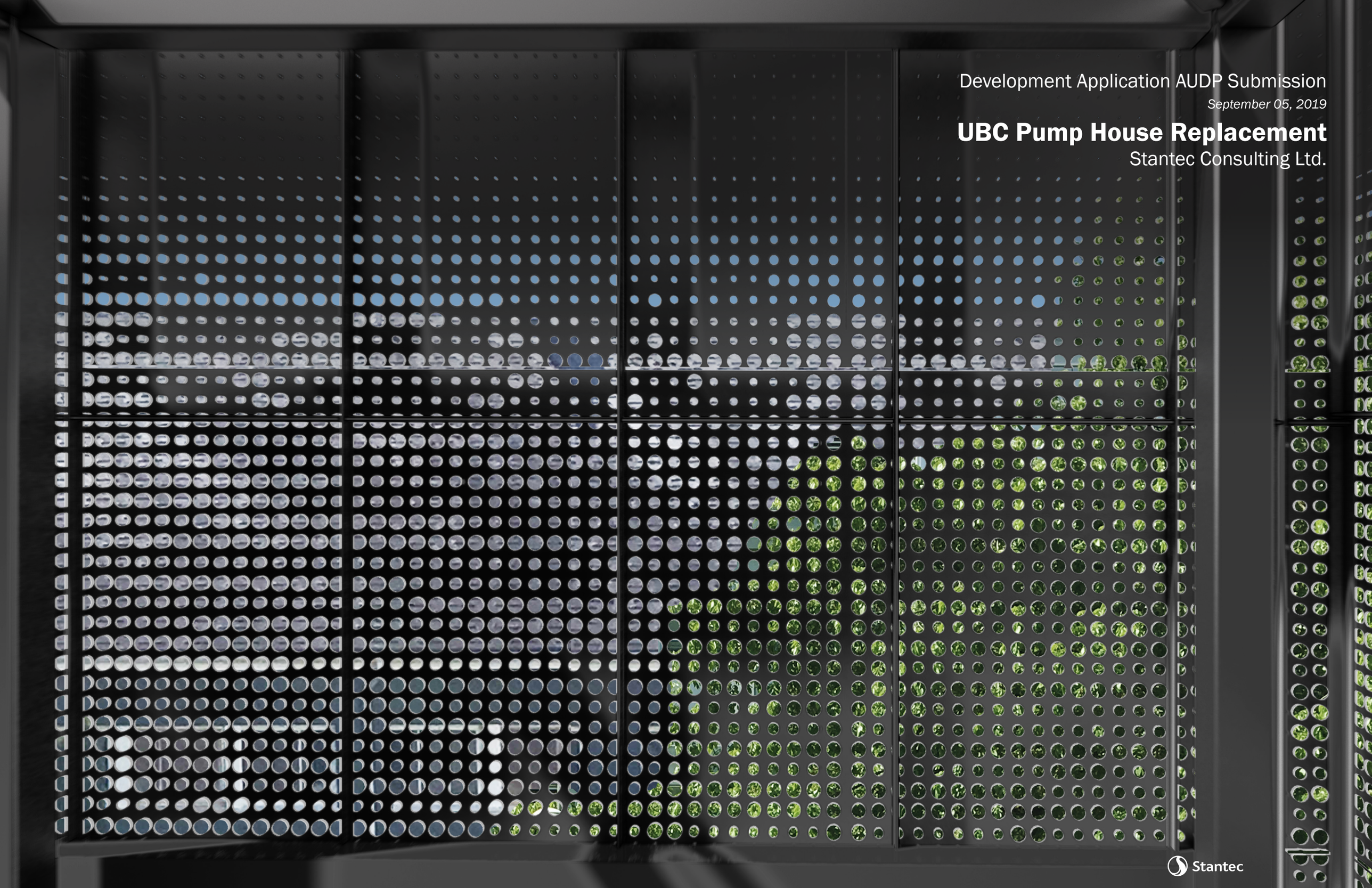
Development Application AUDP Submission

September 05, 2019

UBC Pump House Replacement

Stantec Consulting Ltd.



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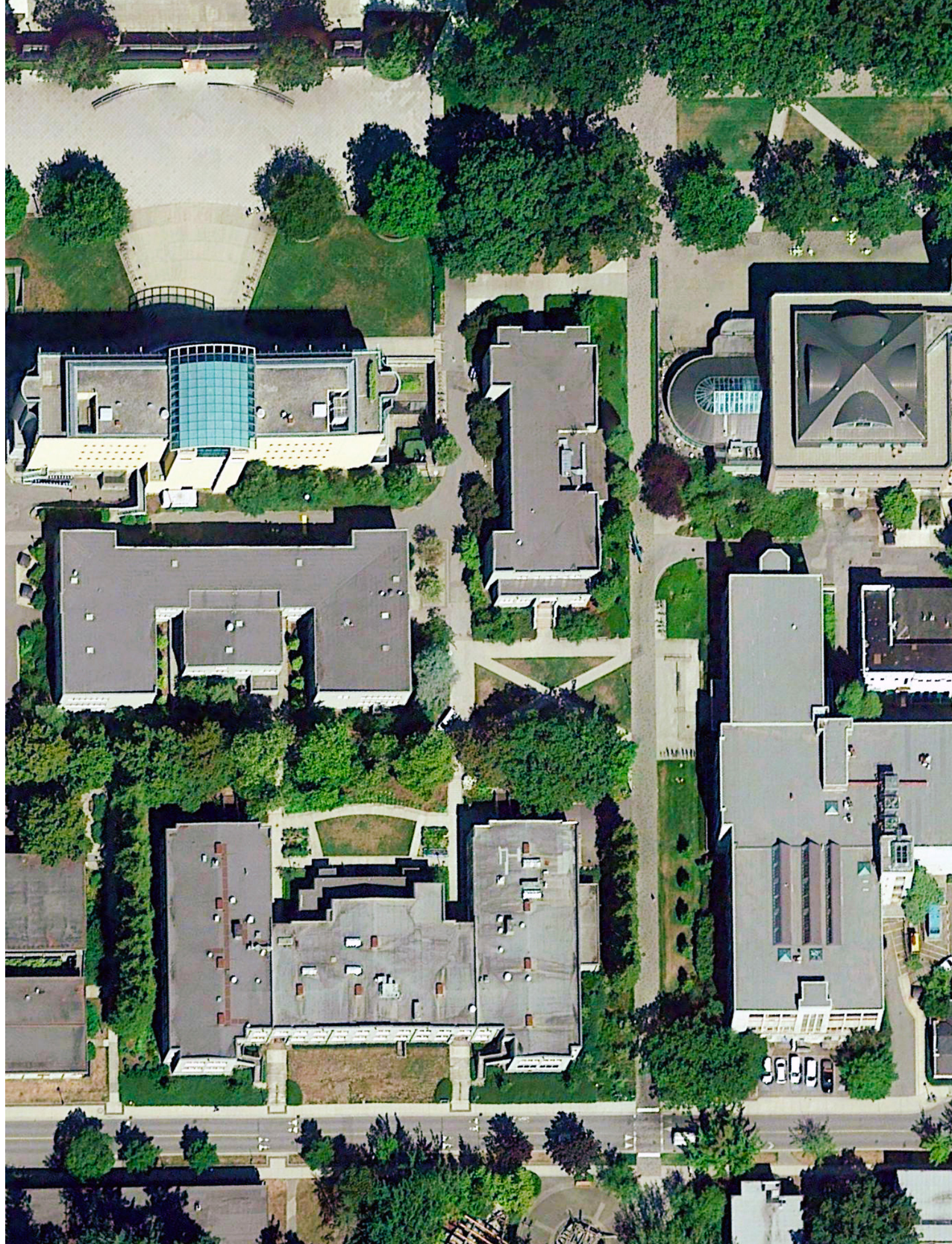
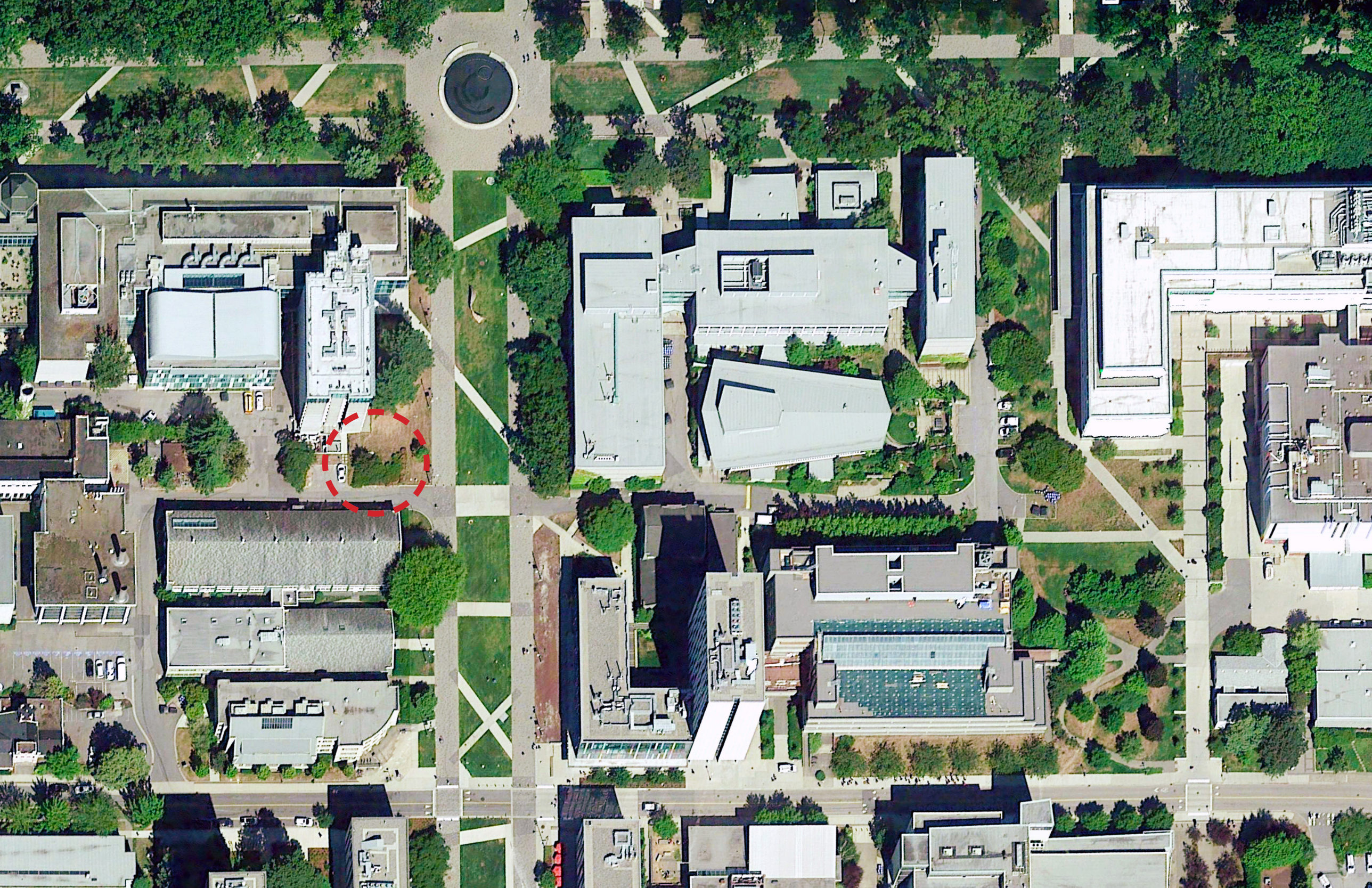
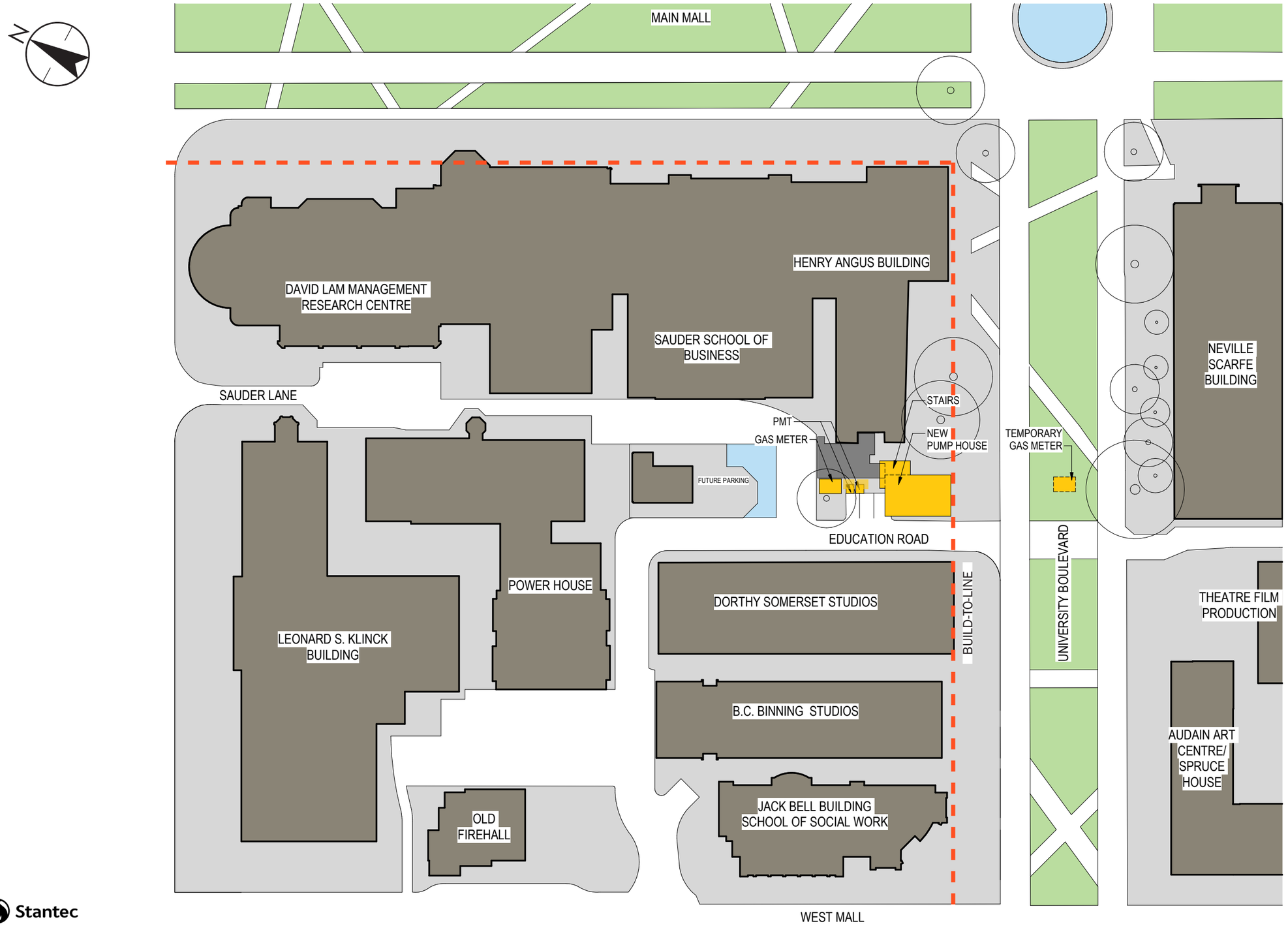
LOCATION

