04 Design approach
Planning principals

Design

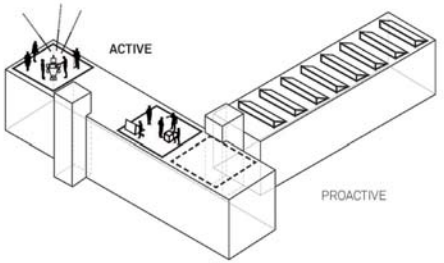
Electrical Engineering is a wide ranging discipline focused on "the study and application of electricity, electronics and electromagnetism." It is invisible to the untrained eye, yet it underpins almost every aspect of contemporary life on a personal level from our homes, our cars and our phones. We want to render it visible in the Electrical Engineering Building to foster an awareness of the research and student activities within and as a way of infusing meaning into the built fabric.

Our core design proposition is to reveal electrical engineering through transparency, materials and light.

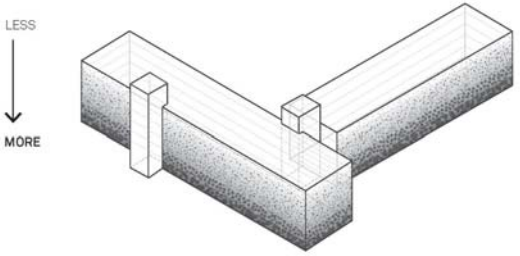
Transparency
Throughout the building fabric will vary the level and nature of transparency according to internal function, building thermal performance, response to campus context, reflect the activity and density of the occupants (lower = more dense, more transparent, higher = less dense, less transparent). A major element will be to create a series of large windows revealing the heart of the building from University Mall.

Materials
The intent is to reflect the materials used in electrical engineering (eg. metallics, copper) but also build upon the existing material palette of variegated face brickwork, ceramic tiles and expressive concrete.

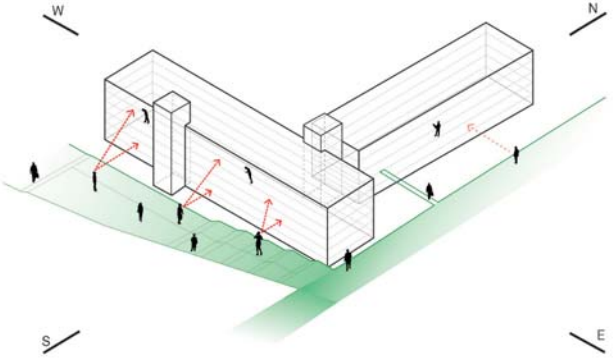
Light
Through modulated transparency and the application of a considered materials palette, the play of natural light will add a further dimension to the external envelope through shading effects and into the interior design through a series of windows either framing or filtering the view. Internally daylighting and views will be controlled via a series of apertures in solid partitions, filtered light and view through textured partitions as well as fully glazed partitions where appropriate.



Activated roof



Activity density



Visibility

04 Design approach
Facade

Approach

Overall the majority of the existing building façade will be retained including all of the variegated face brickwork (refurbished where existing external services are removed), the concrete patterned 'breeze' block zones, most of the ceramic tile spandrels, the white painted profiled concrete soffits and parapets (primarily on the North Block) and the grey concrete window reveals.

The key objectives of the facade strategy are:
_Respond to the UNSW campus context, specifically the University Mall address to the south
_Respond to the environment and local microclimate
_Respond and reflect the active internal functions externally (eg. informal student spaces) through varying transparency
_Improve the building thermal performance (Section J)
_Restore sections of the existing façade where impacted by external services to be removed as part of the refurbishment
_Retain the original character of the building to mirror the recently refurbished Mechanical Engineering Building on the opposite side of University Mall
_Provide a renewed, yet respectful, outward expression of the building for the future

South Block
The southern façade of the South Block, will have all of the existing single glazed windows replaced with new double glazed aluminium framed windows. The glazed will offer improved thermal performance and be highly transparent to reveal activity within the building and support the overall design concept. In response to a highly active informal student zone on Ground to Level 2 in the centre of the South Block, the existing spandrels will be removed to enable full-height bay windows. Other upgrades on the south include extensions to the entry canopies in order to provide improved protection from inclement weather and mitigate the impact of wind driven rain from the south. These elements also aid identification of the School of Electrical Engineering & Telecommunications.

