

BLURRING BOUNDARIES:

Creating Porous Healthcare Environments
for Teaching, Learning and Healing

National University Centre for Oral Health Singapore
(NUCOHS)

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B+H







BACKGROUND

HEALTHCARE IN SINGAPORE

General Hospitals provide acute tertiary healthcare with comprehensive medical facilities, in-house specialists, and allied support services.

Specialist Hospitals and Institutions provide specialist treatment and healthcare. These include medical centres housing independent specialist clinics and doctors.

Community Hospitals are usually semi-public hospitals catering to rehabilitation, geriatric care and coalescing patients. They are usually funded by charities or religious groups, with assistance from government funds and/or public healthcare professionals.

Healthcare Model: Subsidized and non subsidized patients (Usually VIP Services).



BACKGROUND

B+H: MAJOR PLAYER FOR PUBLIC & PRIVATE HEALTHCARE IN SOUTH EAST ASIA THE LAST 10 YEARS: Changi IB, Changi MC, SGH OCH, H9A, NUCOHS, Medini Parkway

NUCOHS (National University Centre for Oral Health, Singapore) second specialty centre for dentistry, after the National Dental Centre Singapore.

Oral Health practices: national dental centre, FOD, private practices.

The National University of Singapore (NUS) is a leading university with a mission to, “transform the way people think and do things through education, research and service.”

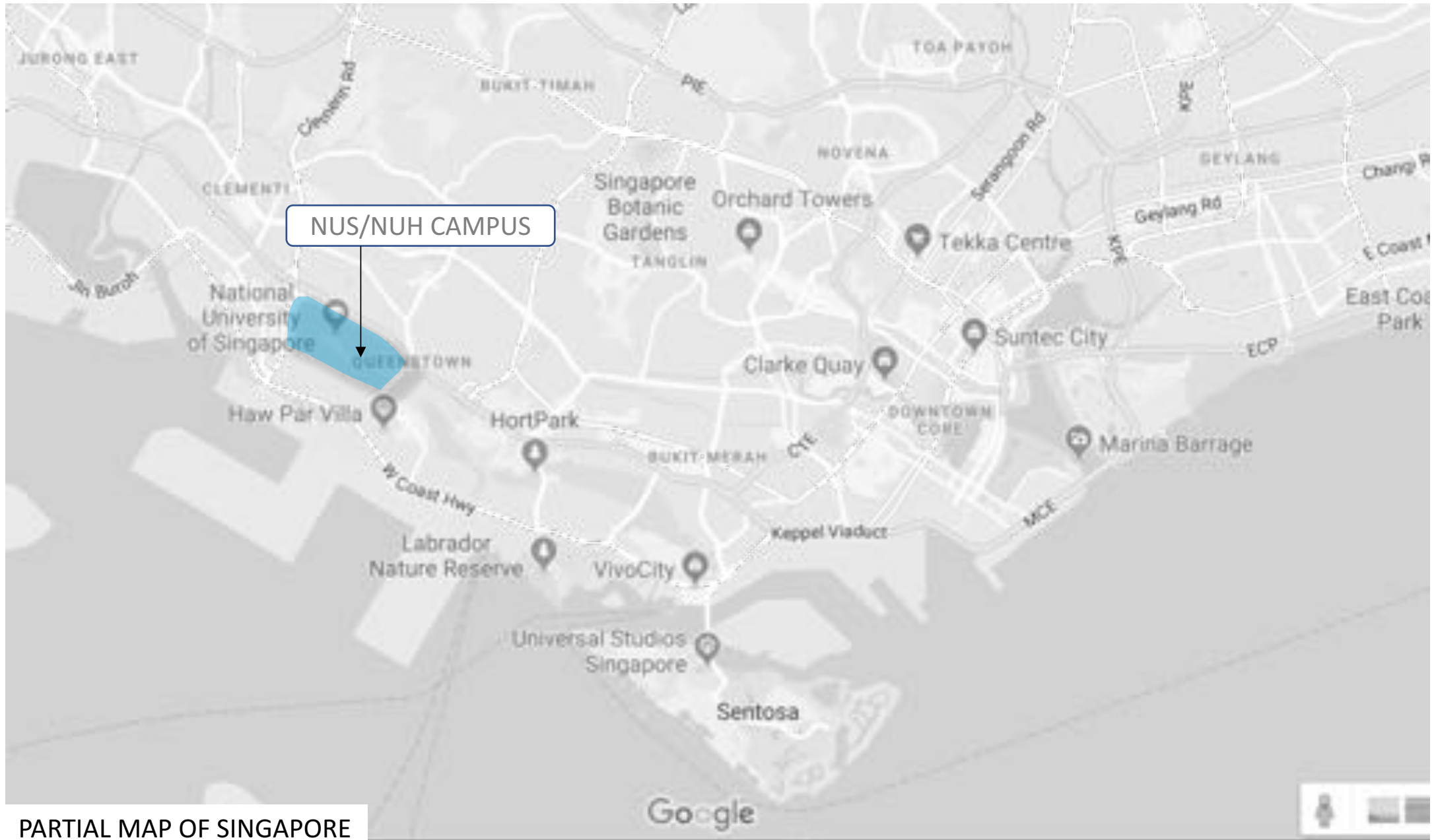
NUS ranks First university in Asia and 22nd in the world

The school will be able to increase its annual undergraduate intake from 54 to 80 per year by 2021.

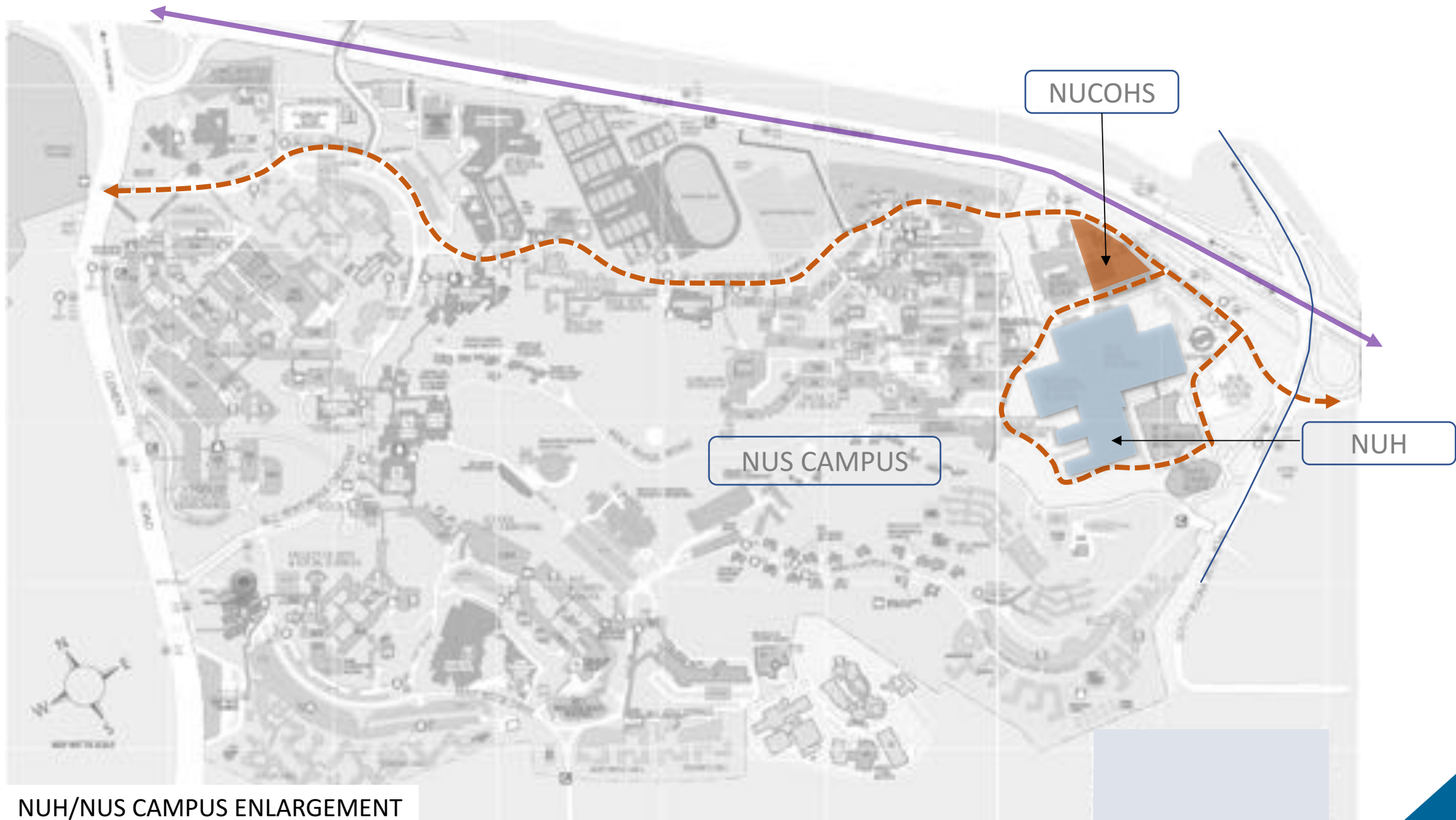
Capacity increase of approximately 500 patients per day