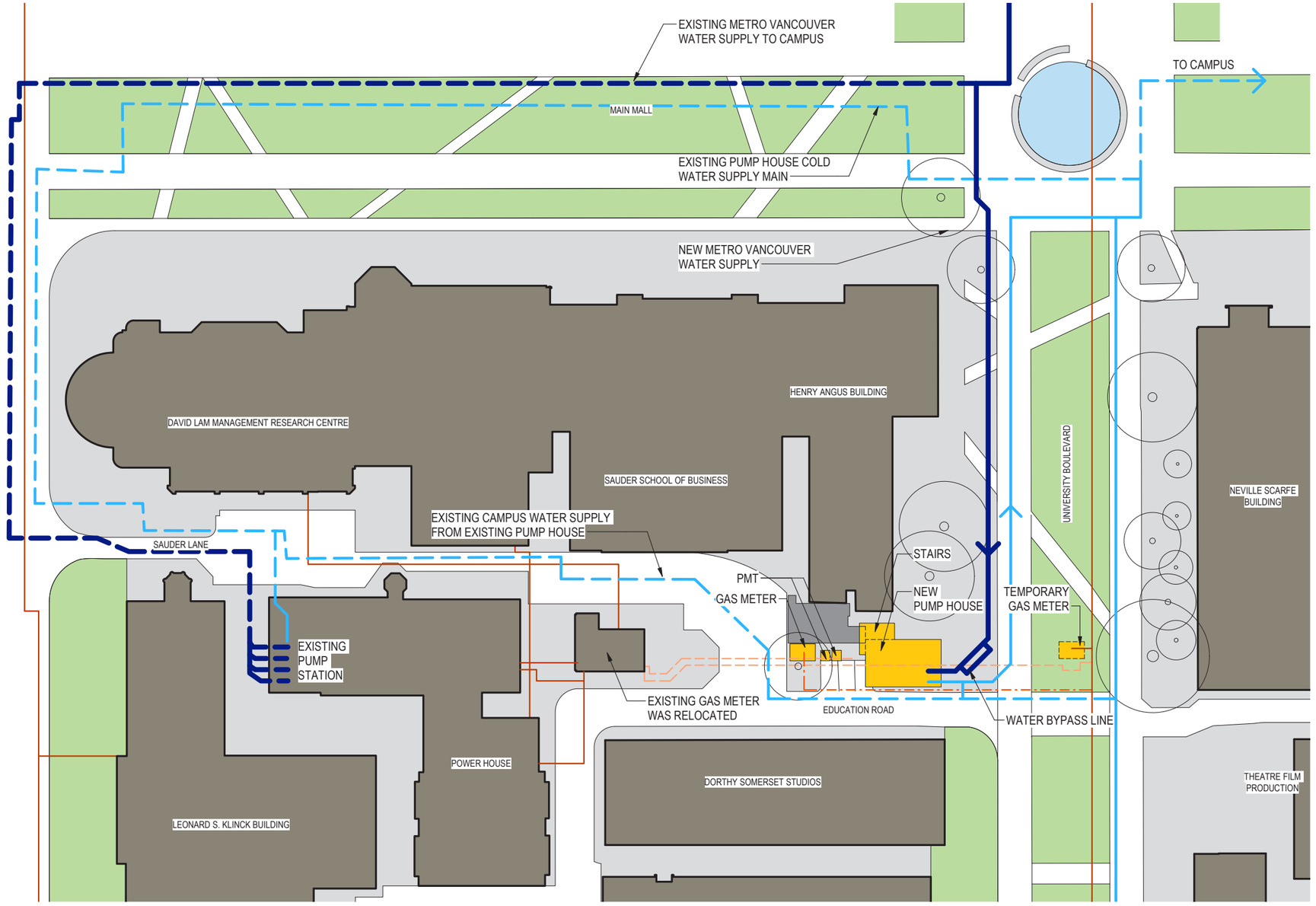




Context Plan



Services Plan



INCOMING METRO VANCOUVER WATER MAIN - EXISTING

INCOMING METRO VANCOUVER WATER MAIN - PROPOSED

OUTGOING CAMPUS WATER SUPPLY - EXISTING PM

OUTGOING CAMPUS WATER SUPPLY - PROPOSED PM

GAS LINE - EXISTING

GAS LINE - TBD

GAS LINE - ABANDONED

0 5m 10m 25m 50m

Scale 1: 500

TRUE NORTH N

SITE ANALYSIS
& DESIGN RATIONALE

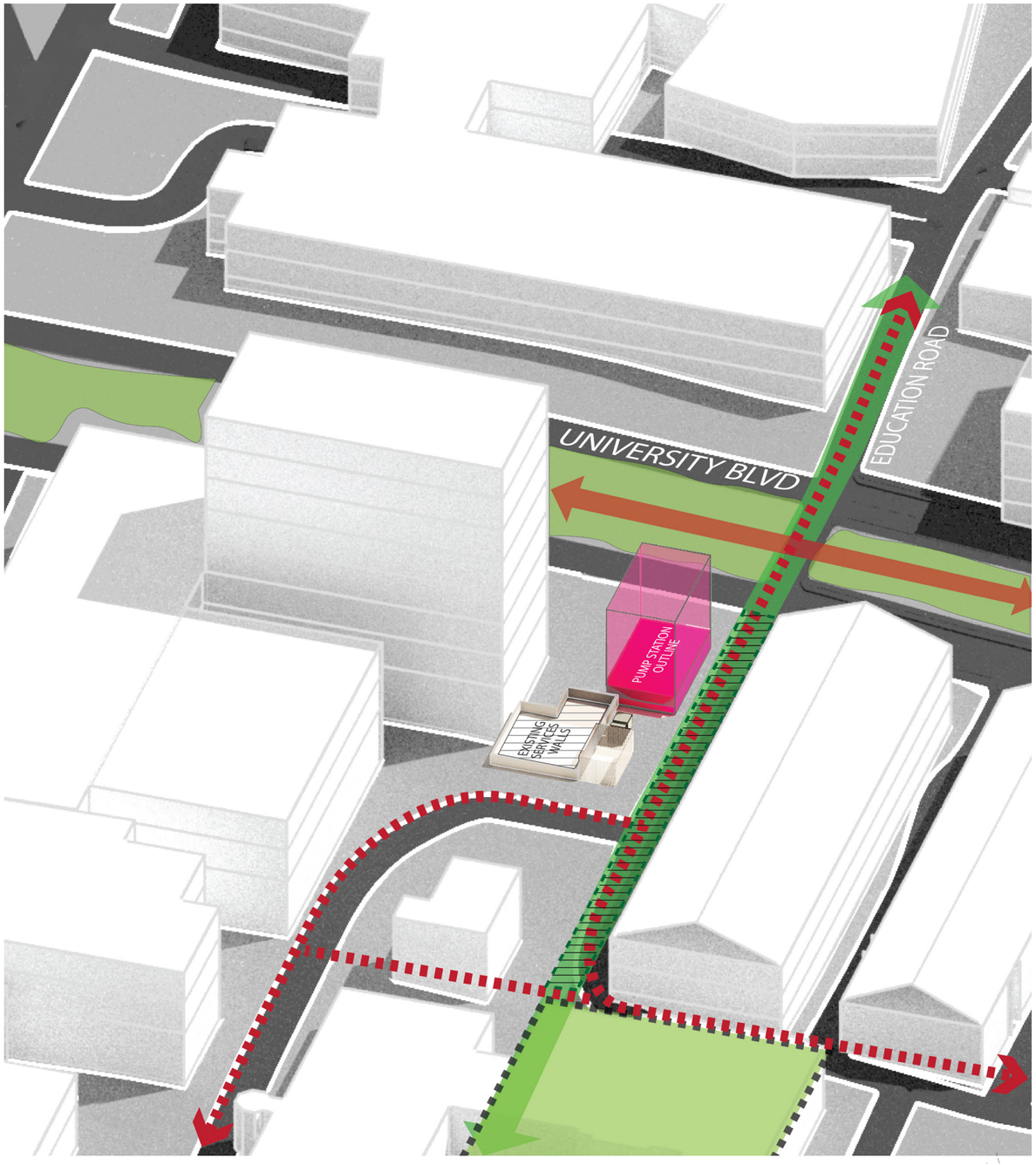
Introduction
The UBC Pump House replaces the existing Powerhouse location and is a housing for a critical piece of campus infrastructure that serves 90% of the campus demand for domestic cold water.

The opportunity is to create architecture that is both true to form, celebrates the process it was designed for and serves to elevate the evolving campus as a 'Living Lab'. As part of an industrial architectural prototype language, the building becomes a quiet piece of civic architecture in a public space.

Site
The project sits on the North corner of University Boulevard and Education Road. The setting is formal as University Boulevard is a ceremonial, landscaped promenade connecting East Mall and West Mall. The prevailing setback for Henry Angus Building & Dorothy Somerset Studio is aligned with the proposed UBC Pump House on the south facade.

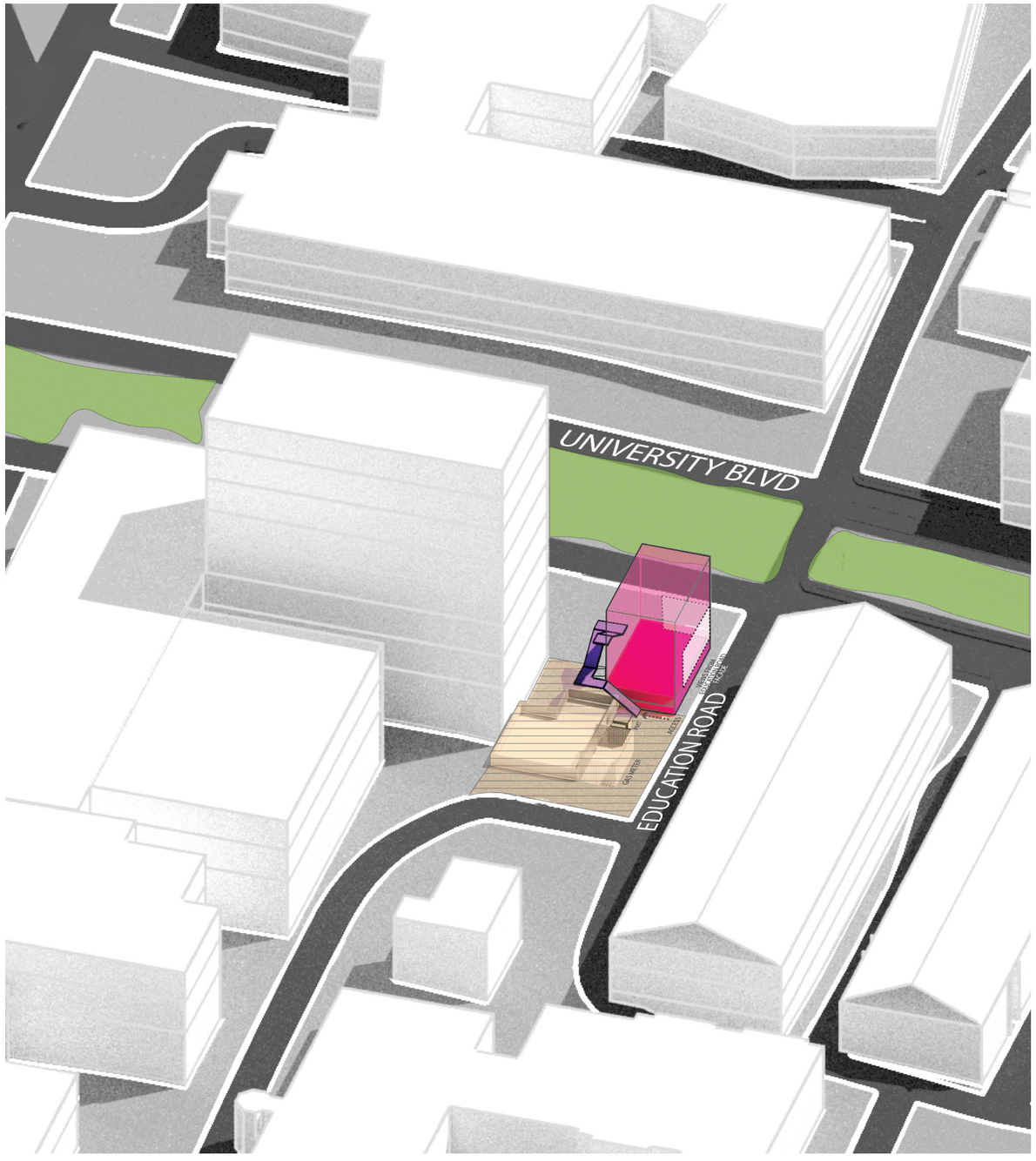
The opportunity is to create a quiet building that seats itself in the landscape without competing with Henry Angus & other academic buildings. The building sits at the elevation of Education Road and within a regraded grass landscape to the east. The mound and planting bed on the site will be regraded with provision for site circulation and exiting from Henry Angus. The proximity of the building to University boulevard orients access to the building from the North side (back of Pump House) to respect the flow and logic of university boulevard and to provide a functional private back of house area. Regrading and improving the surface of Education Road along the west side of the building serves to elevate the status of the service lane as the campus continues to reorganize and grow.

Context



Major Circulation Routes

- Fire Access
- Shared Service/Fire
- Social Spaces
- Elevated Pedestrian Landscape Combined with Service Street



Access & Visibility

- Service Area

DESIGN FACTORS

Key Concerns:

Siting

The building is located on University Boulevard, a ceremonial pedestrian route that serves as a gateway to campus. The Pump House should be in the background of the prominent campus buildings such as Henry Angus Building and the Audain Art Centre.

Language

Infrastructure at UBC is in the process of renewal. With the renovation and addition of new buildings, a common architectural language can elevate public infrastructure.

Building Form

The shape of the building should be quiet and reduced along University Blvd. As an infrastructure building, the Pump House's massing should recede behind the architecture of the campus buildings beside it.

