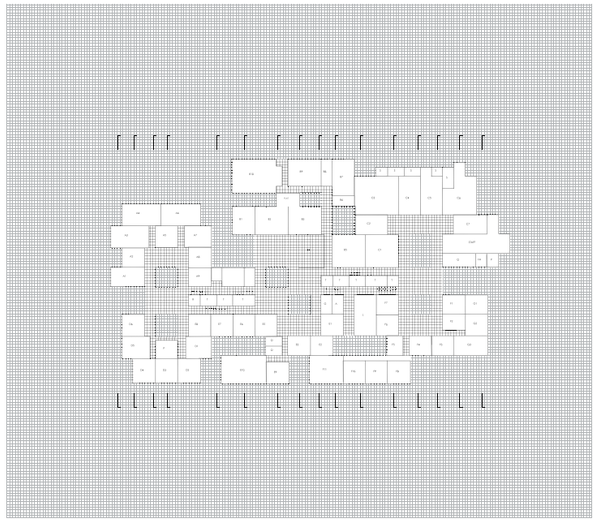
portal frame / purlins / edge beam

the grid / the street / programme arrangement / daylight / section / stair/vertical elements / inside/outside / relationship to exterior









3.2 Shearing Layers

Surfaces

In this building there is considerable overlap between surface and structure. The expression of this construction is key to the experience of the space. The surfaces are the most immediate materials that determine the interior experience. The reflective dark floor is significant, as is the expression of construction evident in the blockwork internal walls. The original colour scheme was largely monochrome, except for the internal gable walls, though some of this has changed over time.

Services

The original services were exposed and expressed for reasons of economy, though this also had an aesthetic value, as they were carefully aligned with the space plan. Upgrades to the services over the lifespan of the building mean the newest installations are not aligned with the original design intention. The original services chimney for the peat fired boilers also acted as a water tower, and is of exceptional significance, as a key element in post-war modernist design.

Stuff

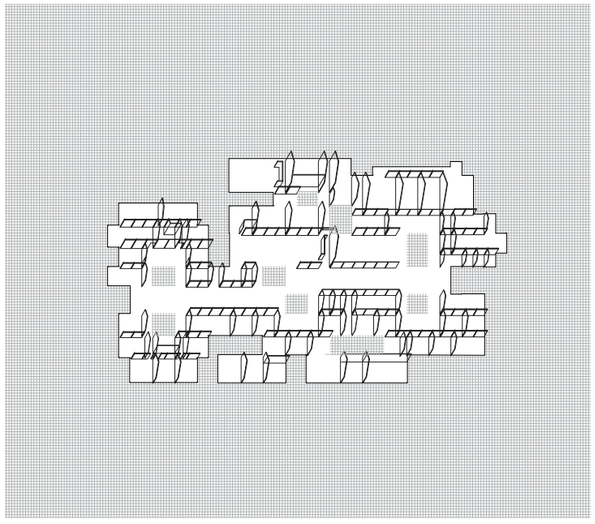
This shearing layer relates to the most ephemeral aspects of our occupation of a building, though these elements often have a high impact on our experience of the place. The planting in the courtyards is a key factor in the experience of the space. The benches, equally are of exceptional significance in the social performance of the school and in achieving the Doyles' ambition for the 'street'.

Society

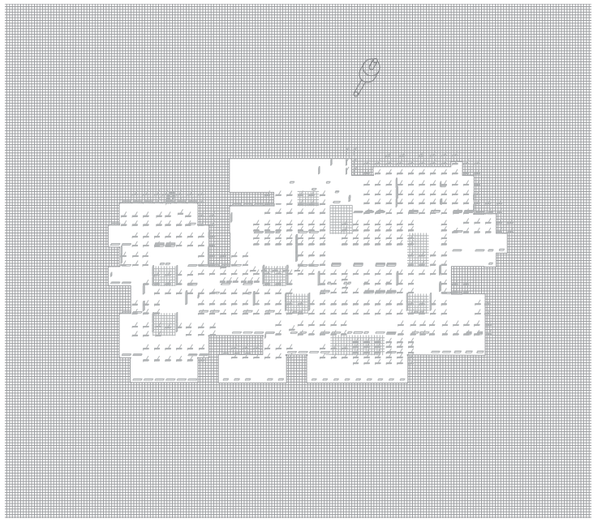
This composite drawing combines the shearing layers; what emerges is a portrait of the multiple elements in the building and their relationship to each other. Of highest significance is the social performance of the street, which is supported by the qualities conferred by the courtyard, daylight, structure and relationship to adjacent spaces.

The term of 'society' relates to the original design intention as well as the socially historical significance; it also points the direction for the future of the school.

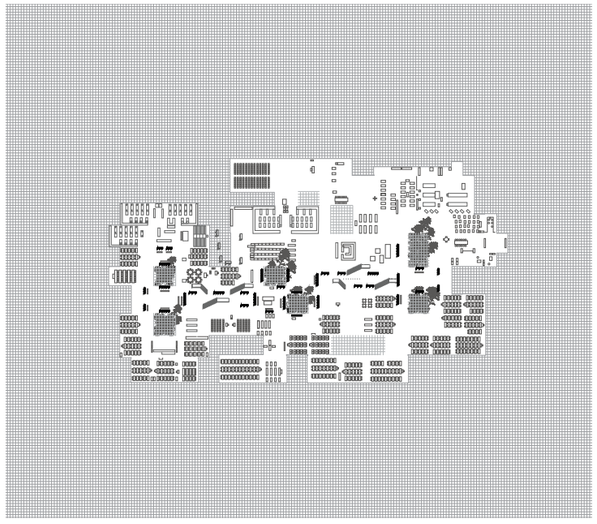
floor / blockwork internal walls / colour scheme / internal glazed screens



lighting / heating / water tower and chimney



courtyard planting / benches / fitted furniture & clock

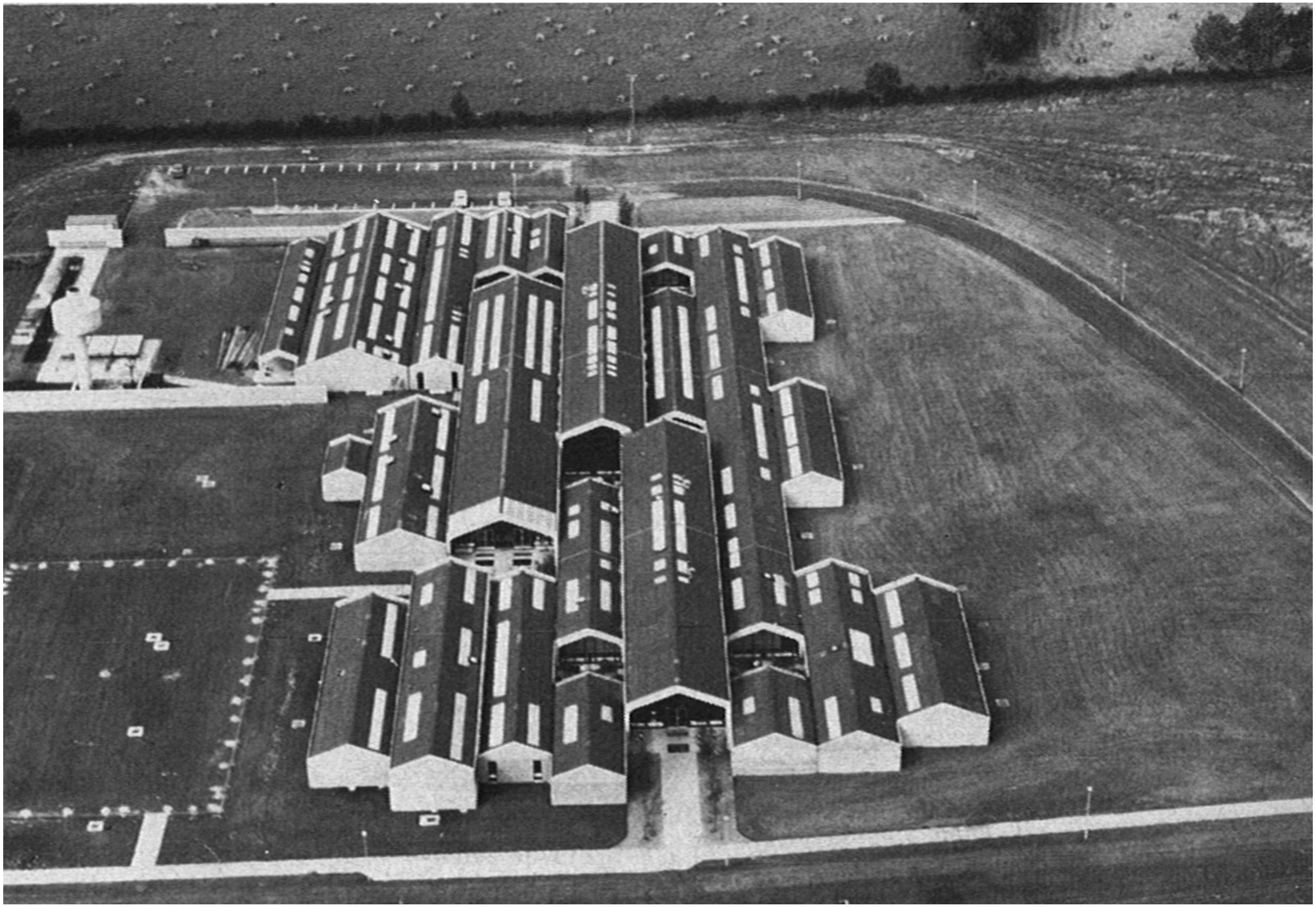


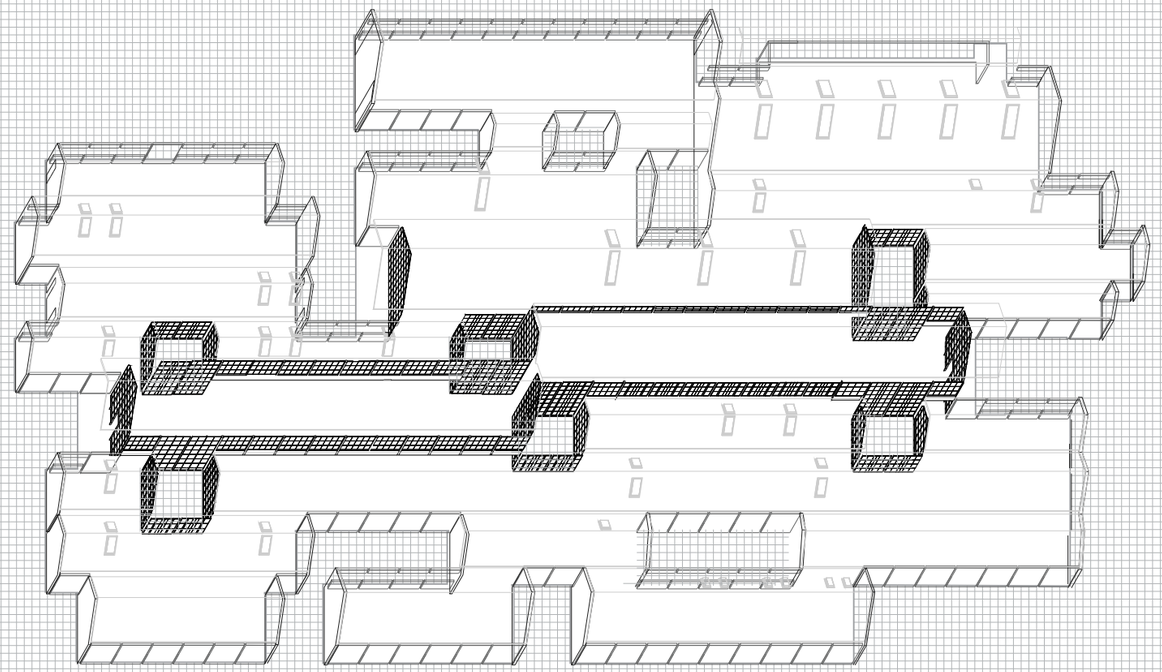
3.2 Shearing Layers

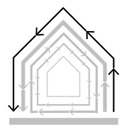
Site

the bog / location / topography / exterior planting / views / orientation

This shearing layer considers the aspects particular to the site and location, the longest lasting aspects of the project. The bog in particular is noted as of exceptional value relative to the school's social role. Though designed for an unspecified site, the location on the outskirts of Birr has been a key to its success.



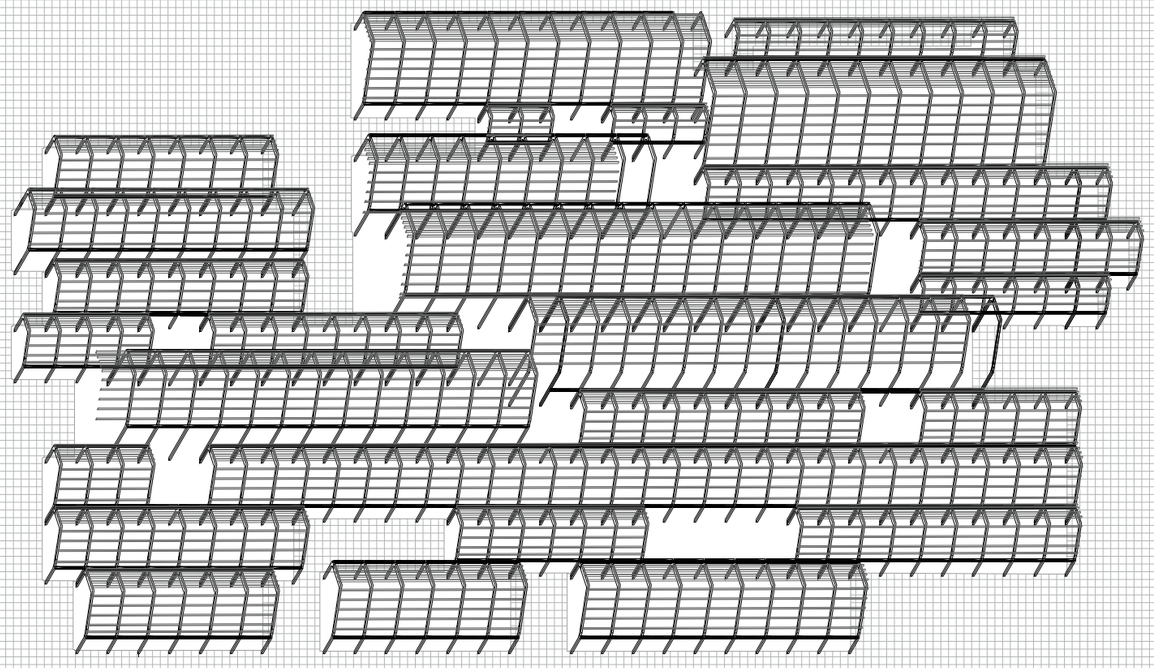




Skin

courtyard elevations / classroom windows / perimeter elevations & gable elevations / clerestory windows / roof / rooflights

This shearing layer considers all elements of the envelope and enclosure including the roof. Of highest value here are the courtyard elevations. These are significant socially, through the light and transparency they offer; technically, in the expression of the means of construction and aesthetically in creating the visual experience in the 'street'.

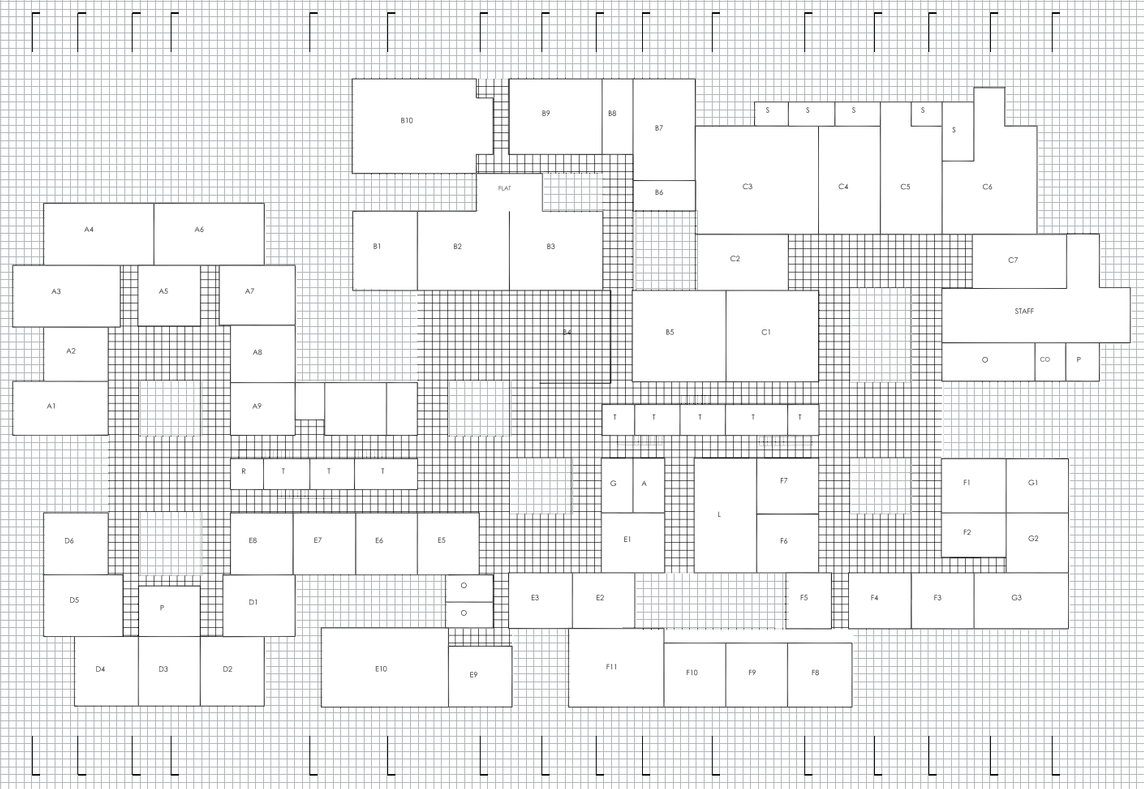


Structure

portal frame / purlins / edge beam

Core to the original project's design was the development of a pre-cast concrete portal frame structure that allowed for flexibility and adaptability in plan. The portal frame's expression and its impact on the spatial experience is of exceptional importance in the building.

3.2 Shearing Layers

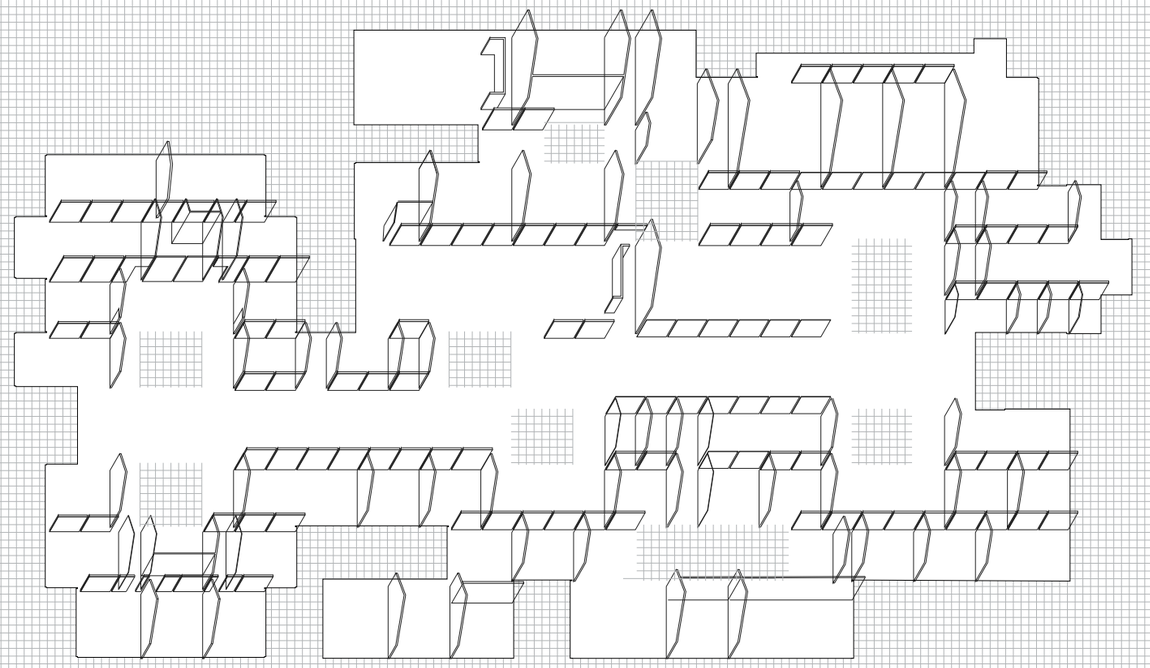


Space plan

the grid / the street / programme arrangement / daylight / section / stair/vertical elements / inside/outside / relationship to exterior

This shearing layer reflects the functional and intangible aspects of the spatial planning. In the school, the programmatic clustering around courtyards, connected by the spine of the 'street', underpinned by the grid, is of exceptional importance. This along with the considerable daylight and spatial experience allowed by the changing section and clerestory lighting creates a spatial plan centred on the street that is of exceptional value.

