MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

OPUS

POST OCCUPANCY EVALUATION

PEGASUS BAY SCHOOL
PEGASUS, CHRISTCHURCH

May 2015

Opus International Consultants Ltd
Auckland Property
The Westhaven, 100 Beaumont St
PO Box 5848, Auckland 1141
New Zealand

Telephone: +64 9 355 9500
Facsimile: +64 9 355 9583

Date: July 2015
Reference: 1-46083.00
Status: Final v 7

CONTENTS

1 EXECUTIVE SUMMARY

The Ministry of Education (MoE) commissioned Opus International Consultants Ltd to undertake a Post Occupancy Evaluation (POE) of Pegasus Bay School, Pegasus, Christchurch. The purpose of the review in accordance with the commissioning brief was to: -

Evaluate the effectiveness of the design and procurement *process*.

Evaluate the end *product* of the completed school facility in terms of its compliance with the MoE guidelines.

Evaluate the *performance* of the completed school as a suitable learning environment.

The evaluation survey aim is to identify the positive and negative aspects of the new school project and in doing so contribute towards increasing the effectiveness of future school development projects. The key recommendations identified have been categorised into two sections, general and school specific.

1.1 KEY RECOMMENDATIONS – GENERAL MOE

- Design compliance: Adopt a standard briefing template for new schools to ensure project objectives remain focussed on the design criteria stipulated in the MoE guidelines.
- Quality of design: Improve the quality assurance procedure for the design and procurement process from the briefing stage through each subsequent stage of the design development process. Consider the auditing of design briefs for compliance before they are issued.
- Quality of specification: Introduce minimum MoE quality requirements for key components. Consider the introduction of approved products.
- Continual improvement: Post Occupancy Evaluations should be part of a longer term audit process. Consider future school inspections over time to include the performance of the building in use.
- Design standards: Storage suitably located and fit for purpose for students, materials and equipment is not well considered.
- Stakeholder support: Clearer guidance on the standards they should be aiming for and what was and was not included in the scope of the project. Fixtures, fittings and furniture were a particular issue.

1.2 KEY RECOMMENDATIONS – PEGASUS BAY SCHOOL

- The metal aluminium boundary fencing is of poor quality, the gates in particular will require modification if they are to remain serviceable.
- The internal sliding doors lack lateral restraint with some already sticking in their top runners. Felt seals to the closing edges are already loose and some are missing. The system will require modification if they are to remain serviceable. Investigate the option for introducing floor guides to prevent future door distortion. Look at ways to secure the felt seals in their channels. These doors are under a 5 year warranty and solutions to these problems need to be implemented within this period.
- The solar shading is inadequate to protect learning spaces from solar glare. Consider the installation of blinds.
- The suspended ceiling has water stains which require investigation and repair as necessary. If the cause is interstitial condensation then the roof void as a whole should be re-assessed for ventilation and humidity control.

- Heated main entrance areas are frequently accessed direct from outside. Consider a lobby or air curtains to prevent undue warm air loss and to maintain a suitable internal working environment.

- There is currently nothing to prevent children from leaving the premises via the automatic main entrance doors with immediate access to the car park and roadway. Consider controlling/monitoring of the entrance.

- The reception area is not easily located by visitors. Consider improved directional signs and the monitoring of the main entrance remotely from reception.

- Exposed glass edge to the office area glazed partition panel facing reception. Refer back to the Contractor under Health & Safety for immediate action.

- Electrical issues such as RCD, toilet hand dryer and toilet heater. Refer back to the Contractor under Health & Safety for immediate action.

2 BACKGROUND OF THE SCHOOL

Construction of the Pegasus Bay School stage 1 was completed in May 2014, providing the school with infrastructure suitable for 420 students. Stage two plans to provide 180 additional learning areas for a total capacity of 600 students. At the time of the survey in May 2015 the school was in its first year of occupation.

Designed to be the first NZ net zero energy school producing its own electricity via photoelectric cell arrays, the design has been engineered to achieve a 5-star NZ Greenstar rating signalling “New Zealand Excellence”. The design encourages open and positive interface with the community, incorporating Council community facilities within its Multipurpose Hall Space and sited such that neighbouring residential properties overlook the school at each boundary.

The school building is laid out on the site in a U shape with the central courtyard facing north and allowing solar gain to indoor learning spaces. Playing fields and hardcourts are to the west of the buildings, with the main entry to the east.