Similar to the southern façade, the northern façade will have all of the existing single glazed windows replaced with new double glazed aluminium framed windows. New glazing will offer improved thermal performance for occupants in combination with perforated metal sun shade elements to mitigate sunlight during the Summer months. Responding to the interior function, some windows will be translucent for privacy to amenities on Ground and Levels 1 and 2. Additionally, two bays of windows either side of the connection to the North Block will be removed to facilitate a services riser to the east and an extended lift foyer to the west.

Only minor refurbishment of existing facades and finishes are proposed for both the eastern and western facades of the South Block.

North Block
A greater degree of refurbishment is proposed for the North Block including a new roof plant level, some recladding and new Ground level openings to improve access and usability of the spaces. This section of the building can accommodate more intervention as it was built after the South Block in a series of stages from the mid-1960s until 2004. Each progressive stage resulted in slight differences in the façade design, details and/or materials. For example, this block lacks the profiled soffits and parapet design characterising the South Block. Changes in the 2004 extension of both materials and details at the northern end of Level 4 detracts from the overall consistent building envelope and palette as it is an aluminium composite cladding facade. To integrate with the surrounding colour palette and diminish the visual impact it is proposed to re-clad these areas and remove the boxed window surrounds.

Both the eastern and western elevations will have new sun shading devices protecting the new double-glazed windows from low Summer sun. Whilst the application of these sun shades will improve the building's thermal performance, they also provide the building with a new expression.

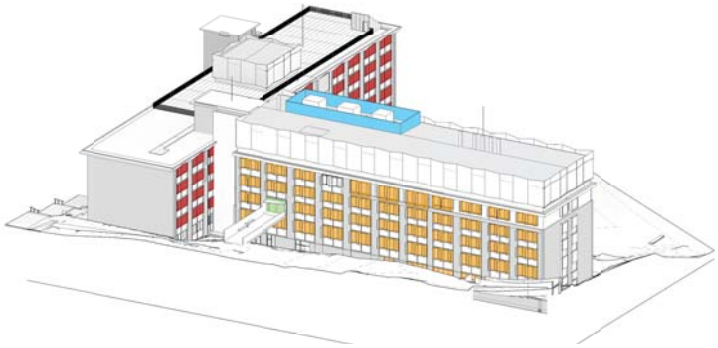
Along the western façade at Ground level, a series of bays are proposed to be opened fully to facilitate new wide panel lift doors with vision panels. These new openings support the need for student indoor and outdoor learning where experiments or devices can be tested externally in the new shared zone. In other areas, the new panel lift doors provide clear access for the Workshop and to the School Stores.

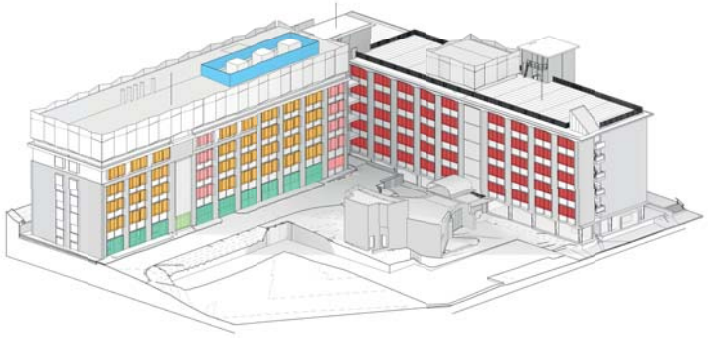
At the junction between the North and South Blocks, an extension of the floor plate (half a building grid module), outside the goods and passenger lift foyer on all levels, is proposed to improve safe handling and loading of goods as well as provide an informal student or staff breakout space along a main circulation route within the building. New automatic sliding doors on Ground will improve building access and compliance.

Refer to the Roof massing section for more detail on the façade in that area.

Rex Vowels Theatre
Broadly, the Theatre building will be retained and refurbished without major interventions. New glazing walls will replace the existing windows in the same location and the roof will be replaced by a new metal deck system. As part of the landscape design creation of a new contemplation space, the walls enclosing the existing gas storage and service area will be demolished.