289 (+21 Dental Chairs) in Clinical Areas

Labs Capacities : 80 students



PARTIAL MAP OF SINGAPORE

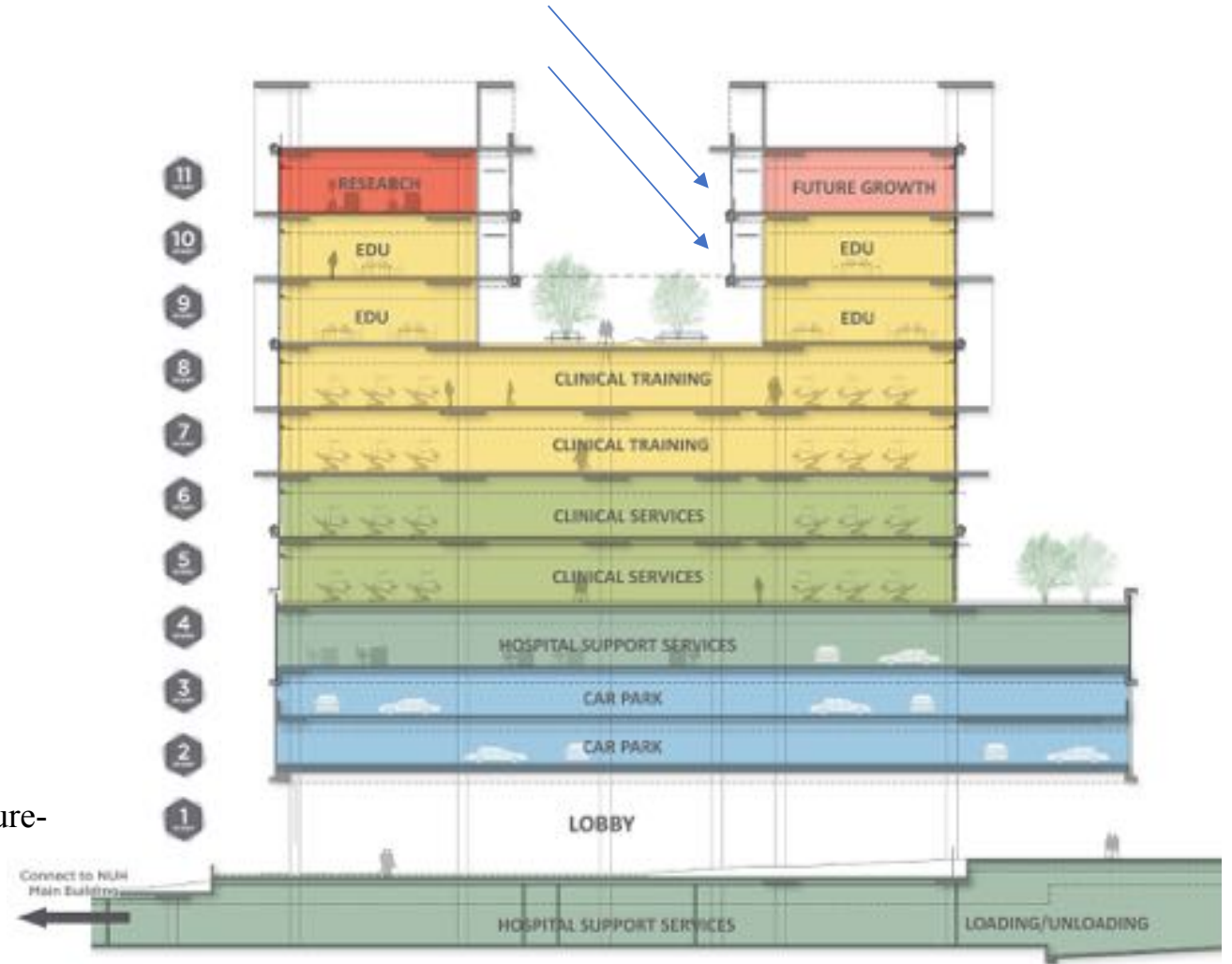


NUH/NUS CAMPUS ENLARGEMENT

PROGRAM | INTEGRATED VISION

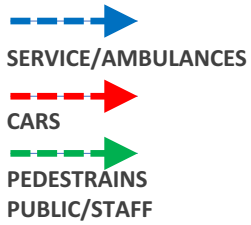
	Space Function	GFA (sqm)	% of GFA
1	Dental Services/PG Training	5,954	17.4%
2	Clinical Training/UG Training	7,223	21.1%
3	Education Space	7,785	22.7%
5	Hospital Support Service	5,766	16.8%
6	Offices for hospital support service	4,434	12.9%
7	M&E	2,638	7.7%
8	Ancillary spaces (link bridge)	504	1.5%
	Grand Total	34,304	100%

- Mixed-use facility
- Hospital support services
- Faculty of dentistry: admin, teaching, doctor and student areas
- Treatment areas
- Research
- Integrated Practice : teaching, treatment, sharing modularity, future-proof
- Landscape connection: sustainability and healing

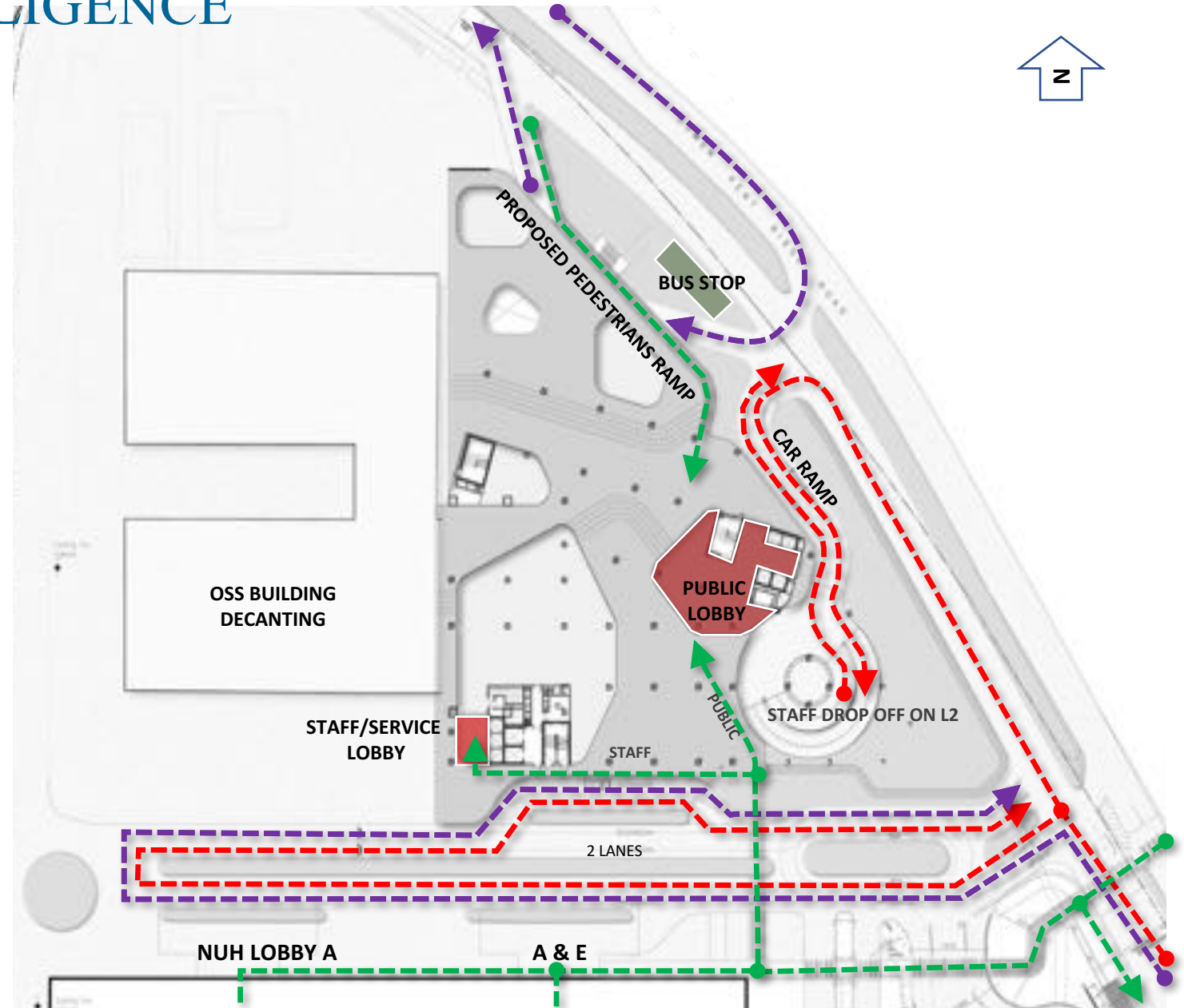


MASTER PLAN & DUE DILLIGENCE

Traffic Analysis



- Enlargement of the NUH road 2x2 lanes
- Drop off for Visitors, Ambulances and taxi on ground floor (L1)
- Drop off for Staff and Students on L2 podium (car park)
- Improved Pedestrians circulation and road crossing
- Proposed pedestrian ramp from kent ridge road / bus stop to the main lobby
- Improved loading and unload ingress
- Flood control