3 THE SURVEY METHODOLOGY

3.1 THE METHOD

The evaluation methodology is based on the UK Building Research Establishment (BRE) early stage POE methodology combined with specific MoE design requirements as outlined in the MoE Development Compliance Framework 2014.2 June, covering the complete procurement process from inception to completion. The three main assessment criteria used for the investigation are Process, Product and Performance.

PROCESS

This aspect of the POE seeks to answer how well the project performed using both a generic construction industry assessment framework and the MoE design requirements. The information will be collated from contract documentation provided by the MoE and interviews with MoE project representatives.

PRODUCT

This aspect of the evaluation seeks to understand the extent to which the facilities meet the core elements of the MoE design requirements.

PERFORMANCE

The final element of the evaluation seeks to determine the contribution that the facilities make towards the MoE goal of excellent educational outcomes. Three key elements of this assessment are functionality and fitness for purpose.

The information gathered under the assessment criteria is then collated and grouped under four main headings: -

- Accessibility
- Health & Safety
- Modern Learning Environments
- Sustainability

4 EVALUATION

4.1 ACCESSIBILITY

Positives: -

- The site has level access with the appropriate use of surface materials. See Figure 1.
- Specially designed scooter racks, sourced locally, together with bike hoops are located close to the main entrance and are well used. See Figure 3.
- Pedestrian access at the main site entrance is between the separate visitors and staff car park areas.
- There is an accessibility ramp from the visitors' car park and pick up/drop off zone.
- The school entry is easily accessible from level access car park adjacent to the entrance. See Figure 2.
- The school entry provides a covered enclosed foyer linking the Multipurpose Hall Space and Library.
- The reception area has automatic opening doors accessed from the central courtyard. See Figure 25.
- School reception area has a lowered countertop and adequate space for both visitors and students. See Figure 4.
- Sight impaired students/parents and staff were contributors in the briefing of the design for way finding throughout the building.
- There are wheelchair access toilets in each learning space and adjoining the hall and reception area.

Figure 1


Figure 2


Figure 3

Figure 4

Negatives: -

- The reception does not engage with the entrance into the school. The visitor is required to enter the building and exit the building prior to arriving at reception. See Figure 5.

- Emergency vehicle access only to the rear of the school site is currently via a privately owned lane. Access to the fields for maintenance has been added with the installation of the boundary fencing.

- The bus stop was originally within the school parking area, however this has been relocated to the road and the space utilised as a drop off-car parking. See Figure 6.

- The main entrance doors are fully automatic, frameless glazed doors. The sensors open the doors frequently when not required. The solution on occasion has been to switch the automatic opening function off, thus restricting access to reception.

- Internal sliding door partitions are full height and suspended from overhead tracks, are heavy and difficult to operate.

- The high dependency space has no RCD power outlet for the installation of a hoist and no emergency call button.

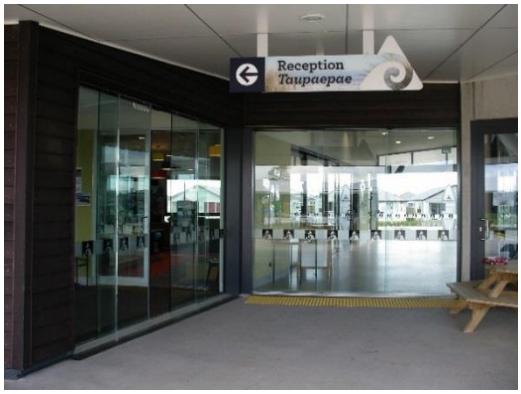


Figure 5

Figure 6

View from reception towards reception entrance doors and central courtyard.

4.2 HEALTH AND SAFETY

Positives: -

- Building services have been installed without undue protrusion into circulation and escape routes.
- There is a PA system which is used in case of emergency.
- The school is surrounded by residential properties overlooking the grounds. No reported issues of vandalism.
- Fencing to the entire site provides separation between students and areas of potential harm. See Figure 7.
- External service and maintenance area is separated from students and incorporates a covered working area. See Figure 8.
- Administration office overlooks the central courtyard.
- Sliding horizontal sash windows are used throughout at low level to prevent children hitting their heads.
- Mechanical ventilation is installed within toilets and point of source extraction provided above hobs.
- External after hours lighting has been provided with proximity sensors.
- Staffroom space overlooks the central courtyard and part of the front car park.
- Health room has a treatment and rest area incorporating 2 beds.
- Specific items of plant are securely installed behind fencing. See Figure 9.