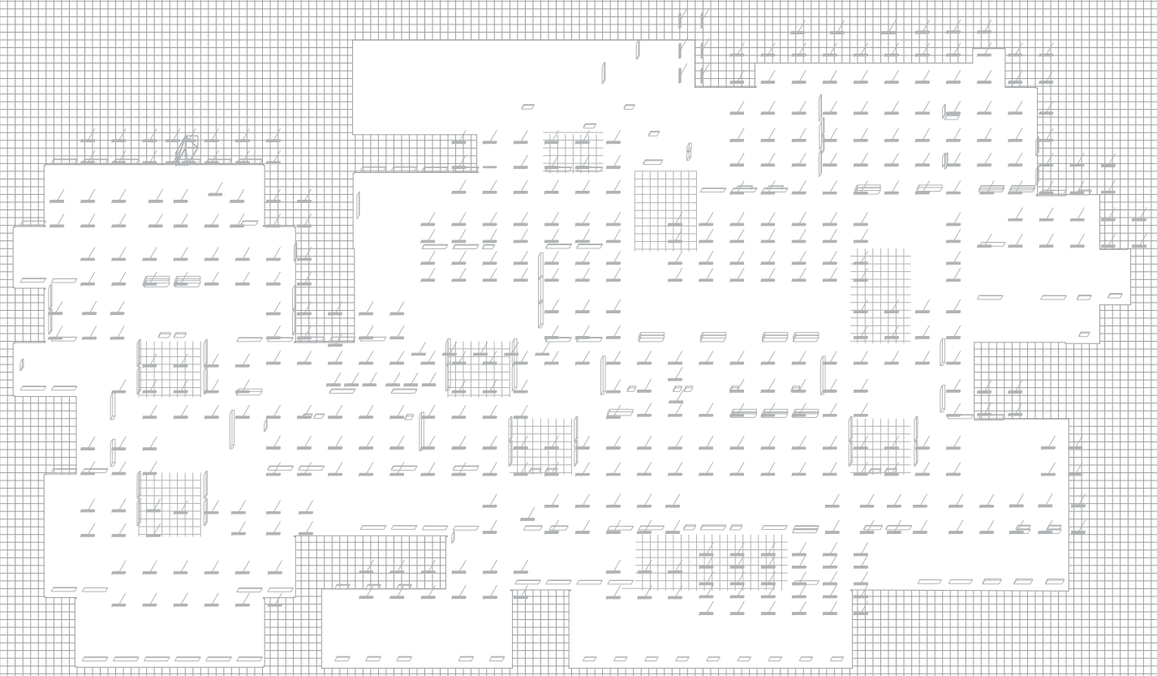

Periodic Table of the Elements
Photosynthesis
Carbon Dioxide + Water —chlorophyll, sunlight→ Glucose + Oxygen
6CO2 + 6H2O —chlorophyll, sunlight→ C6H12O6 + 6O2



Surfaces

floor / blockwork internal walls / colour scheme / internal glazed screens

In this building there is considerable overlap between surface and structure. The expression of this construction is key to the experience of the space. The surfaces are the most immediate materials that determine the interior experience. The reflective dark floor is significant, as is the expression of construction evident in the blockwork internal walls. The original colour scheme was largely monochrome, except for the internal gable walls, though some of this has changed over time.

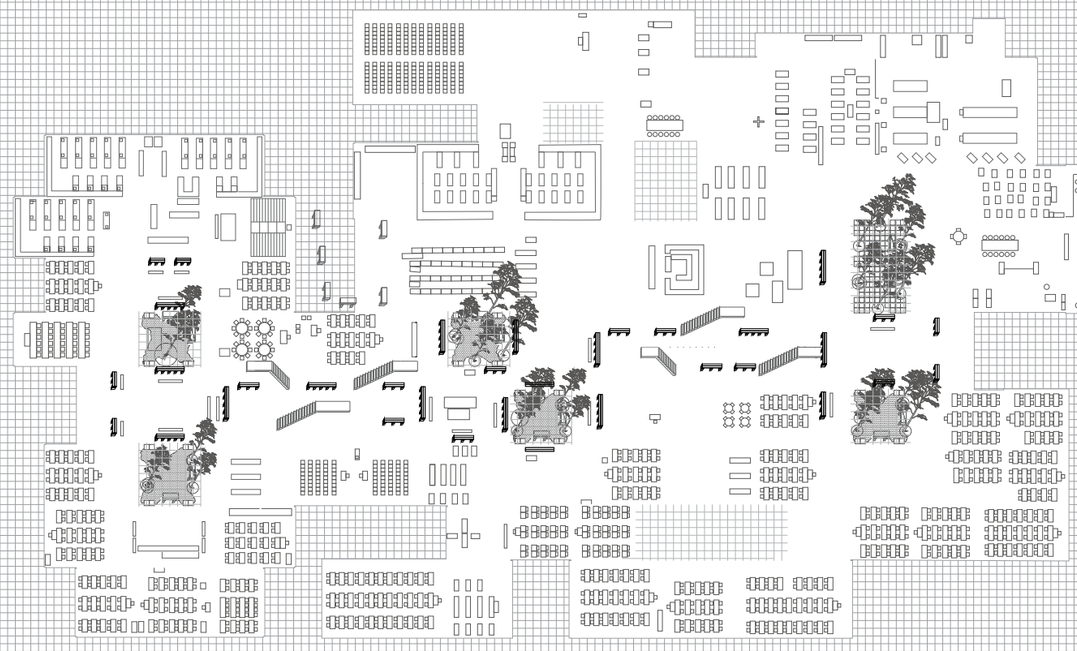


Services

lighting / heating / water tower/chimney

The original services were exposed and expressed for reasons of economy, though this also had an aesthetic value, as they were carefully aligned with the space plan. Upgrades to the services over the lifespan of the building mean the newest installations are not aligned with the original design intention. The original services chimney for the peat fired boilers also acted as a water tower, and is of exceptional significance, as a key element in post-war modernist design.

3.2 Shearing Layers



Stuff

courtyard planting / benches / fitted furniture & clock

This shearing layer relates to the most ephemeral aspects of our occupation of a building, though these elements often have a high impact on our experience of the place. The planting in the courtyards is a key factor in the experience of the space. The benches, equally are of exceptional significance in the social performance of the school and in achieving the Doyles' ambition for the 'street'.

Society

This composite drawing combines the shearing layers; what emerges is a portrait of the multiple elements in the building and their relationship to each other. Of highest significance is the social performance of the street, which is supported by the qualities conferred by the courtyard, daylight, structure and relationship to adjacent spaces.

The term of ‘society’ relates to the original design intention as well as the socially historical significance; it also points the direction for the future of the school.

st. brendan community school, birr.

value mapping matrix

1	exceptional
2	high
3	moderate
4	little
5	intrusive

brand (+)	element	social	technical	aesthetic	use value (as school)	environ. performance	cost/maintenance
site	the bog	1	1	2	3		
	location (edge of town)	1		3	1		
	topography			3	4		
	exterior planting			3	3	3	
	views				3		
	orientation	2		3	3	3	
skin	courtyard elevations	1	1	1	1	4	4
	classroom windows	3	3	2	1	4	4
	perimeter & gable elevations	3	3	2	3	4	4
	clerestory windows	3	2	1	2	4	4
	roof	4	4	4	4	3	3
	roof lights	4	4	4	4	4	
structure	portal frame	1	1	1	2	4	3
	purlins	3	2	2	3	3	3
	edge beam		1	1	4	4	4
space plan	spatial arrangement	1	1	1	1		
	the street	1	1	1	1	3	3
	program arrangement	1	3	3	1		
	daylight	1	1	1	1	4	4
	section	1	1	1	1	4	4
	stair/vertical elements	1	3	3	3	3	3
	inside/outside courtyard	1	1	1	1	4	3
	relationship to exterior	3		3	3	4	4
surfaces (int.)	floor	3	3	2	3		3
	block internal walls	3	1	1	3	3	3
	colour scheme	3	3	1			
	internal glazed screens	3	3	2	3	4	3
services	lighting	4	4	4	4	4	4
	heating	4	4	4	4		4
	water tower/chimney	1	1	1	3		
stuff	courtyard planting	2	3	1	1		
	benches	1	3	3	1		3
	fitted furniture & clock	3	3	2	3		3
society	spirit of place	1	1	1	1		

3.3 Value Mapping Matrix

Introduction & Methodology

While the statement of significance states WHY the building is important, the value matrix establishes WHAT is important in the building. We examined, element by element, what was significant and located those in the building. Starting with the shearing layers as the core elements to be assessed, we ascribed values to these to create a value map for the building.

Shearing Layers : Y-Axis:

To isolate the elements of the building we have used Stewart Brand's shearing layers[1] respectively: site, skin, structure, space plan, surfaces, services, stuff and the addition of the term society for our purposes. These 'shearing layers' are plotted along the Y axis and within each of these 'layers' separate elements have been identified. Each layer includes from 3 - 8 elements. The 'shearing layers' relate to change over time and are ordered from top to bottom on the y axis with elements that change least over time at the top i.e 'site' and those at the bottom, i.e 'stuff' changing sometimes on a daily basis. We have added the term 'society' to Brand's terminology and this relates to the wider 'spirit of place' in the school. The shearing layers are represented in separate planometrics (section 3.2) and these planometrics are used, in the following pages, to show values.

Three Values of Modernity : X- Axis:

Beginning with key conservation charters we established a valuing system that incorporates the 'three values of modernity': social, technical and aesthetic[2]. Drawing on Marieke Kuipers and Wessel de Jonge's 'Designing from Heritage: strategies for conservation and conversion' [3] we developed a matrix of values that cross references these three values with the elements of the building, designated under Stewart Brand's shearing layers.

In addition to the 'three values of modernity' we have assessed the elements of the building under the utilitarian headings: use value (school), environmental performance, cost/ maintenance. The addition of the functional and utilitarian values allows us to view this assessment from different perspectives.

Reading the Value Matrix

We have ascribed 5 levels of value: exceptional; high; moderate; little or intrusive and colour coded these respectively. Elements of exceptional value are considered the most valuable. Some elements are considered intrusive, in terms of architectural conservation concerns. The darkest colour represents the highest value; the white represents little value and the grey represents elements that are considered intrusive. The overall value of the element is read in the column under 'element'. This is determined by the combination of the values listed under the 'three values of modernity'. The assessment and visualisation of the utilitarian values highlight any overlaps or conflicts apparent in between the architectural considerations and the functional requirements.

This 'value matrix' is the key document outlining where the significant elements in the building can be found and this assessment is reflected in all further decisions on interventions and policy. The 'value matrix' should be read in conjunction with the following illustrated significance (section 3.4) and the 'tolerance for change' table (section 3.5) and can be referred to when decisions on the future of the building are being considered.

1. Stewart Brand, How Buildings Learn: what happens after they're built, Viking (London) 1994
2. C. Cook and I. Richards, 'Modern Movement Documentation as a Central Resource for Architectural Education' In: Proceedings: Second DOCOMOMO International Conference, Dessau, September 16–19, 1992 (Dessau: DOCOMOMO Germany, 1993) Referenced in de Jonge, W. (2017). Sustainable renewal of the everyday Modern. Journal of Architectural Conservation, 23(1-2), 62-105.
3. M. Kuipers and W. deJonge, Designing from Heritage: strategies for conservation and conversion (TU Delft: 2017)

Findings

This 'value matrix' shows the weight of value in the shearing layers of 'space plan' and 'structure'. The 'exceptional' value is evident in this area across the most number of columns.

Exceptional Value

Elements of exceptional value include:

- The Bog (site)
- Courtyard elevations (skin)
- Portal Frame (structure)
- Spatial Arrangement (space plan)
- The Street (space plan)
- Programme Arrangement (space plan)
- Daylight (space plan)
- Section (space plan)
- Inside/Outside (space plan)
- B&W Colour Scheme (surfaces int.)
- Water Tower/Chimney (services)
- Benches (stuff)
- Spirit of Place (society)

High Value

Elements of high value include:

- Perimeter & Gable Elevations (skin)
- Edge Beam (structure)
- Blockwork Internal Walls (surfaces int.)
- Internal Glazed Screen (surfaces int.)

Moderate Value

Elements of moderate value include:

- location edge of town (site)
- topography (site)
- orientation (site)
- classroom windows (skin)
- purlins (structure)
- Stair/vertical elements (space plan)
- Floor (surfaces int.)
- Gable Walls & Colour (surfaces int.)
- Fitted Furniture (stuff)

Little Value

Elements of little value include:

- Exterior Planting
- Views
- Relationship to Exterior

Intrusive

Elements considered intrusive include:

- Roof (skin)
- Rooflights (skin)
- Lighting (services)
- Heating (services)

Through this visualising of the valuing process the location of highest significance begins to emerge around the central space of the 'street'. In particular the combination of the 'street', its relationship to the courtyards, the high levels of transparency and the presence of the structure are fundamental to the building's significance. Also evident are the areas of least value and these correspond with areas that are no longer original, such as the roof and the services. This matrix also begins to suggest areas where intervention would be most acceptable, that have the highest 'tolerance for change.'; these are developed further in section 3.5. The value mapping matrix, and the following drawings, become a map to guide future interventions and policies.

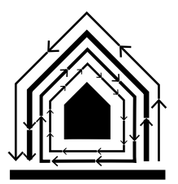


Image overleaf: The matrix shows the highest values coalescing in the 'structure' and 'space' categories, which reflects the project's original ambitions.

Site

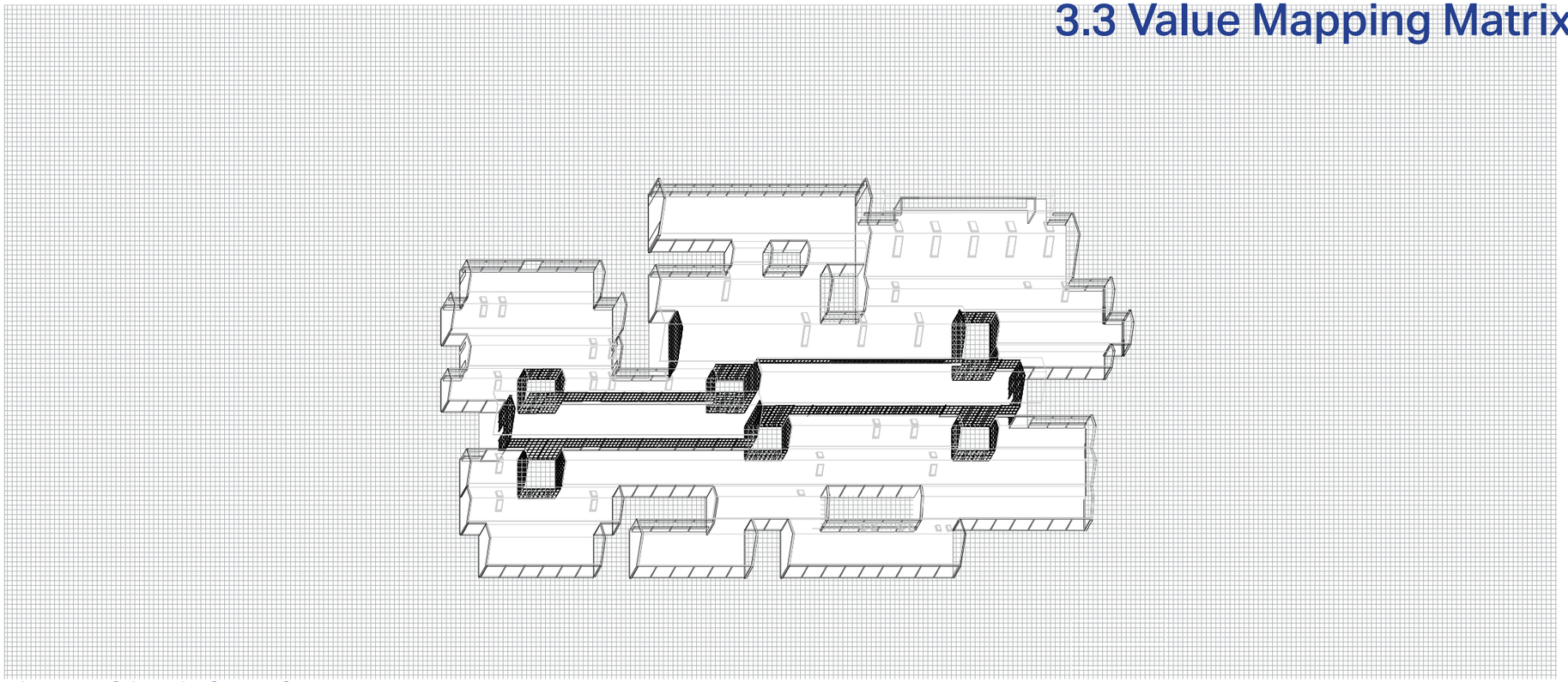
the bog / location / topography / exterior planting / views / orientation

This shearing layer considers the aspects particular to the site and location, the longest lasting aspects of the project. The bog in particular is noted as of exceptional value relative to the school's social role. Though designed for an unspecified site, the location on the outskirts of Birr has been a key to its success.

level of significance key

exceptional
high
moderate
little
intrusive

element & level of significance	description	significance
the bog	The bogs are located remotely to the town and are an integral part of the landscape and industry in the area. The building was originally heated with peat fired boilers. The school owns a 70 acre bog.	The significance of the bog is exceptional because of the relationship between the methods of production and heating integral to the site that are evident in the built design.
location edge of town	The school is located on the edge of the town of Birr Co. Offaly and is the only second level school in the town.	The significance of the location is moderate. Though the competition did not have a site, the connection with the town, developed over 40 years has brought a high social significance. The location also allowed for expansion.
topography	The school is located on a sloped site, though the school plan itself is on one level. There is a drop of approx 20m from the entrance gates to the school building entrance.	The topography is of moderate significance. Though the school was not designed for a sloped site, it has become significant in how the building is perceived on arrival.
exterior planting	The original exterior planting was of significance and there is a detailed plan by Peter and Mary Doyle in their collection in the Irish Architectural Archive.	Much of this has changed over the course of the building's life and additional planting has been added which are of little significance.
views	This relates to views from the site and school to the outside/area.	The views are considered of little significance as the school was built without a site in mind. None of the aspects on the site offers views of significance.
orientation	The school is designed so classrooms are orientated East or West, for better sunlight during the school day.	This element is considered of moderate significance.



Skin

courtyard elevations / classroom windows / perimeter & gable elevations / clerestory windows / roof / rooflights

This shearing layer considers all elements of the envelope and enclosure including the roof. Of highest value here are the courtyard elevations. These are significant socially, through the light and transparency they offer; technically, in the expression of the means of construction and aesthetically in creating the visual experience in the 'street'.

level of significance key

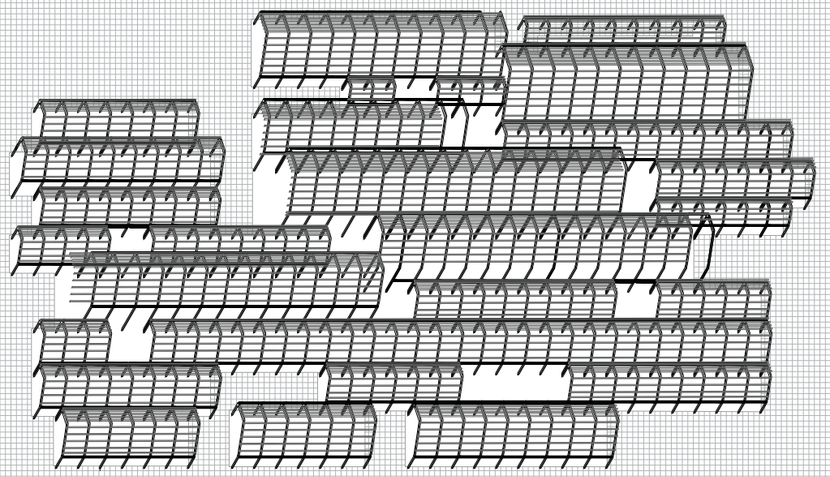
exceptional
high
moderate
little
intrusive

element & level of significance	description	significance
courtyard elevations	This relates to the steel framed single glazed elevations to the 6 original courtyards.	The glazing in these courtyards is considered of exceptional significance, due to the visual and light quality that they provide in the spaces. The fabric is original and intact. The single glazing contributes to the transparency.
perimeter & gable elevations	This relates to the overall elevations to the perimeter of the school, including the gables, considering their construction and expression as a whole. The elevation is composed of expressed concrete frame, concrete bricks and steel framed windows only.	The perimeter & gable elevations are considered highly significant, based on their expression of the technical resolution of the project and the elemental aspect of the construction. Much of this elevation is still intact.
classroom windows	This relates to the steel framed single glazed windows in the classrooms. The windows are divided into 4X900mm bays horizontally and 2 bays vertically, with 2 top hung opening sashes at the upper level.	These windows are considered of moderate significance. The original windows are intact though glass and putty have been replaced. Of significance is their 900mm module aligned with the building, and the steel construction.
clerestory windows	This relates to the steel framed clerestory glazing along the street. These windows are single glazed, with 900 wide module with opening casements at lower level. These elements do not currently open.	The clerestory glazing is considered moderately significant. The windows are original fabric, and adhere to the 900mm module. The light they provide gives clear expression to the portal frame and high levels of daylight to the street.
roof	The original roof was replaced throughout in early 2000s with an insulated corrugated TEGRAL product. Externally there are fall arrest panels and slip resistant panels giving a two-tone grey appearance.	The roof is considered to be intrusive in the building due to the divergence from the original design which was white and reflective.
rooflights	The rooflights were replaced at the time of the roof replacement. New rooflights are placed perpendicular to the ridge, rather than parallel. There are fewer, larger rooflights and fewer lights over first floor rooms.	The rooflights are considered intrusive; their large scale causes overly bright areas and contrasting dark areas. They deviate from original smaller corolite rooflights typically located on roof opposite windows, and giving diffuse light.

