

Higher Education Art Building

Owner's Project Requirements – 2022 ASHRAE Design Competition

Table of Contents

1. Introduction	2
2. The Project	2
3. Owner's Requirements	4
4. Budget Considerations and Limitations	4
5. Building Assumptions.....	4
6. Codes and Standards.....	5

1. Introduction

A university has decided to design a new performing arts building on campus, which is a two-story building with a below grade level and located in Sydney, Australia. Total building area is approximately 23,300 m².



2. The Project

As part of the project, new HVAC systems are to be designed for the new performing arts building. The building consists of offices, classrooms, studios, performance halls, auditorium, offices, food services, and parking areas (refer to the attached drawings and the area table below).

Floor	Space	Space Description	Area
			m2
Level 0	Parking	Vehicle parking - Gasoline, diesel, electric vehicles only	9,480
	Visual arts flex use rooms	Flexible use art rooms for painting, photography, sculpting, and pottery. Note that Room 040.3 will have 6 large top loading electric kilns, and space for aerosol painting.	
	Mech and Elec	Locations for Electrical motor control centers, transformers, and mechanical equipment.	
	Music rooms	Practice rooms for all types of musical instruments.	
	Food services	No cooking, only reheating of food. Will have beverage coolers, warming ovens, microwaves	
	Theatre	Performing arts, will have access to lower level seating, stage. Note that stage will require emergency smoke evacuation for fly tower. Smaller rooms are for dressing rooms, support spaces, and rehearsal spaces.	
Level 1	Visual arts flex use rooms	Art Display room. (needs tight control on RH 30% +/-5%, and temperature 71.6°F or 22°C +/-1°F)	9,520
	Visual arts - Art	Flexible use art rooms for painting, photography, sculpting, pottery.	
	Store	Confectionary / convenience store	
	Food vendors	Point of sale for food vendors	
	Food court	Food court seating	
	Kitchen	Commercial kitchen food prep. Full NFPA 96 equipment gas / electric fryers, grease laden vapors, dishwashers, ovens, griddles.	
	Student union	Multipurpose - band performances, large meetings / presentations or announcements.	
	Pub	Pub with commercial kitchen. Seating in moveable tables. Note there is an open mezzanine 127.7.	
		Food services, confectionary, food warming stations only.	
	Mech and Elec	Locations for Electrical motor control centers, transformers, and mechanical equipment.	
	Theatre	Performing arts, will have access to upper level seating, stage and balcony. Note that stage will require emergency smoke evacuation for fly tower. Smaller rooms are for dressing rooms, support spaces, and rehearsal spaces.	
	Theatre	Smaller performance venue / rehearsal space, with other support spaces for breakout rooms, stage prop production.	
	Music rooms	Practice rooms for all types of musical instruments.	
	Theatre	Stage prop production. Carpentry and painting,	
Student Employment Center	Students space for job applications, interviews with hiring agencies		
Level 2	Visual arts - Art	Flexible use art rooms for painting, photography, sculpting, pottery, and instructing	4,300
	Student Counselling	Office space for student counselling	
	Admin	Training rooms and administrative support spaces.	
	Theatre	Theater support spaces, with follow spots, lighting, dimmer racks, AV equipment. High heat generating equipment.	
	Student union	General office space support student services.	
	Music rooms	Instructional / rehearsal rooms	
	Fine arts	Flexible rooms for fine arts	
	Theatre upper gallery	Upper gallery for theater (open floor may get filled in in the future to become a second floor space)	
Total:			23,300

3. Owner's Requirements

The design team shall make every effort to provide a sustainable design, taking into account: energy efficiency, health and safety, occupant comfort, functionality, longevity, flexibility, and serviceability/maintainability.

The design team shall select systems based on the lowest possible life cycle cost that includes first cost of materials and long term operating costs, as well as other owner goals.

- 3.1 Design the systems to meet ASHRAE Standard 90.1-2019 and 189.1-2019; it is encouraged to set Energy Use Intensity (EUI) target.
- 3.2 Strive to achieve Net Zero Energy (NZE) Building or Carbon Neutral Building; Carbon Neutral Building needs to be defined if it is used in the design.
- 3.3 Provide excellent indoor environmental quality that facilitate occupants' use of the space by providing a comfortable and safe environment.
- 3.4 Avoid design attributes related to poor HVAC system performance, poor space utilization, poor acoustical qualities, inconsistent interior style, and low durability of finishes.
- 3.5 Meet the operation and maintenance needs for an easily serviceable, maintainable, and secure facility that has low utility and maintenance costs.
- 3.6 Design based on the best life cycle cost analysis for the applicable climate and the owner's budget.
- 3.7 Maintain thermal comfort in each space per ASHRAE Standard 55.
- 3.8 Provide ventilation to each space per ASHRAE Standard 62.1.
- 3.9 Provide acoustical controls per ASHRAE Handbooks (i.e. the Chapters on Noise and Vibration Control in HVAC Application, and Sound and Vibration in Fundamentals).
- 3.10 Operate the building at positive pressure to prevent unwanted infiltration.
- 3.11 Accommodate for operations of commercial kitchen in food services (e.g. several 48"-long commercial kitchen hoods).
- 3.12 Select building orientation based on optimized building energy performance.
- 3.13 Regular building operating hours are 7:00am to 8:00pm on weekdays and 8:00am to 4:00pm on weekends; special operating hours are allowed in theatres during performing events.
- 3.14 HVAC systems shall comply with the [ASHRAE recommendations for COVID-19](#).

4. Budget Considerations and Limitations

The approach to allocating resources for the HVAC systems is to examine life cycle costs, including capital investment, operating cost, maintenance costs, and employee productivity. The key values are:

- 4.1 Assume the owner's mechanical budget is \$15M
- 4.2 Life of the HVAC system: 30 years
- 4.3 Return on investment: 7%
- 4.4 Inflation rate: 3%
- 4.5 Utility escalation rate based on a 10-year average increase for utility provider (water, gas, etc.) in the area

5. Building Assumptions

It is assumed that the new building envelope construction and other building systems (e.g. lighting and plumbing) meet ASHRAE 90.1-2019 requirements, while incorporating the owner's project goals below:

- 5.1 Synergy with surrounding architecture.
- 5.2 Superior acoustic criteria in all spaces with minimal sound transmission from the adjacent spaces and low noise produced from HVAC systems.
- 5.3 Assume the building is standalone, and therefore the HVAC systems are not tied to any central plant or district systems.
- 5.4 Assume all the utilities are provided on site (e.g. natural gas, electricity, city water and sewer).

6. Codes and Standards

Codes as determined by the local Authority Having Jurisdiction (AHJ)

- ASHRAE Standard 15 and 34
- ASHRAE Standard 55
- ASHRAE Standard 62.1
- ASHRAE Standard 90.1
- ASHRAE Standard 189.1
- ASHRAE Handbooks

Use the latest available versions of all ASHRAE Standards and Handbooks.