Figure 7


Figure 8

Figure 9

Negatives: -

- There are child safety risks associated with the road finish adjacent to the school where the roundabout has a cobble finish used by students as a pedestrian way.
- Reception has no visibility to the front of the school with no way of monitoring visitors unless they report voluntarily.
- The main entry door is automatic and unmonitored allowing students to access the car park and road.
- Wet areas incorporated into circulation areas are a possible slip hazard as the vinyl is not slip resistant. See Figure 10
- The office glazed partition wall adjacent reception has an exposed unfinished glass edge and is a cut hazard.


Figure 10

- Door locks have been retrofitted to fire exit doors to allow provision for "lockdown" in emergency situation to prevent an intruder.

- Playing field surface installed had sharp objects left over from construction that were manually removed by the school after handover.

- Electrical distribution boards are generally located in dedicated lockable cabinets, however the distribution board located adjacent to reception was not locked and accessible to students.

- North wing students' toilet, hand dryer cover is not securely installed and can be easily removed exposing live electrical terminals. See Figure 11.

- Half of the power socket outlets in student areas are not RCD protected. Where RCD devices are provided the rating of circuit breaker is 40A while sockets of which that circuit breaker protects are 16A so in case of overload condition the protection device will not work.

- Student toilet areas have low level heating convectors with exposed controls. See Figure 13.

- Window handles have been installed inconsistently – some are upside down/opposite to others. Teachers need to check each window latch physically rather than be able to scan to see the locks are all in the "up/locked" position for example.

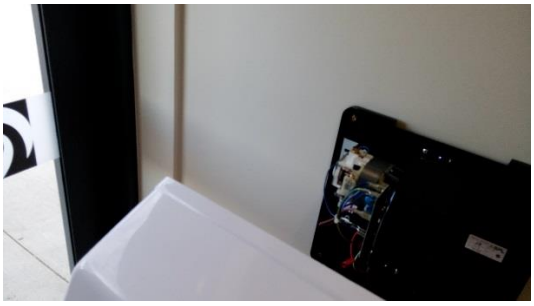


Figure 11


Figure 12


Figure 13

4.3 MODERN LEARNING ENVIRONMENTS

Positives: -

- Heating is under floor wet system.
- The buildings have good natural cross flow ventilation.
- Hand wash basins are provided with automatic shut off tempered water.
- Learning areas have sliding glazed partition walls between general areas and breakout spaces. See Figure 17.
- Covered walkways are provided between buildings.
- The Multipurpose Hall Space has high quality finishes with lights, monitoring and control systems protected by wire mesh or recessed against impact damage. The design also includes sound attenuation measures. See Figure 14.
- Separate spaces are provided for practical activities. See Figure 15.
- External drinking fountains not originally incorporated in the project scope are provided in stainless steel.
- The lighting levels were measured at 350-450 lux in room corners away from natural light. Day lighting is very good with generously sized glazed windows. See Figure 16.
- Light fittings locations are good and adequate. The fittings selected have an upward light throw component illuminating the ceiling. The fittings have fluorescent lighting tubes. LED light fittings would be more energy efficient.
- Generally sufficient numbers of general power outlets are provided within the teaching spaces, admin and circulation areas, above bench levels where necessary to facilitate access and use.
- The Library also functions as the student common room with a sliding partition wall opening up to the covered enclosed entry foyer and hall forming a very large open space.
- Toilets are located between each learning group area.
- High level windows are fitted with electric window openers locally operated.

Figure 14

Figure 15

Figure 16

Figure 17

Negatives: -

- Wet areas are located in circulation areas. Main use appears to be for storage. See Figure 19.
- Lack of storage for student bags. Located externally lacks adequate protection from solar gain providing hot lunches. See Figure 18.
- Glare is a major issue, the school are arranging for solar blinds to be fitted throughout as necessary. School have resorted to sticking black paper to the windows. See Figure 20.
- Minimal outdoor seating was provided mainly in exposed outdoor areas.
- Insufficient storage space located within teaching spaces has meant equipment is lying on ground in passageways, despite schools "de-clutter" policy.
- The Staff Space kitchen along one wall results in congestion during staff breaks.
- The reception area has significant heat loss due to the automatic doors directly opening to the exterior requiring supplementary electric portable heaters.
- Lack of covered learning areas.
- In some areas the school have resorted to removing light bulbs or installing localised lighting control to override the "automatic" light system.
- A high speed fibre internet connection to the school has not been provided and would require investment in hundreds of metres of cabling to the school from the main road.
- Water pattern staining to the ceilings of the gym and sickbay.
- Wall mounted sensors for various systems are poorly positioned meaning that whiteboards had to be custom made to fit around them. Whiteboard location and electrical outlet positions not co-ordinated.
- Large gaps between the bottom of the sliding doors and the floor. As a result they are of limited use as regards sound attenuation between spaces. See Figure 21.
- Smoke detectors have had to be desensitised located adjacent to cooking areas.