Structure

portal frame / purlins / edge beam

Core to the original project's design was the development of a pre-cast concrete portal frame structure that allowed for flexibility and adaptability in plan. The portal frame's expression and its impact on the spatial experience is of exceptional importance in the building.



level of significance key

exceptional
high
moderate
little
intrusive

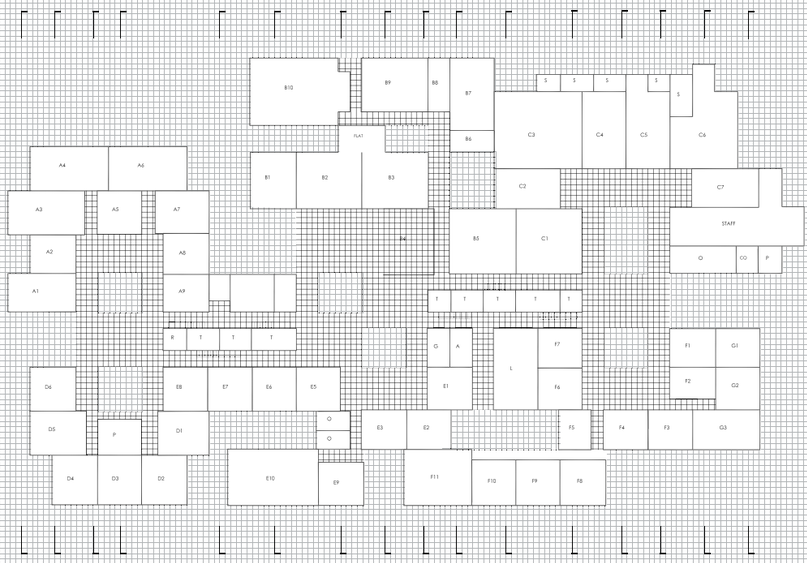
element & level of significance	description	significance
portal frame	There are 222 pre-cast portal frames made by Banagher Concrete, composed of a column and rafter with a section of 300X175mm. They come in 3 heights (2.2m, 3.4m, 4.6m) and 9 widths in 900mm increments from 3.6m to 10.8m. They are structurally sound.	The portal frames are considered to be of exceptional significance as an integral part of the design intent to provide a flexible modular construction that made a spatially diverse plan from a repetitive module of cheap, locally produced, material.
edge beam	The pre-cast edge beam sits between the portal frames and supports the roof. It is a U-shaped section that acts as the roof gutter. It is expressed externally and internally, with an exposed concrete face to exterior and with the inner face plastered.	The edge beam is considered to be highly significant. It is integral to the original structure. Its expression internally and externally is of significance.
purlins	The pre-cast purlins run perpendicular to the portal frames and support the roof. The elements are designed with a curved section that originally held a fixing for the roof. They were designed to hang services and fittings from also.	The purlins are considered to be of moderate significance. They reflect the design ethos of expressing the construction and are carefully designed in section to accommodate services and fittings.

3.3 Value Mapping Matrix

Space plan

spatial arrangement / the street / programme arrangement / daylight / section / stair/vertical elements / inside/outside / relationship to exterior

This shearing layer reflects the functional and intangible aspects of the spatial planning. In the school, the programmatic clustering around courtyards, connected by the spine of the 'street' is of exceptional importance. This along with the considerable daylight and spatial experience allowed by the changing section and clerestory lighting creates a spatial plan centred on the street that is of exceptional value.



level of significance key

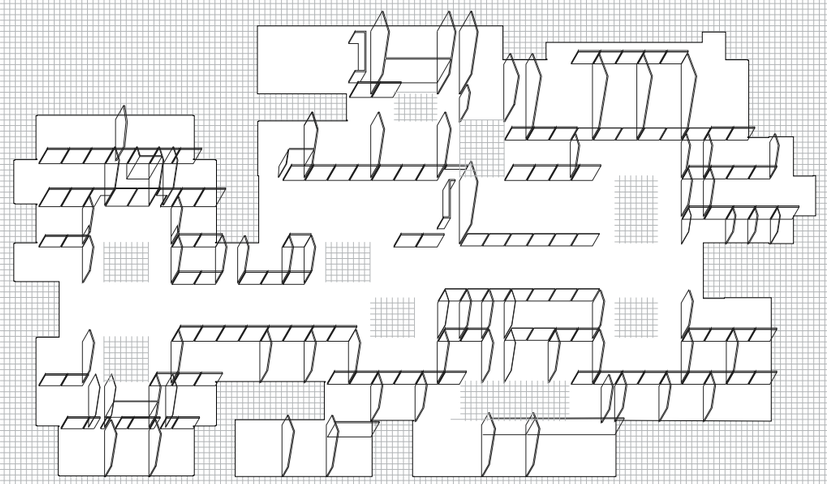
exceptional
high
moderate
little
intrusive

element & level of significance	description	significance
the grid	A 900mm planning and construction grid is used throughout the building. It orders every element of the building including room sizes, structural bays, elevations and window subdivisions.	The grid is exceptionally significant and combines the democratic intention of the plan with the technical ambition of the construction, to create a clearly ordered and expressed building that is rich in spatial experience.
the street	The street runs North - South across the plan and is punctuated by 6 courtyards. It is the main circulation space for the school and all the original classrooms are accessed off it.	The 'street' is exceptionally significant, embodying the core social idea of the project to create vibrant social spaces for students to congregate. Its significance is related to its connection with the courtyards and classrooms as well as its varying section and light.
programme arrangement	This school is arranged into 6 'suites' of learning areas, each one with their own courtyard. These areas are listed from A-E in the original plan.	Programme arrangement is exceptionally important as it reflects the close relationship between the school brief and the spatial plan. Organising the programme around the courtyards offers shared group spaces and overall cohesion to the plan for a large school.
daylight	Daylight in classrooms is provided through windows and some rooflights. In the street daylight is provided from gable elevations, clerestory glazing and courtyard glazing. The orientation of the school with street running N-S affects the quality of the light.	The daylight in the street is exceptionally important. It contributes to the feeling of openness and outdoor space in the street and provides visual variety from the classroom spaces. The daylight is integral to the transparency in the building which is key to the significance.
section	The section varies in height due to varied column heights (2.2, 3.4, 4.6m) and varying bay widths. The higher portal frames are used throughout the street and these provide clerestory light into the section and also accommodate the 2 storey mezzanine area.	The section is exceptionally important. The changing section is illustrative of the potential of the single construction method - the portal frame - which can accommodate classroom and social space equally. It provides spatial variety and complexity in quality and light.
stairs/vertical elements	There are a number of stairs along the street leading to the mezzanine level. These have the original black, horizontal balustrades.	The stairs are moderately important. Their role in the social activity of the street is key.
inside/outside courtyards	This relates to the relationship between the street and courtyard. The relationship is created by the extent of glazing and height of street in section. The glass is all single glazed, contributing to the overall effect.	The relationship between inside/outside in courtyards is of exceptional significance. The single glazing, the extent of glazing and disposition of courtyards provides the transparency that is integral to the experience of the street and the ordering of the spatial plan.
relationship to exterior	The relationship to the exterior is mainly through the classroom windows. Views are visible from the main entrance gables also.	The relationship to the exterior is of little importance in the school. The windows in the classroom serve the functionality of the space but are not about views. The school is mainly an inward focused space, with no or limited views from street to exterior.

Surfaces

floor / blockwork internal walls / colour scheme / internal glazed screens

In this building there is considerable overlap between surface and structure. The expression of this construction is key to the experience of the space. The surfaces are the most immediate materials that determine the interior experience. The reflective dark floor is significant, as is the expression of construction evident in the blockwork internal walls. The original colour scheme was largely monochrome, except for the internal gable walls, though some of this has changed over time.



level of significance key

- exceptional
- high
- moderate
- little
- intrusive

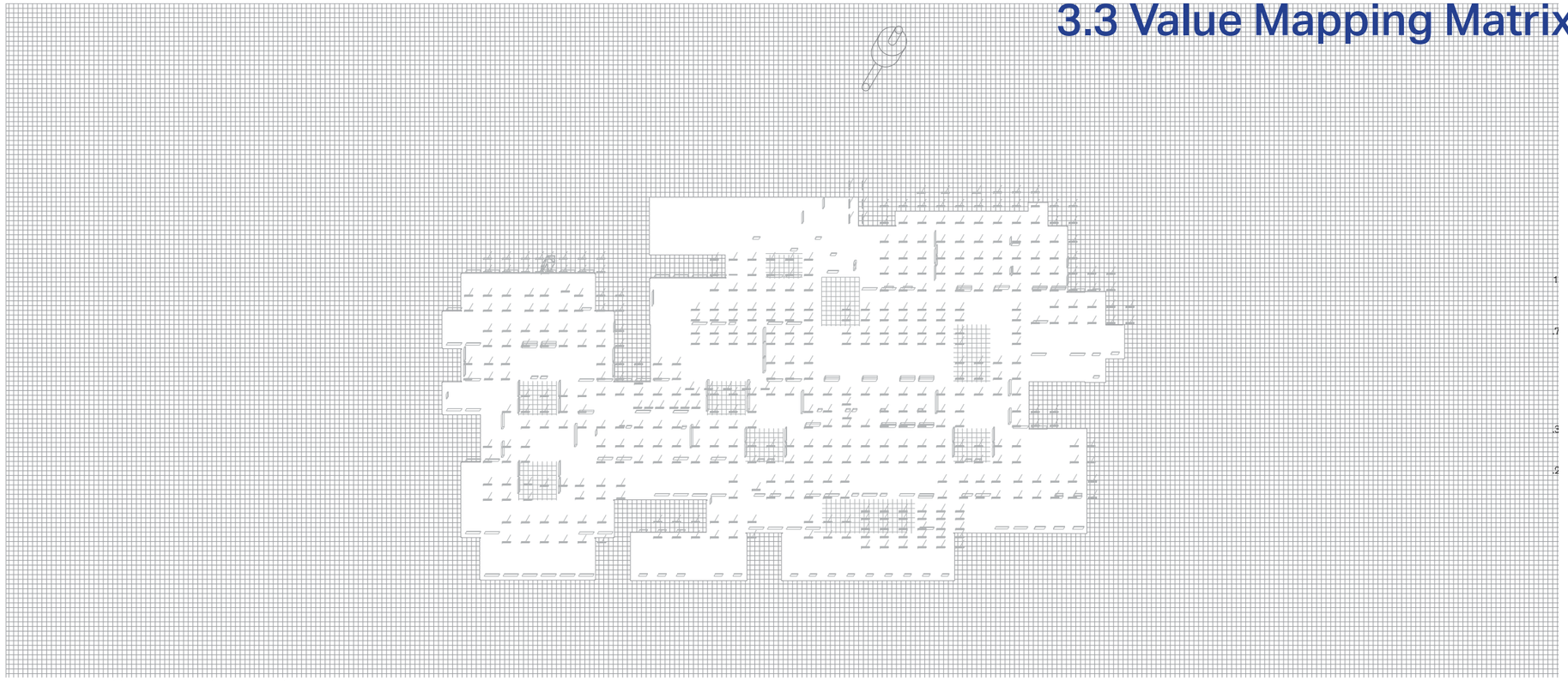
element & level of significance	description	significance
floor	The floor throughout the street and much of the plan is a dark, reflective type of linoleum. There are some carpets and different colour flooring in newer areas.	The floor finish in the street is considered of moderate significance, due to its dark colour, which relates to the original colour scheme, and its reflectance, which enhances the overall feeling of light in the space.
block internal walls	Blockwork is used as 100mm inner leaf to external cavity walls and as non-loadbearing partition walls 215mm thick between the portal frames, separating classroom from social spaces. The blockwork has a brick bond and is painted throughout.	Of high significance as it reflects the design ethos of expressing the primary construction materials, of building simply and cheaply, and of differentiating spatial enclosure from structural elements. The exposed nature of the blockwork is typical of its generation and significant as such.
colour scheme	There is a strong b&w colour scheme to the project; the blockwork and purlins were painted white and the roof had a white finish; the portal frames + glazing bars were black. The internal gable walls were the exception, with strong blue and green colours used.	Of exceptional significance, the colour scheme provides a clear hierarchy to the elements, strengthens the presence of the portal frames, and creates a cohesiveness to the design. The colour scheme is strongly modernist in its aesthetic and approach.
internal glazed screens	The glazed screens are located between the classrooms (library, woodwork, art room) and social space. They are single glazed with black painted timber frames.	The internal screens are considered highly significant, due to their original fabric that is intact. They are significant because of the light they let through from the social spaces into deep plan rooms and views they offer from the classrooms out. Their black colour is significant.

3.3 Value Mapping Matrix

Services

lighting / heating / water tower and chimney

The original services were exposed and expressed for reasons of economy, though this also had an aesthetic value, as they were carefully aligned with the space plan. Upgrades to the services over the lifespan of the building mean the newest installations are not aligned with the original design intention. The original services chimney for the peat fired boilers also acted as a water tower, and is of exceptional significance, as a key element in post-war modernist design.



level of significance key

- exceptional
- high
- moderate
- little
- intrusive

element & level of significance	description	significance
lighting	New lighting was installed when the roof was changed. This lighting runs perpendicular to the portal frames and is suspended from the roof structure and connected with galvanised, conduit trays running between them.	The lighting is considered intrusive to the significance as it does not follow the original design intention of the services. The conduit trays running perpendicular to the structure contribute to this.
heating	Original heating was by peat fired burners. This was replaced with oil fired central heating, operating in in six zones. The heating is by radiators with surface level pipe runs. There are no thermostatic controls at present.	The current heating method is sustainable and nneds updating to work more efficiently for the school. It is therefore considered of intrusive significance.
water tower/chimney	The water tower and chimney dates from the original construction. It is constructed of poured in situ concrete. The chimney from the peat burning boilers runs through the middle of the water collector.	The water tower and chimney is exceptionally significant. It was evident in the competition drawings (as steel structure) and is emblematic of an architecture that values and expresses technology. Though the chimney is no longer functioning, the tower is still significant.

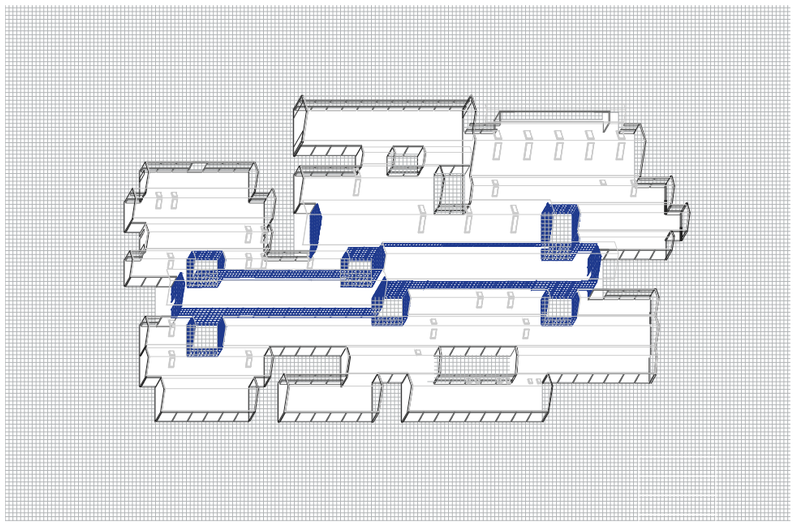
Skin

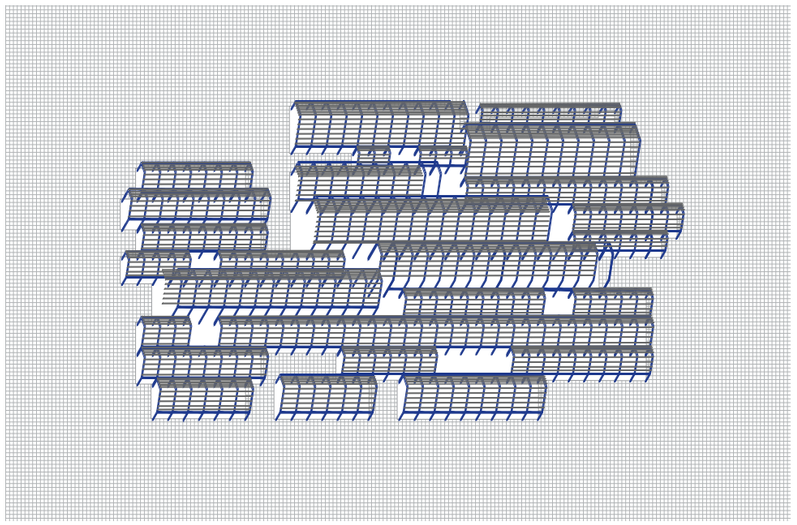
Structure

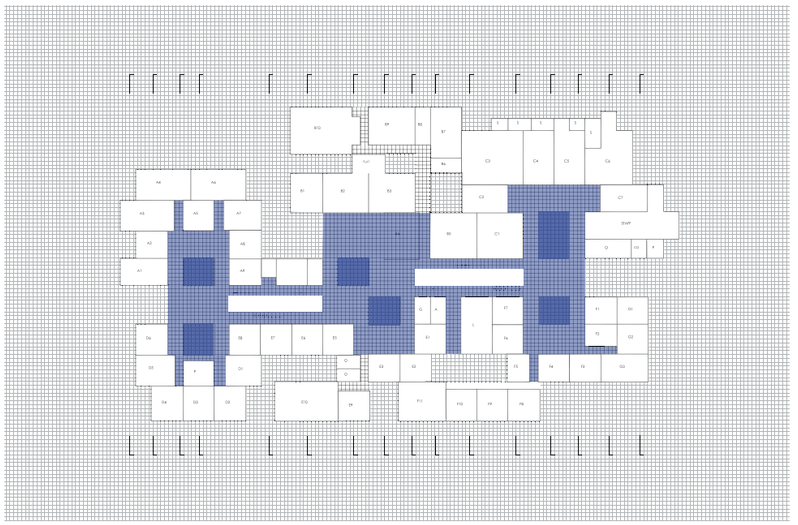
Space plan

Exceptional

- courtyard elevations
- portal frame
- the grid
- the street
- programme arrangement
- daylight
- section
- inside/outside courtyard