MASTER PLAN & DUE DILLIGENCE

Ground Floor



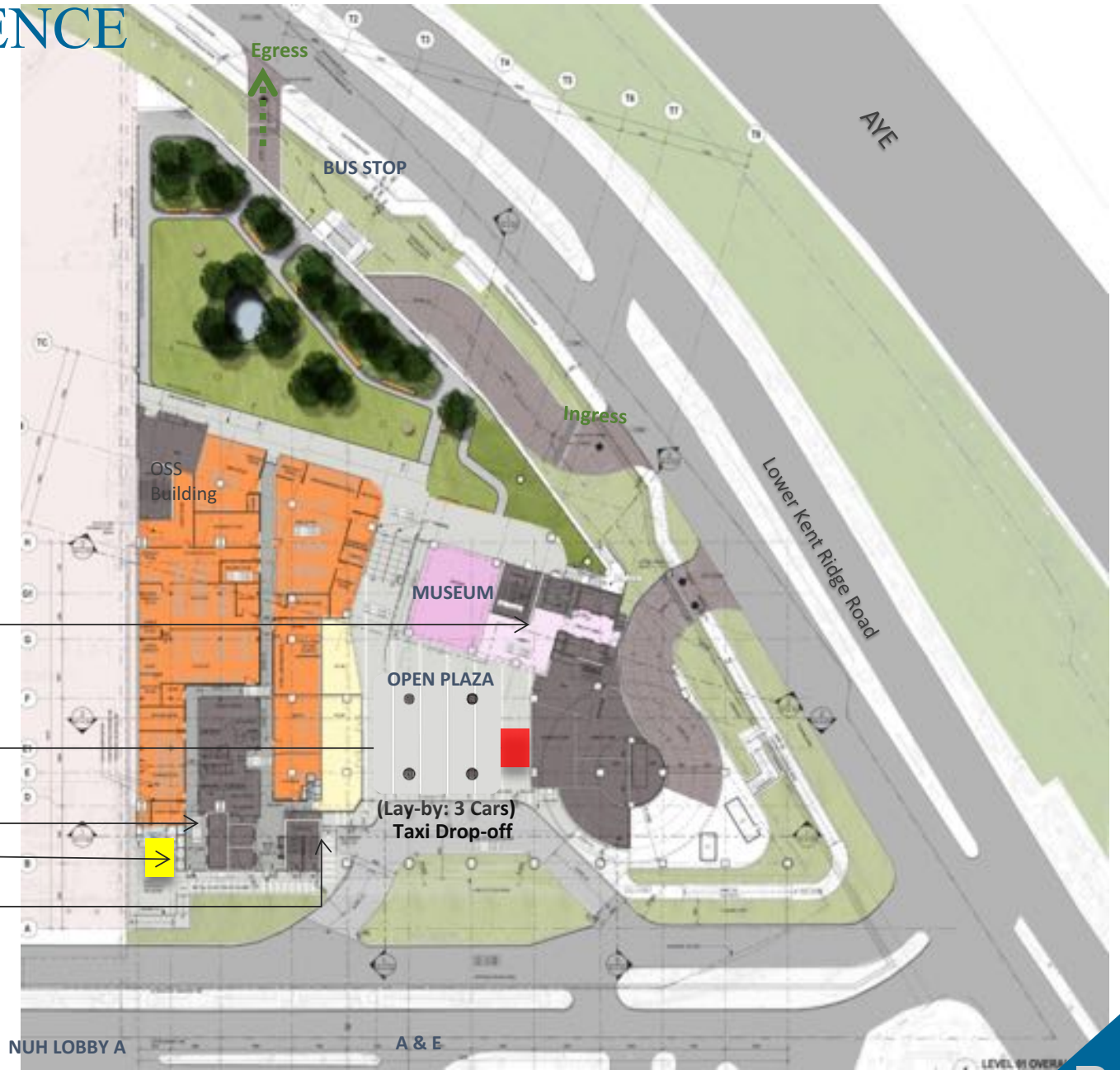
MAIN LOBBY

WHEELCHAIR PARKING

STAFF/SERVICE LOBBY

BIKE PARK

EMERGENCY BAY

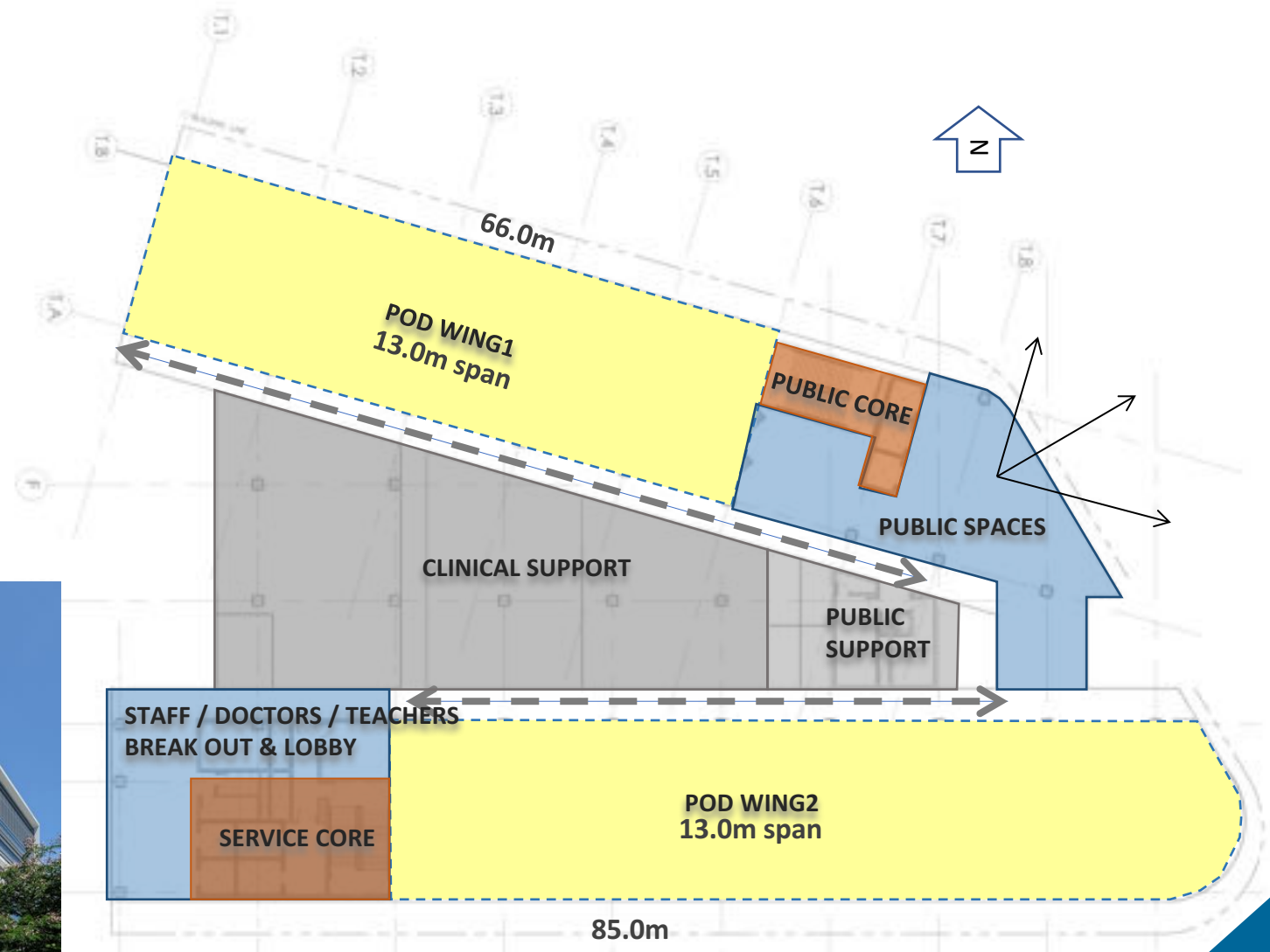


NATIONAL UNIVERSITY CENTRE FOR ORAL HEALTH, SINGAPORE
NUCOHS

ARCHITECTURE & PLANNING CONCEPTS

Building Typology

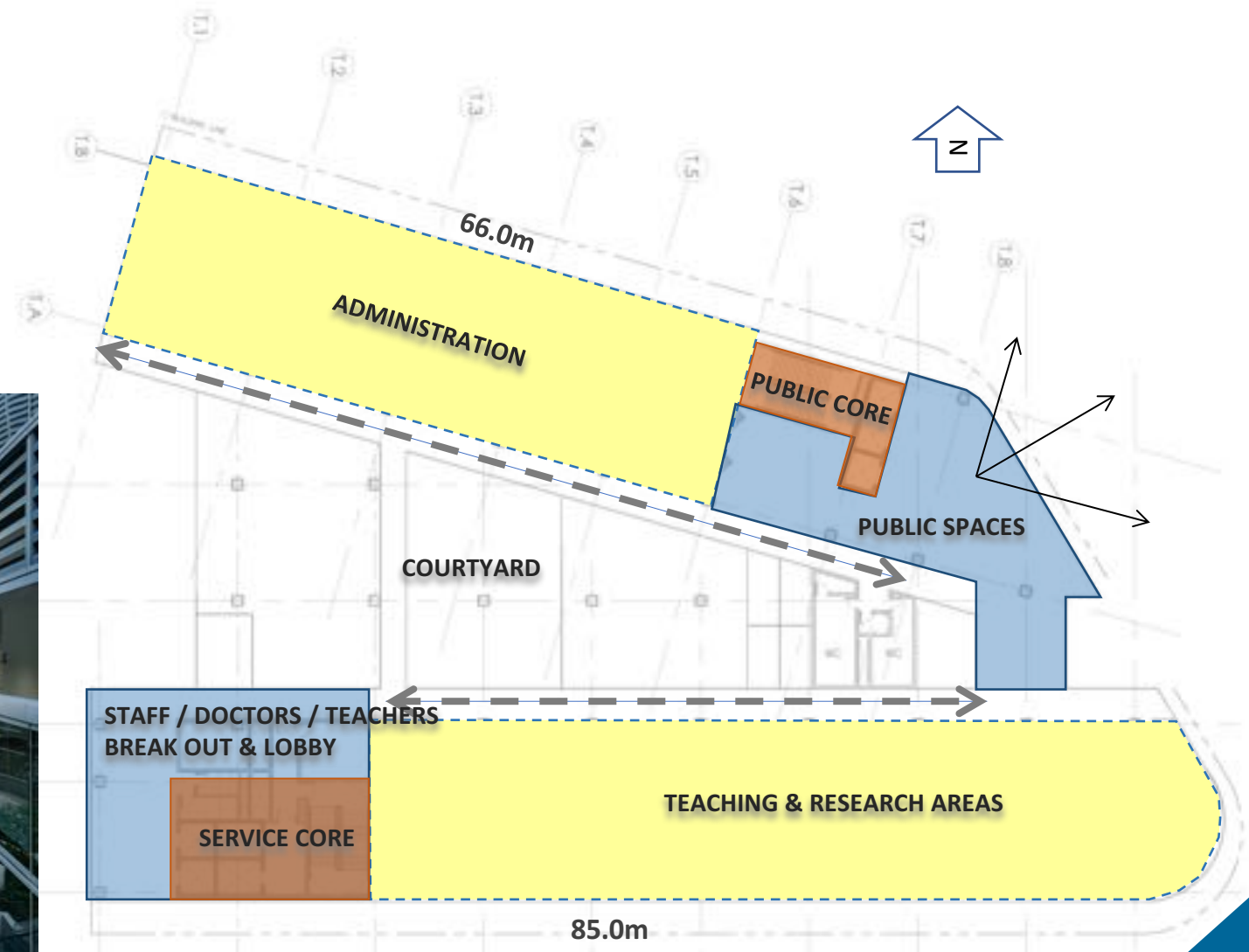
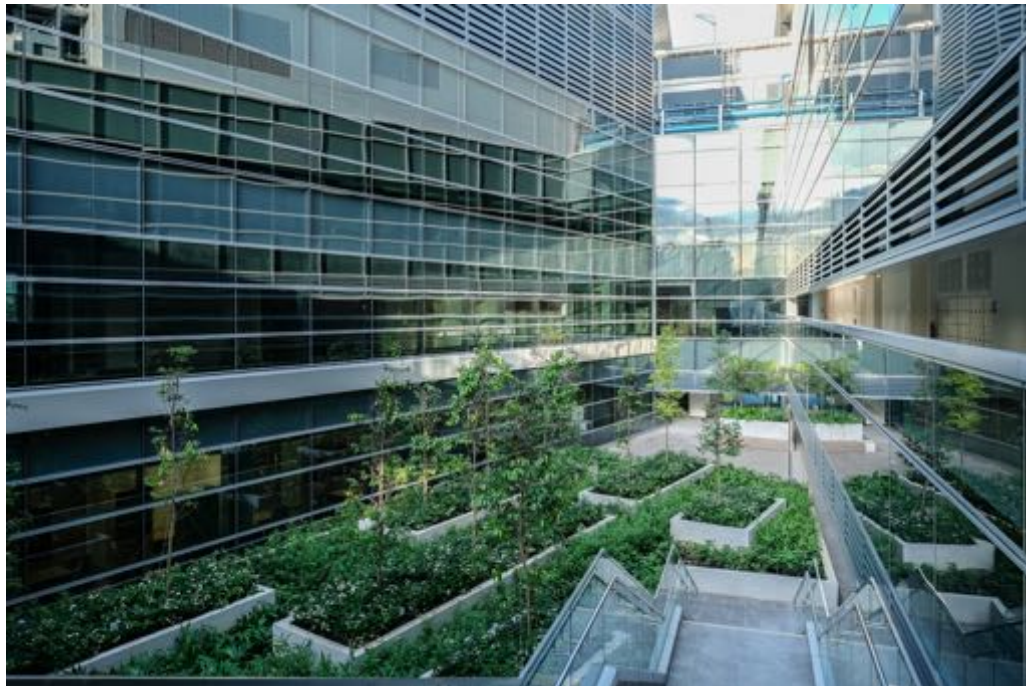
- Concept of wings and central functional core
- Prime space (natural light) : working and patient area
- Secondary space (core) : Supporting areas (clinical & technical areas)
- 2 main distribution corridors
- 1 public core, 1 private core
- Waiting areas along the facade
- Staff/student and clinical spaces easily segregated at night