Figure 18

Figure 19

Figure 20

Figure 21

4.4 SUSTAINABILITY

Positives: -

- Heating system is appropriately zoned and controlled to achieve an energy efficient environment. Heating system is on BMS website - staff can change local heating level for each individual room. Smart sensors used throughout the building.

- Designed to achieve a 5 star rated Green Star building by extensive use of roof mounted PV cells to generate electricity to contribute towards the zero energy rating. See Figure 22.

- A trough urinal as opposed to individual urinals are easier to maintain. See Figure 23.

- The use of generous eaves to the roof perimeters of all the buildings provides excellent protection to facades.

- Roof pitches which carry the rainwater to external gutters and downpipes decreasing the likelihood of internal leaks. See Figure 24.

- High level natural light provided by roof level ribbon windows. See Figure 25.

- Good provision for both bicycle and scooter storage.

- Water supply has adequate isolation valve systems that enable maintenance and alterations.

- Extensive use of landscaping to improve the visual appearance of the courtyard and provide water attenuation during heavy rainfall. Figure 25

Figure 22

Figure 23

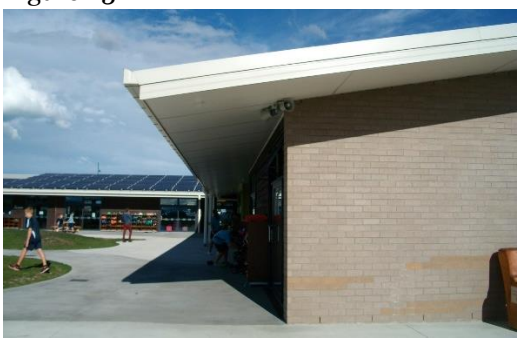


Figure 24

Figure 25

Figure 25

Negatives: -

- After hours use areas cannot be measured separately for energy use, only on a block by block basis.
- Poor specification finish to external downpipes. Paint already peeling off. See Figure 266.
- Air bubbles appear in vinyl flooring when the under floor heating is on.
- The underfloor heating system is powered by two large central heat pump units which are only partially operational. It appears that the space temperature cannot rise above 13 to 16 degrees C. Electric heaters had been supplied to the school to use as supplementary heating which contradict the design brief for a Greenstar rated building. The heating plant may be undersized as it struggles to provide hot enough water for the underfloor heating system. This is an issue for the contractor to remedy.
- Planting is not irrigated and some plants have not survived.
- BMS is not easily accessible as an educational tool. The system is capable but the installer will levy a charge for any further information.
- The school management team have taken on the task prioritising the defects list to resolve the outstanding issues.
- Toilet cubicles lack adequate support. Installation of additional support struts required.
- No splash back or water resistant material behind hand basins. See Figure 27.
- Low grade specification door closer, premature failure. See Figure 28.
- Boundary fencing (not part of the original design documentation) was added using the contract contingency budget and is of poor quality and durability. Aluminium fencing and gates require constant repair with entire panels having to be replaced. See Figure 29.
- Concrete surfaces have cracks appearing in many areas suggesting increased maintenance will be required over time. See Figure 30.
- Internal sliding partition doors. They have no floor guides or supports. They are very prone to deflection by the application of horizontal forces and thus being put out of alignment. Any misalignment causes the doors/partitions to rack resulting in numerous doors getting stuck. This is a constant issue.