3.4
Illustrated Significance
Exceptional

Surfaces

Services

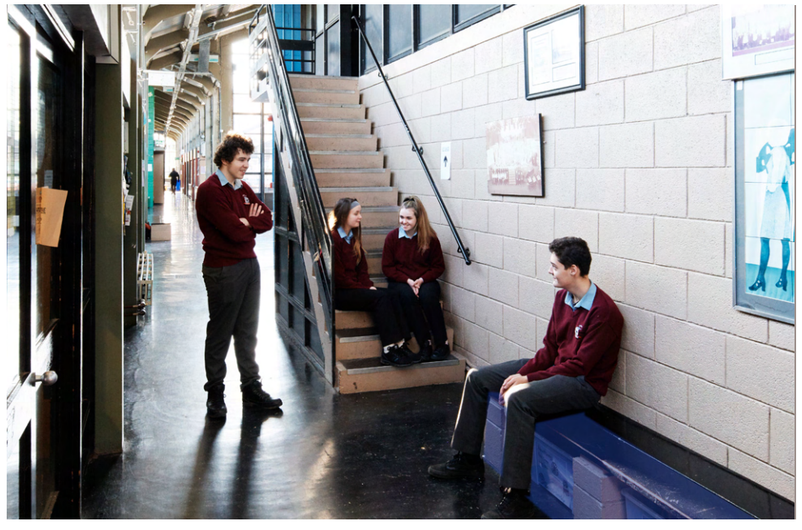
Stuff

Exceptional

- colour scheme

- water tower and chimney

- courtyard planting
- benches



Skin

Structure

Space plan

High

- perimeter & gable elevations
- clerestory windows

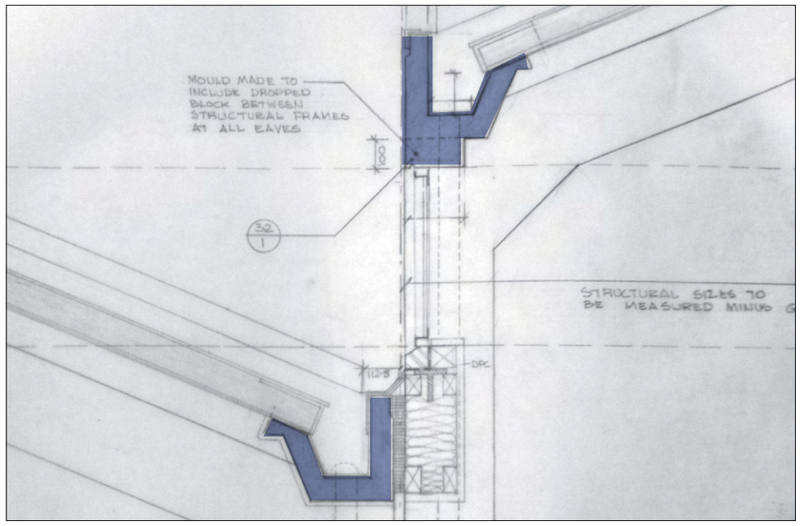
- edge beam

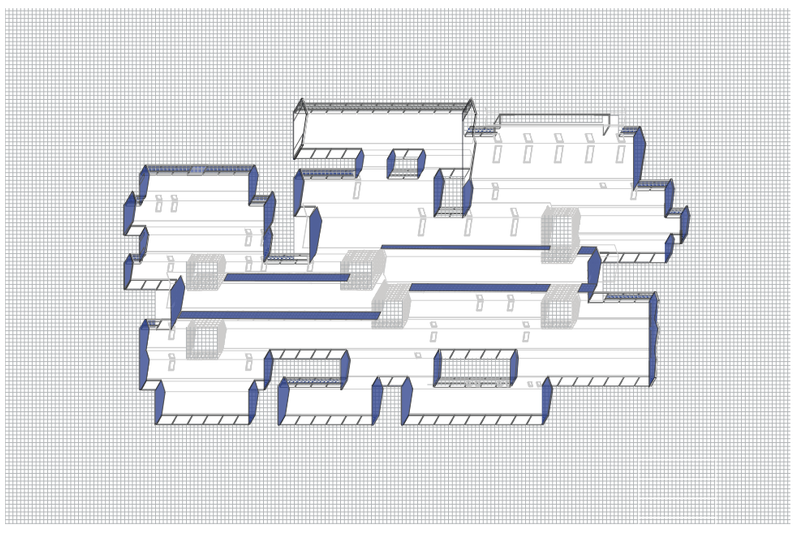
Moderate

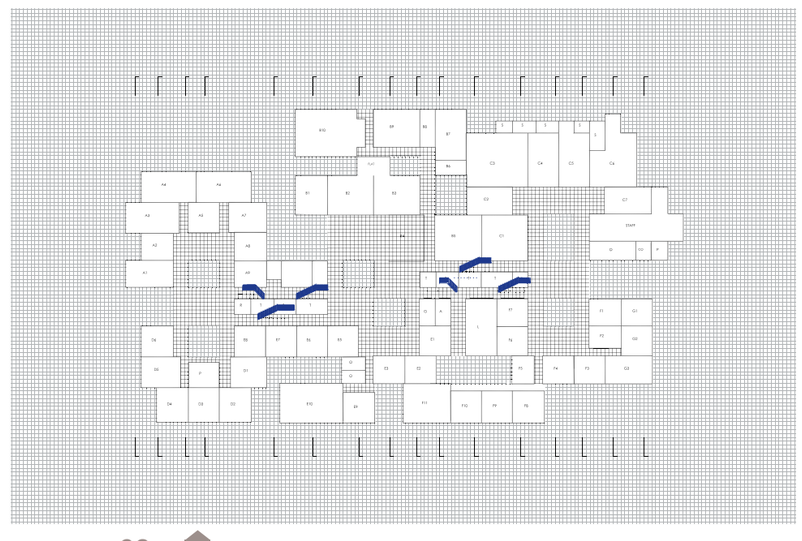
- classroom windows

- purlins

- stair/vertical elements







3.4 Illustrated Significance High & Moderate

Surfaces

Services

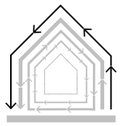
Stuff

High

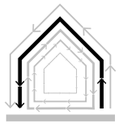
- blockwork internal walls
- internal glazed screen

Moderate

- floor
- gable walls and colours
- fitted furniture



Skin



Structure

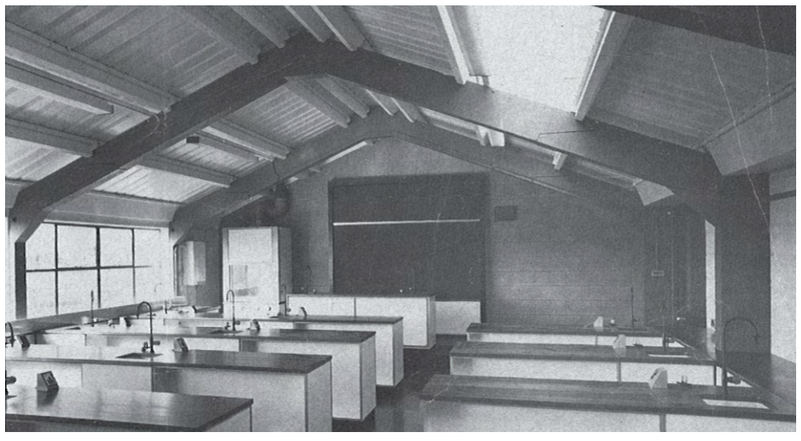
Space plan

Little

Intrusive

- roof
- rooflights

- relationship to exterior



Surfaces

Services

Stuff

3.4
Illustrated Significance
Little & Intrusive

Little

Intrusive

- new roof surface/soffit
- colours of same
- lighting
- heating

st. brendan community school, birr.

tolerance for change matrix

brand (+)	significance	tolerance for change
site	the bog	
	location (edge of town)	
	topography	
	exterior planting	
	views	
	orientation	
skin	courtyard elevations	
	classroom windows	
	perimeter elevations	
	gable elevations	
	roof	
	roof lights	
structure	portal frame	
	purlins	
	edge beam	
space plan	the grid	
	the street	
	programmme arrangement	
	daylight	
	section	
	stair/vertical elements	
	inside/outside courtyard	
	relationship to exterior	
surfaces (int.)	floor	
	blockwork int. walls	
	colour scheme	
	internal glazed screens	
services	lighting	
	heating	
	water tower/chimney	
stuff	courtyard planting	
	benches	
	fitted furniture & clock	
society	spirit of place	

tolerance for change categories

1	nil
2	some
3	moderate
4	substantial
5	high

3.5 Tolerance for Change

Introduction

'Tolerance for change (TfC) is a policy for judging the role that various elements of a site play in supporting its heritage significance and consequently, how tolerant they are to change without adverse impacts on that significance.'[4]

Having written the assessment of significance and identified the significance of the elements of the building, we now consider how tolerant they are to change. In a similar manner to the assessment of significance, we will consider the tolerance for change of each element in the shearing layers of the building. The tolerance for change is forward looking, acknowledging that change will happen to the building over its lifetime. It aims to give guidance to the building owner and user to guide change that retains the significance of the building. The TfC is based on the principles of the Australia ICOMOS Burra Charter.

Methodology

Tolerance for Change (TfC) is assessed across 5 criteria 1- 5 noted below.

1 : Nil to some tolerance for change
The key attributes of the element should be retained and conserved to ensure there is no adverse impacts on significance.

2 : Some tolerance for change
The key attributes of the element should be retained and conserved. It may be changed to some degree providing there is no, or minimal adverse impacts on its significance.

3 : Moderate tolerance for change
The key attributes of the element should be generally retained and conserved. Moderate change to this attribute is possible provided there are only minimal adverse impacts, supporting the significance of the element or the site overall.

4 : Substantial tolerance for change
Substantial change may be possible, avoiding adverse impact and supporting the significance of the site overall.

5 : High tolerance for change
There is a high tolerance for change to this element, avoiding adverse impacts and supporting the significance of the site overall.

For each of the elements identified in the value matrix, we have assigned a tolerance for change value. When making the assessment we are considering how much change is acceptable, without impacting the significance. The lower the tolerance for change (and the higher the significance) the more care is required when considering changes that may affect it. TfC can be used to inform policy or action. This analysis can be used to read the table overleaf.

This process informs policy development that offers operational guidance to the end user, and is aimed at minimising adverse impacts to significance.

4. Tolerance for Change July 2017, Sheridan Burke
5. This methodology is adopted from Sheridan Burke's 'Tolerance for Change Document' available in Appendix

Site

the bog / location / topography / exterior planting / views / orientation

This shearing layer considers the aspects particular to the site and location, the longest lasting aspects of the project. The bog in particular is noted as of exceptional value relative to the school's social role. Though designed for an unspecified site, the location on the outskirts of Birr has been a key to its success.

1	nil	2	some	3	moderate	4	substantial	5	high

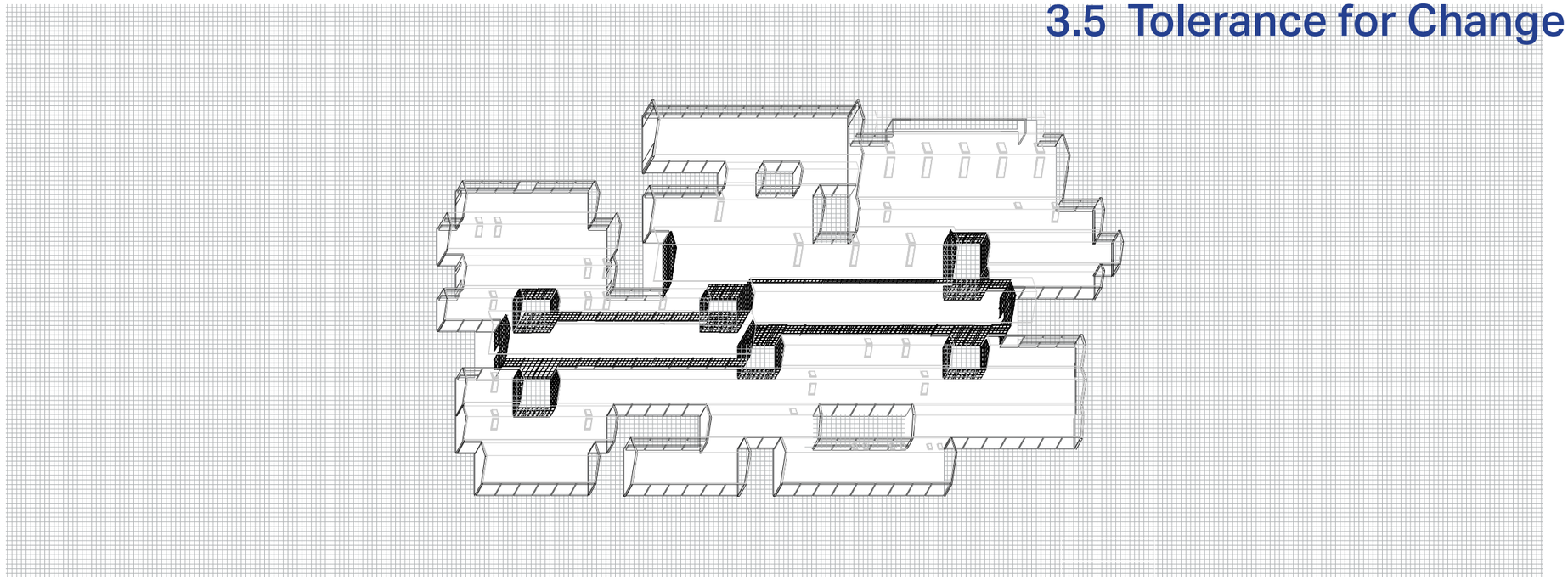
element & level of significance	tolerance for change	description	opportunities
the bog	the bog	The bog will change over time as peat harvesting ceases.	Opportunity to connect the school to the bog through future energy strategies and school engagement.
location edge of town	location edge of town	The location on the edge of town is key for the school and there is little tolerance for change here	
topography	topography	Though the project was envisaged for a flat site, the topography creates part of the experience of the built realisation, where the initial view of the building from the gate is across the roofscape.	
exterior planting	exterior planting	Current planting differs from the original and there is substantial opportunity for change here.	When new planting is being considered, refer to original exterior planting programme, especially at main entrances.
views	views	Views from the site or building do not form an integral part of the design and can be changed without dilution of the original idea.	
orientation	orientation	The building is designed for classrooms to be oriented East-West; a change to this would represent a significant departure from the original design.	

3.5 Tolerance for Change

Skin

courtyard elevations / classroom windows / perimeter elevations / gable elevations / roof / rooflights

This shearing layer considers all elements of the envelope and enclosure including the roof. Of highest value here are the courtyard elevations. These are significant socially, through the light and transparency they offer; technically, in the expression of the means of construction and aesthetically in creating the visual experience in the 'street'.



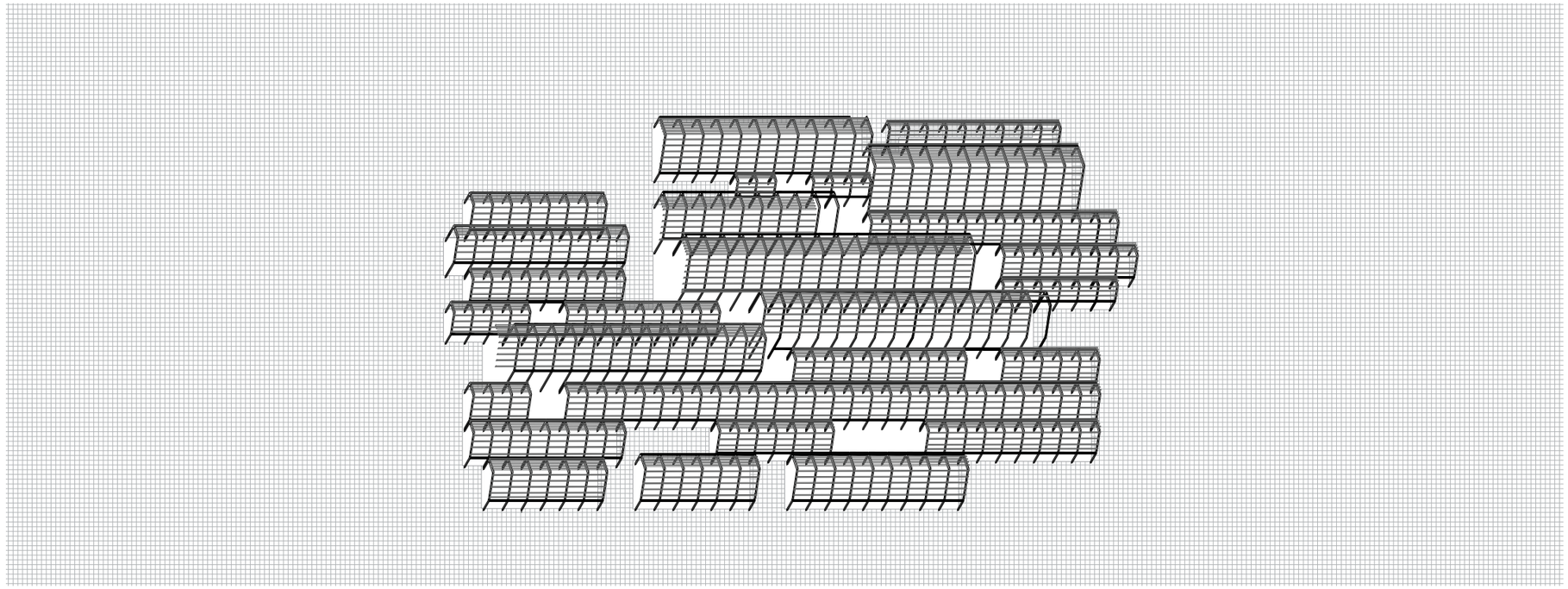
1 nil	2 some	3 moderate	4 substantial	5 high

element & level of significance	element & tolerance for change level	description	opportunities
courtyard elevations	courtyard elevations	These elements are of the highest significance and original fabric. Change would likely impact the transparency in the space; furthermore removing original fabric in this location is not advised.	Maintenance and repair, plus replacement with laminated glass is advised; pilot project with slimline double glazing in existing frames could be tested.
perimeter & gable elevations	perimeter & gable elevations	Relationship and expression of brick, column, edge beam and window spacing are all integral to the significance of the building. Glazed gable elevations are significant but may allow change; consideration of scale of original glazing and expression of corners and structure to be retained.	There is the opportunity to upgrade the windows to thermally broken steel frames with double glazing and retain the significance.
classroom windows	classroom windows	These elements are significant in terms of their material type and relationship to the grid spacing.	Changes specialist steel frame double glazed windows, matching existing, possible here as long as they retain the relationships between the elements that make up the significance and align with the grid. Opportunity to improve thermal performance.
clerestory windows	clerestory windows	These elements are significant in terms of their material type and relationship to the grid spacing. The quality of light they bring in to street is very important and to be maintained. They are original fabric.	Alterations may be possible here, as long as they retain the relationships between the elements that make up the significance and align with the grid.
roof	roof	Original roof has been replaced; the replacement has a negative impact due to dark colour and changed material quality.	When replacement happens, revert to original design with light colour; this also gives the opportunity to increase thermal performance, improve services strategy overall and potential to include PV panels etc.
rooflights	rooflights	Original roof lights were smaller with greater dispersal; new roof lights are larger causing too much difference in light levels across the space	When roof replacement happens new rooflights with designed light spread to be installed. Further light study to be considered here.

Structure

portal frame / purlins / edge beam

Core to the original project's design was the development of a pre-cast concrete portal frame structure that allowed for flexibility and adaptability in plan. The portal frame's expression and its impact on the spatial experience is of exceptional importance in the building.



1	nil	2	some	3	moderate	4	substantial	5	high

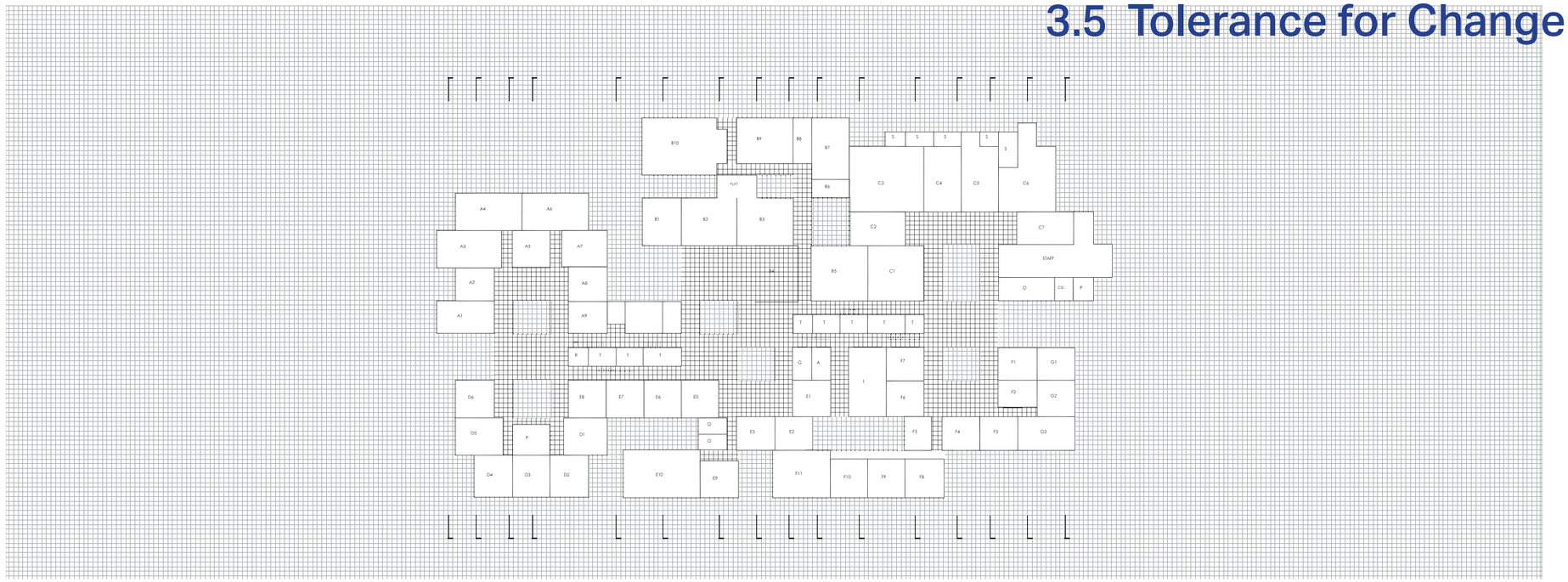
element & level of significance	element & tolerance for change	description	opportunities
portal frame	portal frame	The Portal frame is an integral part of the original design and the existing structure and has no tolerance for change, both in terms of significance, and in terms of feasibility/integrity of the building.	
edge beam	edge beam	The edge beam is integral to the structure of the building, it also acts as gutter, is original fabric and its expression internally and externally is significant	Options for lining and insulating gutters should be carried out as part of re-roofing. Expression and section of gutter to be retained in any proposal.
pur-	purlins	The purlins are carefully designed to span between the portal frames and to carry fittings. Replacement may be possible if these are materially degraded, but replacement should be in line with original.	