Address

Education Road is part of a service lane that provides the loading and access to the infrastructure that services the buildings along its route. As part of that infrastructure, the Pump House's architecture needs to address Education Road over University Boulevard.

Response:

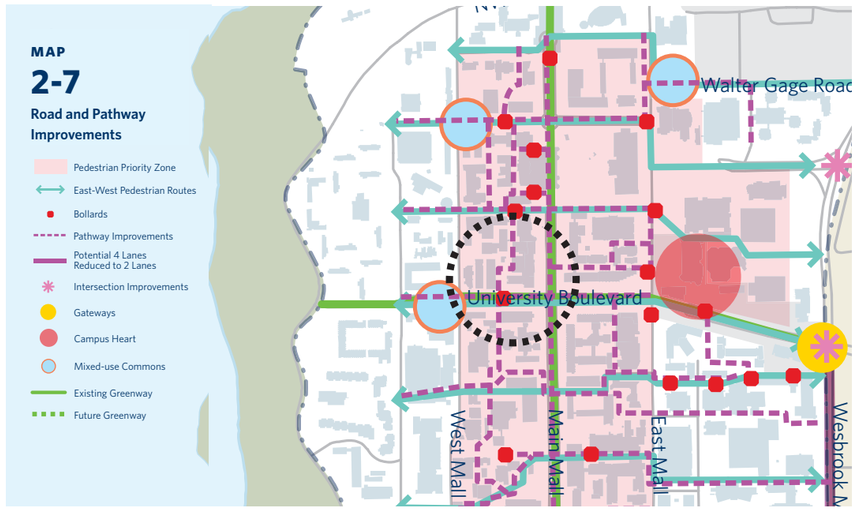
Quiet Design using an Infrastructural Language.

The building uses dark materials and detailed screening, clear zoning of uses, and visual porosity along Education Road to create a subdued architectural response.

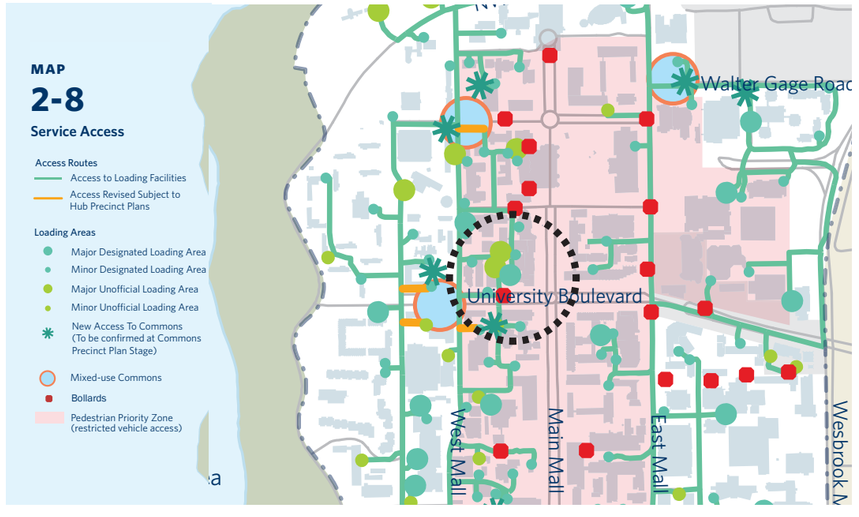
The footprint is sized to the minimum space required for the pump room components, placing the electrical services on the second floor. The result is a narrow form facing University Boulevard, and the majority of the mass facing Education Road. In order to protect the Pump House, the building is pulled away from the curb, allowing truck access and space for pedestrians along Education Road. The building has a simplified language with rich details to house infrastructure.

Access to the building is at the rear of the site where the loading, maintenance servicing, and outdoor equipment is located. The single point of access improves the function of the building and conceals the clutter of the doors and stairs away from University Blvd.

Educational opportunities address Education Road using glazing to reveal the interior of the pump room. A wood structure around the pipes and equipment that provide domestic cold water to campus forms part of the common architectural language of the infrastructure on campus. The materials and form helps the public perceive this building as a piece of the important services that help the campus function.

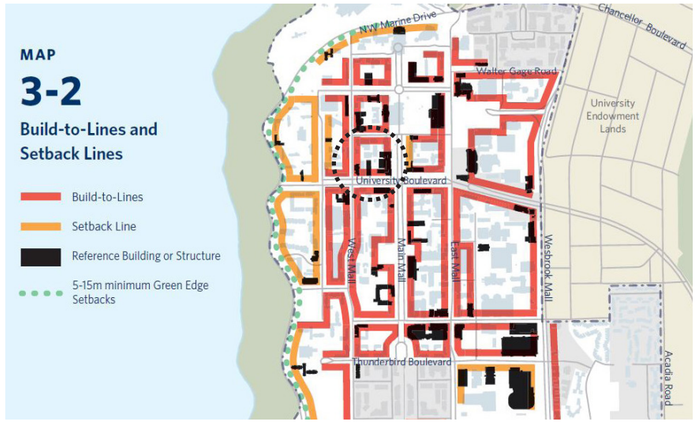


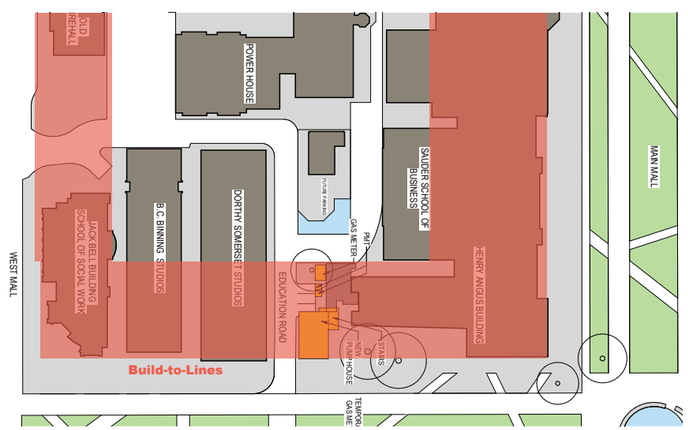
Education Road is planned to have pathway improvements as part of the campus pedestrian network.



Education Road currently provides major service access

DESIGN FACTORS





Response:

Building Siting

The UBC Campus Plan and the technical parameters of site infrastructure have been considered in the siting of the Pump House. The building is located within the Campus Core of UBC. Referencing the UBC Vancouver Campus Plan, alternative locations were examined within the build-to-lines envelope. The current proposed location coincides and is in line with the Campus Plan.

We have accommodated the AUDP comments related to building design but the restrictions of fitting all the technical components on site directed us to shift the building to its current position. The team worked to minimize the footprint where possible to allow for pumps to function. We discovered that the location at the rear of the site could not accommodate the functional width of the building. In addition, the back of house area did not have available space to fit the PMT, the Gas Meter (which is currently temporarily located on the intersection of University Blvd & Education Rd) and space for maintenance access.

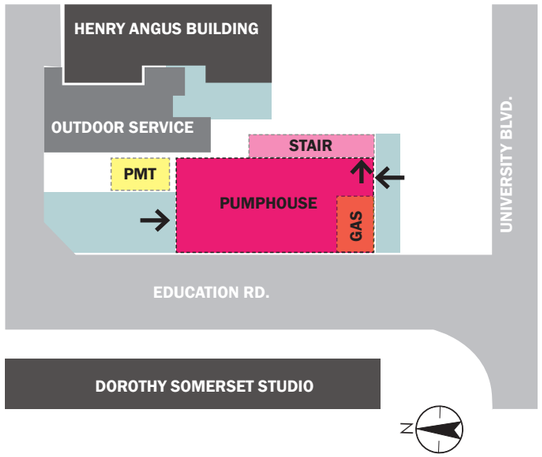
The siting relied heavily on the technical parameters of the process services in coordination with the location of service pipes underground and their alignment to the site. The design minimizes impact to infrastructure on the site and surrounding sites by using University Blvd as a main corridor for infrastructure.

Site Services

The Metro Vancouver Water Main & the Outgoing Campus Water Supply runs East/West under University Blvd. Site services and water distribution from the existing Pump House take a circuitous route. The new Pump House has an incoming and outgoing distribution line following the spine of University Boulevard. It has a logical distibution and frees up the remainder of the infill sites in the vicinity.

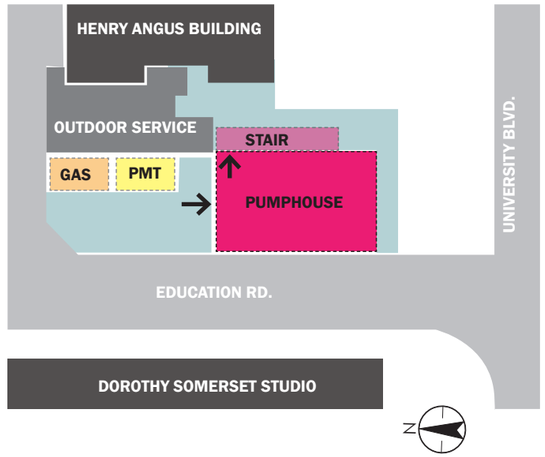
DESIGN ITERATION

SITE LOCATION



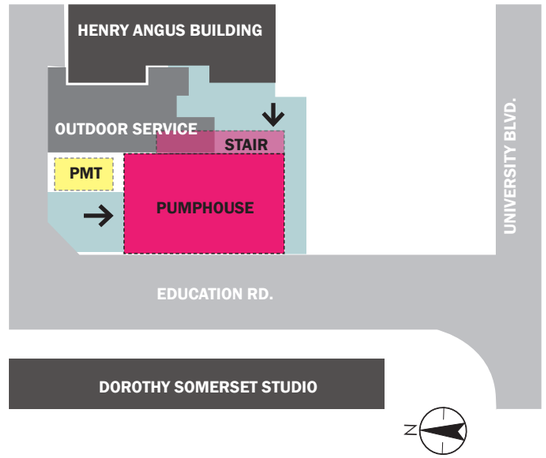
V1. AUDP 1

- Aligned with Dorothy Somerset Studio.
- Gas Meter located inside building
- Stair Access from inside building
- Building access from north and south side



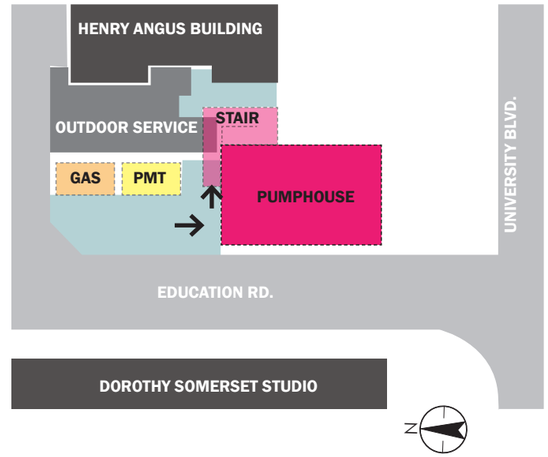
V2. AUDP 2

- Final building width realized.
- Aligned with Dorothy Somerset Studio.
- Gas Meter located outside building
- Stair Access from inside building
- Building access from north side



V3. SITING STUDY

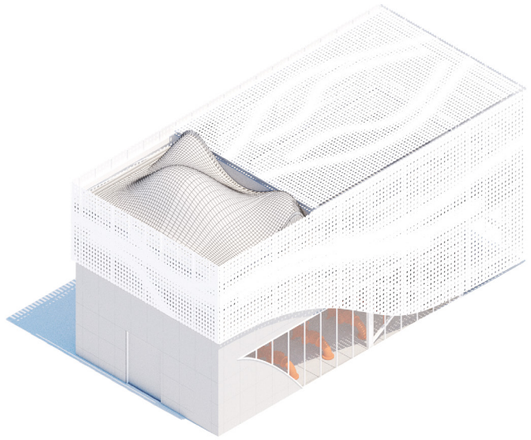
- Aligned with Henry Angus Building
- Gas Meter located off site in public realm
- Stair Access from outside, on southeast side of building
- Building access from north side



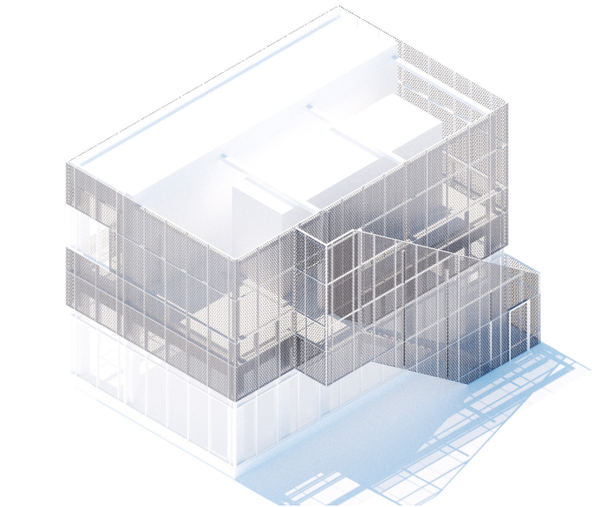
V4. AUDP 3

- Added clearance from Education Road
- Minimized footprint and kept as far north as possible.
- Aligned with Dorothy Somerset
- Gas Meter returned to site
- Stair Access from outside, on north side of building.
- Building access from north side

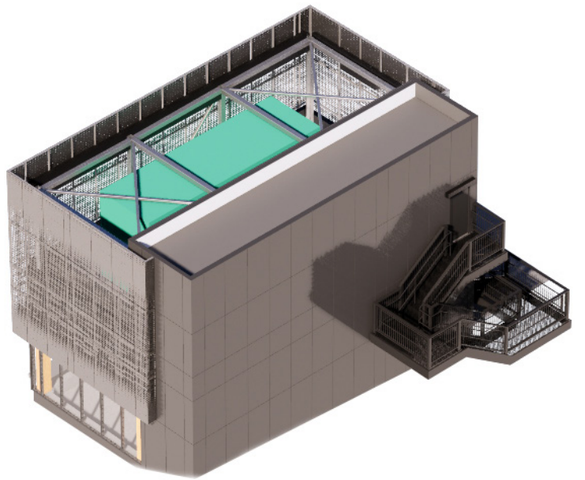
DESIGN ITERATION

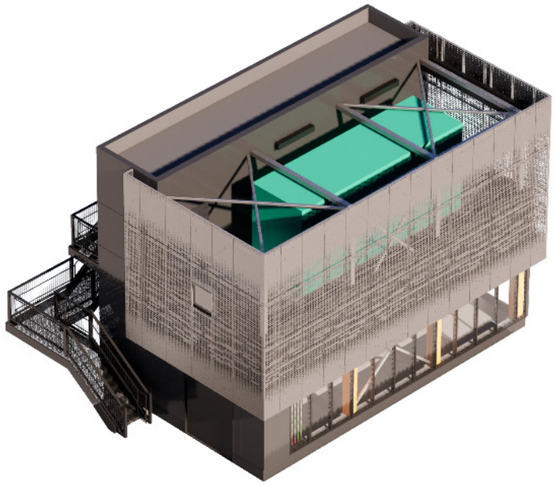


FREE FORM



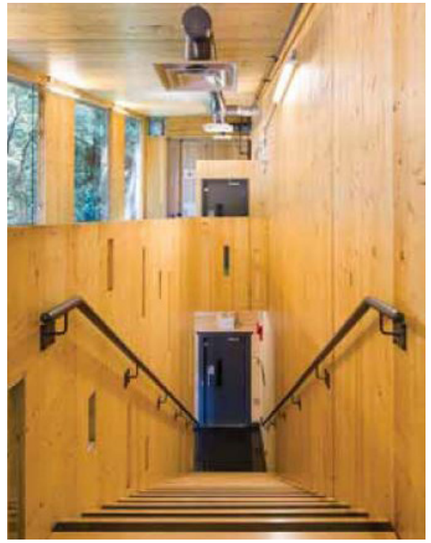
BASE TRANSPARENCY & RAISED SCREEN





MINIMIZED MASSING & FACED WEST

CREATING A LANGUAGE OF INFRASTRUCTURE AT UBC



Bioenergy Research & Demonstration Facility (BRDF)

COMMON INFRASTRUCTURE LANGUAGE:

- Use of wood material for structure (exposed wood interiors)
- Use of combination of exterior metal & transparent elements.
- Use of neutral colours for the building & buildings that complement the academic campus.
- Creating a sense of human scale.
- Using infrastructure as a “living lab”.