To simplify access and movement around the Theatre, the glazed facades and doors on the east and west between the Theatre and South Block will be removed. This space will remain under cover but become a breezeway, providing an east/west pedestrian connection from Engineering Road to the lift foyer.





04 Design approach
Roof massing

Design

As a consequence of the EEB moving from a naturally ventilated building to a fully conditioned one, the existing plant rooms are inadequate in both size and location. Space for new building services plant, based on functional requirements, determined a total roof plant area of 1,939 sqm (GFA) with an average internal clear height of 4.5 metres required for equipment. Primarily for mechanical services, the new roof plant room is very efficiently planned yet adds height and bulk to the existing building envelope.

Our strategy to offset this added visual bulk is to locate the new roof plant primarily on the North Block (90% of the total area) as it is less visually sensitive from nearby residential areas on Willis Street, minimises increased overshadowing of the University Mall to preserve the existing pedestrian amenity and is closer to services access for future replacement of mechanical equipment. There is a smaller roof plant area on the South Block (10% of the plant area) located near the existing lift overrun tower. It is positioned to group the roof bulk whilst preserving any current views across the building roof and retain large unencumbered areas for research and student experimentation by various UNSW Schools and groups.

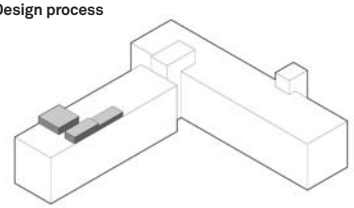
On both roofs there a series of projections beyond the ridgeline including fume cupboard exhaust flues, some miscellaneous exhaust flues, a higher zone required for the cooling towers, poles part of the lighting protection system and a series of existing research antennae (relocated to new locations on the South Block).

Form, Articulation and Materials

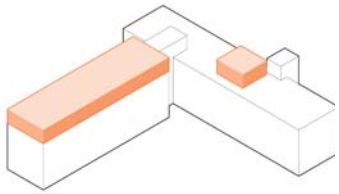
As one of the most visible changes to the existing building envelope, careful consideration with respect to the visual bulk and form of the new plant level is required. Additionally the new roof level needs to relate to the existing building features, geometry and underlying grid. The proposed approach is outlined in the series of diagrams below.

In summary, the new roof volume is lifted up from the existing parapet to articulate the form and allow for mechanical intakes as required in this zone. To unite the new and existing forms, the new plant volume is 'folded' in plan on the gridlines reflecting the existing angled parapets. Then to provide new expression of the building and an identity on the campus skyline, the parapet rises and falls to create a 'crown' effect. Lastly, to tie back into the concept of transparency, materiality and light, a translucent material such as a multi-wall polycarbonate panel system is proposed. The material will be translucent and provide a subtle layered effect in contrast to solid panels or metal louvres. As a lightweight system has good insulation values, will reduce artificial lighting need during day in the plant room, is impact and UV resistant with low maintenance requirements.