ARCHITECTURE & PLANNING CONCEPTS

Building Typology

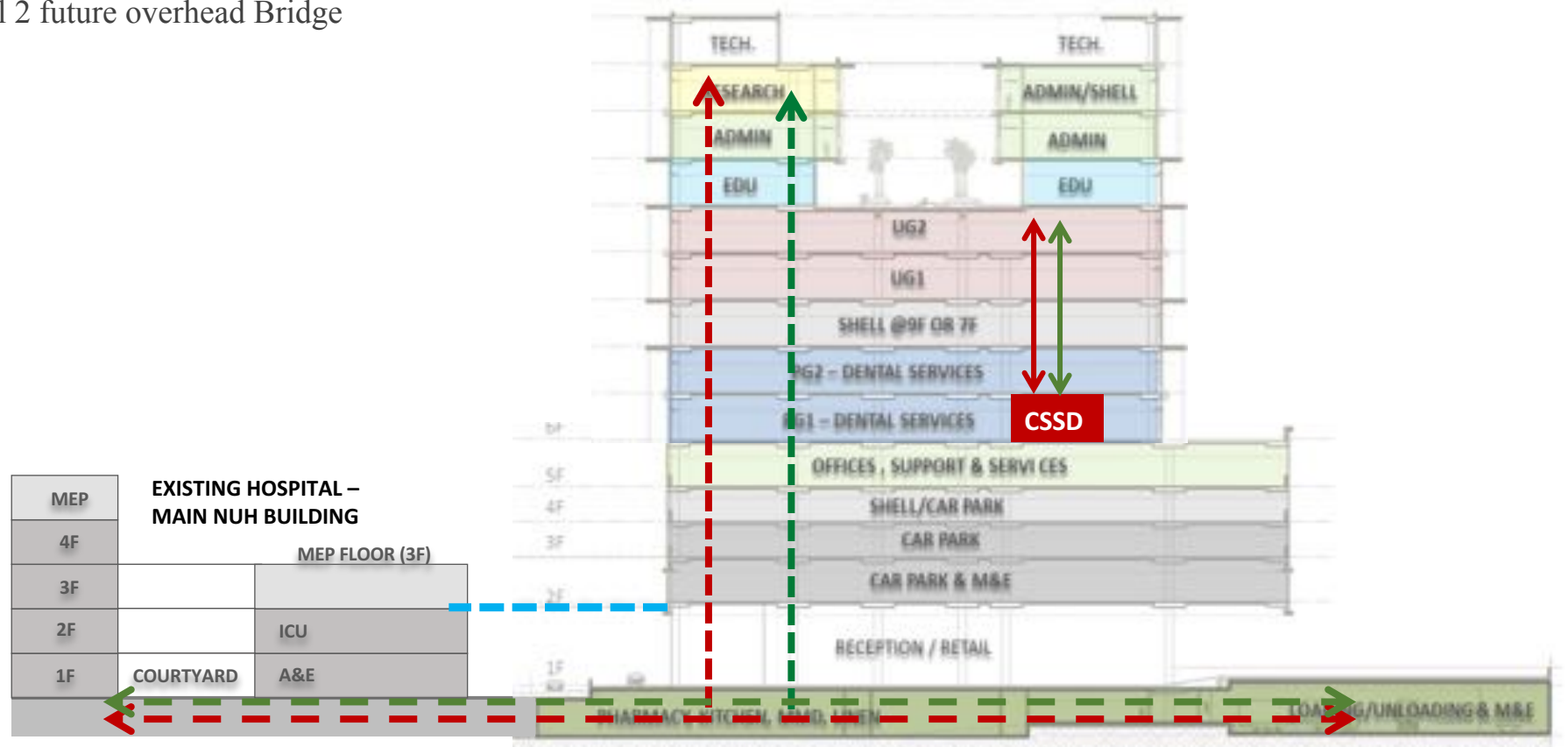
- COURTYARD ON UPPER FLOORS
- INCREASE NATURAL DAYLIGHT
- BETTER CONNECTION TO NATURE



CONNECTIVITY

Main Hospital & Central Sterile Department

- Clean & Dirty Service corridors in the basement link to the Main Hospital Building
- Public & Patients Link at Level 2 future overhead Bridge
- Central CSSD at L5



CONNECTIVITY

Patient & Instrument Flow

Clean Workflow

- ① CLEAN CART HOLDING
- ② CLEAN CARTS
- ③ OPEN PG & DO PROSTHO

Dirty Workflow

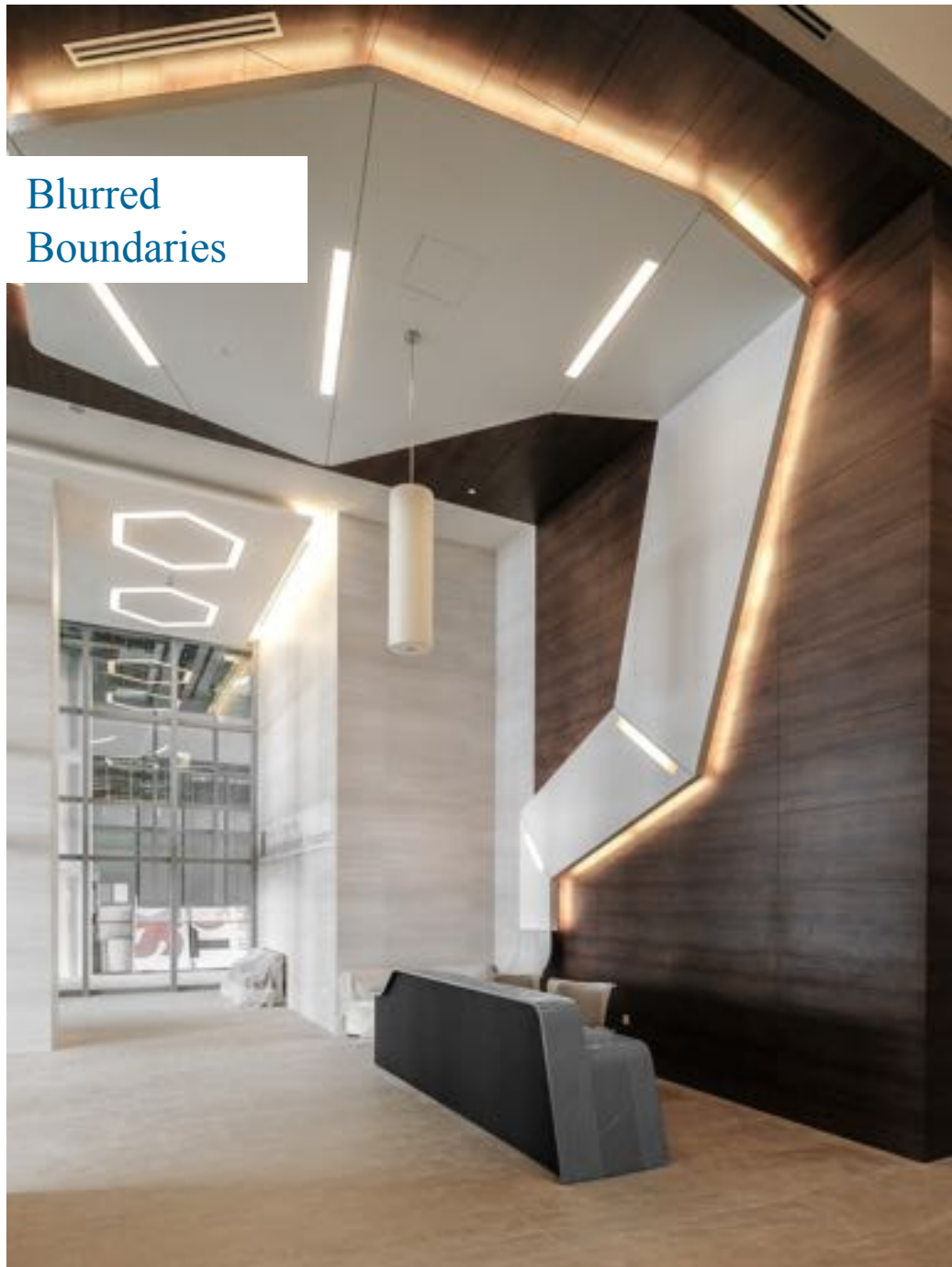
- ① OPEN PROSTHO
- ② DIRTY UTILITY - DIRTY TO COLLECT HERE
- ③ DIRTY HOLD

Patient Flow

- ① LIFT LOBBY 2- ARRIVAL
- ② COUNTER 2-QUEUE NO
- ③ TO SUB WAITING-CALL
- ④ TO PROSTHO CLOSED OP-REVIEW
- ⑤ TO L6 XRAY DEPT.
- ⑥ TO SUB WAITING
- ⑦ TO PROSTHO CLOSED OP- TREATMENT
- ⑧ PAYMENT AT COUNTER 2 (IF NECESSARY)
OR AWAIT TRANSPORT
- ⑨ LIFT LOBBY 2-DEPARTURE



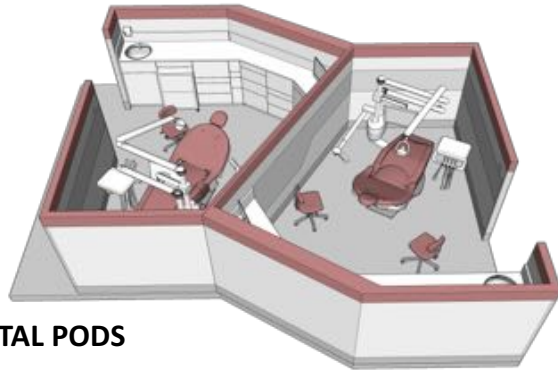
Blurred
Boundaries



ENVIRONMENTS THAT FOSTER COLLABORATION



TUTORIAL ROOMS



DENTAL PODS



STUDENT/ TEACHING LABS



Open operatory pods are mixed on the same level as tutorial and break-out rooms to encourage accidental encounters among students and create spontaneous opportunities for knowledge exchange.