BIOENERGY RESEARCH & DEMONSTRATION FACILITY (BRDF)

Renewable & Recycled Material (Wood): This building reflects the use of wood in multiple states. It is sited within a dense area of trees, built from wood products, and generates energy from wood waste.

Structure: The building structure is exposed of engineered wood of Douglas-fir glulam columns and beams that function as composite assemblies with SPF cross-laminated timber (CLT) walls, floors, and roof decking all supported on a concrete foundation.

Program & Building Material: The building is a simple rectangular industrial-style shed, using glass & corrugated metal cladding. The structure uses a clear span to allow for the plant equipment to fit. The program also includes a mezzanine area (offices, labs and a public viewing space).

Growing Energy: The Bioenergy Research & Demonstration Facility (BRDF) was built in response to UBC’s need to generate sufficient heat and power. UBC campus’ growing energy demand through required an action response which was in this building case was through generating an affordable alternative fuel source that would also reduce campus greenhouse gas emissions (GHGs).

Display of Technology: The facility is part of the Campus as a Living Lab initiative that combines operational infrastructure, research and educational opportunities related to sustainability, in this case, bioenergy.

CREATING A LANGUAGE OF INFRASTRUCTURE AT UBC

UBC CAMPUS ENERGY CENTRE

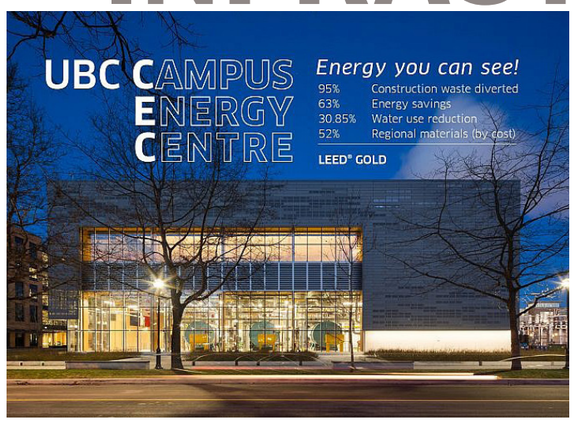
Sustainability: The major sustainable design strategies were to locate the facility in a pre-existing parking lot; utilize as much structural engineered wood to offset embodied carbon; and to design the building as a “living lab” that showcases and communicates the building and district scale sustainability objectives.

Structure: The building structure is exposed, using locally sourced glulam engineered wood columns & clear span beams. Structural engineered wood was used throughout the facility to offset embodied carbon.

Program & Building Material: The building is a simple volume of strategically planned program with a skin applied on top. The powder coated steel screen uses three different types of panels; an opaque, a 30% perforated, and a 50% perforated panel. The different use of panels creates a dynamic facade enlivened by the play of light.

Reduced Energy: The UBC Campus Energy Centre was built in response to UBC’s commitment to reduce its greenhouse gas emissions by 33% from its baseline, by 2015.

Display of Technology: The facility is designated as a “living lab” that showcases and informs of the crucial role it plays as the main source of thermal energy for the growing UBC Campus especially in the use of screen. The screen allows of certain areas to be revealed where equipments exist or concealed, lets daylight into glazed areas, provide a human scale and create weather protection at the entrance. Outside the building a flowmeter read out display is located, contributing to the “living lab” concept.



UBC CAMPUS ENERGY CENTRE

PRECEDENTS

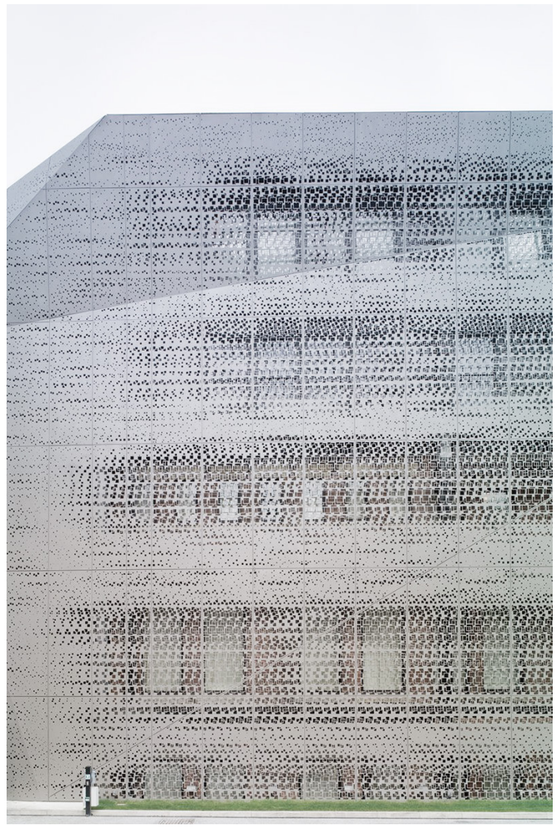
Form & Materials
The exterior form and interior space are determined primarily through function of the building housing critical university infrastructure. Through siting and educational opportunities, the building is designed with materials to enhance the position of services on campus and elevate the public realm. The architecture is rectilinear, subtle and serves to **elevate purpose** through educational opportunities and visual clarity.

The building is a simple volume of functionally planned program with a skin applied on top. The building's exterior is comprised of curtain wall system over wood structure, and a perforated steel screen that allow for areas of the building to be revealed or concealed. The perforated screen is comprised of a motif of gradated patterns of perforations based on an 'impeller' design. The screen itself, the size of the apertures changing scale are reminiscent of 'constrictions', pressure changes and screens that occur within water pipes and pump design.

Screen Pattern through Perforation

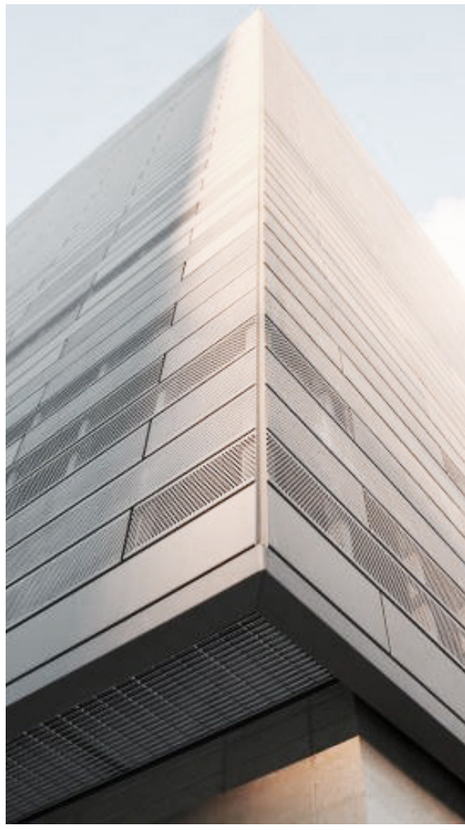
Tecnoparc
Terragona, Spain

Screen Pattern, Private vs. Public



Restored Heritage Building
London East End, England

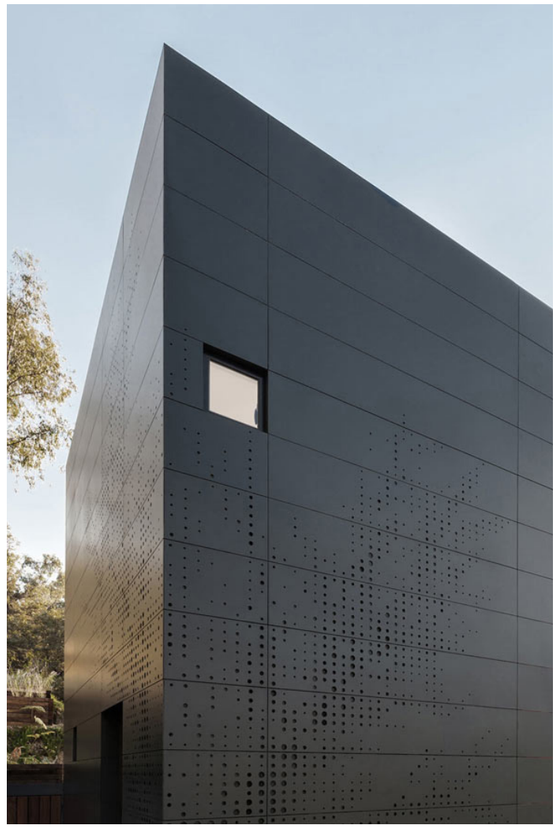
Screen Pattern, Panalization



UBC Campus Energy Centre
Vancouver, British Columbia

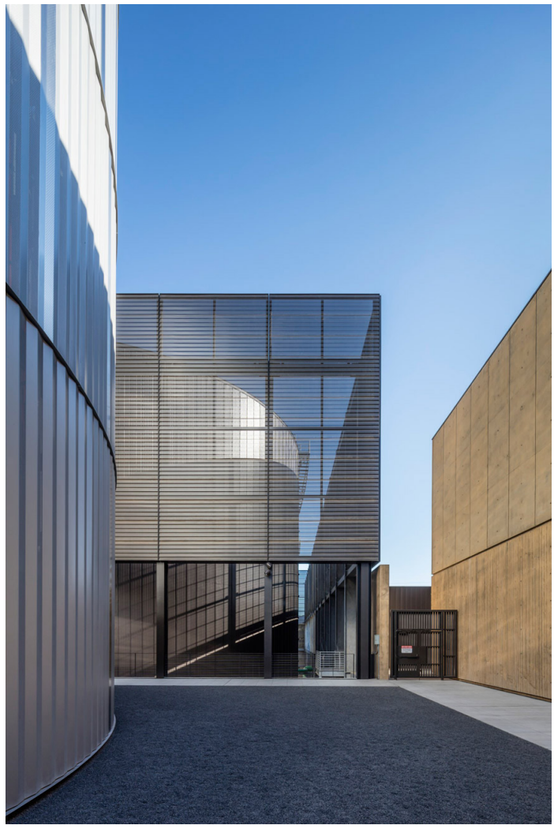
Precedents

Powder Coated Dark Metal Panels



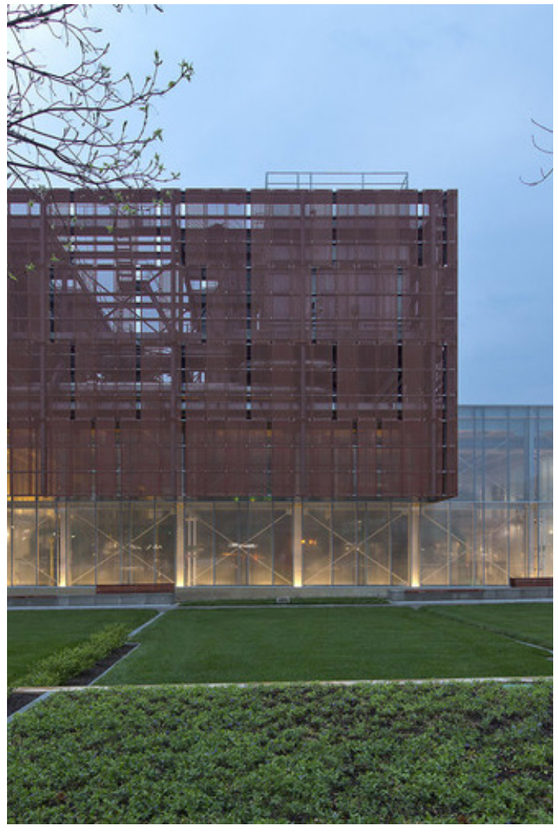
Black Casa Alta Perforated Facade

Combination of Screen and Transparency



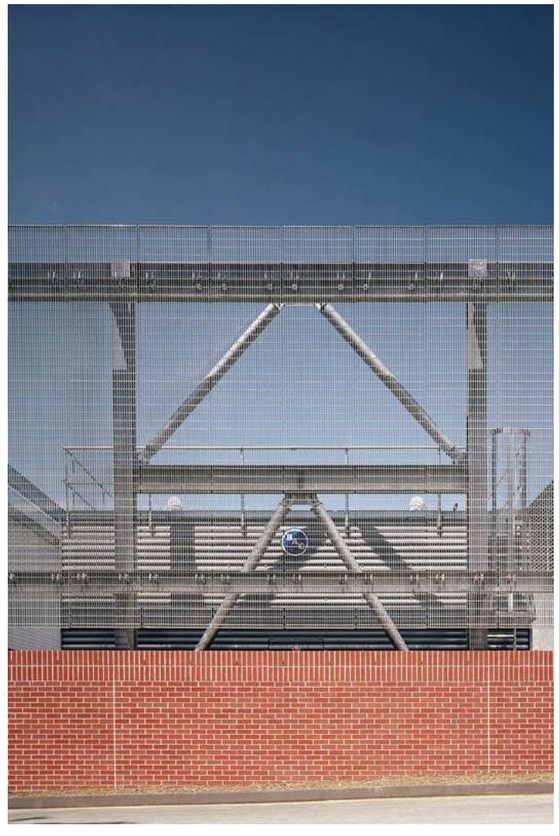
Stanford University, Centra Energy Facility
Stanford, California