3.5 Tolerance for Change

Space plan

spatial arrangement / the street / programme arrangement / daylight / section / stair/vertical elements / inside/outside / relationship to exterior

This shearing layer reflects the functional and intangible aspects of the spatial planning. In the school, the programmatic clustering around courtyards, connected by the spine of the 'street' is of exceptional importance. This along with the considerable daylight and spatial experience allowed by the changing section and clerestory lighting creates a spatial plan centred on the street that is of exceptional value.



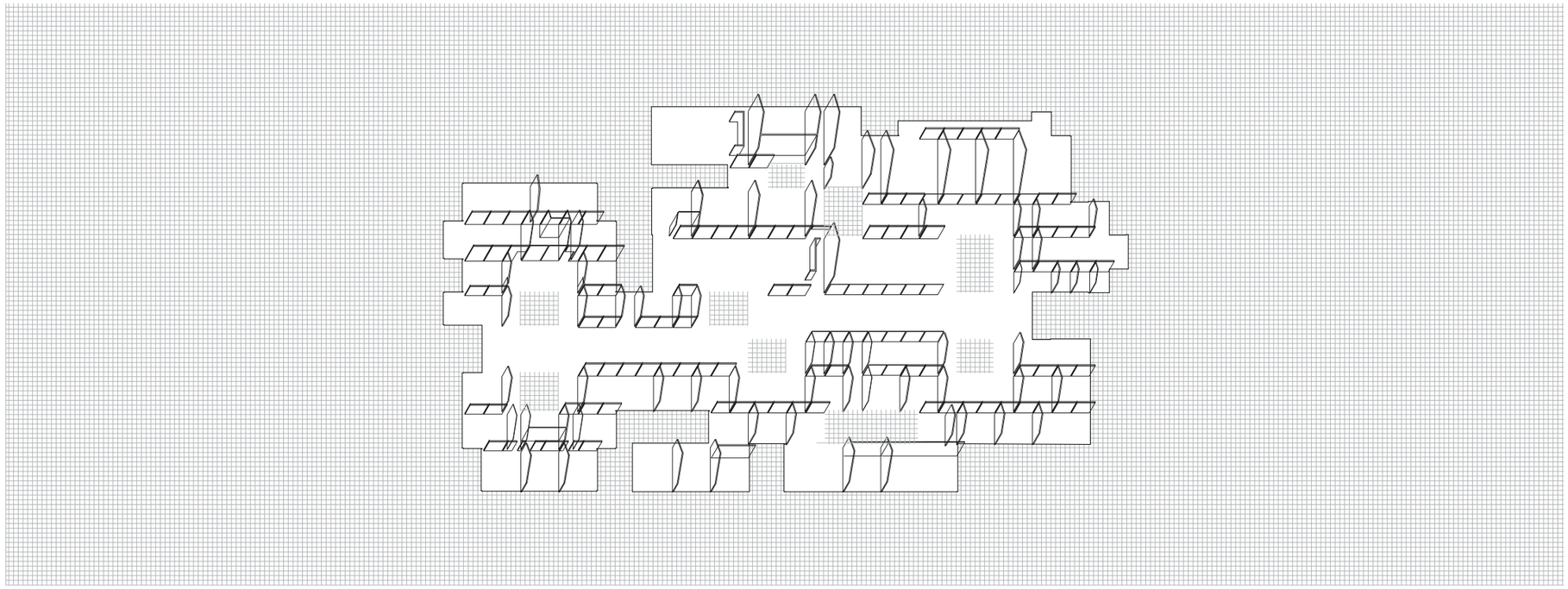
1 nil	2 some	3 moderate	4 substantial	5 high

element & level of significance	element & tolerance for change level	description	opportunities
the grid	the grid	The grid is the ordering element that underlies the whole spatial arrangement and technical detailing. There is no tolerance for change here.	All/any new additions should respect the 900mm grid module.
the street	the street	Of exceptional significanc, the 'street' is core to the architect's original intention and the social vibrancy of the school today. No change should impact on the hierarchy of the street as the main organiser of the building. Light levels and views to be retained.	
programme arrangement	programme arrangement	Though the programme arrangement - where related subjects are aggregated around a courtyard - is of high significance, there is ability to change the programming of spaces without impacting the significance hugely.	As curriculum develops aspects of this programming may change, though the suiting of learning types around courtyards is of benefit to the coherency of the school plan.
daylight	daylight	All efforts to maintain the levels of daylight in the central space, from clerestory, gable and courtyard glazing should be retained. Daylight in the classrooms requires modification.	Where glazing is replaced in these areas careful consideration should be given to type and quality; further recommendations in section 5.
section	section	The variation in section, created by the portal frames, is of exceptional significance. The sectional profile needs to be maintained in any changes.	
stairs/vertical elements	stairs/vertical elements	While the stairs are important socially, there is room for change here, especially if required to meet new regulations.	Upgrades to stairs should consider the original design and overall aesthetic of the school in any design changes.
inside/outside courtyards	inside/outside courtyards	The relationship between inside and outside, created by the courtyards, is of central importance to the building. Any developments to the building should retain and enhance this relationship.	Original frames to be retained but alternative glazing can be considered; laminated single glazed or special slimline double glazed windows in the original frames to be examined further (see Section 5).
relationship to exterior	relationship to exterior	The relationship to the exterior is of little significance. Any change should retain the same daylight levels.	

Surfaces

floor / blockwork internal walls / gable walls and colours / b&w colour scheme

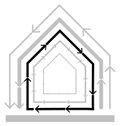
In this building there is considerable overlap between surface and structure. The expression of this construction is key to the experience of the space. The surfaces are the most immediate materials that determine the interior experience. The reflective dark floor is significant, as is the expression of construction evident in the blockwork internal walls. The original colour scheme was largely monochrome, except for the gable walls, though some of this has changed over time.



1 nil	2 some	3 moderate	4 substantial	5 high

element & level of significance	element & tolerance for change	description	opportunities
floor	floor	The floor throughout the street and much of the plan is dark. The dark and reflectant quality of the floor should be retained in any changes.	Change here could upgrade the quality but retain the reflectance and colour scheme of original.
block internal walls	block internal walls	The blockwork internal walls express the core architectural ideas of the project, based on economy of means and expression of construction. Changes should retain the presence of the blockwork walls.	
colour scheme	colour scheme	The original colour scheme was black and white for all elements, except the coloured gable walls. We advise reversion to the B&W colour scheme to give clarity to the interior of the building and retention of colour to gable walls.	Inexpensive opportunity to bring coherence to overall plan through re-instating original colour scheme.
internal glazed screens	internal glazed screens	These are important as original fabric, and also as light givers to the classrooms. Changes here should be carefully considered and should retain the visual experience, colour and breakdown of panes.	Options around double glazing within existing frames, could be considered, which would give greater sound protection.

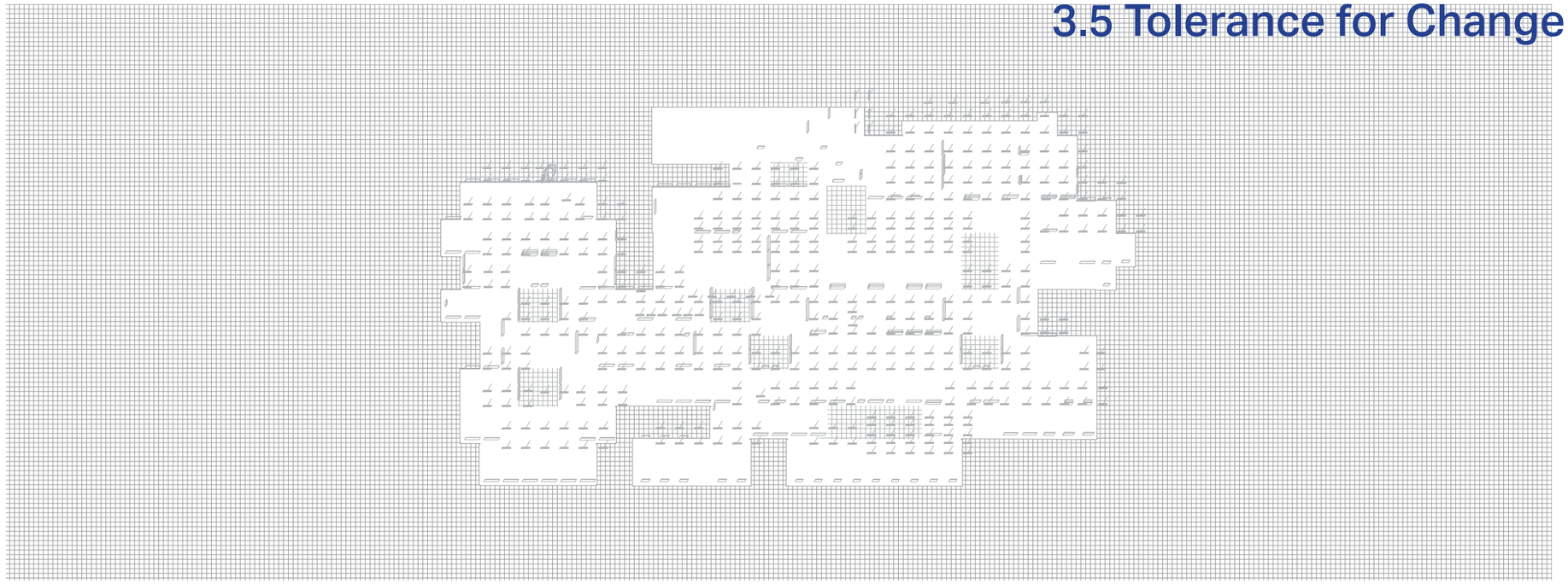
3.5 Tolerance for Change



Services

lighting / heating / water tower and chimney

The original services were exposed and expressed for reasons of economy, though this also had an aesthetic value, as they were carefully aligned with the space plan. Upgrades to the services over the lifespan of the building mean the newest installations are not aligned with the original design intention. The original services chimney for the peat fired boilers also acted as a water tower, and is of exceptional significance, as a key element in post-war modernist design.



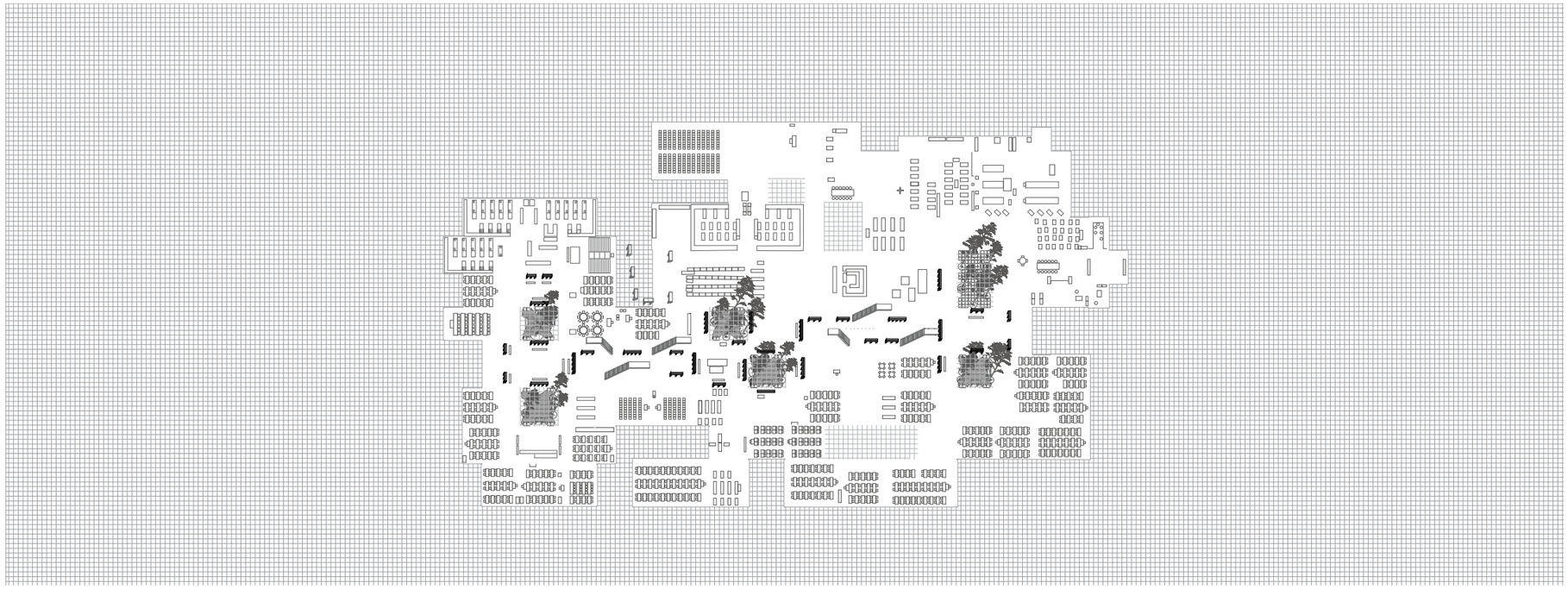
1 nil	2 some	3 moderate	4 substantial	5 high

element & level of significance	element & tolerance for change level	description	opportunities
lighting	lighting	The lighting has been fully changed since the original, with the loss of clarity in a services strategy, loss of uplighting, and lighting that goes against the portal frame structure. There are ample opportunities for change and improvement here.	Opportunity to retain clarity of original design as well as energy saving options.
heating	heating	The heating has changed from peat fired to oiled fired heating. Underground services have been introduced. There is ample opportunity for change here.	Opportunity for sustainable measures and reduced running costs.
water tower/chimney	water tower/chimney	While the water tower and chimney is of exceptional significance, it no longer serves its original purpose. Functional changes are possible, though formal changes should be avoided.	Retaining, celebrating and communicating the significance of this tower is important to the overall understanding of the school.

Stuff

courtyard planting / benches / fitted furniture & clock

This shearing layer relates to the most ephemeral aspects of our occupation of a building, though these elements often have a high impact on our experience of the place. The planting in the courtyards is a key factor in the experience of the space. The benches, equally are of exceptional significance in the social performance of the school and in achieving the Doyle's ambition for the 'street'.



1 nil	2 some	3 moderate	4 substantial	5 high

element & level of significance	tolerance for change	description	opportunities
courtyard planting	courtyard planting	The retention and maintenance of planting to the courtyards is important in the significance of the building; guidance from the original plans can be sought, however there are options for change here depending on the school's needs.	Evolving considerations in curriculum regarding sustainability could be explored through the courtyards.
benches	benches	The original benches are still intact and in use. They should be retained. If repair or replacement is necessary, this should be done with matching materials.	The benches are exceptionally significant. They form part of the original design and are still intact. They are integral to the design intent of the street as a social space and they continue to be vitally important to its function as a social space.
fitted furniture	fitted furniture	Original furniture elements should be retained and restored as necessary.	

Section 4
Policies & Managing Change

4.1 Introduction

‘Policy or conservation policy is shorthand for all of the policies and actions needed to manage a place of cultural significance and retain its values. Developing policy is an essential prerequisite to making and implementing decisions about the future of a place. Conservation policy covers more than just physical conservation’.

The generation of policies for intervening in and managing sites of significance is one of the key stages of the conservation planning process as outlined in the Burra Charter (2013). Conservation policies provide guidelines on how to proceed in the operation and development of sites of significance.

The policy framework developed for St. Brendan’s Community School, Birr below responds to the vulnerabilities and opportunities as identified and with reference to the assessment of significance. These and the policies which respond to them have been divided into two categories: (i) Physical (ii) Management and Operational.

Vulnerabilities

Physical

- Loss of Original Fabric
- Dilution of Original Plan
- Fabric Detrioration
- Heat Loss
- Services
- Air Quality

Management / Operational

- No Protected Status
- Funding Structures
- Lack of Plan
- Energy Legislation
- Demolition
- Change of Use

Opportunities

Physical

- Enhanced Fabric
- Increased Comfort
- Reduced Energy Consumption
- Improved Classroom Performance

Management / Operational

- Protected Status
- Ireland 2040
- CMP
- Wider Impact

4.2 Vulnerabilities & Opportunities

Vulnerabilities

Physical

Physical vulnerabilities relate to the fabric of the building. They concern areas identified as significant which have been adversely affected over the course of time, or may be reasonably expected to become vulnerable in the future if measures are not put in place to protect them. Many of these overlap closely with, or impact on, other aspects within the school buildings and site. The condition survey carried out for this report identified significant fabric deterioration. This allied with inappropriate historic interventions leads to the possibility of further loss of original fabric. Other vulnerabilities relate to the functioning of the building as a school. These include the possible dilution of the original plan and, thereby, its origins in the architects' innovative interpretation of the democratisation of education, an evidently significant moment in Ireland's twentieth-century social history. Other aspects relate to the building's meaning-in-use as a school including the problem of excessive heat loss, inadequate (and anachronistic) services, and poor indoor air quality. All of these compromise the building's performance as a conducive and stimulating learning experience as originally envisioned by the architect and expected by today's education and environmental standards.

Management/Operational

The lack of protected status has meant that over the years the school, responding pragmatically to operational and immediate needs, has undergone some inappropriate interventions to its significance as a cultural site. The continuing lack of such status and the lack of a plan that addresses the site holistically means that such developments may continue in the future. This is exacerbated by the current funding structures of the Department of Education and Skills under which schools bid for funds based on short term or immediate needs. This structure is not designed to differentiate between the finance to maintain and develop a culturally significant site and those of other facilities. The continuing raising of environmental standards and energy legislation is also a threat to a building which, as noted above, suffers from excessive heat loss and other environmental issues. Despite the architects' vision of functional flexibility, the continuing use of the building as a school is a key aspect in its cultural significance. A future change of use caused perhaps by fabric, environmental and energy performance that is inadequate to educational best practice and legislation is a possibility. The lack of protected status may mean that if such an eventuality occurred it could be followed by the worst case scenario of demolition.

Opportunities

Physical

Alongside the evident vulnerabilities there are also opportunities to rethink and replan the future of the school by reconciling the issues surrounding its conservation with strategies for overcoming its environmental and energy problems. Strategic interventions designed to realise the interlinked opportunities of enhanced fabric, increased comfort, reduced energy consumption and improved classroom performance can occur in a manner consistent with the significance of the building and the elements involved. This leads to a greater opportunity, to reaffirm St. Brendan's as a state of the art school for twenty-first century education, one which is simultaneously a paradigm of energy efficiency and a continuing piece of highly important social, cultural and education heritage.

Management Operational

Opportunities within the management and operation of the school provide some of the means to achieve this. Seeking and gaining Protected Status would give national recognition to the significance of the school and help prevent any inappropriate developments in the future. It could also help to differentiate levels of funding between St Brendan's and other non-listed schools. The repair, upkeep and maintenance of a listed building is acknowledged as being more costly. Protected status may also open up other funding streams regarding built heritage. The increase in education funding promised by Ireland 2040 may also allow further investment into the school. The suggestion of a deep energy-driven retrofit for St. Brendan's reconciles the programme's development of education with its carbon-reducing environmental obligations and planning. The adoption of the Conservation Management Plan (CMP) by the school community and the Department of Education and Skills would facilitate a strategic approach to the whole site from physical interventions to ongoing maintenance programmes. Its definitions of how to precisely address the educational and environmental needs of the school makes it clear why significant investment is necessary and appropriate. Coupled with protected status this relates to the final opportunity to build on the international recognition of school by the Getty Foundation and the related media coverage to realise wider impact. Generating further knowledge of the architectural and cultural significance of the site could potentially provide further leverage. This could be achieved through participation in cultural and other events such as Culture Night, Open House and Heritage Week and other forms of initiative concerning media liaison and publicity and through the development of a communications strategy.