Figure 266


Figure 27

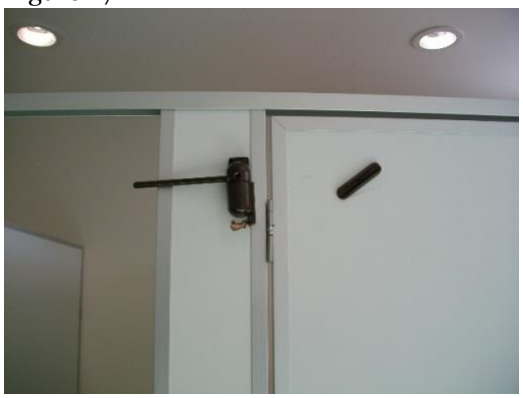


Figure 28

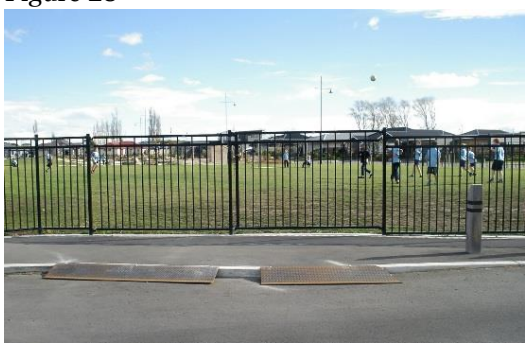


Figure 29


Figure 30

5 RECOMMENDATIONS & FINDINGS

5.1 GENERAL RECOMMENDATIONS

5.1.1 QUALITY OF SPECIFICATION

The selection of poor quality components frequently found in schools are continuing to impact on operational maintenance costs.

BENEFIT:

Introduction of components that are known to work will reduce operational maintenance costs.

FINDINGS:

The aluminium fencing is sub-standard. In appearance and dimension the fencing is compliant, however it already requires maintenance due to a lack of material quality. The sliding door system is sub-standard, it is identified as not functionally appropriately and requires an alternative design solution.

5.1.2 DESIGN BRIEF:

There exist competing pressures between the school's aspirations, the architect's vision and the MoE guidelines. The recommendation is to adopt a standard briefing template for new schools that ensures project objectives remain focussed on the design criteria as outlined by the MoE. Project briefs to be signed off after they have been subject to a compliance audit.

BENEFIT:

The use of design principles at the outset in an initial briefing document will provide clarity on the deliverables required and make it easier to identify inconsistencies between the brief and the MoE requirements.

FINDINGS:

It is essential that the operational requirements of a school are correctly interpreted in the design brief. Failure to fully engage the designers with the operational needs have resulted in inadequate briefing and design outcomes that are not consistent with MoE requirements.

Inadequate storage provision, the need to retrospectively install solar blinds generally around the school, inability to monitor who enters and leaves the school with reception poorly located indicates a lack of rigor in the design process evaluation.

5.1.3 HANDOVER

Schools require a thorough and supported handover process to understand how to use/operate and maintain the building. Consider better training and the provision of a support service.

BENEFIT:

More effective use of the building so that it performs in accordance with the design. Decreased operational expenditure and more reliable data when auditing the building performance.

FINDINGS:

The school staff were unfamiliar with the school systems.

5.2 PEGASUS BAY SCHOOL SPECIFIC RECOMMENDATIONS

5.2.1 SUSTAINABILITY:

The school double gates are poorly designed and their failure is likely. Additional supports required investigate improvements in design and material. As fence panels fail replace with steel, not aluminium.

FINDINGS:

The school are aware of the short comings of the installed fencing and gates.

5.2.2 HEALTH & SAFETY:

The school reception is remote from the main entrance. The automatic opening main building entrance doors are unmonitored.

FINDINGS:

There is no effective barrier to prevent unauthorised access or exit by visitors or students.

5.2.3 OUTSTANDING DEFECTS:

The school management team are concerned at the lack of progress in resolving the defects that have arisen within the defects period.

FINDINGS:

Various defects which the school has listed, which include water stained ceilings, faulty space heating, cracked concrete etc. which have longer term maintenance implications if not remedied, need to be rectified within the scope of the building contract, before issue of the final certificate.

6 CONCLUSIONS

This school is one of the latest generation of schools constructed to the higher design standards set out by the MoE. Much improved design solutions as regards weathering details and the practical application of sustainable features make this an attractive school which should perform well over the coming years.

There are still issues with component specifications, the sliding partitions internally and the fencing externally are likely to cause future maintenance issues and the school still need to spend more money on the building to realise its full potential, solar blinds generally, student storage and external shading are all required.