Creating Framed Views Through



East Regional Chilled Water Plant
Ohio State University

Revealed Structure



Central Energy Plant
Pennsylvania, USA

LANDSCAPE CONCEPT

REFERENCE NOTES SCHEDULE

SYMBOL	EXISTING DESCRIPTION
×	TREE-REMOVED
+	TREE-EXISTING

SYMBOL	EXISTING DESCRIPTION
	EXISTING CONCRETE PAVERS TO REMAIN
	EXISTING PLANTING TO REMAIN
	EXISTING CIP CONCRETE PAVING TO REMAIN

SYMBOL	HARDSCAPING DESCRIPTION
	CIP CONCRETE BAND
	NEW CONCRETE (BROOM FINISH)
	EXISTING CONCRETE WALL TO REMAIN

SYMBOL	DESCRIPTION
	PLANTING BED

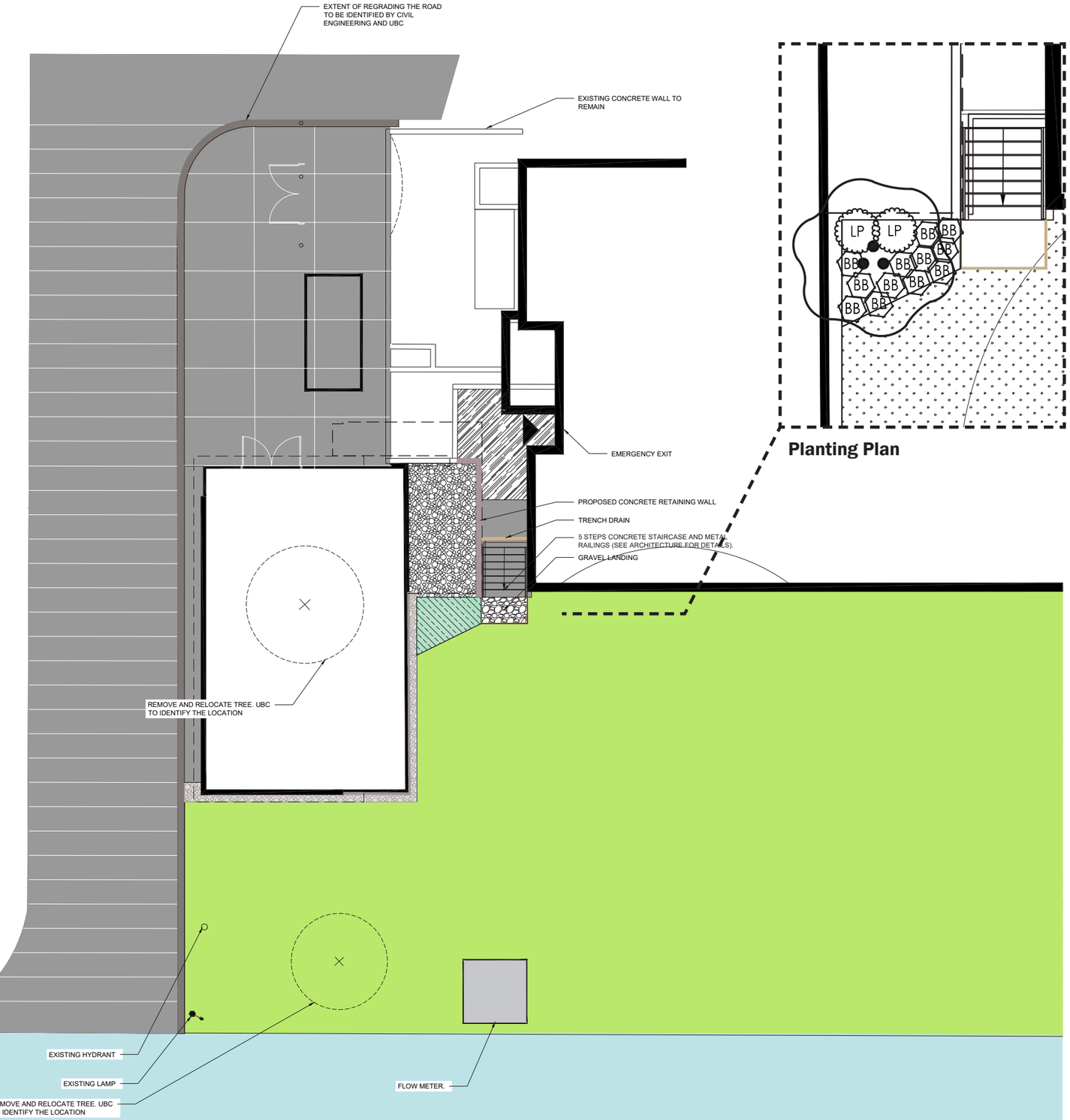
SYMBOL	DESCRIPTION
	TRENCH DRAIN

SYMBOL	HARDSCAPING DESCRIPTION
	RIVER ROCK SURFACING

TREES	CODE	QTY	BOTANICAL / COMMON NAME	SIZE
	AA	1	AMELANCHIER `AUTUMN BRILLIANCE` / AUTUMN BRILLIANCE SERVICEBERRY	MULTISTEM

SHRUBS	CODE	QTY	BOTANICAL / COMMON NAME	SIZE
LP	LP	2	LONICERA PILEATA / PRIVET HONEYSUCKLE	#3 POT
BB	BB	12	RHODODENDRON `BADEN BADEN` / BADEN BADEN RHODODENDRON	#3 POT

GROUND COVERS	CODE	QTY	BOTANICAL / COMMON NAME	CONT
	S	186.0 m²	SODDED LAWN NATIVE MIX/ HYDROSEED	SOD



1:100 0 1 3 5m

NORTH

Stantec

LANDSCAPE

Planting Palette

Landscape Approach
Landscape Design approach is focused on bringing a simple, functional and low maintenance design that integrates into the existing UBC campus and support the new pump station building. Two existing trees on site will be relocated off site by UBC and the 2 existing pine trees in front of the neighbouring Henry Angus Building will be preserved. The proposed planting palette will provide a landscape with year-round interest including fall colour and spring flowers. The planting will complement the new building and also provide some visual buffer to the exterior 2nd floor access staircase. An extension of lawn will also be added to the forecourt along University Boulevard.

Grading and Drainage
The grading of the proposed site will tie to the elevations of the surrounding roads and the new pump station. Education Road will be regraded along the new proposed pump station with a new concrete broom finish surface, the replacement with ‘elevated’ materials such as scored concrete, banding and flush profile curb (no curb) to take this service road connection to University Boulevard to the same level as other service cross streets in the area.

Safety and Functionality
The pedestrian circulation on and around the site supports all employees, visitors and students on campus. The hardscape will have even transitions between surfaces for safety and accessibility, site lighting and an open feel to address CPTED issues around the pump station.

Sustainability
Our local professionals have designed landscapes that are both LEED and ENVISION driven. Our LEED and ENVISION certified landscape architects will lead & participate with integrated design process and make informed decisions towards reaching highest sustainability levels within each rating system

SUSTAINABILITY
ARCHITECTURE

UBC's Sustainability Goals
At UBC's campus, sustainability is an essential step to achieve human & nature wellbeing. By 2035, UBC has committed to spreading regenerative sustainability throughout teaching, learning, research, partnerships, operations and infrastructure, and the UBC community.

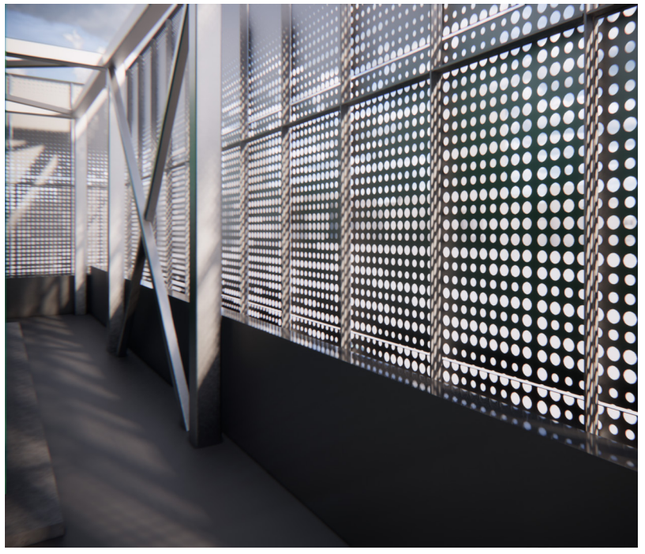
Campus as a Living Laboratory UBC has committed its campus, educational & research capabilities, as a living laboratory. The campus is used for testing, studying, teaching and developing technologies. The UBC Pump House is an infrastructure addition that will contribute to the living lab of UBC, drawing the publics awareness to the water pump system that distribute water to 90% of the campus.

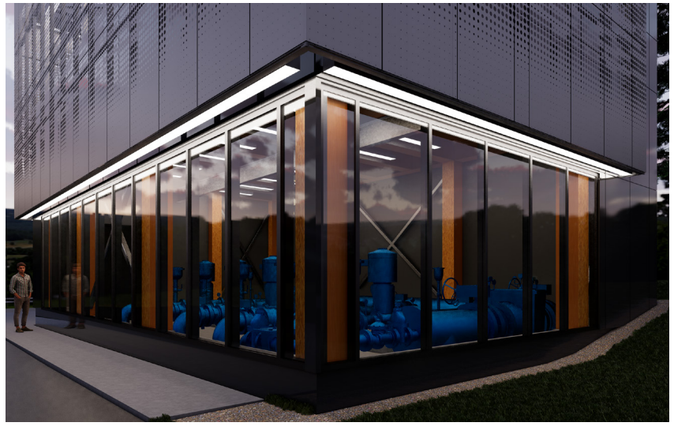
Using Renewable Material The UBC Pump House structure is a combination of exposed glulam columns and beams supported on a concrete foundation.

The use of structural steel is limited to the steel cross bracing, exterior structure around the generator and the exterior metal grate stair/ steel stringer.

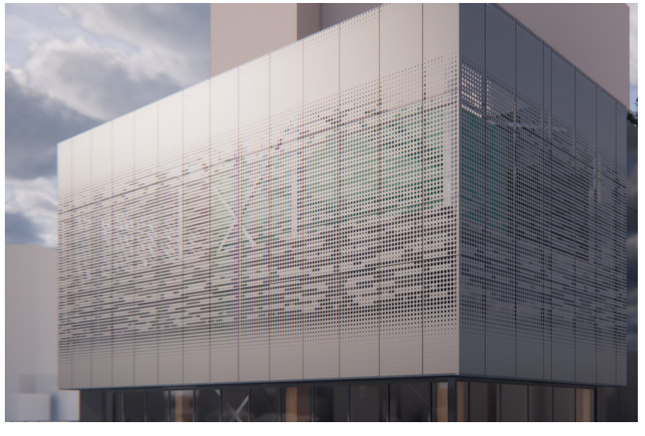
Bird Friendly Design Guidelines for Buildings
UBC, as an educational institution, is a leader in regenerative sustainability. Part of their regenerative sustainability initiative is protecting & benefiting the biodiversity system on campus and beyond. "Birds are particularly important because they provide essential ecosystem services in the form of pest control, pollination, and seed dispersal.", UBC Bird Friendly Design Guidelines for Buildings. UBC implemented design strategies to reduce bird collision; reduction of glazing quantity, applying visual markers to glazing (up to 4th floor), reduction of light pollution & implementation of operational systems that eliminate or reduce the use of light if not necessary.

To keep in line with UBC Design Strategy of Bird Friendly Buildings, glass was only used in the first floor for up to 8' & we wrapped the majority of the building with a metal screen & dark metal panels. To reduce lighting pollution, we will use limited exterior lighting.





Reduction of Lighting Pollution through Limiting Exterior Lighting

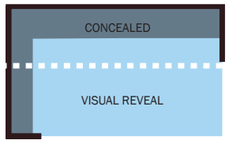


Metal Screen Wrapped around Generator

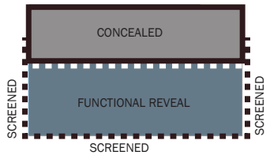
PARTI DIAGRAM
MASSING RATIONALE

Massing Concept

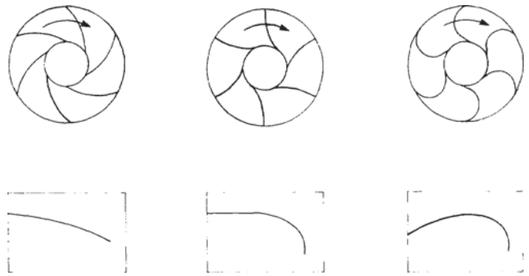
Plan



Slicing Building in First Floor Based on Revealed vs Concealed Program

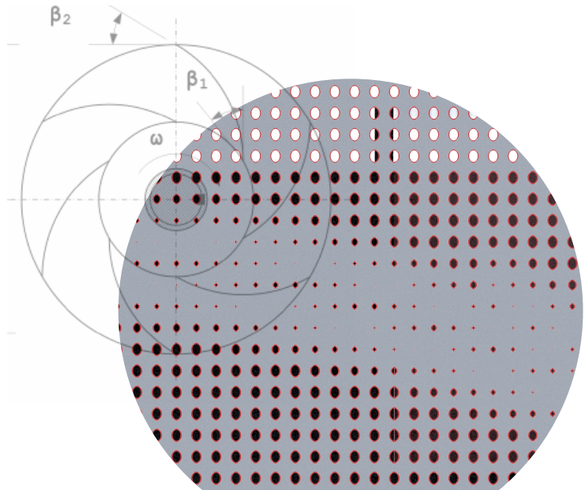


Slicing Building in Second Floor Based on Revealed vs Concealed Program



Impeller Shape and Pressure Profile

Screen Pattern Concept



Educational opportunities

- Visual transparency to draw the curious in from Education Road prominently
- Building screen ‘Impeller’ design motif using basic engineering conveyance principles
- Use of computational design techniques to generate screen pattern (Grasshopper)