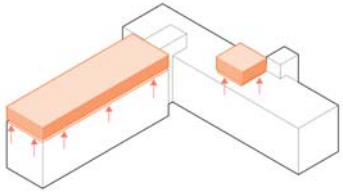
Design process



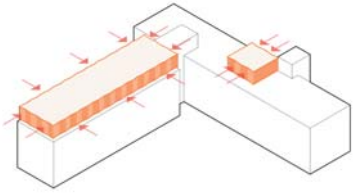
Existing conditions



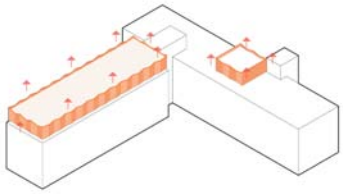
Solid unarticulated



Lifting from the roof



Manipulating the walls

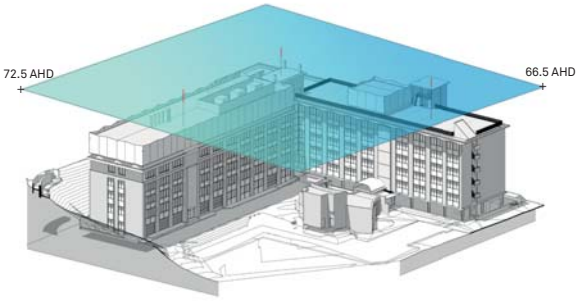


Expressing the skyline form

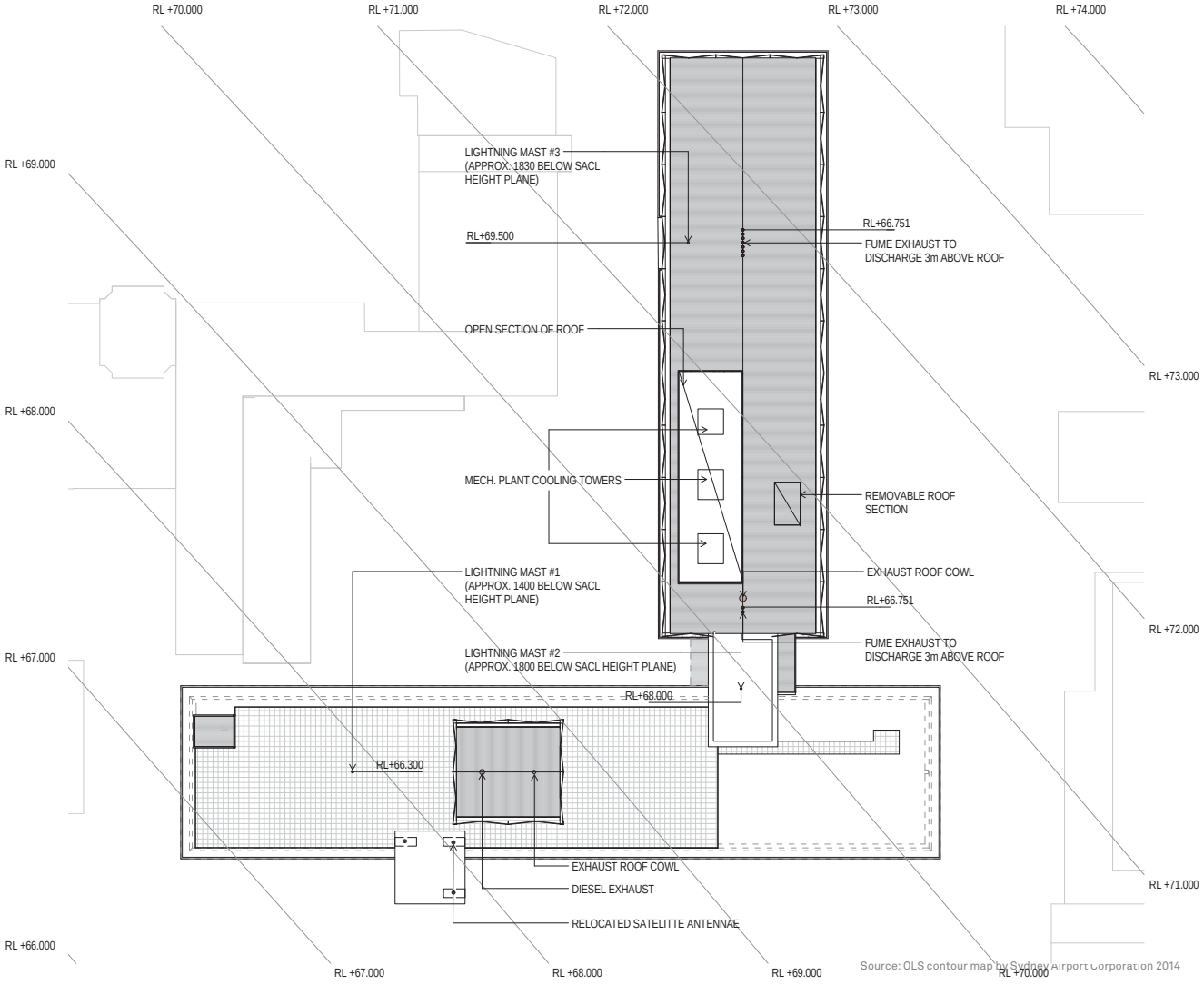
04 Design approach
Roof massing

OLS Height Plane

The SACL OLS height plane extends from the north-east corner of the northern building at approx. 72.5m (AHD) sloping towards the south-west corner of the south building at approximately 66.5m (AHD). No object associated with the Electrical Engineering Building (EEB) protrudes into this height plane. The tallest objects on the EEB are the lighting protection masts, which maintain a minimum clearance of 1.4m underneath the OLS height plane. Although this application seeks to install new plant equipment on the roof, relocate existing antennae and satellite, the proposed locations of which will not breach the OLS height plane.