DENTAL SERVICES L5



- Non-Subsidized Patients (Endo, Prosthodontics Closed Ops)
- Subsidized Patients (Endo, Prosthodontics Closed Ops)
- General Student Labs
- Support (Central 3-zone CSSD)
- Tutorial Rooms

OHT Closed Ops

DENTAL SERVICES L6

- Non-Subsidized Patients (Ortho, Pedo, OMS, Perio Closed Ops)
- Subsidized Patients (PG Open Ops)
- 4x Special Needs / 2x Surgery Suites
- Support (X-Ray / Satellite CSSD)
- Tutorial Rooms



CLINICAL TRAINING L7 / L8

- Subsidized Patients (UG Students)
- General Student Labs
- Support (Central 3-zone CSSD)
- Tutorial Rooms



OPEN OPS (UG) - South Wing

FLEXIBILITY, MODULARITY & FUTURE-PROOFING

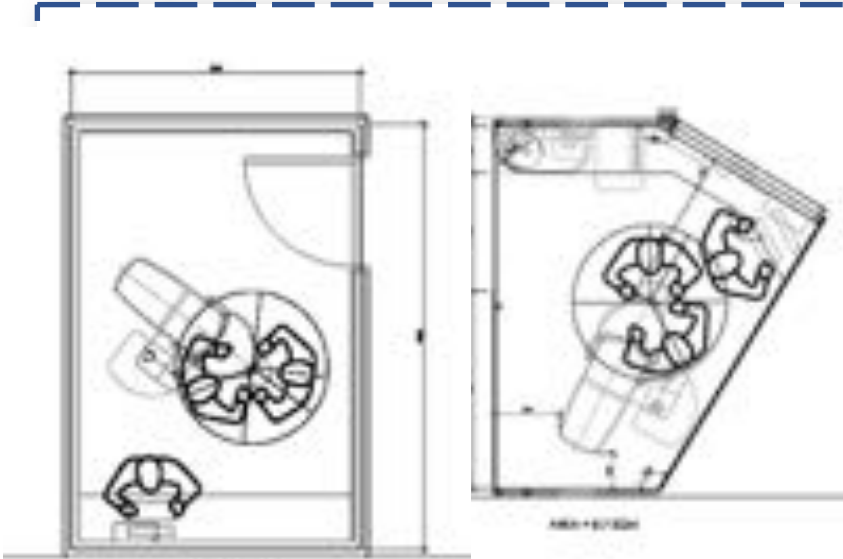
Visibility
Landmark
Multi-faceted
Connected
Porous
Integrated
Functional
Social
Community

Sustainable
Form
Contextual
Adaptable
Flexible
Accessible
Network
Modular
Future state



CHAIR DESIGN – OPEN AND CLOSED OPERATORY

Currently Proposed



Area : 12 sqm.

4200mm x 2850mm V

Area : 14 sqm.

4200mm x 3325mm V

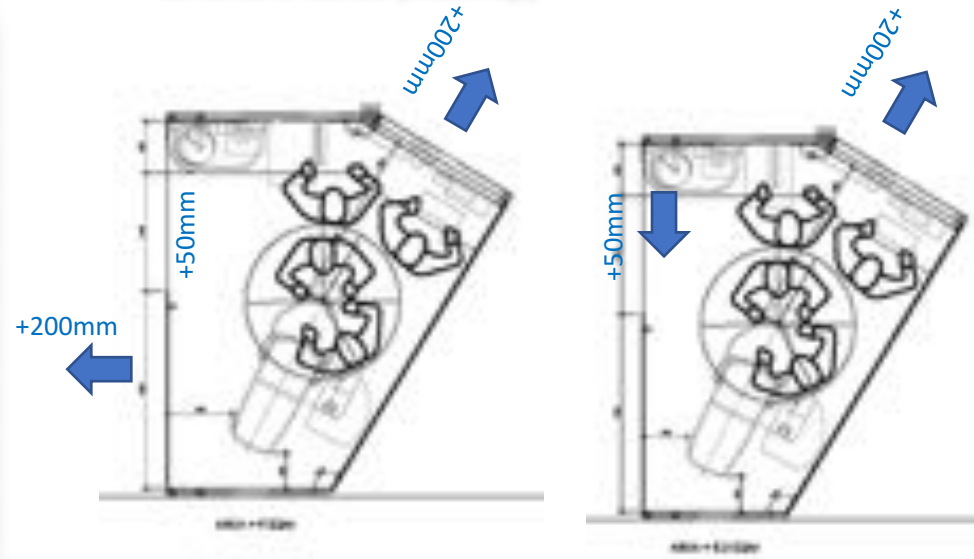
Area : 8.7 sqm.

Operator width increased 200mm to improve wheel chair accessibility to Operatory. The space however does not allow assisted patient transfer from wheel chair to dental chair.

Area : 10.7 sqm.

Special Enlarged

Variations tested (Mock up)



Area : 8.7 sqm.

Operator length increased 200mm to allow 500mm bench depth for write-up and data key in. Basin depth increased to 500mm as well. Operatory width also increased 200mm to improve wheel chair accessibility to Operatory.

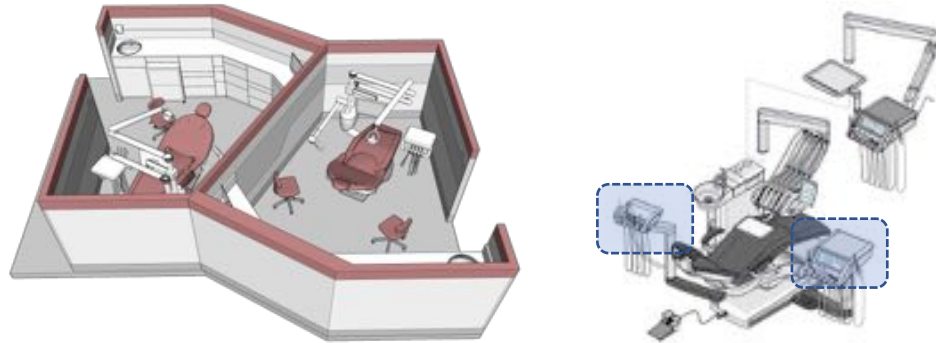
Area : 8.3 sqm.

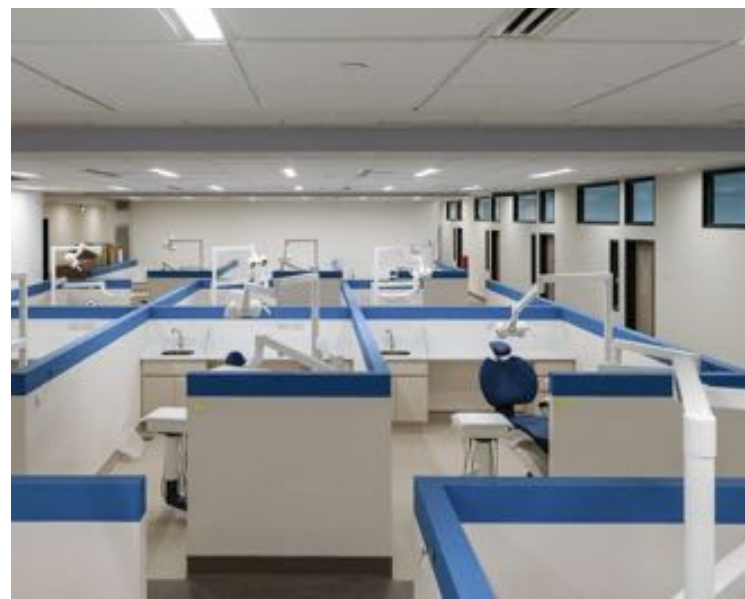
Operator length increased 200mm to allow 500mm bench depth for write-up and data key in. However Operatory width remains as 420mm, wheel chair access to Operatory remains a challenge.

PODS PLANNING CONCEPT – UG1 & UG2

Tutorial Room & Breakout rooms to be converted

- Open operatory (PODS) distributed evenly in the prime space
- Clusters of 6 PODS
- Tutorial & Break out rooms (2017)





PODS PLANNING CONCEPT EXPANSION

Conversion of Tutorial rooms & VIP to Open Operatory Chairs Clusters

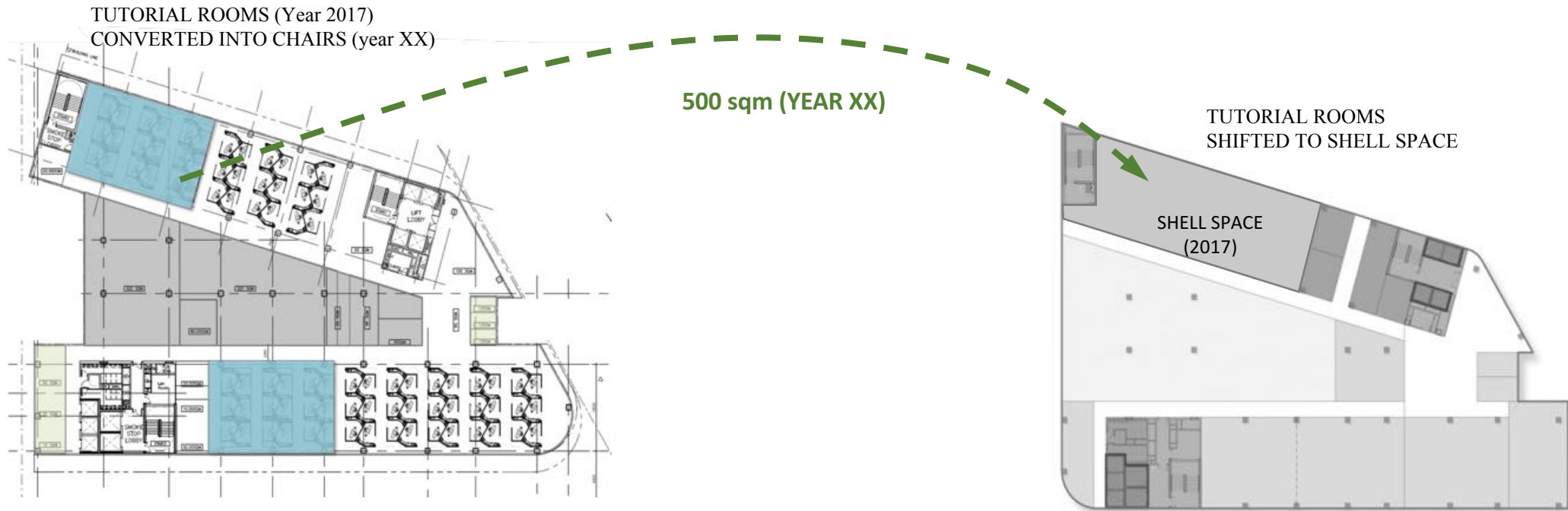


- Provision of services for the future chairs in the screed

FUTURE-PROOFING

Space management (with shell)

Built-in unoccupied shell space distributed throughout the tower design to allow for future expansion of services and functions.