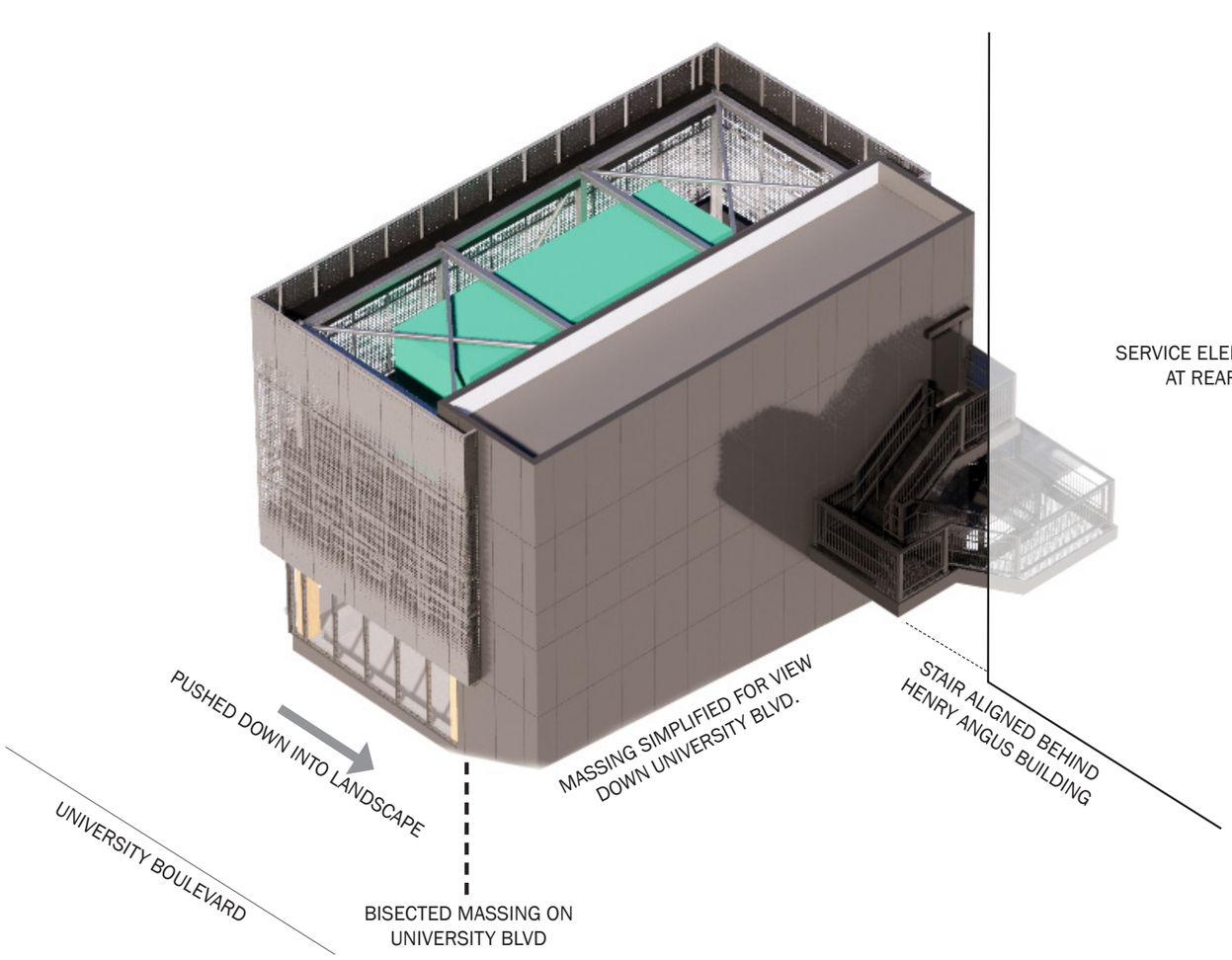
Regenerative Sustainability

As we move beyond design for sustainability towards a more regenerative future for buildings and community, the role of public infrastructure projects will lead the way in the sense they are finely tuned to elevate, educate and acknowledge. Celebrating our purpose and creating opportunities for education through infrastructure helps build awareness and a sense of community through shared knowledge and ownership.

Sustainable & Resilient Building Features

- Durable, low maintenance building materials appropriate for infrastructure projects improves life cycle costs (curtain wall system with metal screen)
- Avoidance of ‘Red List’ materials for the building . (Living Building)
- Educational opportunities through education in design (Building as part of the Living Lab concept)
- Use of low carbon structure (CLT panels & glulam)

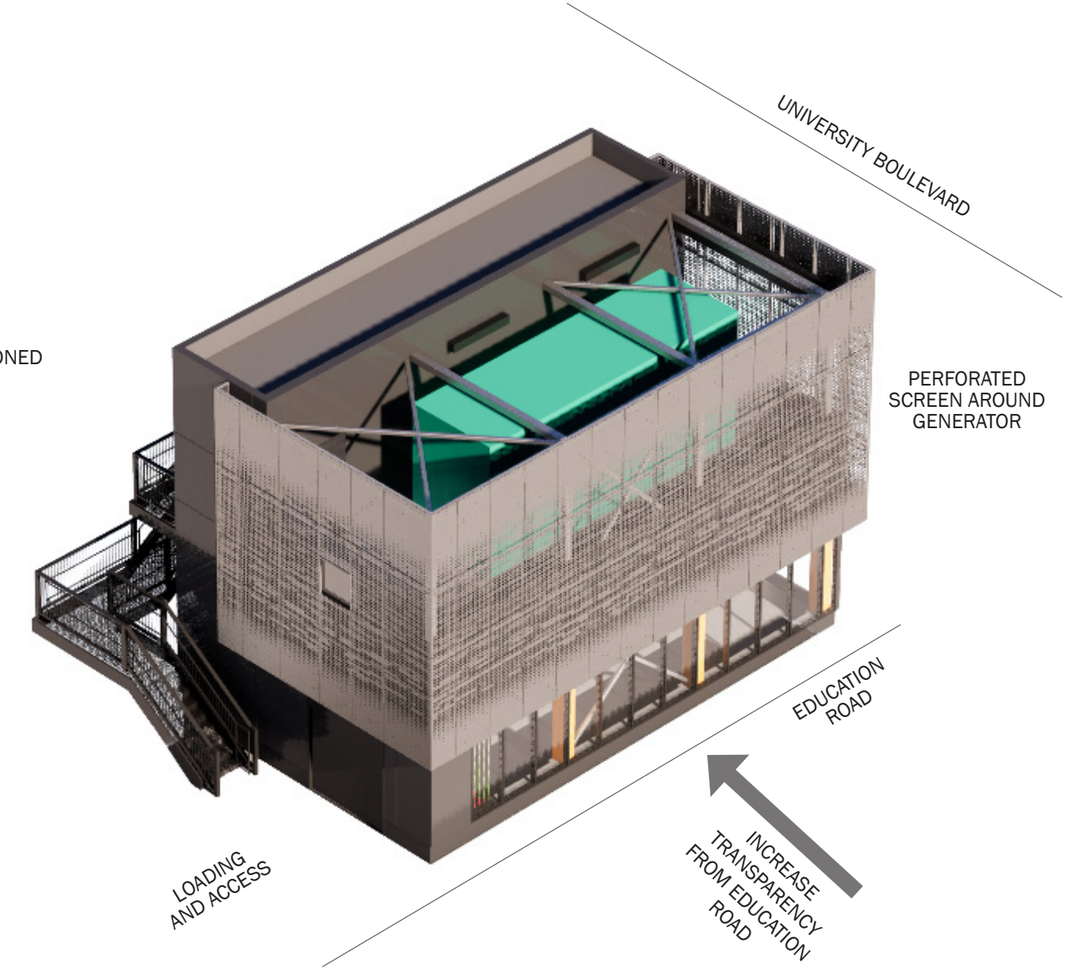
PARTI DIAGRAM
MASSING RATIONALE



From University Blvd

Building turns away with closed simple massing from Henry Angus and University blvd. With some opening to reveal some of what's inside.

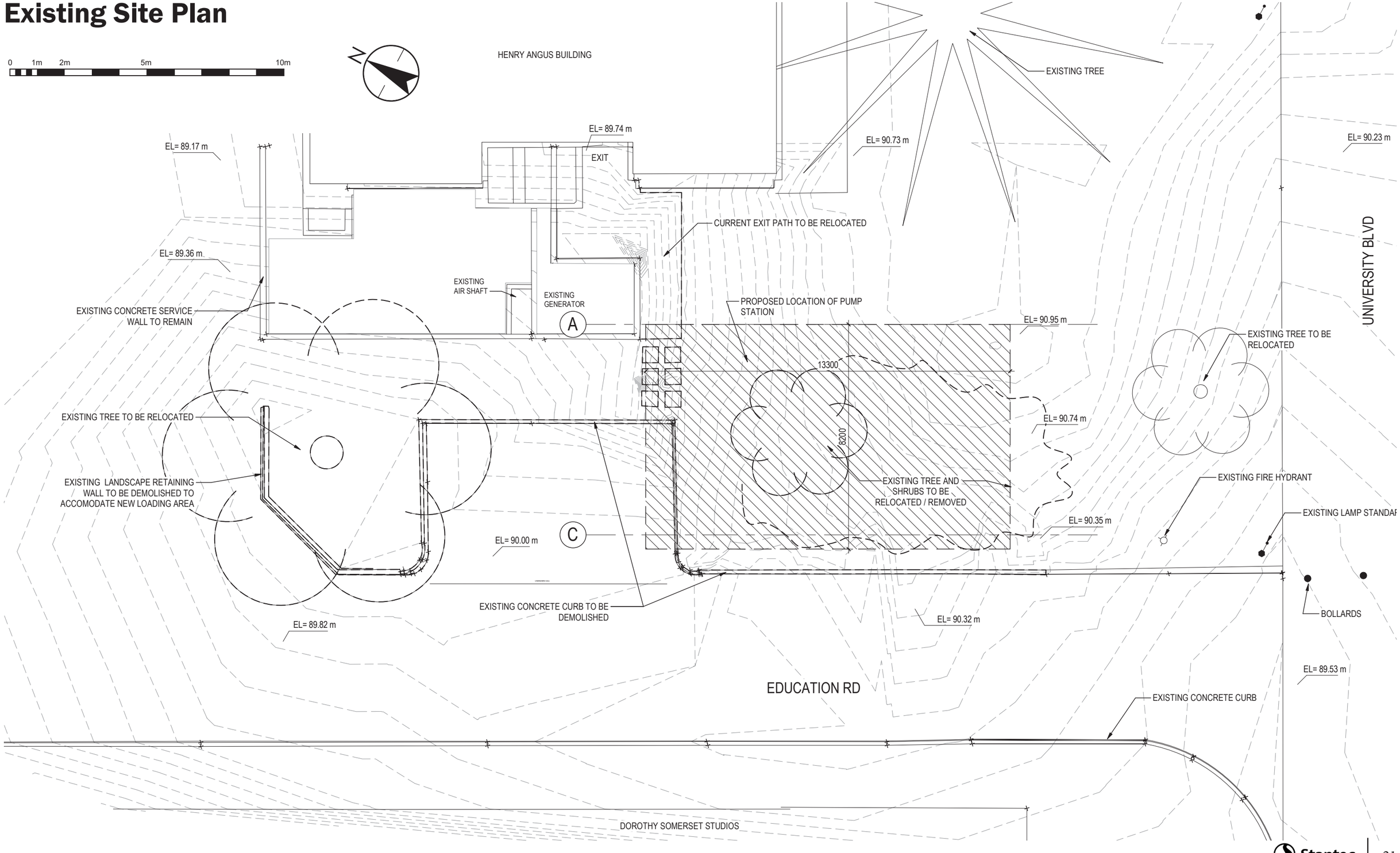
Use of common industrial vernacular language.



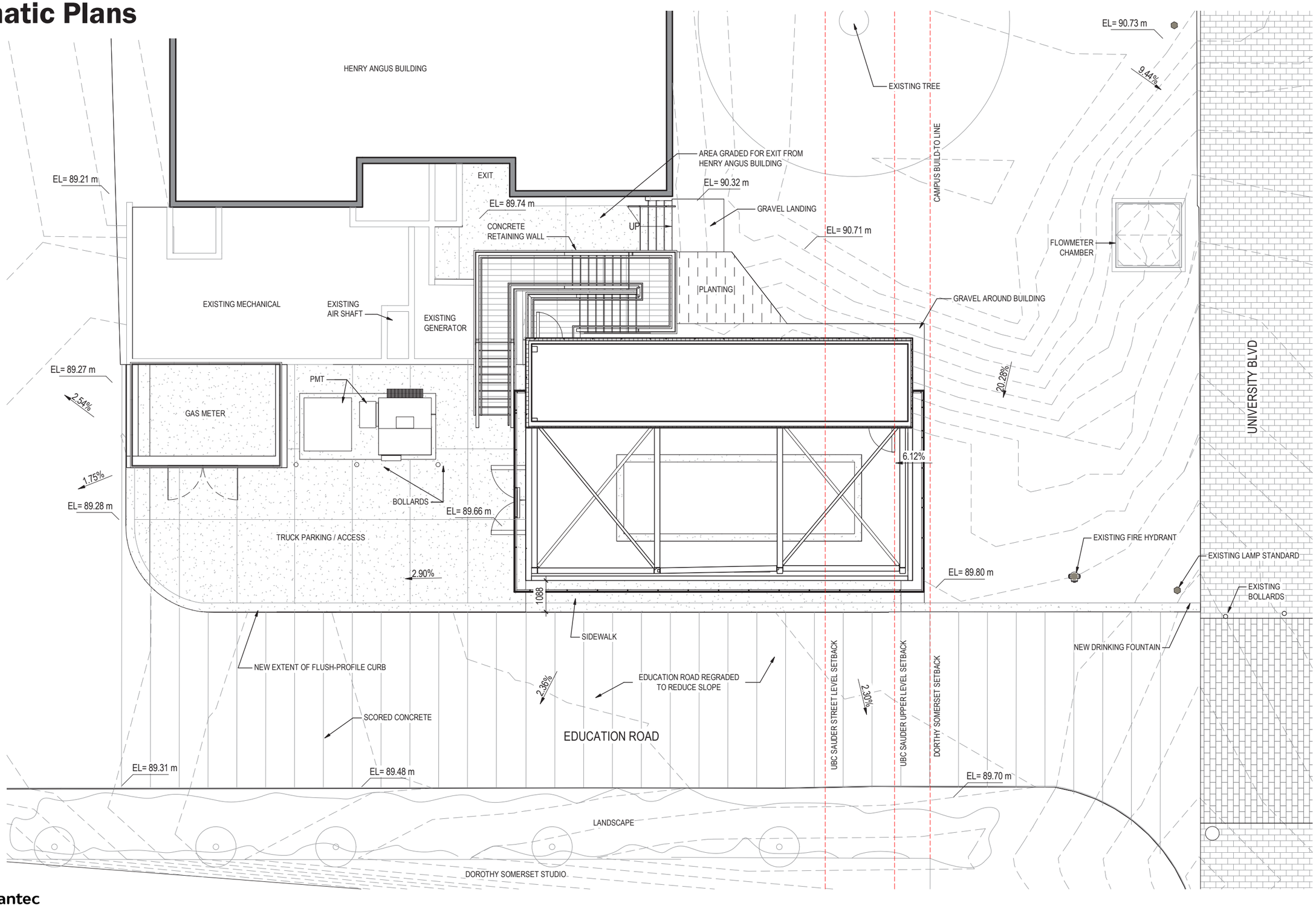
From Education Rd

Screen wraps only the exposed outdoor equipment. Tall glazing along Education Rd allows full view of the pump room inside. All access points located together.