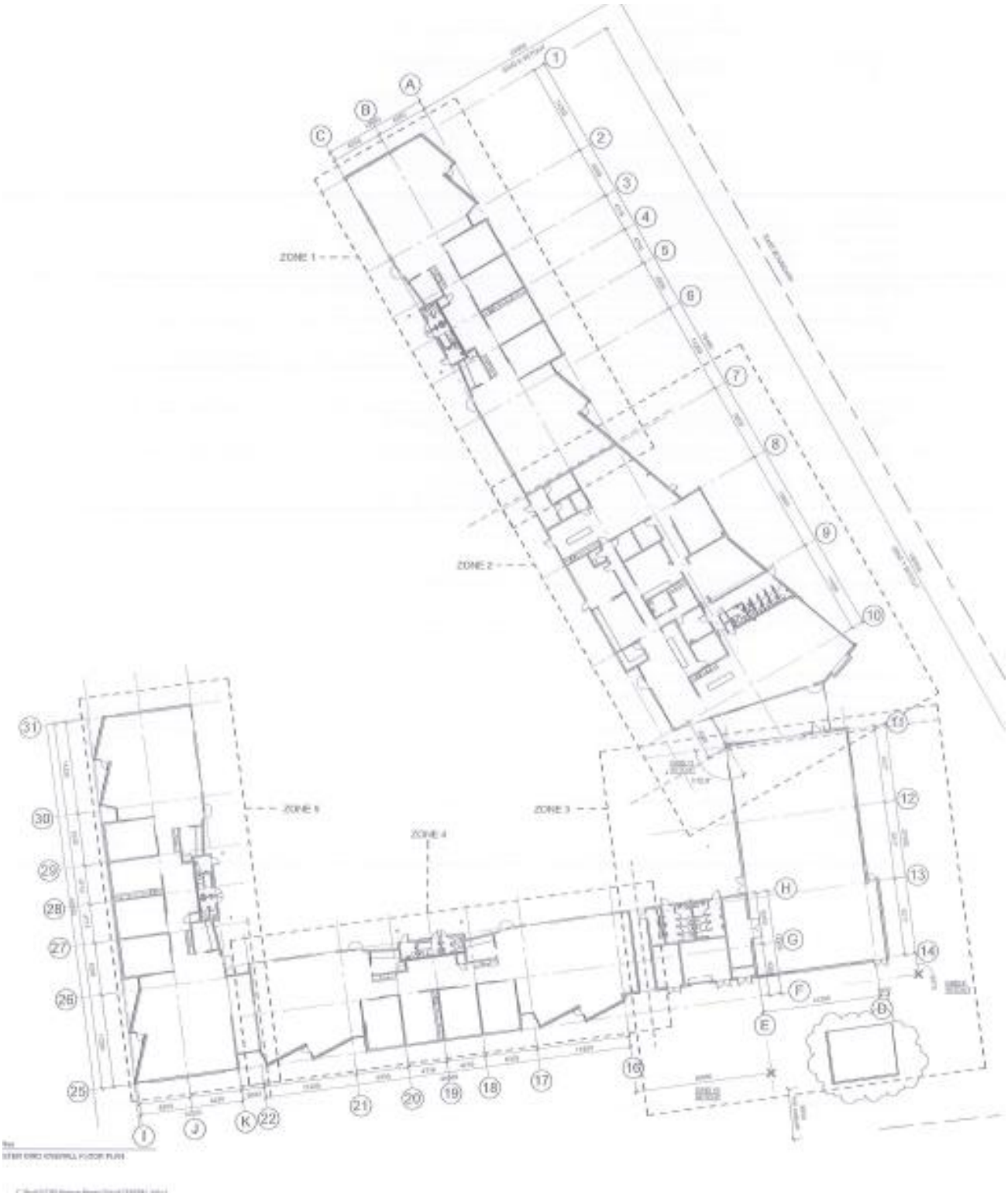
The school Principal in particular expressed satisfaction with the school as a learning space for students. Spacious and flexible there is much to commend the design.

View of an internal learning space.

7 APPENDICIES

7.1 DESIGN SITE PLAN

7.2 DESIGN FLOOR PLAN



7.3 CLIENT SUPPLIED INFORMATION

List of Information – Pegasus Bay School, Pegasus, Christchurch.

- O & M Manual
- Weather tightness report
- PMIS Documentation
- Tender programme
- Project Plan
- Works Contract
- Team Structure Chart
- Maintenance Plan
- Funding Application
- Practical Completion Certificate
- Project Directory
- As built drawings

Opus International Consultants Ltd
The Westhaven, 100 Beaumont St
PO Box 5848, Auckland 1141
New Zealand

t: +64 9 355 9500
f: +64 9 355 9583
w: www.opus.co.nz