

TRIUMF ARIEL , UBC

Design Rationale

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Project Overview

TRIUMF, Canada's National Laboratory for Particle and Nuclear Physics proposes to build the Advanced Rare Isotope Laboratory (ARIEL) to augment the Rare Isotope Beam (RIB) science program at the Isotope Separator and Accelerator (ISAC) facility on the TRIUMF campus at 4004 Wesbrook Mall (UBC), Vancouver.

The first phase of ARIEL Project is the Stores Building which is currently under construction at the southwest end of the campus. The final phase of ARIEL project will comprise the main the ARIEL Building and 2 accessory buildings - Compressor Building and Badge Building.

It is the intent of TRIUMF to make use of this opportunity to create a contemporary image that reflects their position and leadership in the global community of particle physics and their advancement in technological research of sub-atomic physics.

ARIEL

Site Planning

ARIEL is unique in that the building is more than a building to house experimental activities but is one of the many components of the machine itself which is strongly influenced by the geometry of the beamlines associated with the e-linac and Cyclotron, and to support the technical requirements of space and safety. The building will be located on a very constricted site between the Administration Building and the ISAC I Building. The siting and design must respect personnel flow (the secure zone and outside the secure zone), equipment movement, fire truck access and complex existing services.

Despite its confined location, ARIEL will be presented as the gateway, 'gateway to the universe' and a strong visual element that anchor the adjoining architectural elements.

In order to secure ARIEL within the secured side, a new fence line is introduced along the existing driveway between the Administration Building and ARIEL. Landscape buffer is provided between the fence and the pedestrian walkway on the public side. The existing footpath leading from the parking lot to the campus is also reconfigured to provide a graceful connection from the parking lot to the campus entry.

The Building

ARIEL is a 4 storey building, with 2 storeys below grade and 2 storeys above grade with a mechanical penthouse on top. It comprises three major components along the length of the building:

1. North end is the 'Rare Isotope beam (RIB) Annex' which also contain the main electrical and mechanical component that services ARIEL
2. Middle portion is the Target Hall which is a single volume, 4 storeys high concrete shell
3. South end contains laboratories and control areas

At the lowest basement, the accelerators and target stations will be connected by new beam lines in a common tunnel.

A significant portion of the building will be below grade which is established by the level of the electron and proton beam lines. Although spaces will be occupied by people, there will be a limited number and in most spaces with very infrequent occupancy.

In those spaces frequently occupied by people and located above grade, windows will be provided for a quality naturally illuminated work environment. Extra large, heavy capacity elevators (8,000 lbs) are provided with access to all floors from the south elevator and from grade to Level B2 from the north elevator.

The internal placement and planning of the spaces is dictated by function. Specific spaces such as the Target Hall, Laser Ion Source Room and Hot Cell area are strategically placed with respect to the beam line and tunnel.

Support spaces on the south of ARIEL provide labs which are used in the process of making targets ready for use in the Target Hall. These include Target Preparation and Assembly, Radio Chemistry lab and Conventional Lab. The Crane Control Room on the top floor in the south portion of ARIEL is shared by crane remote handling and target conditioning immediately adjacent to the Target Hall.

The Target Hall is centrally located in ARIEL at the terminus of the beamline tunnel at the Target Pit. The targets will be placed in the Target Pit surrounded by shielding. Used targets will also be stored in the Target Hall until they are ready for removal. The remote controlled 20 ton crane will be required to move heavy targets and other components necessary for installation of the hot cells and operations within the Target Hall.

Exterior Expression

ARIEL exterior form and materials will present an image of the “gateway” to the site and a material palette that relates to adjacent buildings while creating a presence of its own. The translucent ‘Kalwall’ facade scattered with vision glass, together with the super-graphics stair tower on the north side creates a prominent but welcoming appearance as people approach from the parking lot along the landscaped walkway. The vertical expression of the north façade also contrasts with the horizontal low profile of the adjacent buildings. The use of metal cladding on the south and west elevations establishes a visual relationship with the rest of the campus. Galvalume is chosen to provide a neutral color tone to tie in the different color cladding around the adjacent buildings on site. Accent panel of ‘copper’ color is chosen to give ARIEL its own identity. Oval cladding patterns, the ‘dancing orbits’, are created on the wall panels on the West Elevation. This will create a dynamic and interesting visual effect during both daytime and night time (if lit) in lieu of an otherwise plain and static blank wall.



COMPRESSOR BUILDING

Compressor building is a new free standing facility which comprises a compressor room for cryogenic equipment, a covered bicycle storage and end of trip facility. The new ARIEL facility will require a cryogenic system for the process cooling associated with the e-linac. This new assessorary building will be located south of the Experimental Hall adjacent to the existing cooling towers. Helium buffer tanks will be located on a steel rack beside the building. An overhead Mechanical and electrical service trunk which carries helium pipes and ionized water, electrical and communication conduits will connect the Compressor building to the Electron Hall. Windows are not desirable for the compressor building on the north and west side for the reason of noise control. Windows are introduced in the change room for natural light and possible ventilation.