SACL height plane diagram



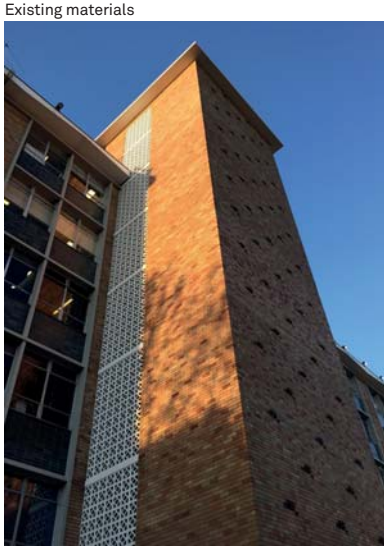
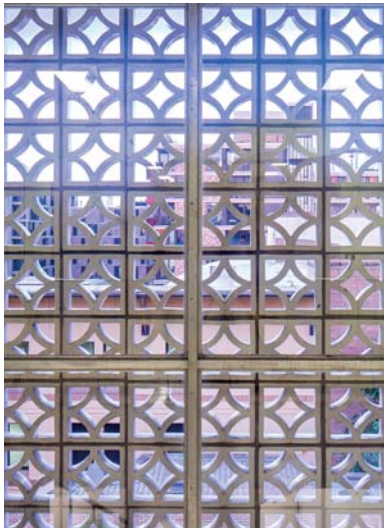
Source: OLS contour map by Sydney Airport Corporation 2014

Materials

Existing
_Variegated brickwork
_Ceramic tiles
_Natural and white painted concrete
_Concrete 'breeze' block

Proposed
_Translucent lightweight panels
_Perforated metal panels (sun shades, screens, intake/exhaust zones)
_Clear and tinted performance glazing
_Anodised or powder coated aluminium
_Solid steel plate with a paint finish
_Precast concrete paving and landscape wall units
_Interlocking concrete paving

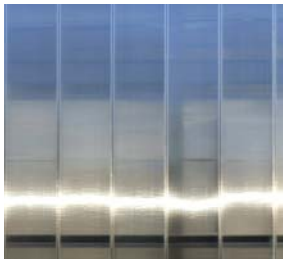
Existing materials


Proposed materials








Material references

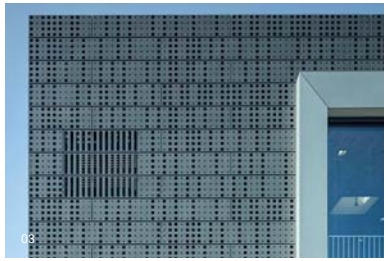
01 - Translucent panels - Laban Dance Centre, London (Herzog deMeuron)
02 - Translucent panels - The University of Sheffield Advanced Manufacturing Research Centre Training Centre (Bond Bryan Architects
03 - Perforated panels - Oerlikon Substation, Zurich (Illiz Architects)
03 - Perforated panels - Switch +, Münster (Modulorbeat Architects)
04 - Perforated panels - de Young Museum, San Francisco (Herzog deMeuron)
05 - The Nelson-Atkins Museum of Art, Kansas City
06 - Perforated panels - Gadigal Avenue Apartments (Collins and Turner)
07 - Traslucent panels - Nelson Atkins Museum of Art, Kansas City (Steven Holl Architects)


01

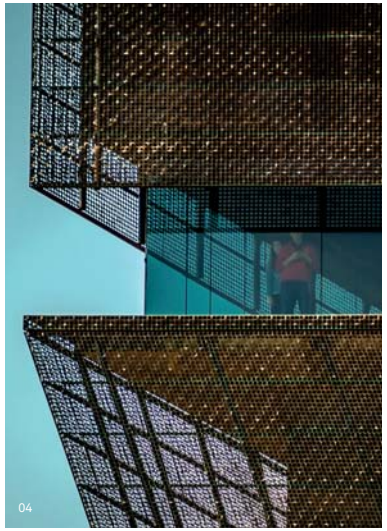

02


06


07


03


05


04

Landscape Plan

The landscape design strategy aims to:
_Upgrade existing degraded pavements
_Prioritise the pedestrian over the vehicle
_Provide clear sight lines and accessible entries (applying CPTED principles)
_Use robust materials and a plant palette that relates to the UNSW campus strategy
_Allow for a flexibility of space with opportunity for outdoor learning and greater social interactions

This public domain has been developed using three key principles: address University Mall; prioritise the pedestrian; and expand the classroom outdoors.