L10 UG1

- 4 TUTORIAL ROOMS (200 sqm)
- 2 Break out rooms (50 sqm)

L11 UG2 :

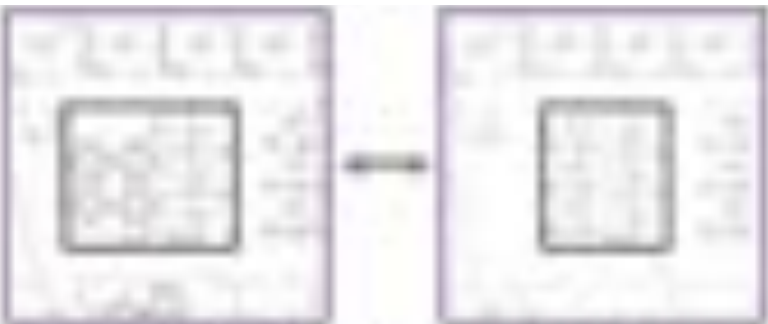
- 4 TUTORIAL ROOMS (200 sqm)
- 2 Break out rooms (50 sqm)

L11 : RESEARCH FLOOR

Estimated net Shell space : 600 sqm

Tutorial Rooms & Break out space (500 sqm)

1

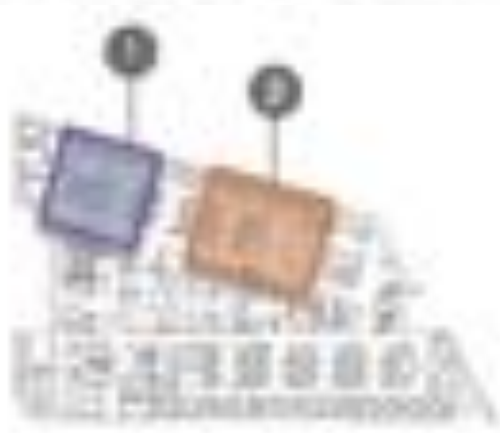


Tutorial rooms convert to clinical operatories

2



Waiting areas convert to clinical operatories



Modular designs allow for flexibility in usage



1 Tutorial Rooms



2 Waiting Rooms

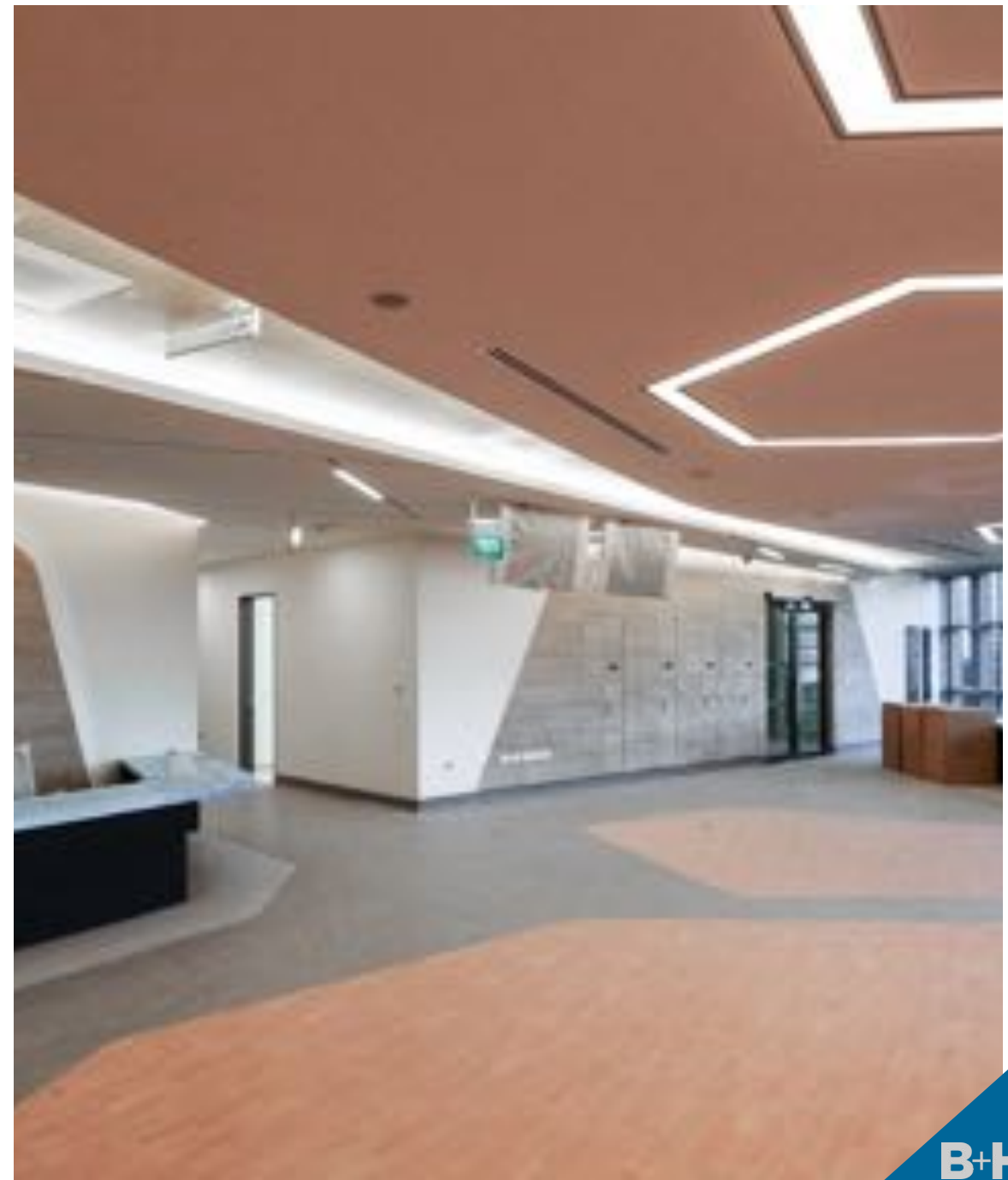
FUTURE



Clinical Operatories

2 Modular design that provides the option to change the function of spaces as required to accommodate changing requirements

INTERIOR DESIGN CONCEPT
Patient Experiences
Reception/Waiting Area (5th FL)



INTERIOR DESIGN CONCEPT

Patient Experiences

OHT Waiting Area (5th FL)



INTERIOR DESIGN CONCEPT

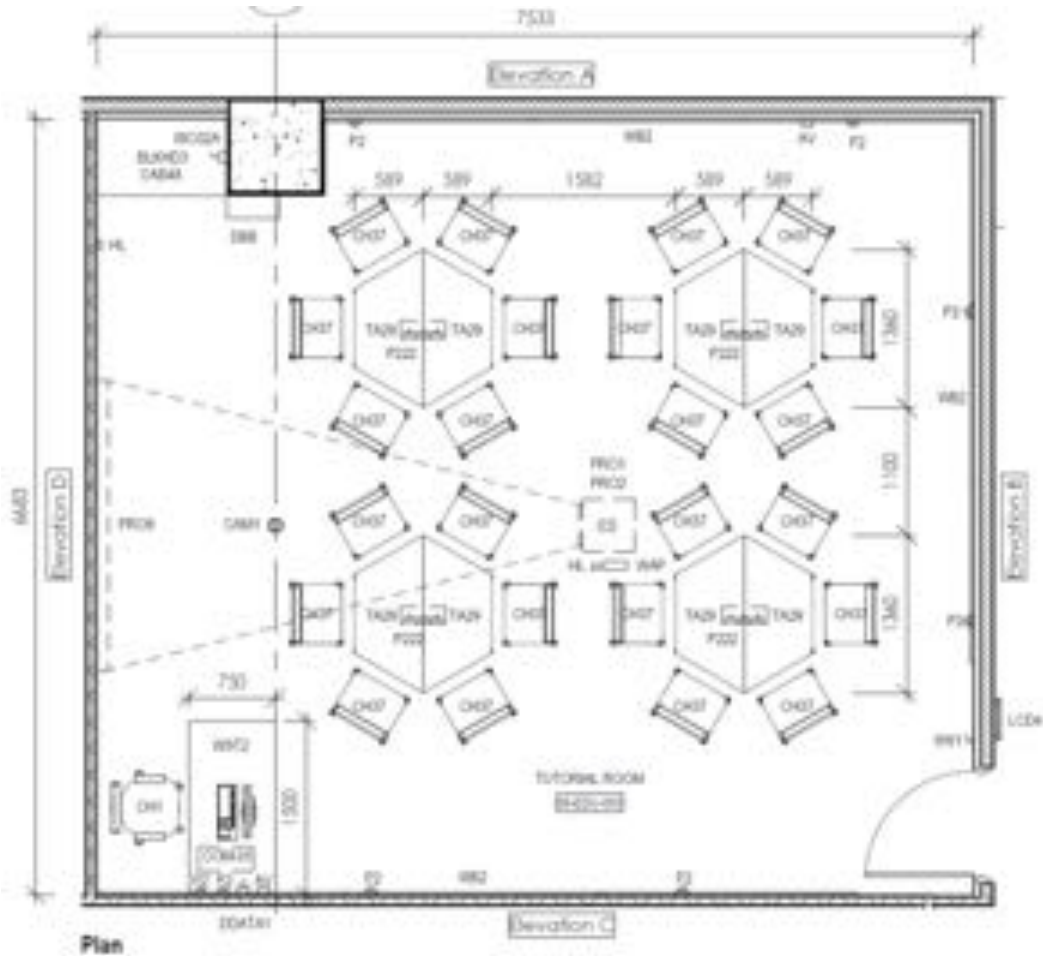
Patient Experiences

Sub-Waiting Area (6th FL)