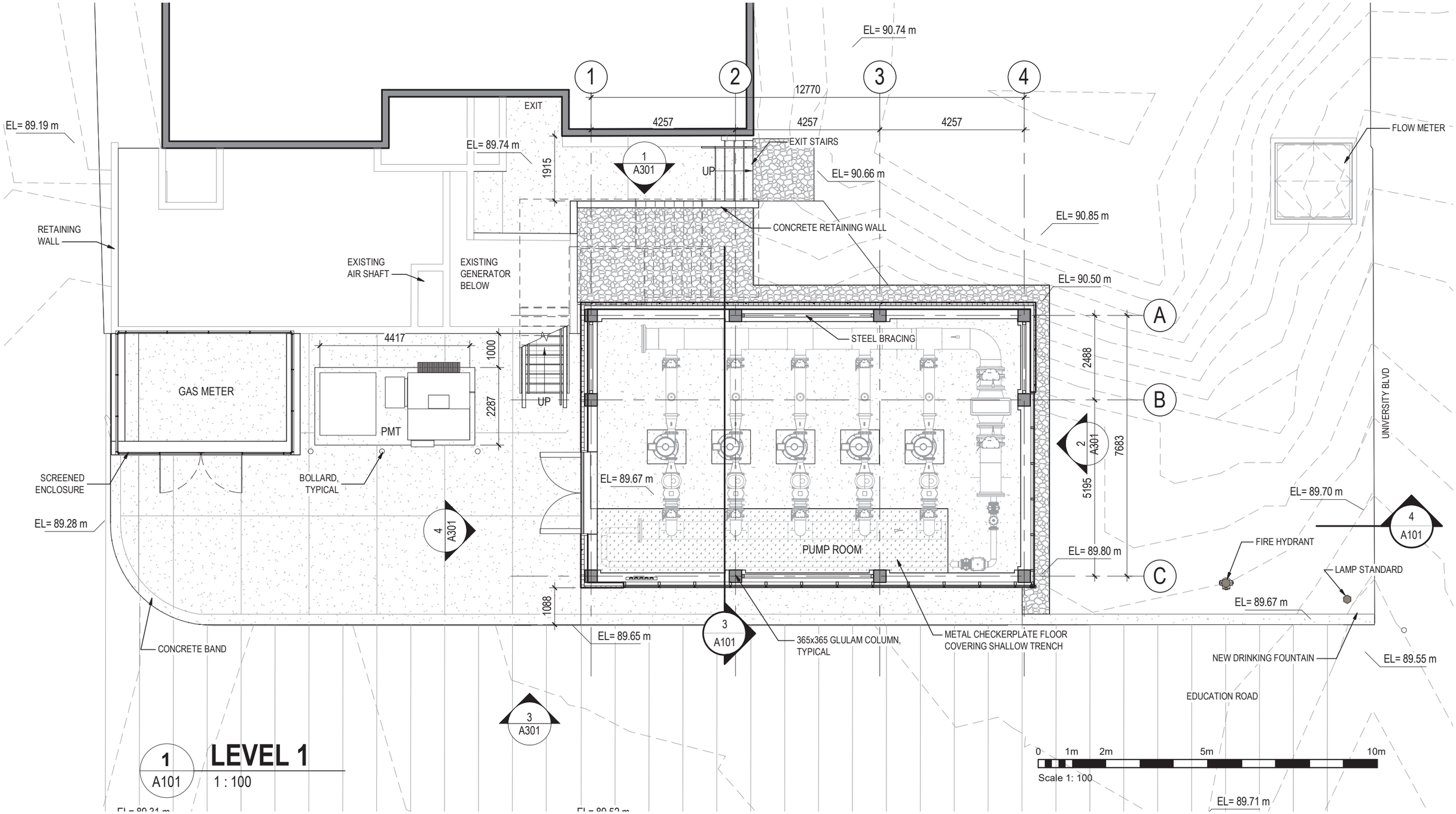
Existing Site Plan



Schematic Plans



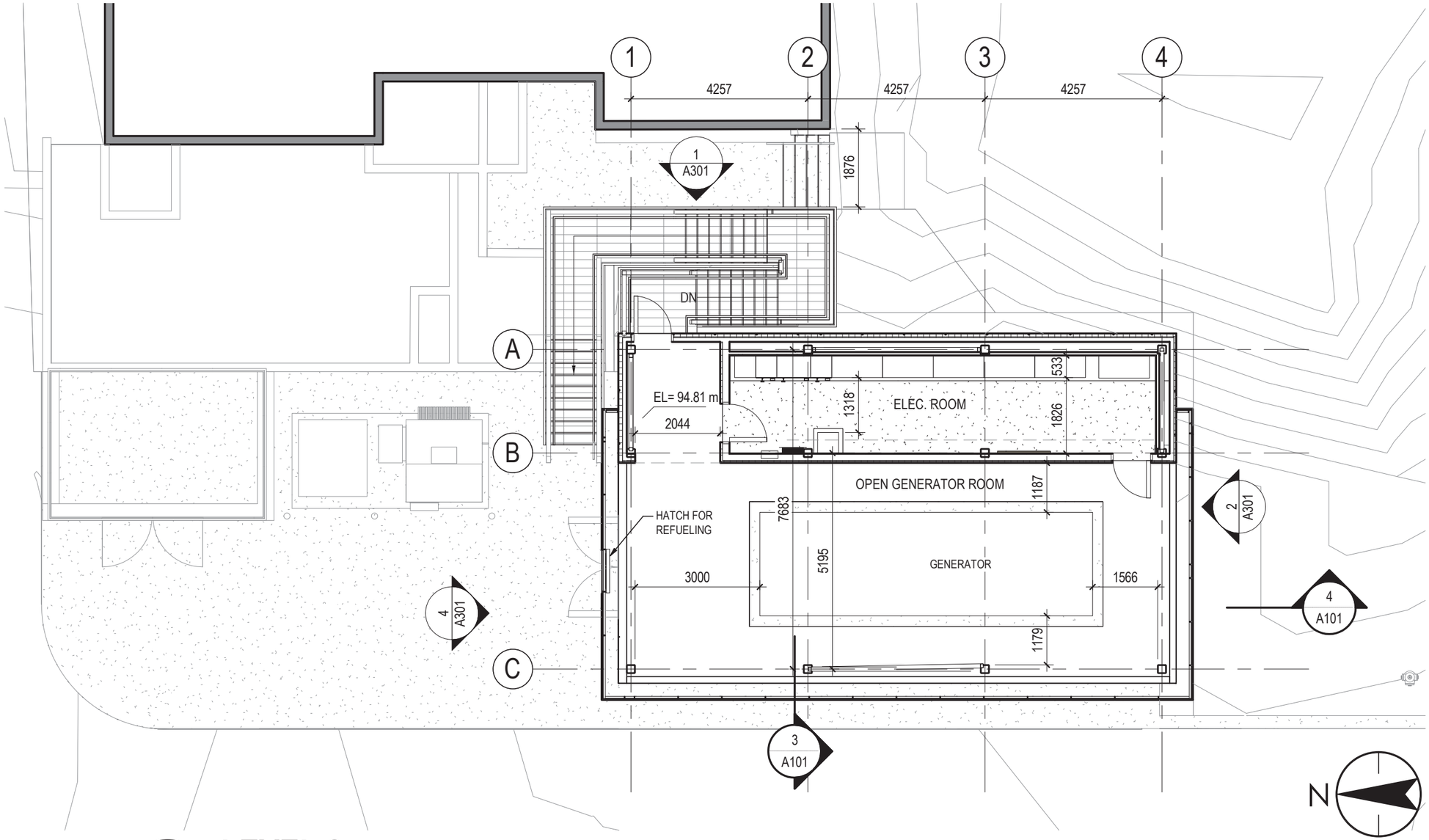
Schematic Plans



1 / A101 LEVEL 1

1 : 100

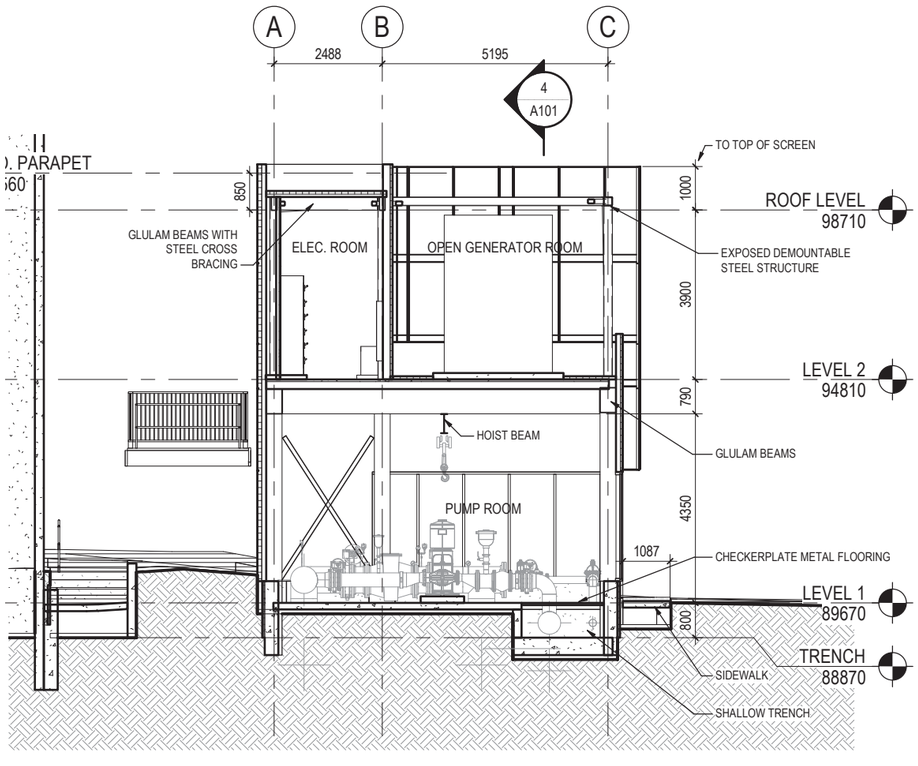
Schematic Plans



2 / A101 **LEVEL 2**

1 : 100

Schematic Sections

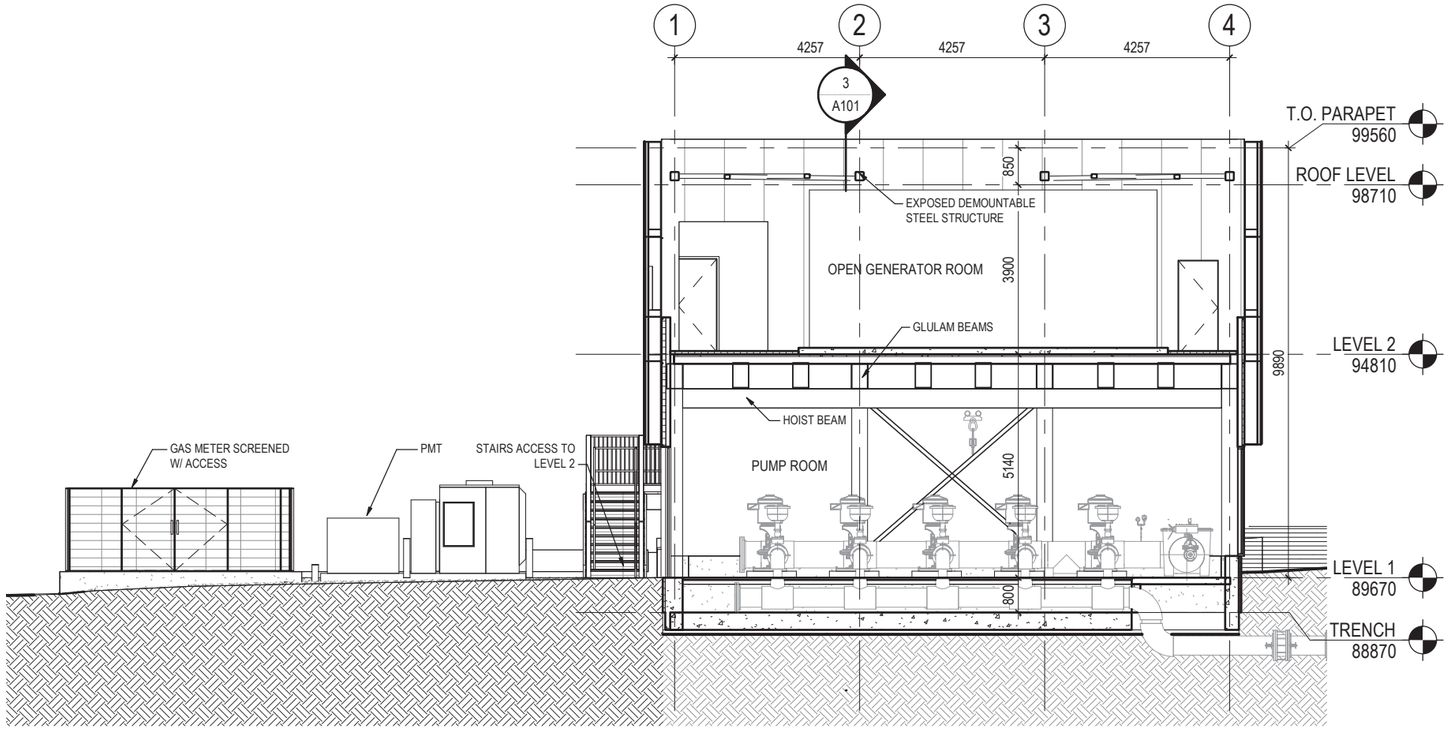


3 A101 **SECTION 4**

1 : 100

0 1m 2m 5m 10m

Scale 1: 100



4 A101 **SECTION 1**

1 : 100

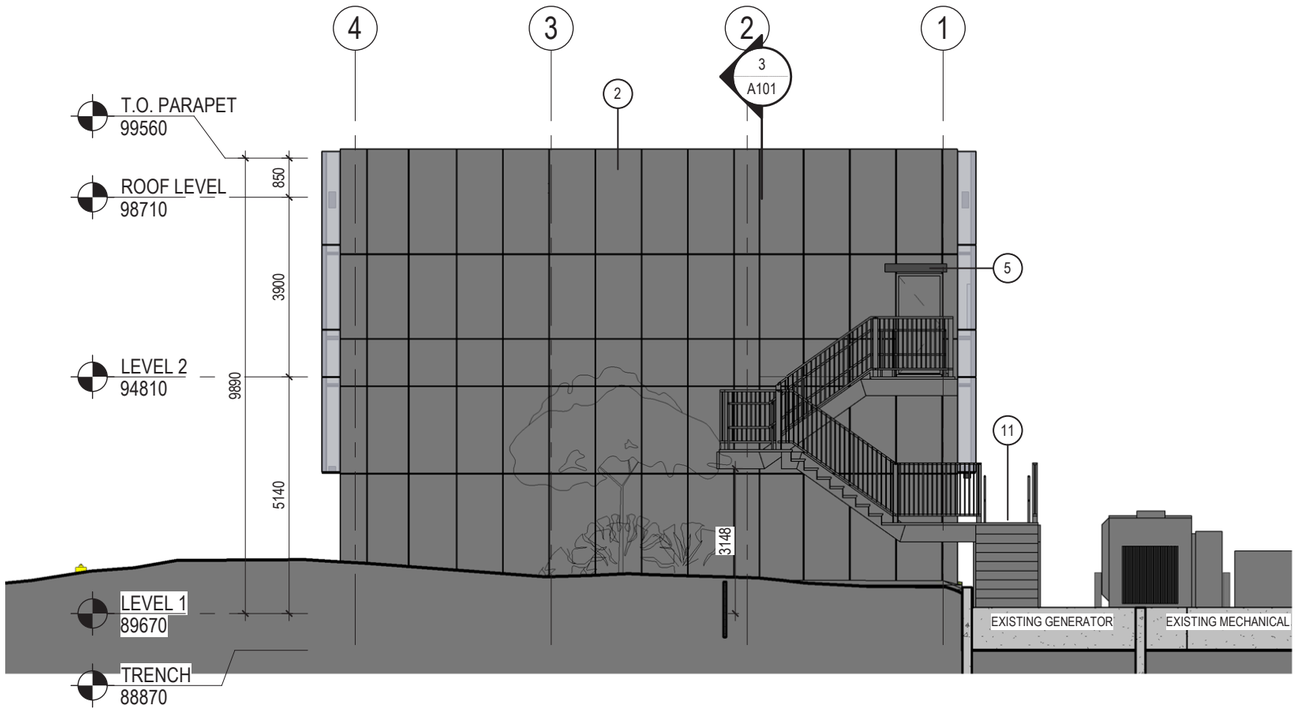
0 1m 2m 5m 10m

Scale 1: 100

Elevations

EXTERIOR MATERIALS LEGEND

1	PERFORATED METAL SCREEN ON STEEL STRUCTURE
2	INSULATED METAL PANEL, DARK GREY
3	CURTAIN WALL, CLEAR GLAZING WITH CHARCOAL ALUMINUM MULLIONS
4	PAINTED ALUMINUM DOOR, DARK GREY
5	EXTERIOR LED LIGHTING
7	LED LIGHTING STRIP ON UNDERSIDE OF SCREEN
9	36" TALL, 6" STATIONARY BOLLARD, UBC GREY TO MATCH EXISTING
10	METAL PANEL OVER PROTECTION BOARD AND INSULATION ON FOUNDATION WALL
11	STEEL STAIR WITH PERFORATED EXPANDED STEEL TREADS
12	HATCH
13	REVEAL