Vulnerabilities

Physical

- Loss of Original Fabric
- Dilution of Original Plan
- Fabric Detrioration
- Heat Loss
- Services
- Air Quality

Management / Operational

- No Protected Status
- Funding Structures
- Lack of Plan
- Energy Legislation
- Demolition
- Change of Use

Policies

Physical

- Maintenance and Repair regime to be developed and followed
- Physical intervention strategy to be developed in line with CMP to retain elements and aspects of highest significance
- Environmental and energy strategy to be developed in line with CMP
- Engage consultant (conservation grade architect) as part of the design team with respect to significant physical interventions.

Management / Operational

- Adopt CMP by school board, school community and building's owners
- Apply for Protected Status with CMP as basis of protection
- Space Assessment & extension strategy developed in line with CMP
- Heritage Impact Assessment required when major renovations proposed
- Communication Strategy to be developed to increase impact of CMP: strategy to include external and internal communication
- Designation of Staff and Student members in School as Liason for Building
- Policy Review and implementation becomes school board's responsibility

Opportunities

Physical

- Enhanced Fabric
- Increased Comfort
- Reduced Energy Consumption
- Improved Classroom Performance

Management / Operational

- Protected Status
- Ireland 2040
- CMP
- Wider Impact

4.3 Policies

Introduction

The policies below are designed to provide a framework for conserving the school, its buildings and activities. As related above they are divided into categories (i) Physical (ii) Management and Operational.

Physical Policies

Design and follow a maintenance and repair regime

Produce a cyclical timetable for inspections and maintenance.

Develop a physical intervention strategy in line with CMP to retain elements and aspects of highest significance

The CMP gives guidelines on the respective significance of the buildings and its elements and their tolerance for change. The intervention strategy can take cognisance of the phasing and timing of interventions.

Develop environmental and energy strategy in line with CMP

The CMP provides valuable data on the environmental performance of the building and outlines strategies to improve its energy consumption and staff and student comfort in a manner consistent with its significance as a piece of built heritage.

Engage consultant (conservation grade architect) as part of the design team with respect to significant physical interventions.

On-going expert advice will be necessary to ensure future developments at the school remain appropriate and in keeping with the observations of the CMP. This advice to be adopted at the project initiation stage.

Management & Operational Policies

Adopt CMP by school board, school community and building's owners

The CMP represents the culmination of systematic research into the needs of the school as a totality. It provides clear strategies for its future operation and development.

Apply for Protected Status with CMP as the basis of protection

The findings of the CMP can be used to apply for protected status and help determine the scope of protection.

Develop space assessment and extension strategy in line with CMP

The CMP should be used as a guide to determine how best to use existing space and plan future developments.

Prepare required Heritage Impact Assessment when major renovations are proposed

This can be facilitated in discussion with the conservation grade architect consultant.

Develop communication strategy.

This should communicate the significance of the building internally to its staff and students but also encourage external engagement to increase wider public knowledge and appreciation of the school.

Designate staff and student members in school as liaison for building.

This role is threefold; firstly to act as informed client, giving feedback on user's needs, in light of the buidling's significance, when changes are proposed or required; secondly this role has a guardianship role, including record keeping, ensuring information is retained and passed on as necessary; thirdly this role involves developing and maintaining the communication strategy that explains the significance of the building to its users and a wider audience.

Review policies periodically

It will be necessary to revisit the policies periodically (once every 5 years as a guide) to review that they are still fit for purpose.

Implementation of policies becomes part of the school board's agenda.

This concerns embedding discussions, feedback and review of policy implementation within the governance structure of the school and its communications.

Section 5
Strategies for Intervention

5.1 Introduction

Introduction

The process so far has brought us an understanding of the significance of the school, that informs policy and in turn guides future action. Conservation essentially means all the processes of looking after a place or site so as to retain its cultural significance. But change is inevitable and conservation also addresses how best to manage change. This section of the report outlines principles of maintaining the existing fabric and highlights the importance of this; it offers a guide to managing change and it brings together the analysis carried out in sections 1-3 to propose strategic methods of intervening to improve the quality of the existing school.

ICOMOS' Madrid - New Delhi Document, outlines the approaches to 20th century cultural heritage and is the basis for this element of the report.

Managing Change

'do as much as is necessary and as little as possible'

Conservation can be described as the process of managing change. Change is inevitable and can come from a variety of sources. The response to each of these should always refer back to the statement of significance, tolerance for change and policies to determine how the action should be guided.

Change can take the form:
- change of use (partial or whole)
- material changes through repair or replacement
- new additions/extension to the school
- demolition, partial or whole

These changes are precipitated by:
- policy or demographic changes
- changes to pedagogical methods
- deterioration of fabric through lack of maintenance or lifespan of materials being reached
- legislative changes, e.g. upgraded safety legislation, or environmental regulations
- additional space & functional requirements
- redundancy of part or whole of building

Principles to adopt when considering change are:
- Proposed change should be approached cautiously.
- The principal of 'do as much as is necessary and as little as possible' should underpin any proposed changes.
- Change should be assessed against the significance of the building and the tolerance for change. Changes should not detract from the significance.
- Changes should be reversible if possible.
- Integrate the assessment of heritage impacts of change at the initiation of proposals
- A flexible approach to achieving building standards may be required.

Maintenance & Repair

Maintenance means the continuous protective care of the fabric and setting of a heritage place or site, and is to be distinguished from repair. Continual and appropriate maintenance, along with periodic inspection, is the best and first conservation action. A maintenance plan will outline the maintenance required, and intervals for these. It will also identify responsibilities for maintenance within the organisation.

Repair may involve the restoration or reconstruction of existing and/or new fabric to bring an element to a functional state. Specific repair methods are appropriate for different materials and investigation of the existing material by a specialist is appropriate before repair is undertaken. Repairs should be undertaken using the least invasive method possible.

Restoration means returning a place to a known earlier state by removing accretions or by reassembling existing elements with the minimal introduction of new material. Significant elements should be repaired or restored rather than reconstructed.

Interventions

Interventions and additions need to respect the significance of the place. They should respect and consider scale, character, setting, composition, proportion, structure, landscaping, materials, detailing etc. of the existing building. Additions should be discernible as new, on close inspection, but work in harmony with the existing, 'complementing, not competing, interpreting not imitating.'

Principles for intervention include:
- Significant elements should be repaired rather than replaced.
- If replacement is necessary, replacement should be like for like and new materials should be distinguished.
- Interventions should enhance and sustain cultural significance
- Careful record should be made of proposed changes, documentation of existing should be made prior to works. On completion, archives of records should be kept to inform future work.
- Significance should not be adversely affected by energy conservation measures, with a balance being struck to ensure proper functioning of the building.
- Interventions to a place of cultural significance should be executed with sustainable methods.
- Consultation with all parties is necessary to ensure a balanced solution between competing needs and to ensure sustainability of the place.
- Any intervention to improve energy performance should be based on the baseline information produced by this study.

Technical

Space Plan

1. Classroom & Social Space as Different ‘zones’

2. New Bag Storage at Class Perimeter

Fabric

1. Follow Maintenance Plan

2. Insulate and Re-line gutters

3. Repair Spalling plaster below Clerestory throughout

4. Insulate Cavities with Pumped Insulation

5. Perimeter Insulation to all external walls

6. Upgrade Windows

7. Improve Airtightness

8. New Roof

Services

1. Develop Services Strategy

2. New Heating Controls

3. Boiler Upgrade

4. New Mechanical Air System

5. Future Energy Source

5.2 Intervention Overview

Introduction

The interventions consider physical changes that can be made to improve the school. These are separate but connected to policy and management changes also.

The interventions are divided into 3 categories those that relate to:

- Space Plan
- Fabric
- Services

These proposal are described in brief on this page, and in greater detail in the following pages. The proposed interventions are assigned values; a strategy and phasing for works are proposed at the end. In each case the proposed works are listed in the order of simplest to achieve to the most complex or expensive. Each of the three components - Space Plan, Fabric, Services, is interdependent and measures may achieve the best result when taken together. Consideration of this is also elaborated on in the phasing aspect of the report. These measures should be undertaken alongside the policy, management and maintenance measures and not in lieu of these.

These interventions do not consider extensions to the school but rather works to the original fabric. Consideration of new extensions should be done with regard to the CMP but specific direction is outside the scope of this plan.

Space Plan

Space plan relates to how the rooms and building is used, or the functional and social aspects of the building, rather than the fabric performance or more technical aspects of services. In that regard it is the area closest to management and involves some spatial as well as management aspects.

The two interventions considered in relation to the space plan are:

- classroom and social spaces treated as different thermal zones
- new bag storage at class perimeter

Fabric

Fabric relates to the physical components that come together to make the building. The services aspect is considered separately, though the space, fabric and services aspects are inter-connected.

Nine interventions are proposed here in total, and these are detailed below.

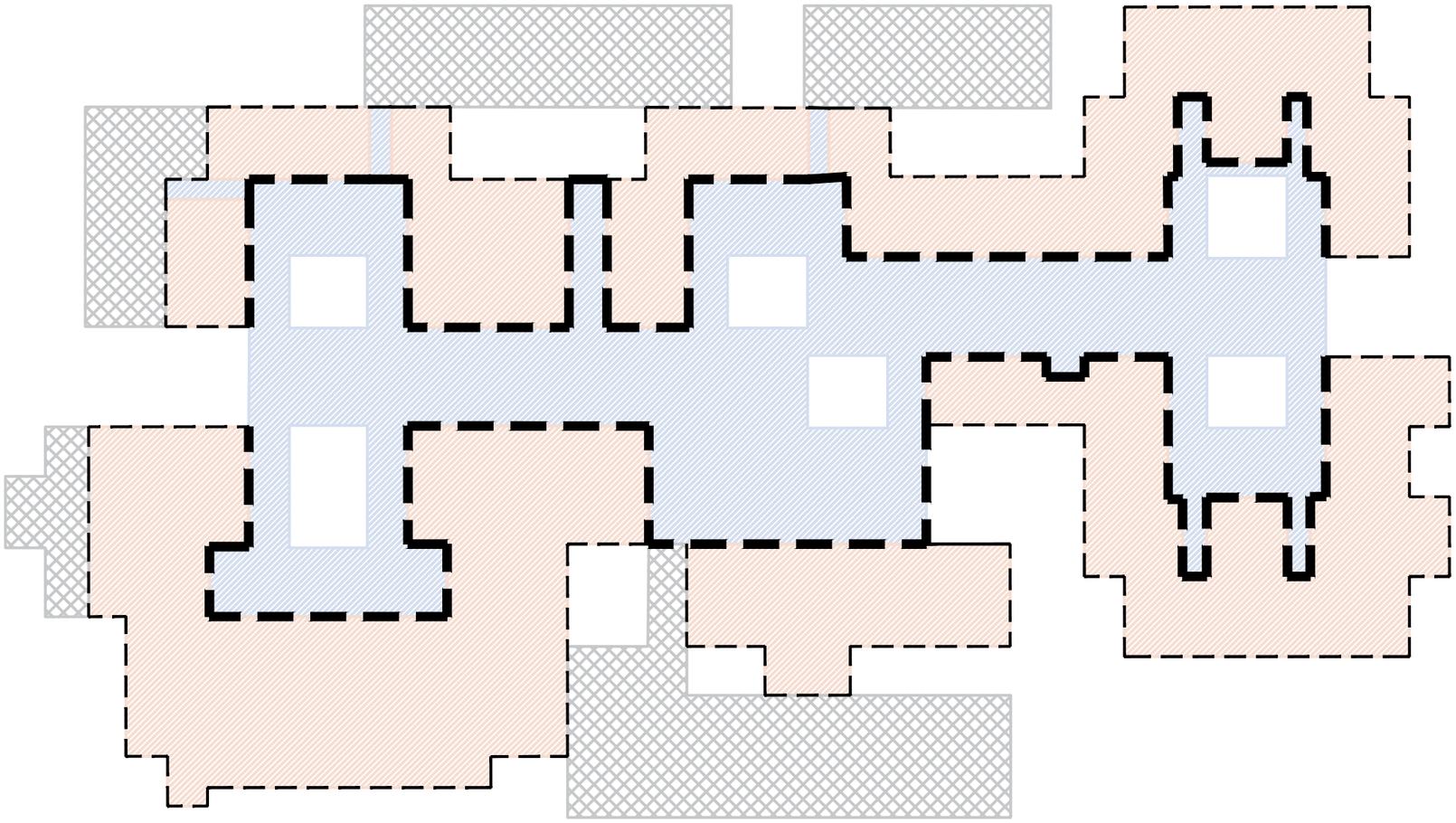
- Follow Maintenance Plan
- Insulate and Re-line gutters
- Repair Plaster below Clerestory throughout
- Insulate Cavities with Pumped Insulation
- Perimeter insulation to all external walls
- Lining to Social Spaces
- Upgrade Windows
- Improve Airtightness
- New Roof

Services

Services relates to the technologies that we use to heat, cool, light and ventilate our buildings. The baseline study identified the issues and problems facing the school with regard to services. Improvement in these measures, alongside the fabric measures can reduce the heating costs and energy usage and bring the building closer to meeting its sustainability targets. We have modellled the impact of these measures and included variations on this at the end of this section.

The 5 interventions with regard to services are:

- Develop Services Strategy
- New Heating Controls
- Boiler Upgrade
- New Mechanical Air System
- Future Energy Source



New zoning

- **Create two zones of thermal comfort. The strategy is to improve teaching spaces whilst social spaces are treated like a winter garden environment.**

KEY

	SOCIAL SPACES	18°C
	CLASSROOMS	20°C
	RECENT EXTENSIONS	2010-2017

5.3 Intervention Space Plan

1. Thermal Zoning

The aim is to achieve optimal quality in the classroom as these are the learning spaces, where air quality, temperature and relative humidity have a real impact on the education of the child. The social spaces, do not have the same performance requirement and indeed their bright, airy qualities offer a valuable contrast to the environment of the classroom. The open airy quality of the street is central to its original design and also recognised as valuable by current users.

A contrast between the teaching spaces and central spaces allies with the proposed intervention strategy. It is feasible to intervene in the classroom to improve its thermal performance, because of its scale and its discrete nature, whereas with the social space this is more complex. Furthermore, from a significance aspect, the classroom spaces are considered of lesser significance than the social spaces, which allows for greater intervention in the classroom than to the central street.

In effect, this means setting the thermostats to different temperatures in each zone. The classroom will be set to the optimal temperature and the social spaces to a cooler temperature. It is important that the school body understands why this approach is being taken and accepts that the central spaces may be cooler at times and understands the value in this, performatively and in terms of significance. It re-enforces the street as an outdoor space, and inhibits the introduction of what has been described as ‘thermal beige’, often found in modern buildings, where the temperature and humidity is consistent across spaces, producing a bland experience of the building.

This is a low cost, high impact intervention.

2. New Bag Storage

The current bag storage in the central social spaces is significantly detrimental to their cohesion as social spaces, to their functionality, to the visual experience and connection of views across the space. Notwithstanding the issues of bag storage and related health and safety, opportunities exist to increase storage around the perimeter of classrooms. This can be undertaken with additional thermal measures that would re-enforce the different temperature zones between classroom and social space.

This measure has a high value in terms of the social value and aesthetics of the school; it is relatively low-cost and high impact.

1. Follow Maintnenance Plan

The development and implementation of a maintenance plan is key to the conservation of buildings. The maintenance plan should identify elements that require regular maintenance, the intervals at which they need maintenance, how the maintenance should be carried out and by whom, and what budget is required for this.

The policies recommend the creation of a maintenance plan for St Brendan's. This should, address the following items, though will not be limited to these:

- Roof: Water ingress can significantly damage building fabric and can be minimised by regular cleaning of roof gutters and inspecting the roof and rainwater goods for deterioration or repair needs.
- Windows: The window condition to be examined annually. Where mechanisms are not working introduce repairs. A regular painting regime for the windows should be adopted with appropriate paints used. Where repair of glazing occurs, matching putty to be used.
- Services: Services require regular repair. The intervals of these will be set by the manufacturer of the equipment. All servicing to be logged and records retained.

Other elements may emerge in a more detailed plan.

Proper maintenance will save costs by elongating the life of the building elements and by reducing likelihood of leaks, for example from blocked downpipes.

This is a low cost high impact measure.

2. Insulate and re-line Gutters

The gutters throughout the building are uninsulated, causing excess transfer of cold from inside to outside through the concrete eaves beam. The cold surface of the gutter can allow condensation to appear. In addition to the condensation from lack of insulation, it seems that leaks are occurring at points along the gutters, causing the plaster on the inside face of the beam to spall, with a risk of the plaster de-laminating and falling off entirely.

The replaced roof in the early 2000s closed off the internal rainwater pipes in the concrete columns and introduced downpipes to the exterior of the building. While this eliminated the problem of cold and leaks from the internal downpipes, it introduced a new problem. The water in the gutters now has to travel up to 40m to reach a downpipe (rather than a previous 10) which causes additional water in the gutters and increases the chances of water ponding and not moving.

The proposed intervention addresses the issues of both the cold and the leaking. These in turn, will stop additional spalling of plaster below and will allow that to be repaired. The proposal is to line the gutters with a slim insulation and fibreglass membrane above to create a continuous seal.

This is a relatively low-cost intervention with a high impact.

3. Repair Spalling Plaster Clerestory

This measure can be undertaken once the gutters have been re-lined. It is a relatively simple procedure of repairing plasterwork. It will have a high impact on the aesthetic value of the school and the pride associated with that.

This is a relatively low cost measure that will have a high value in how the building is perceived.

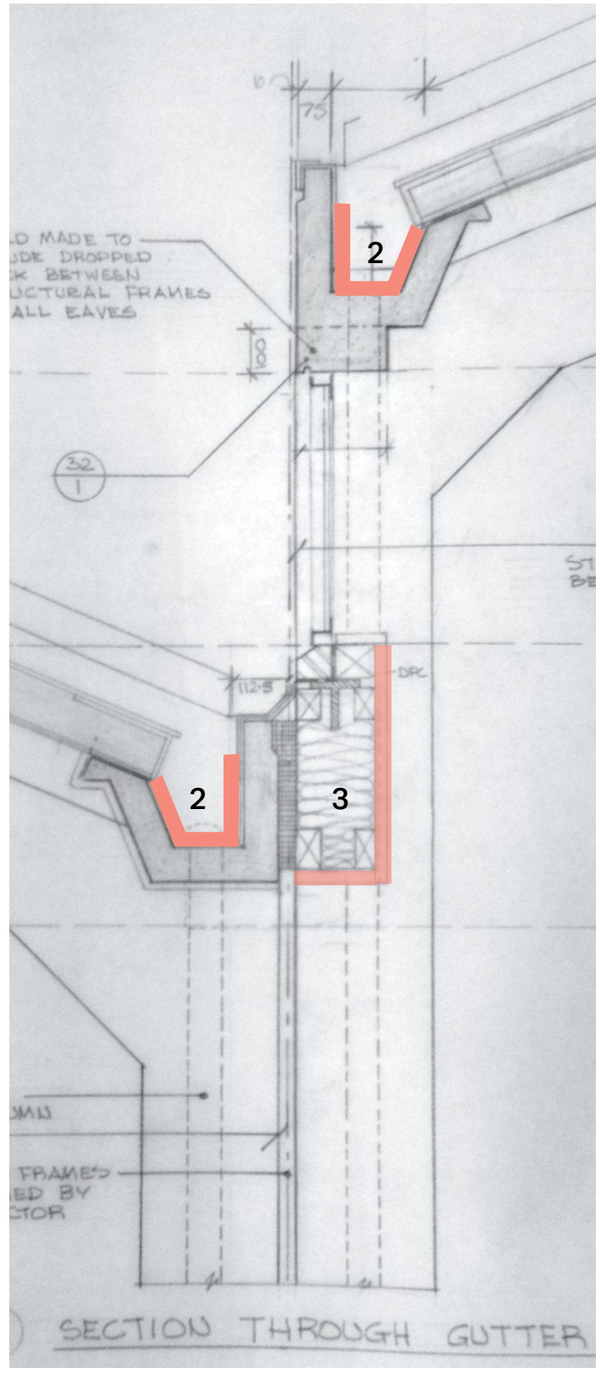


Fig. X Original Archival Section of Gutter and Eaves Detail. by Peter and Mary Doyle Architects, highlighted to indicated location of interventions 2&3