STUDENT AMENITIES

Tutorial Rooms Modularity: Octagonal and Rectangular Shapes – 24 to 100 Pax



SEMINAR ROOM – 10th Floor



SEMINAR ROOM – 10th Floor



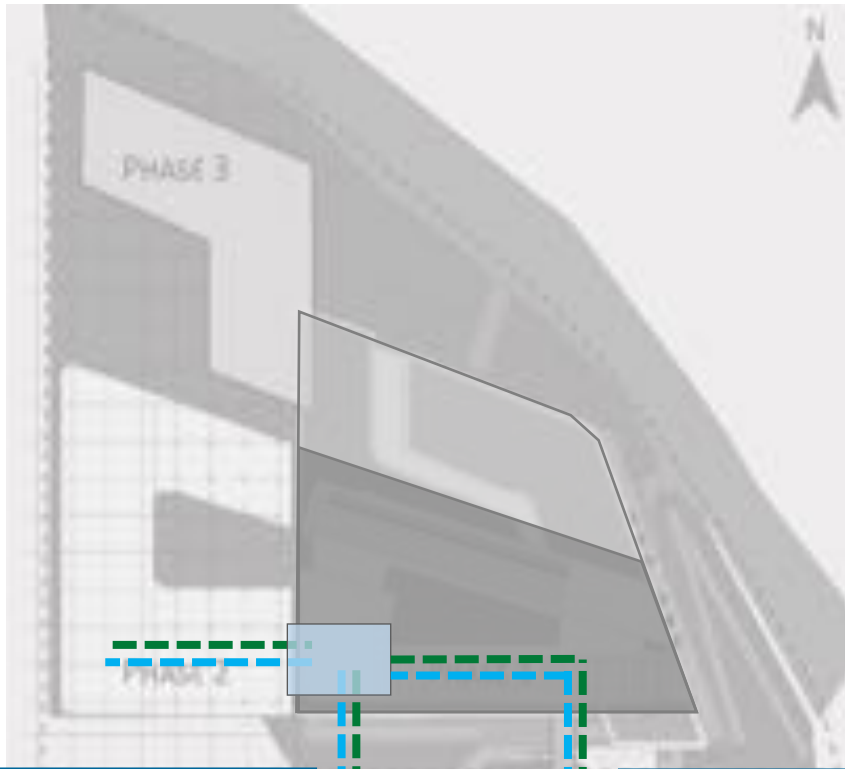
SEMINAR ROOM – 9th Floor



FUTURE PROOFING

Connectivity to future phases (Level 2 COH / Level 3 NUH)

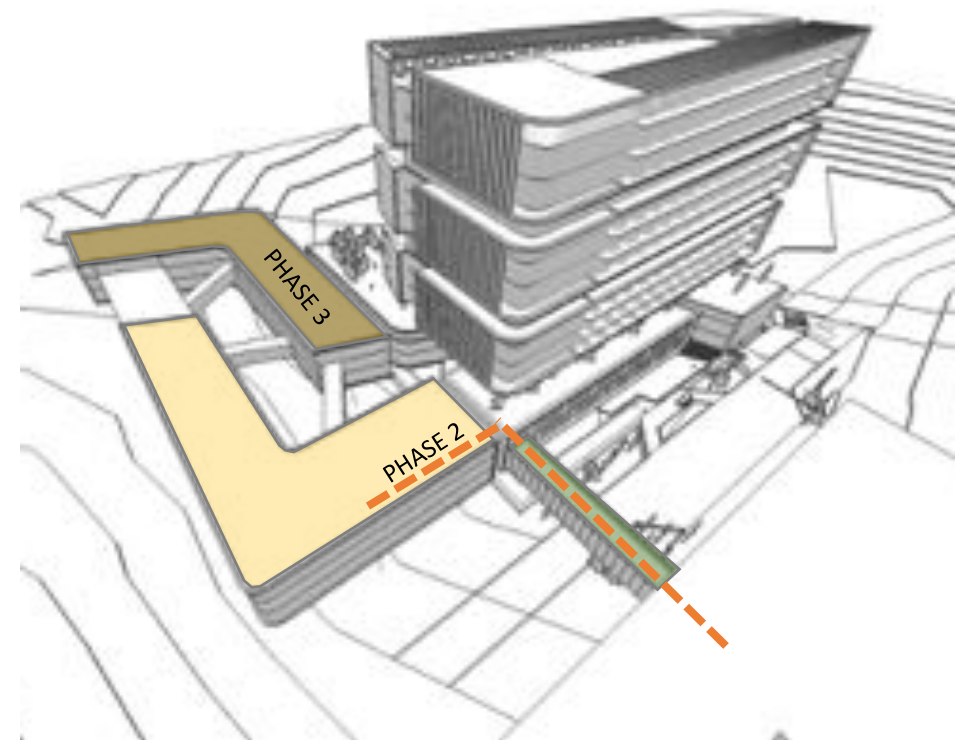
- STAFF PREFERRED ROUTE
- INPATIENT PREFERRED ROUTE



COH STAFF LOBBY
AS A DISTRIBUTION SPACE FOR
FUTURE PHASES

FUTURE CONNECTION BY
BRIDGE WILL BE
FACILITATED ALONG
THIS FAÇADE

- A bridge from NUH to COH to COH PHASE 2
- Good segregation of flows with additional path
- The bridge can be connected at various locations on the south elevation, but preferably at the staff lobby