14	LED FLOWMETER DISPLAY

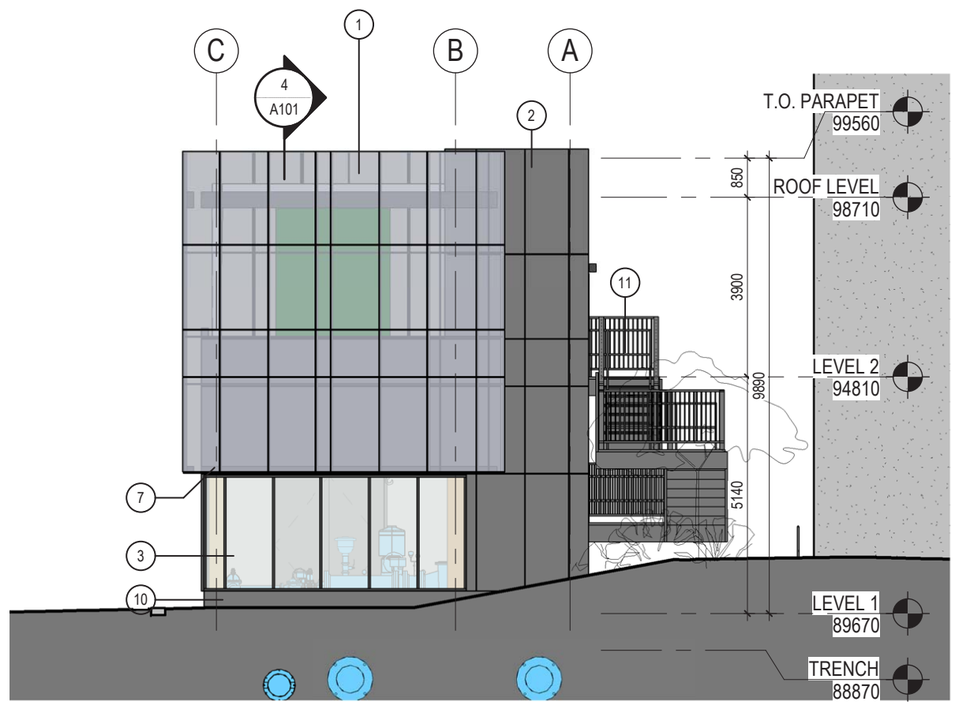


1 A301 **EAST ELEVATION**

1 : 100

0 1m 2m 5m 10m

Scale 1: 100



2 A301 **SOUTH ELEVATION**

1 : 100

0 1m 2m 5m 10m

Scale 1: 100

Elevations

EXTERIOR MATERIALS LEGEND

1	PERFORATED METAL SCREEN ON STEEL STRUCTURE
2	INSULATED METAL PANEL, DARK GREY
3	CURTAIN WALL, CLEAR GLAZING WITH CHARCOAL ALUMINUM MULLIONS
4	PAINTED ALUMINUM DOOR, DARK GREY
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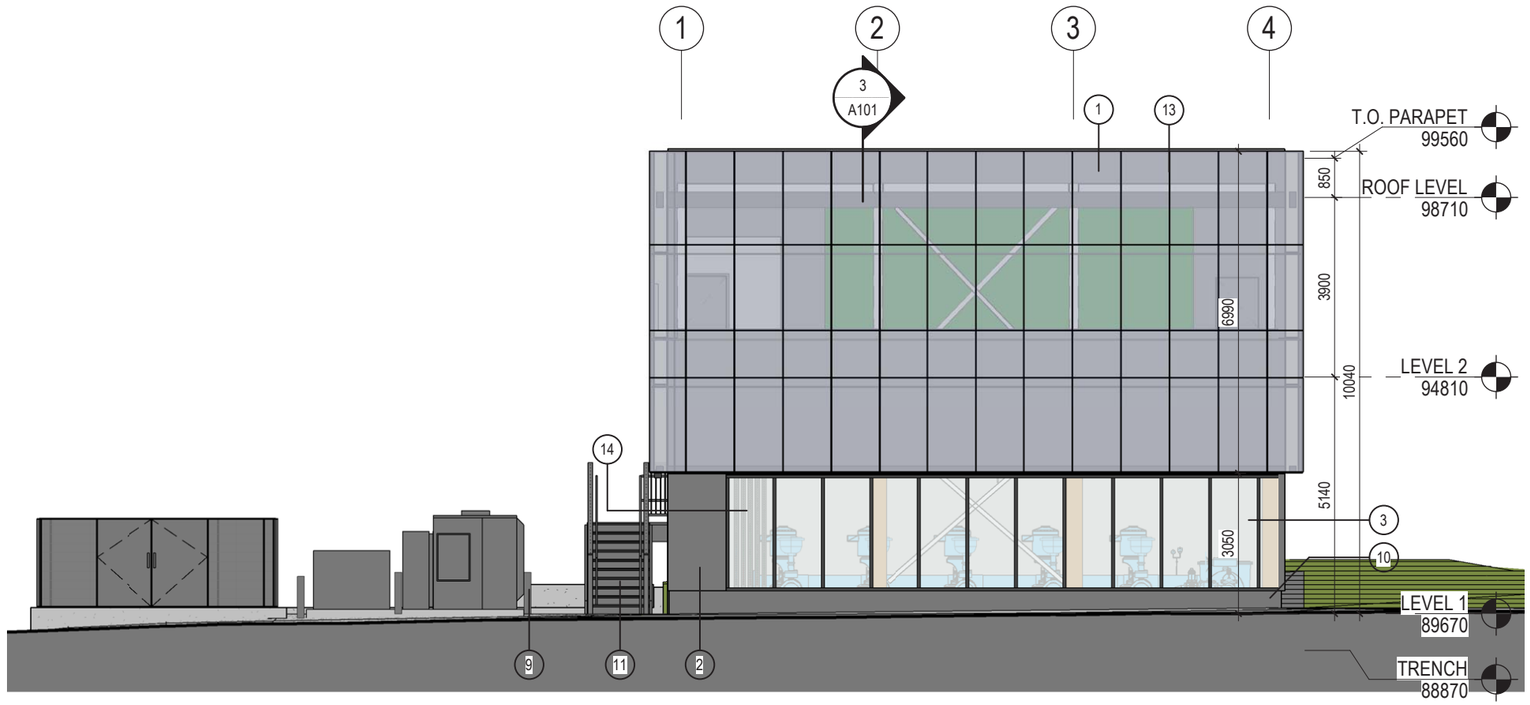
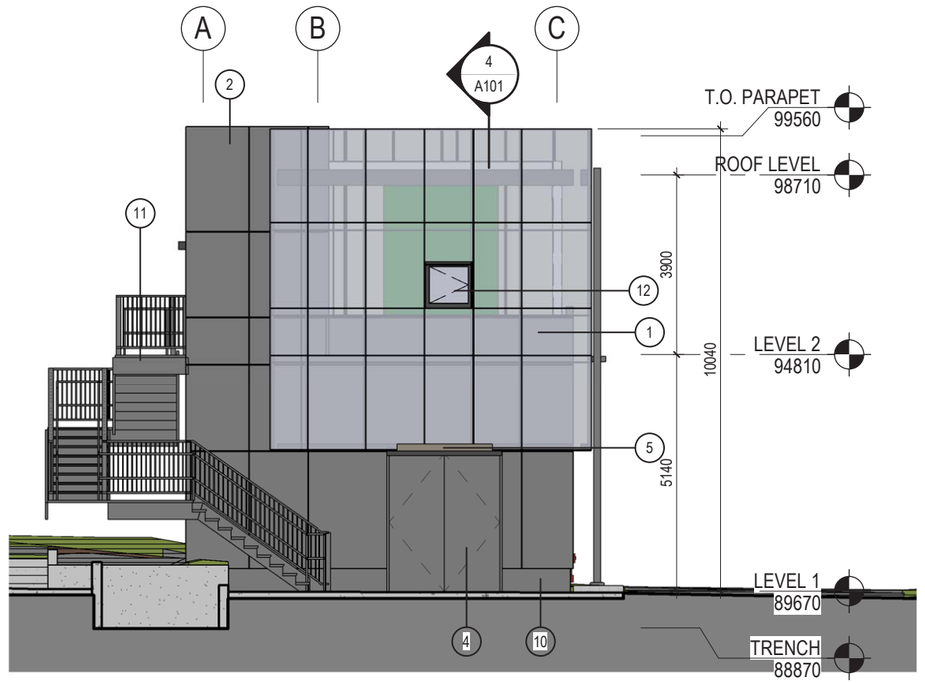


3 A301 **WEST ELEVATION**

1 : 100

0 1m 2m 5m 10m

Scale 1: 100



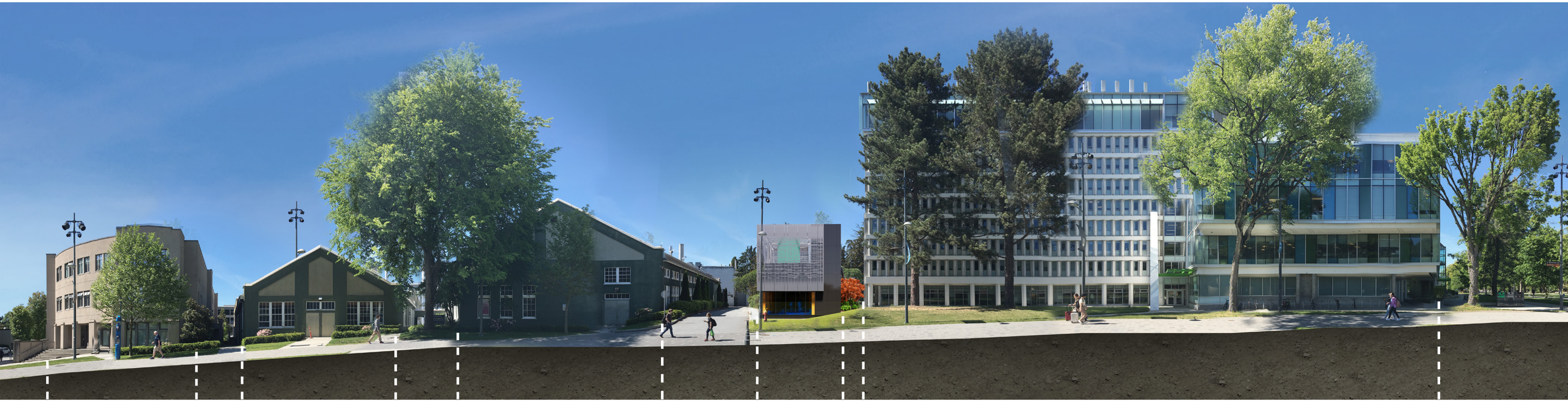
4 A301 **NORTH ELEVATION**

1 : 100

0 1m 2m 5m 10m

Scale 1: 100

RUNNING STREET-SCAPE



PERSPECTIVES

View from University Blvd at Education Rd Looking North

View from University Blvd

Views from University Blvd Looking East

Interior View of Pumps Area

View from University Blvd at Education Rd Looking North at Night