These principles have been applied to four zones around the EEB to provide:
_Improved accessibility and visual connectivity from EEB entries to University Mall
_Pedestrianisation and pavement upgrades to College Road
_Terraced bleachers to the west of the Rex Vowels Theatre
_Contemplation courtyard to the west of the Rex Vowels Theatre

A new ramp with integrated drains is proposed to replace the existing stair transition to the eastern building entry at the Ground floor along University Mall. Two existing raised garden beds are proposed to be removed to improve sight lines and allow for the program within the Lower Ground floor to expand outdoors. The existing precast concrete paving will be upgraded with minor adjustment of levels and drains.

College Road is proposed as a shared way that is infilled with unit paving to provide a flush ground plane, prioritising the pedestrian. The existing balustrade is proposed to be replaced with single steel balustrade along the western edge of the shared zone adjacent to the EEB workshops. The 500mm concrete edge is retained, with the existing balustrade proposed to be removed and replaced with a series of timber seating edges and steps where required. Equitable access from College Road is provided up to the EEB through ramps in two locations.

Servicing of the EEB is maintained with truck access to the existing goods lift. A bin store and loading zone is proposed to be located within the shared zone. Existing cross falls will be retained with a minor level adjustment of existing storm water pits required. Pavements are proposed to be interlocking concrete unit pavers to tie into the UNSW palette.

New bicycle racks are proposed to the east of the EEB entry bridge on Level 2 adjacent the existing planting zone to tie into the broader UNSW circulation network.

A new series of insitu concrete bleachers with integrated planting zones and timber seating edges are proposed to mitigate the level change between College Road and the Rex Vowels Theatre. A line of precast concrete stairs is located to the south of the bleachers, providing direct access from the lower level to the EEB goods lift. The terraces will allow for a variety of social interactions from groups of three to four people to group discussions. USB and power connections are proposed to be integrated into the bleachers, further promoting the opportunity for people to gather and congregate in the space.

A single courtyard space is proposed adjacent to The Rex Vowels Theatre. A deciduous tree bosque, with a decomposed granite base and a series of seating elements replace the existing external service storage and provides an opportunity for students to gather before and after lectures. The existing pedestrian access to the west of the courtyard is proposed to be improved by removing an existing structure along the northern facade of the EEB.

The quality of space will be further improved through an upgrade of the existing paving and regrading of levels to mitigate flood issue and improve accessibility.


Terraced bleachers (Australian Fine China, Perth-HASSELL)


Planting Grove (Novartis Headquarters, Forum 1 Courtyard, Switzerland-PWP)


Shared Zone (New Road, Brighton, England-Gehl Architects)

1. Existing entry steps removed and replaced with new access ramp with integrated drains
2. Existing garden beds removed allowing for new paved zone with internal furniture spill-out opportunity
3. Increased circulation around existing lift core. New stairs and drainage upgrades
4. Pavement upgrade to College Road. Retain existing kerb. Ramp up to flush shared zone
5. New flush shared zone to College Road. Remove existing kerb
6. Insitu concrete bleachers with integrated planting zones and timber seating edges to form outdoor classroom and exhibition zone
7. Breezeway created by rearranging entry doors. Paving continues through this zone
8. New deciduous tree planting with seating under with decomposed granite throughout
9. Widened pedestrian bridge to eastern EEB entry
10. Existing wall height to be reduced to improve site lines to the EEB eastern entry
11. Intercom control boom gate access to College Road
12. Goods loading zone
13. Existing cycle racks to be retained
14. Additional cycle racks to be provided
15. Proposed external lighting upgrades in accordance with Australian safety standards