5.4 Intervention Fabric

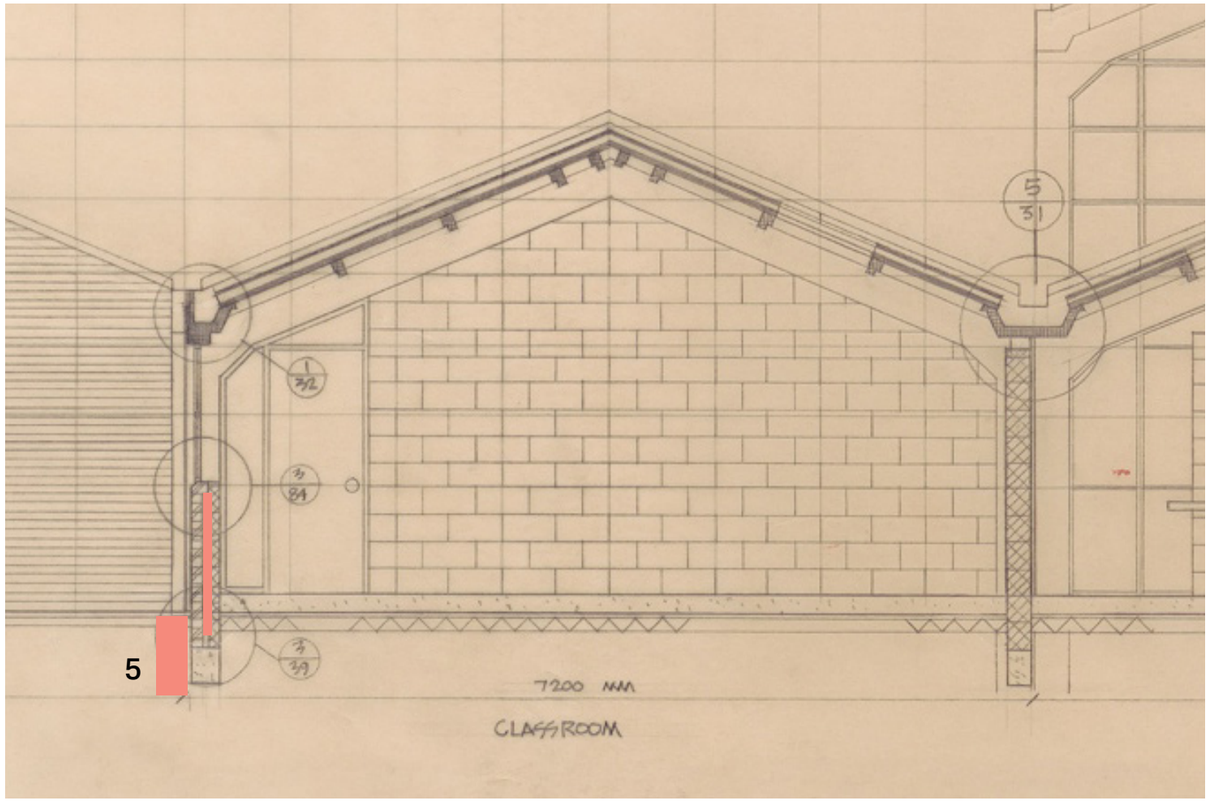
4. Insulate Cavities, Pumped Insulation

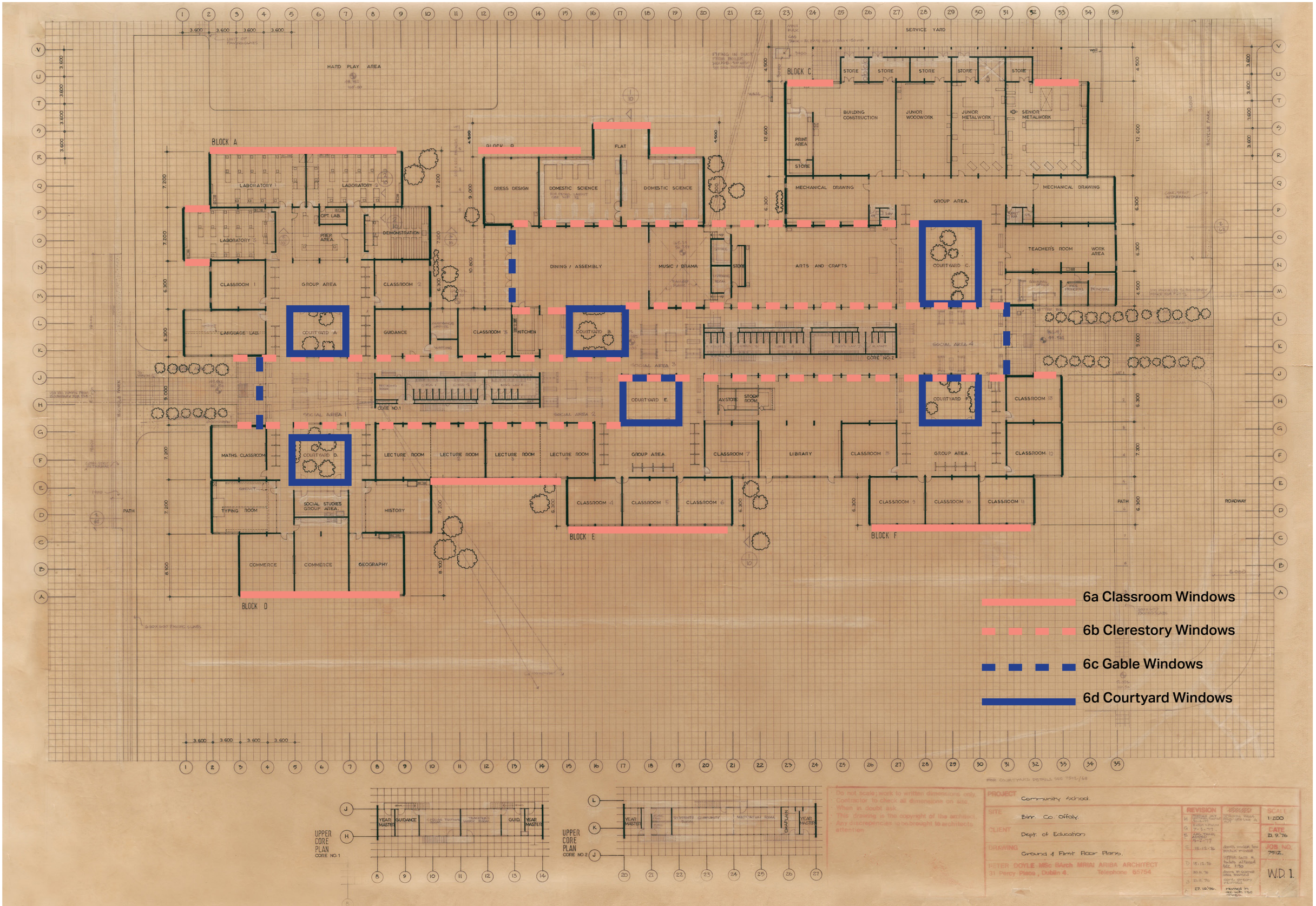
The existing external walls are of cavity construction, with rockwool insulation in the cavity. Opening up works identified that the insulation was installed in the original construction and is still in place. The thermal performance of this can easily be enhanced by pumping the cavities with insulation.

This is a low cost method of improving the thermal performance of the school, with a high impact relative to the cost of the intervention. This can also be undertaken with very little disruption to the running of the school.

5. Perimeter Insulation External Walls

This is a proposed insulation below ground to the outside of the external walls, from ground level to top of foundation, as highlighted on the section. This has the impact of reducing heat flow from the perimeter of the building to the ground. This can be undertaken with very little disruption to the school and is a relatively low impact intervention.




BLOCK A
BLOCK B
BLOCK C
BLOCK D
BLOCK E
BLOCK F
HARD PLAY AREA
SERVICE YARD
LABORATORY 1
LABORATORY 2
LABORATORY 3
OPT. LAB.
PREP AREA
DEMONSTRATION
CLASSROOM 1
GROUP AREA
CLASSROOM 2
LANGUAGE LAB.
COURTYARD A
GUIDANCE
CLASSROOM 3
KITCHEN
COURTYARD B
DRESS DESIGN
DOMESTIC SCIENCE
FLAT
DOMESTIC SCIENCE
DINING / ASSEMBLY
MUSIC / DRAMA
STORE
ARTS AND CRAFTS
COURTYARD C
STORE
STORE
STORE
STORE
STORE
BUILDING CONSTRUCTION
JUNIOR WOODWORK
JUNIOR METALWORK
SENIOR METALWORK
PRINT AREA
STORE
MECHANICAL DRAWING
GROUP AREA.
MECHANICAL DRAWING
TEACHERS ROOM
WORK AREA
CORE NO.1
CORE NO.2
SOCIAL AREA 1
SOCIAL AREA 2
SOCIAL AREA 3
SOCIAL AREA 4
COURTYARD E.
AV STORE
STOCK ROOM
COURTYARD
CLASSROOM 13
MATHS CLASSROOM
COURTYARD D.
LECTURE ROOM
LECTURE ROOM
LECTURE ROOM
LECTURE ROOM
GROUP AREA
CLASSROOM 7
LIBRARY
CLASSROOM 8
GROUP AREA.
CLASSROOM 12
TYPING ROOM
SOCIAL STUDIES GROUP AREA
HISTORY
CLASSROOM 4
CLASSROOM 5
CLASSROOM 6
CLASSROOM 9
CLASSROOM 10
CLASSROOM 11
COMMERCE
COMMERCE
GEOGRAPHY
PATH
PATH
ROADWAY
UPPER CORE PLAN CORE NO.1
UPPER CORE PLAN CORE NO.2
YEAR MASTER
GUIDANCE
GUID
YEAR MASTER
YEAR MASTER
STUDENTS COMMUNITY
YEAR MASTER
6a Classroom Windows
6b Clerestory Windows
6c Gable Windows
6d Courtyard Windows
PROJECT Community School.
SITE Birr Co. Offaly.
CLIENT Dept of Education
DRAWING Ground & First Floor Plans.
PETER DOYLE MSc BArch MRIAI ARIBA ARCHITECT
31 Percy Place, Dublin 4. Telephone 65754
SCALE 1:200
DATE 21.9.76
JOB NO. 7512.
W.D. 1.

6. Upgrade Windows

The windows in the school are of 4 types - classroom, clerestory, gable and courtyard - and each category has a different value ascribed to it in section 3. The proposals for the windows therefore reflects their significance as well as a consideration of the importance of their impact on thermal performance, in light of the spatial strategy proposed in 'Space Plan'.

The existing windows were found, generally, to be in reasonably good condition. Recommendations for repair and maintenance are included in the window report (see section 1 and appendix). The 4 window types are listed below and the proposed interventions are listed with them.

Moderate Significance & Moderate TFC

6 (a) Classroom Windows

Moderate Significance & Moderate TFC

These are considered of moderate significance, therefore we consider it acceptable to replace the original windows with double glazed steel frame windows (see appendix, window proposals) that match the original window frame and breakdown of panes, with 4 bays of 900mm. Aluminium or other alternatives provide a much thicker frame than the original steel frames and takes away from the significance of the building.

Replacement of these windows means disturbing the window cill tiles also and consideration for jamb detail as it meets the frame, in particular as these measures should be incorporated along with airtightness measures. Detail consideration of the impact of this will need to be made if the classroom windows are replaced.

Alternatives examining secondary glazing to the interior of the window and retaining the original were explored, but not considered practicable, due to the difficulty in opening the windows for ventilation as a result.

6 (b) & (c) Clerestory & Gable Windows

6(b) Clerestory Windows
Moderate Significance & Moderate TFC

Giving light to the street, the impact of the light of these windows is very significant, as is the steel frame construction and the connection to the module.

Changes, similar to the classroom windows can be made here, using steel frame double glazed replacement windows with the same module as the original, using 900mm bays. Consideration of opening windows with actuators for ventilation should be included in an overall ventilation strategy.

6(c) Gable Windows
High Significance & Some TFC

The gable windows are of high significance, due to their scale and impact on the space, the fact that they are original material, using steel frame windows with the 900mm module. Their image is iconic in the original photos of the entrance. However change can be considered to improve the door seals in particular, to include double glazing within the frames.

While the exact intervention and design has to be determined, we believe there are possibilities for improvement here, while retaining the significance.

6(d) Courtyard Windows

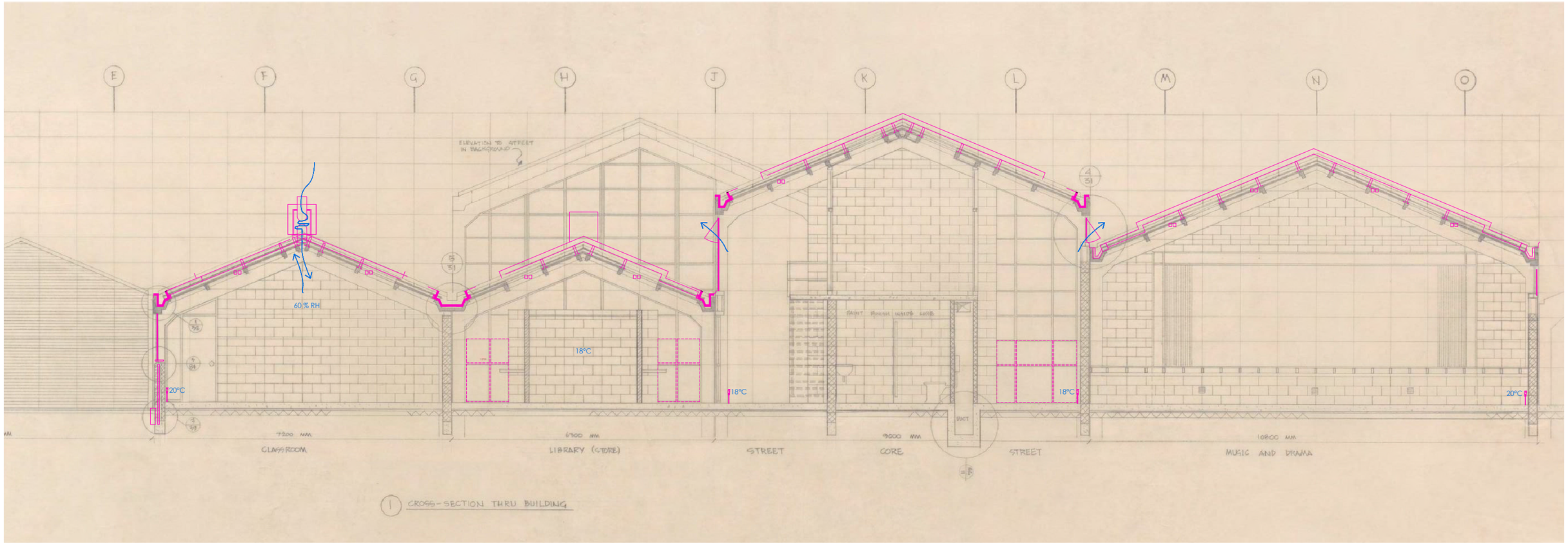
Exceptional Significance & Nil to some TFC

The courtyard windows are considered of exceptional significance, with nil to some tolerance for change. Their impact, visually, socially, functionally on the social space is exceptionally significant and changes should not diminish this.

The simplest strategy is to maintain these windows and allow for replacement of laminated and toughened glass throughout - this will remove the solid black panels at the base thus improving the transparency of the windows, along with increasing the safety of the glazing. Standard double glazed glazing units by their nature cause reflectance rather than transparency and are not proposed. Colour distortion occurs with standard glazing and this would also diminish the impact of the courtyards.

Options of a pilot project introducing specialist slim-line double glazing into the existing frames could be pursued initially on one courtyard. This would largely eliminate the condensation to the inside panes of the courtyards and thereby improve transparency. Details to consider here include the option of retaining single glazing to the corner, to minimise loss of transparency. Careful specification of the glass should be made to ensure no colour distortion. There is the possibility that the new double-glazing, however could introduce a new problem whereby the frames become the coldest surface and attract condensation, leading to their deterioration. Further investigation is required here.

Replacement of the units with similar slimline, steel double glazing units is possible but is not considered desirable as it removes the most significant original fabric. Equally, if the space plan is adopted the school is accepting the lower temperatures of the courtyard and it reduces the requirement for high thermal performance from these windows.



1 CROSS-SECTION THRU BUILDING

7. Improve Airtightness

Heat loss occurs both through fabric and air leakages, where heated air from the building is drawn out through gaps in construction to the colder air outside. Air tightness is a simple and effective measure to improve thermal performance. When refurbishment is taking place, airtightness measures should be introduced, meeting contemporary standards of airtightness.

The airtightness of the existing fabric was tested and this has been documented in Section 1. Areas identified needing retrospective airtightness measures should be addressed. These include the gap above beam between classroom and corridor space.

Where measures such as new windows are introduced the junctions between this and main structure should be made airtight. Equally, where a new roof, or lining to social spaces are introduced, airtightness measures can be easily implemented. Improved air tightness will also reduce sound transfer from one space to the next.

This measure will improve thermal performance and thermal comfort. It will also affect the air changes per hour in the spaces. This is particularly important in the teaching spaces and should be undertaken along with strategies to improve air quality and controlled infiltration of fresh air.

8. New Roof

While the existing roof is performing well thermally, it is detracting from the significance of the overall building, due to the deviation from the original design (the darker colour, changed roof light design and changed services strategy) a change here could have a number of benefits. The benefits include:

- reversion to original design removing material that is detracting from the quality of the space
- improved rooflighting, closer to original design and integrating shading and automatic opening of rooflights
- better thermal performance and airtightness; including addressing gap between edge of roof and gutter that is currently uninsulated
- opportunity to create an integrated services strategy to streamline the services
- opportunity to introduce mechanical or other measures to improve the air quality
- opportunity to introduce water attenuation measures through introduction of sedum or other measures on the roof
- opportunity to incorporate solar/PV panels or other energy technologies into the roof

This is a high cost high impact intervention. While the roof is performing well thermally relative to the rest of the building fabric, it is also probably reaching its end of life as it is nearing 20 years old. When the opportunity arises to replace the roof it should be considered along with all the measures outlined above and integrated with other measures outlined in space plan, fabric and services intervention strategies.

1. Develop a Services Strategy

A services strategy considers the combined impact of the services on the space as well as their environmental performance over time. Due to the nature of ad-hoc decision making, the choice of services and their routing is often not integrated within an overall plan.

A services strategy would consider the service elements - heating, lighting, ventilation, data - together, identifying appropriate locations of their routing, responsive to the established significance of the building.

This strategy should examine the original documentation and photographs, in particular with regard to the lighting adopted in the original design and the routing of these.

2. New Heating Controls

At present there are no heating controls in the building. New heating controls that allow programmable and automatic control of heating, based on times and temperature sensors from thermostats. should be introduced. In addition, the heating controls should allow for separate zoning, connected to the space strategy where classrooms and social spaces are calling for different temperatures.

3. Boiler Upgrade

The boiler is in need of upgrade. This is an opportunity to consider alternative energy sources, with more renewable potential. This should be considered along with item 5 'Future Energy Source'.

4. New Mechanical Air System

A system to manage the air quality is considered important due to the level of CO_2 that was recorded in section 1 in the classrooms. A mechanical system can be designed to respond to CO_2 and relative humidity levels and so reduce issues that could arise as the fabric improves, eliminating risk of lack of air change, moisture gathering and consequent mould growth.

Interventions can be:

- Local - systems can be put in place per classroom only, where air in and out is controlled per classroom and not connected to a wider system. This has the advantage of not requiring large runs of ducting through the building

or

- Centralised - operated from a number of centralised fans in the school drawing air from classrooms to outside

Depending on the specification the functionality of the systems can offer

- Humidity monitoring
- CO2 monitoring
- Heat recovery
- Heated air intake

Mechanical ventilation systems can be a combination of passive and active (mechanical) systems or they can be fully mechanical, meaning air is drawn in and extracted by fans. The air drawn in can be heated or unheated, depending on the system used. There is the option of including heat recovery in a fully mechanical system.
Options considered are described overleaf.

5.5 Intervention Services

1. LOCAL / LOW TECH
Install 2 ceramic core hole in the wall vents per classroom. The ceramic core that heats the incoming air. The vents work in pairs, sensing humidity to provide intake and extract required.

Pro
- cheap,
- low tech & easy to install (designed for retrofit)
- local to the classroom so doesn't require potentially intrusive service runs throughout the building
-

Con
- may need power?
- no CO_2 monitoring
- location an issue as does not work below cill level and can't be installed in windows
- Doesn't provide MHRV

2. PASSIVE / ACTIVE

This is a system that is known as partially passive and partially active. It involves passive fresh air intake in each classroom and centralised extract from the social spaces.

Location of intake units is to be determined; these could possibly be in a new roof. Extract units could be fitted at mezzanine level in the social spaces

Pro
- doesn't need full ducting in the social spaces
- works with existing architecture of the school
- can have CO_2 and humidity monitoring

Con
- Difficulty with locating intake vent
- Heating air intake not heated (though option to mechanise + heat this)
- Doesn't provide MVHR

3. FULLY MECHANICAL

This is a system that mechanically pushes the fresh, air, that has been heated, into the classroom and extracts the air mechanically also. It can be school wide or classroom specific. It can have sensors for CO_2 inbuilt as well as mechanical heat recovery ventilation.