ESD & GREEN MARK ASSESMENT

OVERALL ENERGY SAVINGS |

GREEN MARK SCORE : 111 (PLATINUM) | 3% ESTIMATED PREMIUM

Annual energy savings of 2,691,000 kWh

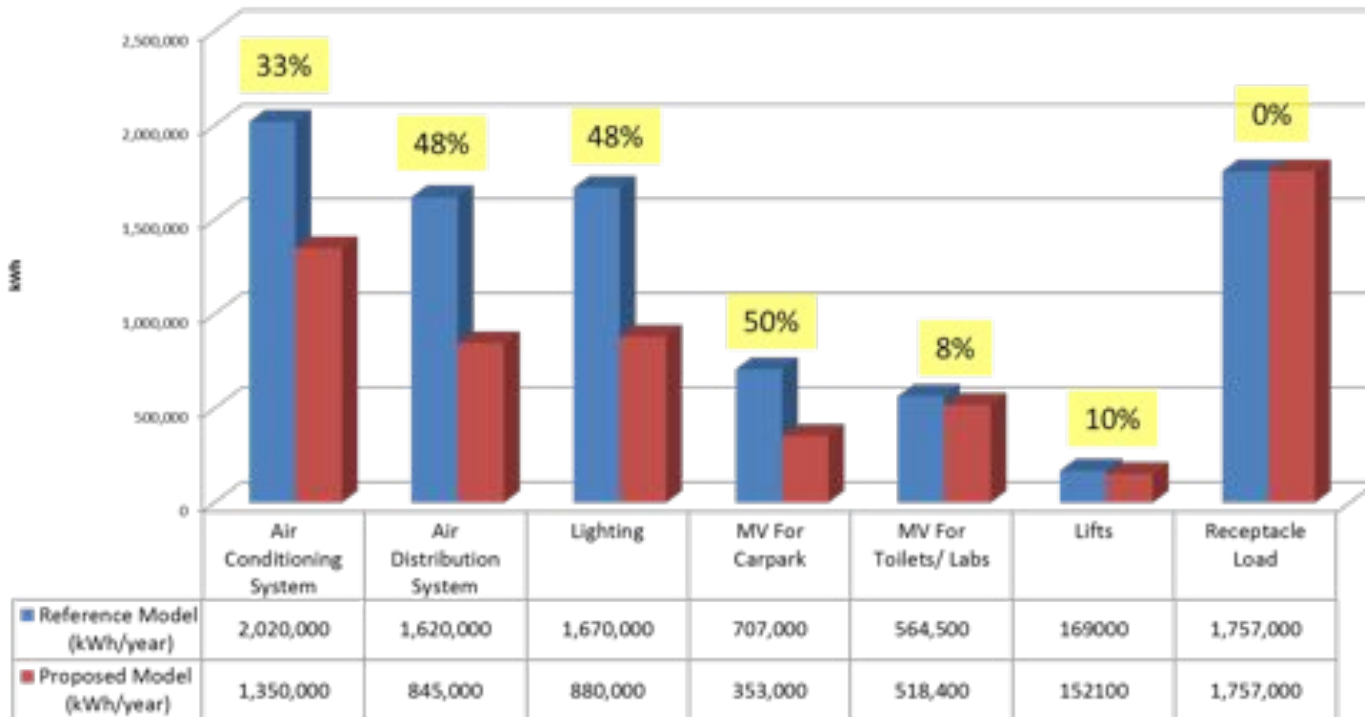
Annual water savings of 12,000 m3

Operational carbon footprint reduction of 1346 tons of CO2

SAVING OF 133,100 TREES

ANNUAL SAVING OF 853,000 SGD
EQ. 465 – 4 BDR HDB

Annual Energy Consumption



ENERGY EFFICIENT T5 & LED LIGHTING SOLUTION FOR ALL APPLICABLE SPACES

Energy EFFICIENCY CHILLER PLANT 0.60 kW/Rton

NUHS COH/SB

EXCELLENT WELS Water Fittings For sink taps, urinals, basin taps, WC

EXTENSIVE USE OF GREEN CONCRETE & ENVIRONMENTAL FRIENDLY PRODUCTS

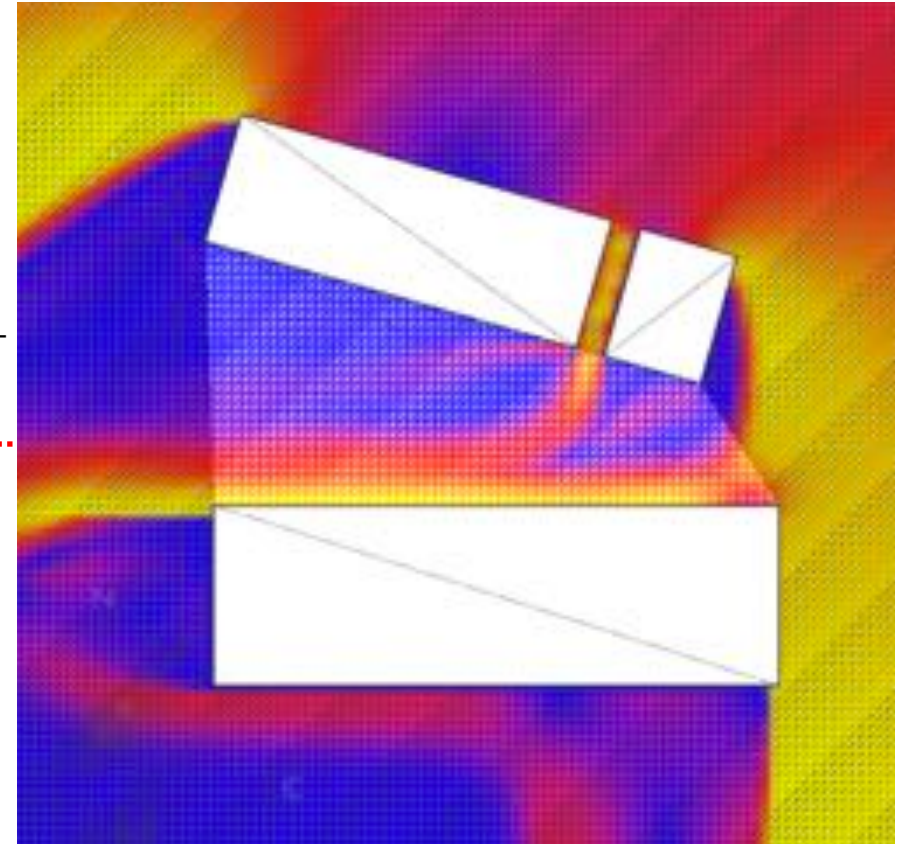
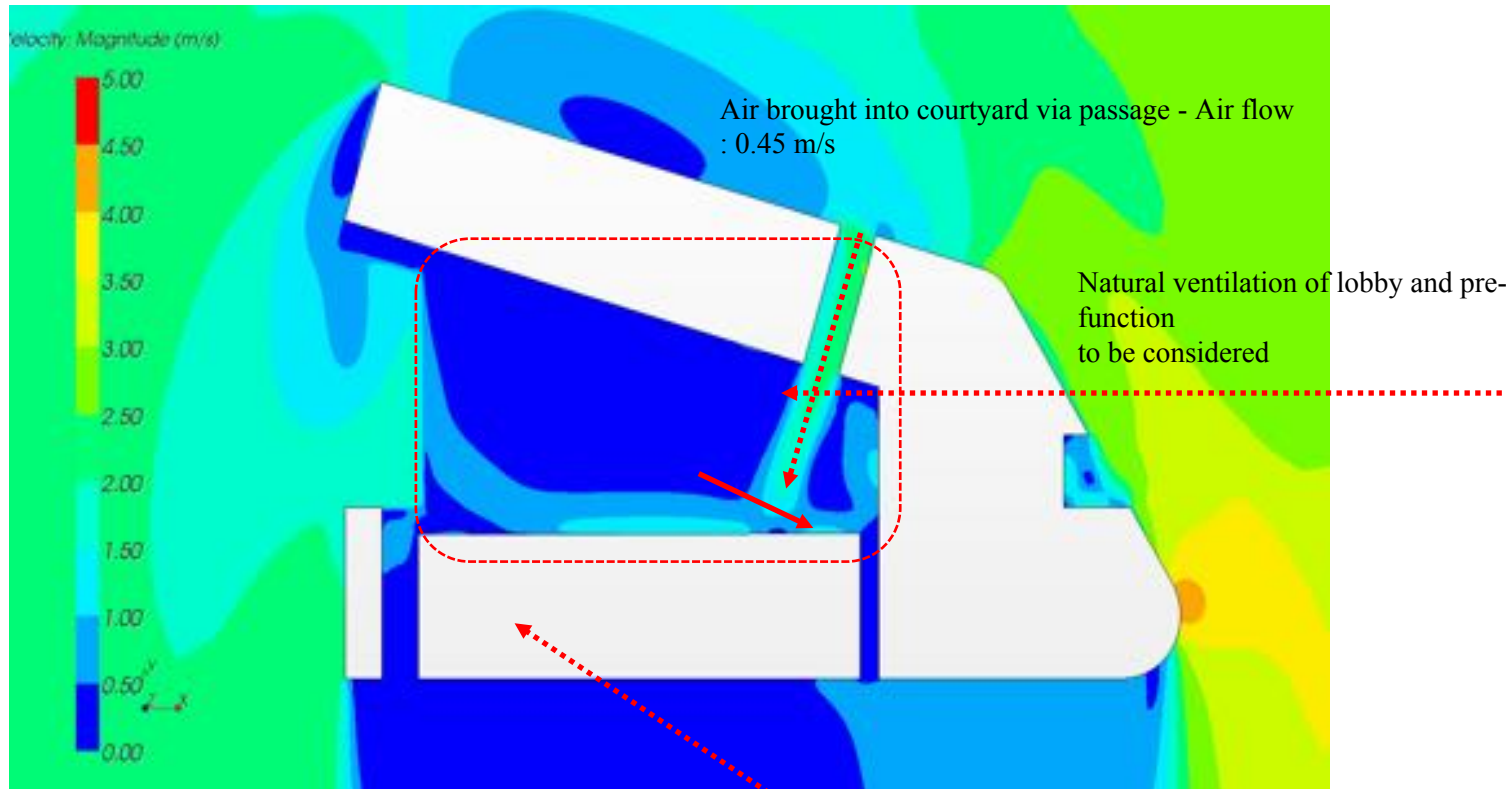
Total Energy Savings ~ 31.6% (Pre-requisite 30%)

PASSIVE COOLING

Wind Flow Simulation (Courtyard)



Velocity Contours on Level 12, under NORTH Wind



Deflectors on L5 to redirect wind to the courtyard

LANDSCAPE

LEVEL 9 COURTYARD

- + Accessed by students and staff and allows for a main events space with flexible use
- + Planting helps to screen quiet rooms from gathering spaces while creating interesting views of the landscape
- + Encourages mingling and exploration

LEVEL 5 TERRACE

- + Sensorial garden environment, using plants with interesting smells, colours and medicinal attributes
- + The landscape provides shady and comfortable seating areas for staff and visitors as an extension to the internal waiting areas

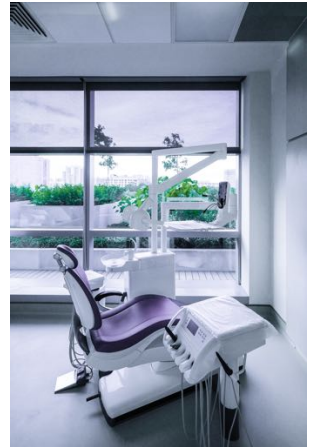
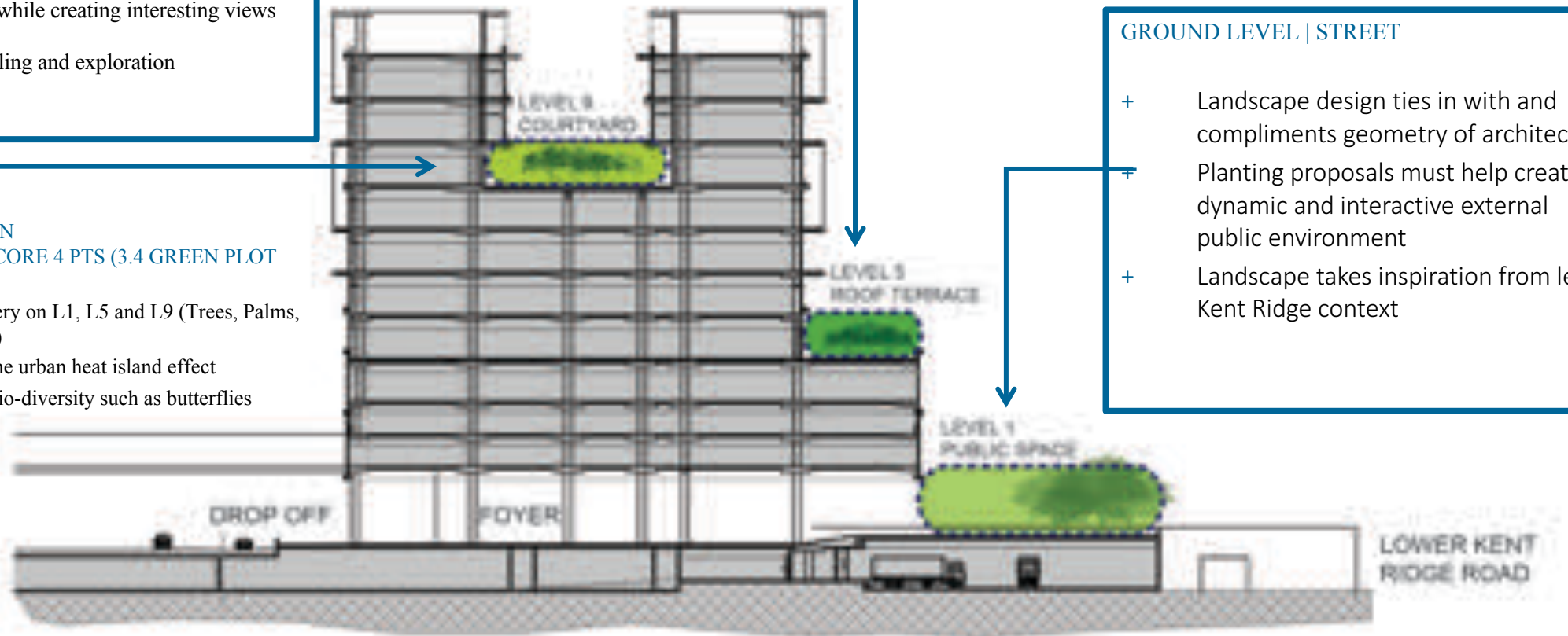
GROUND LEVEL | STREET

- + Landscape design ties in with and compliments geometry of architecture
- + Planting proposals must help create a dynamic and interactive external public environment
- + Landscape takes inspiration from leafy Kent Ridge context

GREENARY PROVISION

(EST. GREEN MARK SCORE 4 PTS (3.4 GREEN PLOT RATIO))

- Extensive greenery on L1, L5 and L9 (Trees, Palms, Shrubs and Turf)
- Helps to offset the urban heat island effect
- Increase urban bio-diversity such as butterflies



LANDSCAPE



L9 COURTYARD



L5 ROOF TERRACE



L1 PUBLIC SPACE









Thank you!

QUESTIONS?

PROGRAM | INTEGRATED VISION

Dental Chairs : 289 Dental Chairs (+21 Future Ready)
Specialities: PROSTHO, ENDO, PEDO, PERIO, ORTHO, POST GRAD, UNDER GRAD.
4x SPECIAL NEEDS
2x SURGERY SUITES
X-Ray Suites
Laboratories
Ceramic Lab, Prostho Grad Lab, Service Lab, Grad. Lab, Plaster, Casting & Packing rooms
230 Dental Lab Workstations
80 Simulation Lab Benches with Phantom heads
4x Pharmacy Lab Clean Room
Sterilization
Central CSSD 3 zones
Teaching Amenities
100 Pax and 60 Pax Seminar Rooms
15x24Pax Tutorial Rooms
2x 100 Pax Tutorial Rooms
Academic, Clinicians, Administrative Offices
Biomedical Research Facility (Appox. 1500m2)
Bioimaging, Biophotonic, Biomaterial, Cariology, Tissue Culture, Biomolecular, Microbiology, 2x Clean rooms
Hospital & NUCOHS Support Services (Approx 7,000 m2)