LEGEND

- EXTENT OF PUBLIC DOMAIN WORKS
- +34.00 EXISTING LEVEL
- +34.00 (EX) PROPOSED LEVEL
- EXISTING TREE TO BE REMOVED
- EXISTING TREE
- PROPOSED TREE PLANTING
- CONCRETE SEAT/BENCH
- TIMBER SEATING EDGE
- FLEXIBLE SEATING
- PROPOSED SHRUB PLANTING
- PAVING
- BIKE RACKS
- STAINLESS STEEL BOLLARDS
- DRAINAGE CHANNEL

05 Area analysis
Area schedule

Existing

The Electrical Engineering Building currently comprises of two buildings, a South Block and a perpendicular five level North Block. Rex Vowels Theatre attaches to the Lower Ground floor foyer and forms part of the project scope. The buildings have an existing Gross Floor Area (GFA) of approx 14,172sqm and an existing Useable Floor Area (UFA) of approx 10,700sqm UFA (excluding Nura Gili on Lower Ground).

Proposed

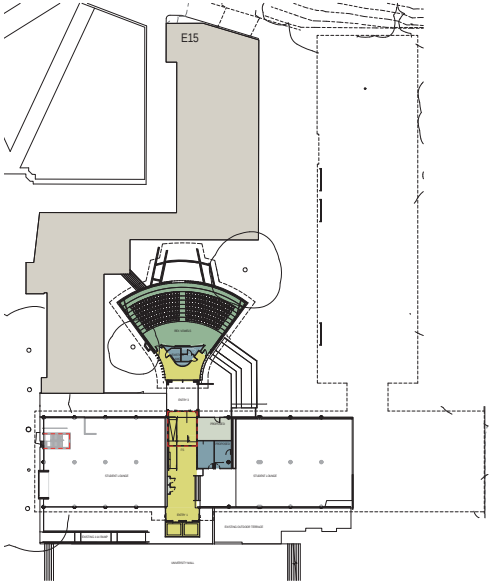
The proposed design reduces the existing UFA from 10,700sqm to 10,399sqm, a decrease of approx 311 sqm or 3%. This is a net result of building upgrades to amenities, building services & new mechanical roof plant required to service the building.

UNSW Electrical Engineering Building Proposed Area Schedule

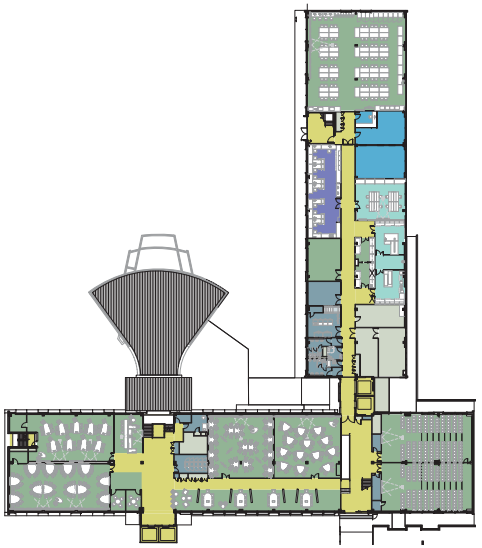
UFA	Lower Ground	Ground	Level 1	Level 2	Level 3	Level 4	Roof	**Totals**
Research		82 sqm	561 sqm	209 sqm	884 sqm	1,010 sqm	42 sqm	**2,788 sqm**
Teaching	284 sqm	1567 sqm	1174 sqm	1,749 sqm				**4,774 sqm**
Workplace		103 sqm	367 sqm	71 sqm	1,091 sqm	1,000 sqm		**2,632 sqm**
Workshop		205 sqm						**205 sqm**
Total UFA	284 sqm	1,957 sqm	2,102 sqm	2,029 sqm	1,975 sqm	2,010 sqm	42 sqm	**10,399 sqm**