Pro
- Fully controllable air system
- Heated air on entry
- Sensors included

Con
- Most expensive option
- Most impactful spatially as requires considerable amount of equipment and ducting connecting air intake and extract
- Noise associated with air handling units

NEXT STEPS

As the air quality and in particular the high CO_2 levels are identified as problematic by the on site research, addressing the air quality in the school is of primary importance. Intervention measures, such as new windows, cavity insulation, additional airtightness, will reduce the air infiltration and consequently put a greater onus on getting fresh air into the building.

RECOMMENDATION
The next step is to undertake a more detailed and focused study of the options outlined above. Our preliminary findings are that a partially passive/ active system is the most effective but this will need to be tested. These measures could be undertaken as a pilot in part of the school. Integrating the air strategy with a replaced roof allows for full integration of an air system with minimal impact on the significance of the building.

5. Future Energy Source

While the school's present levels of energy usage will diminish if some or all of the other interventions are implemented, alternative energy sources for the future should also be considered as a means of further reducing its carbon footprint. This has many potential benefits.
Unusually St. Brendan's Community School already has a series of attributes that combined, lend themselves to forming a strategy for transitioning into potential new energy sources. These include its generous curtilage, its extensive roofscape, the site of the former turf burning facilities, and the bogland (approx. 28.3 ha) in the school's possession. A new future energy framework involving a combination of some or all of the following should be considered:

Heating

The school should consider alternative heating technologies. Currently available technologies include biomass generators, which generate a combination of heat and power fuelled by short rotation coppice willow. The willow chips could be purchased or, more sustainably still, potentially grown on the bogland or on poor quality agricultural land purchased by the school for this purpose. The bio-mass generator would occupy the site of the former turf burner.

An alternative to a reliance on biomass could be provided by a large Ground Source Heatpump (GSHP) powered by wind-turbines located on the bogland. These however have wider implications for the school building, including introducing underfloor heating to the whole school, which has a significant cost implication.

Electricity

The whole or part of the east facing sections of the school's roof could be covered with photovoltaic cells (PV). When combined with new LED lighting within the school, covering two thirds of this roof would generate enough to meet demand and a significant surplus. Covering the whole east facing roof could in addition contribute to the powering of a GSHP.

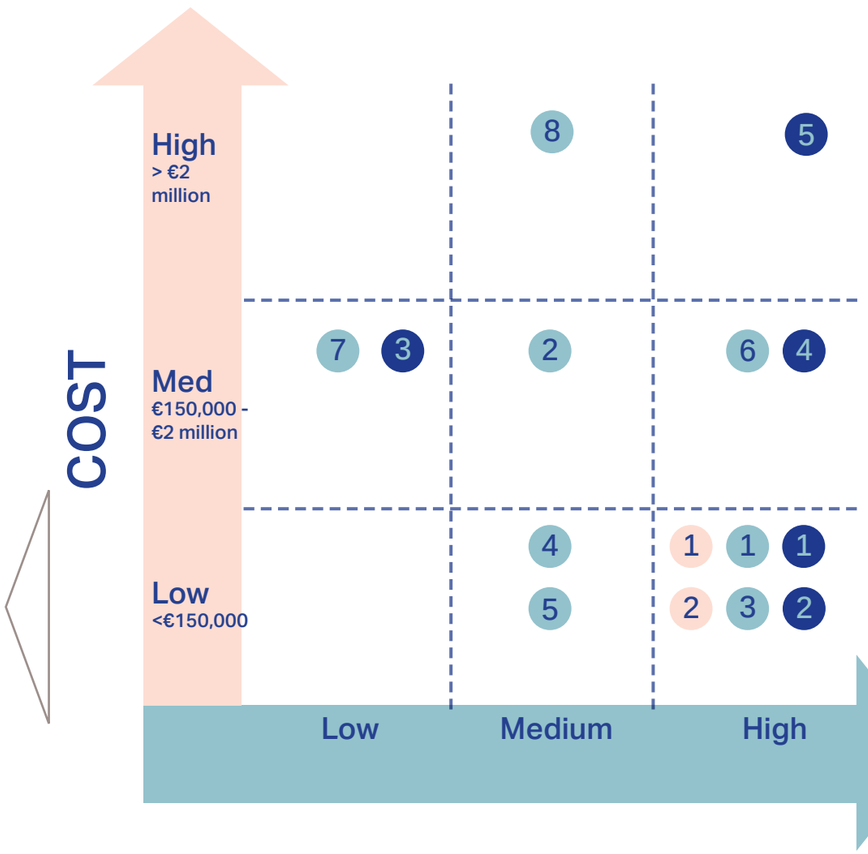
Next Steps

These proposals require considerable capital expenditure and require further investigation. At 2021 prices, for example, the covering of all the east facing roof sections would cost 600,000 Euros. Yet these outlays should be placed in the context of present and future running costs with the cost of oil likely to rise. It is also often easier to raise funds for new innovations (especially within sustainability) than to maintain a status quo dependent on fossil fuels.

There are also evident educational benefits from adopting a participatory approach to the production of energy within the building and its curtilage. It would add enormously to the students' carbon literacy and their understanding of their own and the school's ecological footprint. It could also promote localism – investing and developing sustainable local resources within the community rather than relying on finite oil sources from overseas.

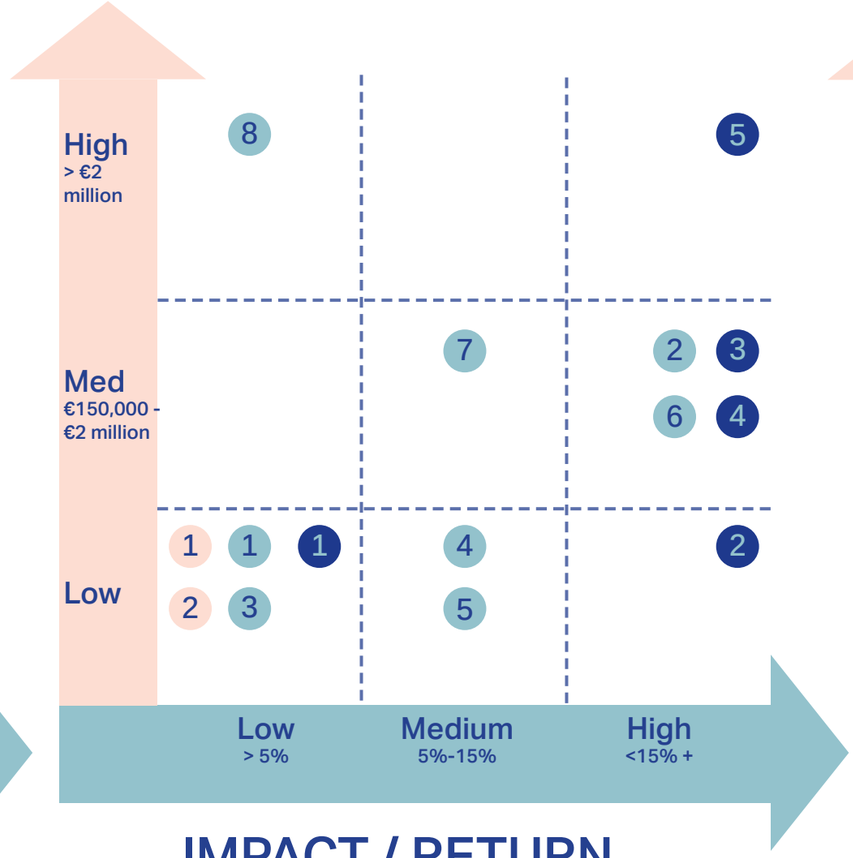
1. Social

What is the benefit to the people using the space & the functionality of the school, relative to its cost?



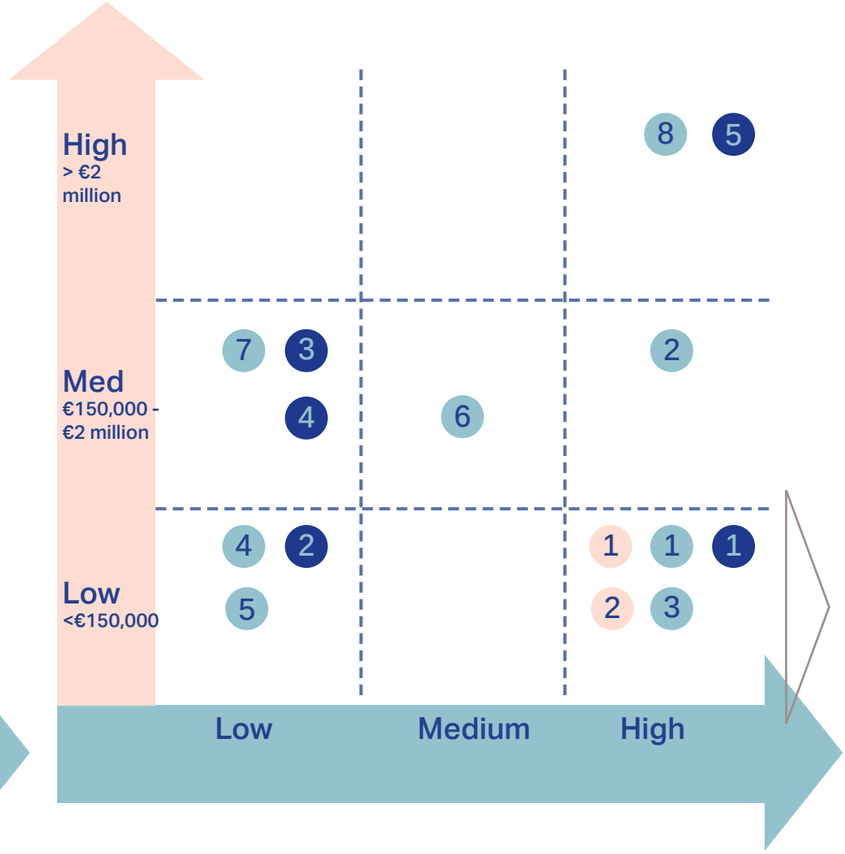
2. Technical

What is the benefit in terms of energy saving relative to cost of works?



3. Aesthetic

What is the value of the intervention relative to the original design principles and what is their benefit?



IMPACT / RETURN

Key

Space Plan

1. Classroom and Social Space different zones
2. New bag storage at perimeter

Fabric

1. Follow Maintenance Plan
2. Insulate and re-line gutters
3. Repair Spalling Plaster
4. Insulate Cavity with Pumped Insulation
5. Perimeter Insulation
6. Window Upgrade
7. Improve Airtightness
8. New Roof

Services

1. Develop a Services Strategy
2. New Heating Controls
3. Boiler Upgrade
4. New Mechanical Air System
5. Future Energy Source

5.6 Intervention Valuing

Social Value

This matrix attempts to assess the social impact of the measures. Social impact relates to how the social spaces are used, and how they are perceived. Aspects of physical change that improve the experience, perception and use of the space can all be considered to have a social value. This metric also relates to the wider functioning of the building as a school, the continued use of which is of highest significance. Aspects that improve the building's functionality as a school, as well as its retention as a school in the longer term all have a social impact.

The highest return for lowest cost include:
- classroom and social space as different zones
- new bag storage at perimeter
- follow maintenance plan
- repair spalling plaster
- develop a services strategy
- new heating controls

Technical Value

This matrix assesses the technical impact of the proposed measures. Technical impact relates to the reduction in energy expenditure per measure. These are banded from low, less than 5% reduction in energy usage, medium, 5-15% reduction in energy usage, and high, greater than 15% reduction in energy consumption. The reduction in energy consumption is also indicated alongside the cost for the measures. These figures have been calculated from the existing heating system and fabric of the building using a PHPP model.

The areas of lowest cost for greatest return:
- new heating controls.

Following this, the next greatest return, though at medium cost include:
- insulate and re-line gutters
- window upgrade
- boiler upgrade
- new mechanical air system

Medium return but low cost measures include:
- insulate cavity with pumped insulation
- perimeter insulation

Aesthetic Value

This matrix assesses the aesthetic impact of the works. This category considers the original design principles of the project, the cohesion of the building as a designed element, importance of original fabric and the impact of intangible measures such as sound, sunlight and atmosphere.

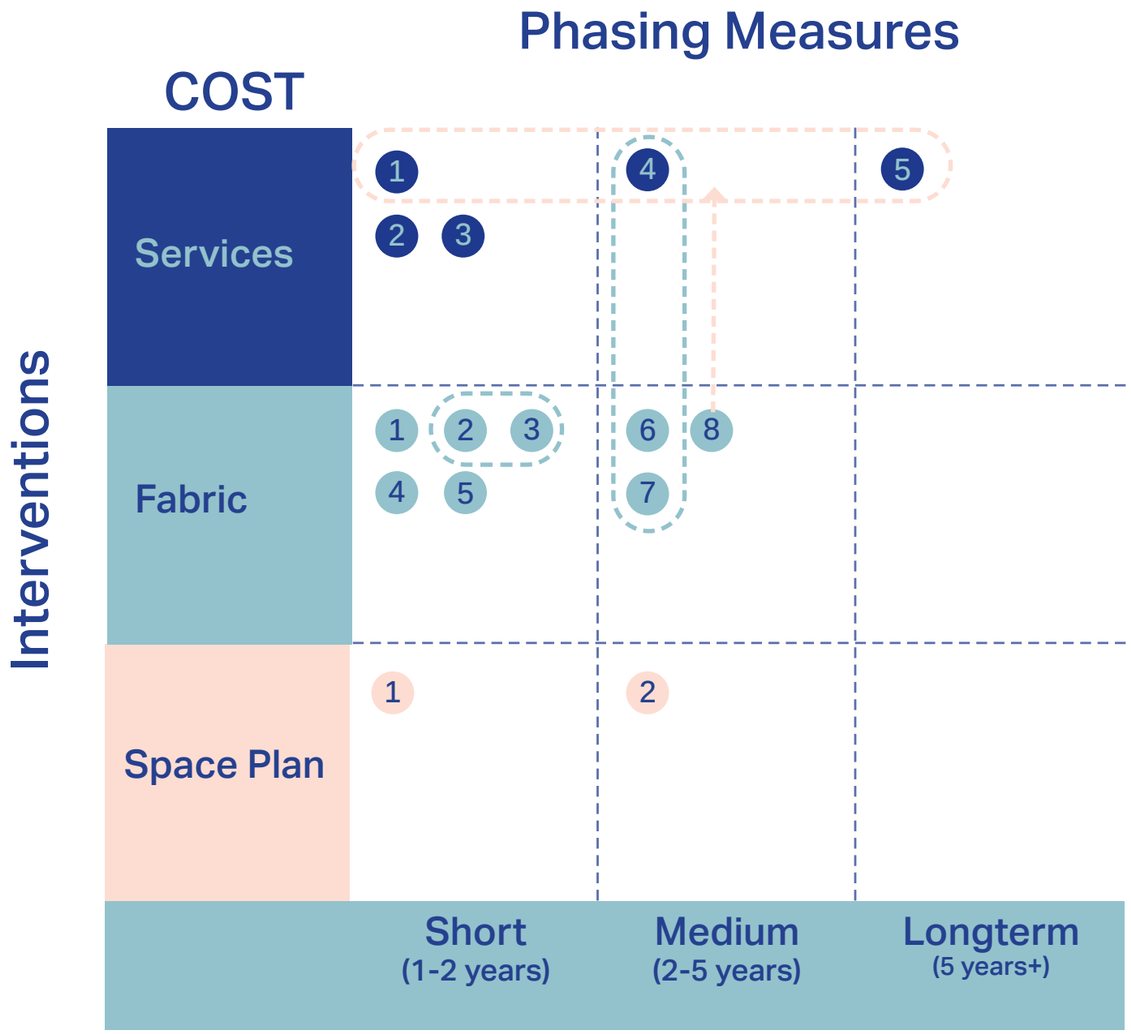
The measures with the highest impact and lowest costs include:
- classroom and social space as different zones
- new bag storage at perimeter
- follow maintenance plan
- repair spalling plaster
- develop a services strategy

Other measures that have greater cost but high impact include
- new roof
- future energy source
- insulate and re-line gutters

Findings

These matrices are intended to assist in identifying the most important and valuable measures to be taken for the benefit of the school. The 3 different headings illustrate that certain measures have different values depending on which criteria you use. For example, addressing the bag storage has negligible impact on energy usage but the highest impact on the social and aesthetic values of the school. What this demonstrates is the many different values that come together in making decisions about the school's future and that consideration of many different values is important in the decision making process. The right choice is a balance of the people, the building and the economic needs of the school. It is important to consider more than one metric in making decisions.

Another key element in making a decision on intervention measures to develop is the phasing aspect of works. The following pages consider the works alongside their phasing. The conclusion makes recommendations, taking all these aspects together, on what measures to pursue.



Key

Space Plan

1. Classroom and Social Space different zones
2. New bag storage at perimeter

Fabric

1. Follow Maintenance Plan
2. Insulate and re-line gutters
3. Repair Spalling Plaster
4. Insulate Cavity with Pumped Insulation
5. Perimeter Insulation
6. Window Upgrade
7. Improve Airtightness
8. New Roof

Services

1. Develop a Services Strategy
2. New Heating Controls
3. Boiler Upgrade
4. New Mechanical Air System
5. Future Energy Source

5.7 Intervention Phasing

Phasing

The phasing diagram indicates the measures in their categories - space plan, fabric, services - and a proposed phasing for the works. The phasing is based on, firstly, how easy the measures are to take and secondly, consider which measures need to be taken together. The time frames they are considered against include: short term, in the next 1-2 years and possibly undertaken as summer works; medium term, considers a longer timeframe, based on the design or consultancy work that might be needed for these works, as well as in consideration of the larger costs involved in these works; long term relates to the future vision of the school within a changing environmental climate and projects to 2030 and beyond when all public buildings are required to be Net Zero Energy.

The short term measures proposed include:
(social)
- classroom and social space different temperature zones

(fabric)
- follow maintenance plan
- insulate and re-line gutters
- repair spalling plaster
- insulate cavity with pumped insulation
- perimeter insulation

(services)
- develop a services strategy
- new heating controls
- boiler upgrade

The medium term measures proposed include:
(social)
- new bag storage at perimeter

(fabric)
- window upgrade
- improve airtightness
- new roof

(services)
- new mechanical air system

The long term measures proposed include:
- future energy source

Works Interdependence

Many of the elements of the works have interdependencies which need to be considered when undertaking the work. This is to ensure that the works are undertaken in the correct order. Continuity of consultancy on these issues is important also.

Specific measures that are interdependent are:

1. Insulate and Re-Line Gutter
   +Repair Spalling Plaster:
   The gutters should be insulated and re-lined before the plaster is repaired.

2. Develop a Services Strategy:
   This relates to both the technical specification of the services as well as a space strategy that considers the routing of cables and ducts and their impact on the spaces. It includes all services from space heating, lighting, ventilation, data and mechanical systems and considers their short and long term development. It is vital this is undertaken in advance of other services or space measures being implemented so that these recent measures don't impede future services measures.

3. Window Upgrade
   + Improve Airtightness
   + New Mechanical Air System:
   Much of the air leakage occurs at the junction between the window and the concrete frame. When new windows are installed in the classroom this is an opportunity to improve the airtightness, which also reduces heat loss. The airtightness measures include introduction of tapes which need to be concealed by plaster or lining at the jambs, head and cills.
   Because of the reduced 'leakiness' at the window junction it becomes increasingly important to improve the ventilation, including imporved, controlled air intake and extract.

4. New Roof
   + New Mechanical Air System
   + New Energy Sources
   The introduction of the new roof gives the greatest opportunity to improve the services generally, and should be included in the 'Develop a services strategy plan'. In particular, if the new roof is integrated with the mechanical air system this allows for much more flexibility for air intake and extract and also reduces the impact of ducting on the spaces. Consideration of new energy sources should be integrated in the design of the new roof, for immediate or future implementation.

Next Steps

The next steps include agreeing the intervention strategy within the school, making the relevant applications to the Department of Education and Skills and beginning the implementation of works.

Some of the works can be undertaken as summer works and require minimum involvement from a design team. Other measures, such as the mechanical air system, require additional consultant input to test design options and system efficacy. We consider it vital that this design team includes architectural conservation expertise to ensure the full impact of the measures are considered and to protect the significance of the building. The full design team should be made aware of the significance of the building and be familiar with the CMP.

Options include developing a pilot programme for a section of the school where the full suite of measures can be undertaken and monitored over time. This could function as a test case for the Department of Education and Skills, especially based on the fact that the data for the existing condition is already in place.

5.8 Recommendations

Our recommendations for this intervention strategies, is for the school board and community to adopt this plan. The development of a long term services and energy strategy will inform all decisions and this should be undertaken as a priority as it affects all spatial, energy, fabric and environmental aspects of the building.

Once the plan is in place, the next stage is to start the items identified as short term, and to progress the items, through appointment of consultants, of medium term measures.

At all times the decisions on interventions should be made in relation to the statement of significance and the value matrix. If in doubt about an intervention, these documents will help assist the decision making. Communicating the decision making to the wider school community is important in their adoption.