In addition, a new covered bicycle storage area and end of trip facility will be incorporated into this building for TRIUMF staff. The building is sited at the east end of the existing open space in the centre of TRIUMF campus. Together with the existing trailer Aa at the west end, a courtyard is preserved which can generously house a volleyball court. This is a common pastime for TRIUMF staff during lunch hours. Despite the utilitarian nature of the building, a strong vibrant color is chosen for the west façade and articulated wood structure for the canopy reinforce the recreational nature of this open space.



BADGE BUILDING

The new Badge Building will be a pre-fabricated modular building designed to integrate and connect to ARIEL through a breezeway that will serve as the main entry element to the secured (behind the fence) portion of the campus. This building will serve both as a temporary facility while ARIEL is under construction and as the final facility.

Steel / wood composite structure and wood finishing elements will be used as much as is applicable and it will be a showcase of high-quality pre-fabricated construction. Full height glass will be introduced as much as possible to display movement and animate the surrounding.



THE LANDSCAPE DESIGN

The TRIUMF Campus has evolved over several years, with the focus being placed on the buildings and the equipment they house. During this evolution, no real attempt has been made to unify the campus through hard or soft landscaping. The landscape designs of the Stores, ARIEL and Compressor buildings attempt to begin the process of developing a unified design language for the campus.

The introduction of the ARIEL Building will change both the pedestrian and vehicular circulation patterns, offering an opportunity to create an entry sequence that will unify both the hard and soft landscape language. Signage will be incorporated into the entry sequence and will be designed as part of a family of signage, initiated with the signage at the Stores Building. The path from the parking lot to the badge building will be upgraded to higher quality paving materials leading to a pedestrian promenade alongside the existing building.

Some clearing will be required to allow for the realignment and associated regrading of the existing path around a new transformer. Due to the condition of the existing trees and shrubs along this path, removal and replacement will be the preferred option. Tiered retaining walls and native planting will be used to blend the edge where the path cuts into the existing wood lot.

Alongside the promenade, raised planters will be incorporated to scale down the security fence and allow for enough soil depth over the building slab below. In line with the planter, a contemporary bench will be installed under the building overhang. Lighting will be set into the continuous concrete wall to wash the promenade.

High quality materials are being proposed for both the paving and the fencing along the entry sequence. Due to the depth to the structural slab below, sawcut concrete paving is being proposed in the North/South direction, while unit concrete pavers will be used along the North Face of the ARIEL building to tie the ground plane in with the existing landscape. Wire wall is being proposed for the fencing material, but the final fence design will require coordination with the regulatory body to ensure that a conforming fence design is achieved.

A similar design language to ARIEL will be used for the paving and seating around the Compressor Building while the low maintenance landscape design will incorporate the existing trees along the North edge of the site. A lawn area will be preserved off the covered patio, between the existing trailer and the new building, for volleyball and other active recreation.

Drought tolerant, adaptive plant material will be chosen throughout the project, native planting will be used adjacent to the wood lot and no planting will be installed beneath the building overhangs. The existing irrigation system will be evaluated with the maintenance department to develop an irrigation strategy for the existing landscape and any of the newly installed planting.

TRIUMF - ARIEL, UBC A LEGACY & A PROMISE

Renewing the Promise of a University City

TRIUMF is one of the world's leading subatomic physics laboratories. It brings together dedicated physicists and interdisciplinary talent, sophisticated technical resources, and commercial partners in a way that has established the laboratory as a global model of success. ARIEL will allow TRIUMF to develop technology to advance Canada's supply of critical medical isotopes, capitalize on existing investments, and broaden its research capabilities in particle physics, nuclear physics, nuclear medicine, and materials science. It will place UBC on the leading edge of the research world.

Physical Planning Principles

Principle 1 : The University Lands : as One

The project improves the presence of TRIUMF on the edge of the property by introducing a contemporary structure serving as the 'gateway to universe'.

Principle 2 : The Community : Vibrant and Ever-Changing

ARIEL is designed to present a new and contemporary image of TRIUMF to the public. It is an important statement and commitment. TRIUMF is marketing to inform the public that UBC is at the forefront of sub-atomic physics research.

Principle 3 : The Experience : A Place to Remember

The confined but yet strategic location of ARIEL complements its function perfectly with the adjoining buildings . The building can be easily accessed and prominent within its context. The building is designed with its own character and at the same time it belongs to the family of new and old buildings within the TRIUMF campus.

Principle 4 : The Environment : Incredible Riches

ARIEL will be designed with sustainable principles in mind. The nature of this type of facility creates a tremendous challenge to achieve LEED requirements. Conventional LEED measures may not be applicable. An innovative approach to promote sustainability will be investigated which will include a future tie-in to UBC campus for waste heat recovery, super conductive technology for accelerator and an overall storm water quality management strategy for the whole TRIUMF campus.

Principle 5 : The Endowment : A Legacy Retained

ARIEL is an essential and integrated component of TRIUMF. It implements the mission of TRIUMF as a leader in world of particle physics research.

Principle 6 : The Perspective : A World Beyond

The new building design offers more than just as a shelter for a machine. It embraces the aesthetic, social and ecological aspect of TRIUMF and contributes to UBC as a whole.

Principle 7 : The Opportunity : Global Leadership in a Changing World

ARIEL advances TRIUMF's competitive global position in isotope beams for physics, materials science, and medicine.