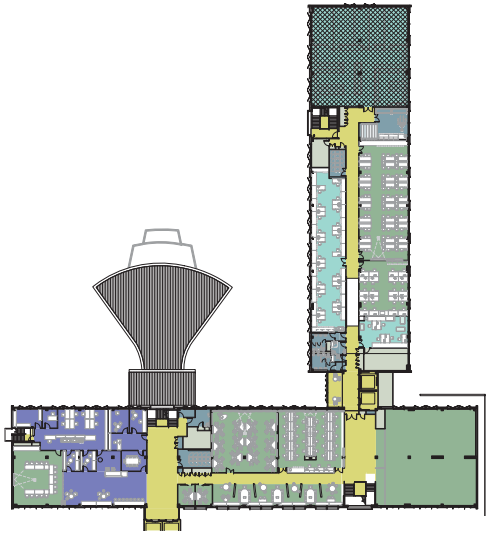
05 Area analysis
Area reference plans

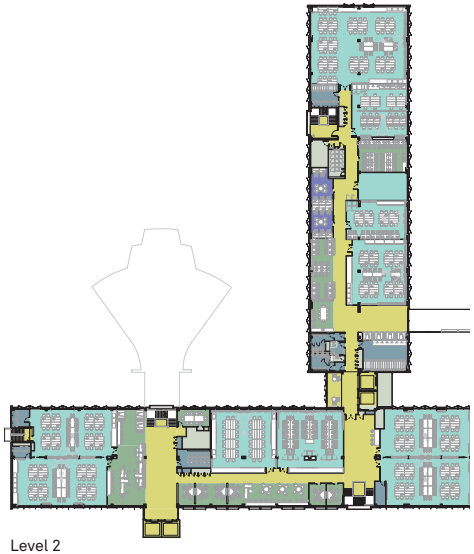
Legend
- Workplace
- Teaching
- Research
- Workshop
- Circulation
- Services
- Amenity

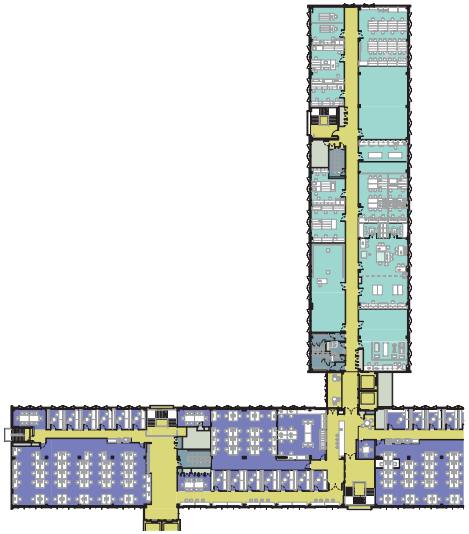


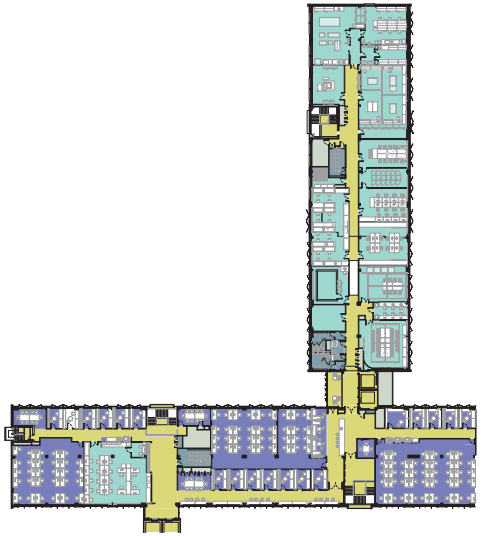
Lower Ground

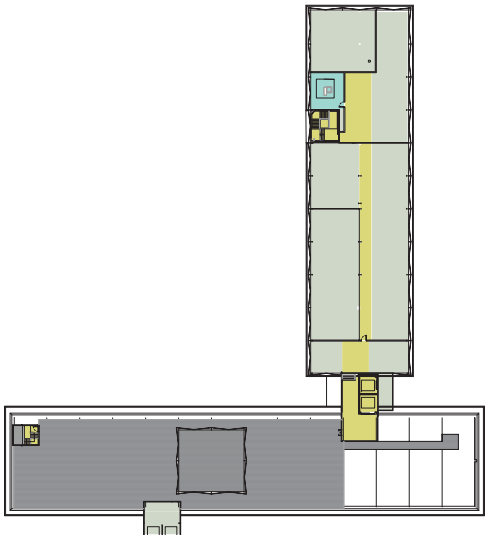

Ground


Level 1


Level 2


Level 3


Level 4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