THE CAMPUS TODAY

Campus Context

This aerial photograph of Greater Beirut shows the three major geographic regions of Lebanon. Beirut is one of many cities in Lebanon on the coast of the Mediterranean Sea. The narrow coastal region of the country is 225 kilometers long. Mount Lebanon is visible further inland in the photograph. This chain of mountains, ranging up to 3,000 meters in height, makes up the second distinct region of the country and serves as the structural backbone of Lebanon. Finally, the Bekaa Valley, to the east of Mount Lebanon, is more arid than the rest of the country; yet due to location and terrain, it serves as the country’s major agricultural area.

Also evident in the photograph is the striking location of AUB on a promontory jutting out into the Mediterranean. The central district of Beirut and new port development lie to the east of the university, while the fabric of the city extends to the south and includes a new airport runway built into the sea. The urban area of Beirut can be perceived as a triangle, with AUB on one corner at the edge of the sea.

AUB is truly an urban campus and can be understood only in the rich context of the cultural and historic diversity of Beirut, as shown in Figure 5. The university lies within an area known as Ras Beirut, an area which has been defined by the university and its growth and development. The major central district and “heart” of Beirut lies to the east, an area that is in the process of “rebirth.” To the south of AUB lies the Hamra district, the former center of commerce and shopping; as other areas in the city become more attractive sites for retail, office and residential development, the Hamra district is itself experiencing a period of economic adjustment. The Corniche serves as a major vehicular connection and a pedestrian promenade that extends along the entire edge of the sea, linking many of the major attractions in the city, including the central district.
A close-up aerial photograph of the campus depicts the four major forms of AUB. Color in the photograph especially reveals to us historic details of the university buildings and landscape.

First, the distinct red-tiled roofs of the Upper Campus reveal historic buildings. The vast majority of these structures were built prior to 1900, when local building practices produced buildings with red-tiled roofs. In contrast, the Lower Campus has newer structures built without these restrictions.

Second, a distinct band of green vegetation runs along the escarpment separating the Upper Campus from the Lower. Appropriately labeled the “Middle Campus,” this region, with its lush greenery, combined with the vegetation of the rest of the campus, is a stark contrast to the rest of Beirut. As such, AUB can be viewed as a green oasis inside a dense urban fabric—an asset it must protect when considering its future development.

Third, the major open space structures of the Lower Campus are evident: foremost, the main athletic field, and to a lesser extent, the AUB beach.

Fourth, the large footprints of the hospital and teaching facilities in the Medical Center, as seen at the bottom middle of the photograph: the AUBMC appears to belong more to the urban structure than to the AUB campus.
AUB is surrounded by four distinct uses on it four major sides (see Figure 6, The Neighborhood). To the west, the university is flanked by like-minded institutional uses, with the International College for high-school age students and the International School for elementary students. Many of these students later attend AUB. To the north, the campus is bounded by the Corniche and by the Mediterranean Sea beyond. The Corniche serves as perhaps the only shared ground for all the various classes of Beirut's citizens.

When viewed from AUB's Upper Campus, the Mediterranean Sea acts primarily as a visual backdrop; yet it also serves as a source of cool summer breezes. To the east, the university is bounded by residential and mixed-use neighborhoods. Some of the sites to the northeast along the Corniche include tall, private residential towers which block views from AUB and could be predicative of future high-density growth patterns along the Corniche. Finally, the south of AUB is a vibrant university commercial district, with fast-food and student-related services along Bliss Street, and other commercial and residential uses further from the university. As mentioned above, the Medical Center is very much within the urban fabric of this area, and has high-traffic streets running through it in stark contrast to the main campus.
Existing Conditions

Study Area
The study area, totaling approximately 24 hectares, includes the land holdings of AUB and land not owned by AUB. The study area generally can be defined as land between the Corniche on the north, Blies Street on the south, John F. Kennedy Street on the east and the land holdings of the International School on the west. The study area for the university is, for the most part, extremely well-defined and is surrounded by a fence or wall. The border of the campus to the northeast is the least defined, and is compromised by a series of parcels owned by private parties and by several AUB-owned parcels that are not contiguous to the other holdings. Kerr and, to some extent, Penrose Hall extend from the core of the campus at the southwest corner.

The Medical Campus, with a distinct set of boundaries of its own (defined by Clemenceau Street on the north, Abdul Aziz Street on the west, mid-block to Sidany Street and nearly to the Gefinor Plaza to the east), has its own urban feel and composition, with a weak physical connection to the main campus.

For the most part, the study area and campus have well-established boundaries. Given the lack of undeveloped land around the campus, the land area described within this study boundary will take on the challenge of accommodating any growth AUB may have in its future.
Land Use and Building Use

Given its history of development as well as its singular topographical situation, there are certain conditions that are unique to the AUB campus. It is the paradigm for university campuses to have a central teaching core made up of the academic facilities, in the case of AUB, however, the facilities are dispersed, often to the periphery of the campus. In fact, the heart of the university is occupied by greenery and sports fields, much of which now provides space for functions usually found at the edges of campuses.

Other elements of the land use pattern fit the paradigm of an efficient campus. The housing is clustered into “communities” at the edge of campus—a condition that allows access to both the campus and the community. The Upper Campus accommodates all the student activities spaces leaving the Lower Campus to accommodate the sports facilities. The Medical Center is well located at the edge of campus, also providing convenient access—from the campus for doctors and employees, and for patients and visitors coming from the city.

Three buildings are vacant: The Old OPD, and Durrafourd East and West. The Old OPD is in the process of being designed for use as private doctors’ clinics. The Durrafourd Buildings, at present, do not have a designated use.
Faculty Distribution

The facilities for the six faculties are consolidated in discrete clusters, with the exception of the Faculty of Arts and Sciences. The buildings serving the arts programs are located on the Green Oval, whereas the science programs are accommodated in the Lower Campus.

- During the fall of 2000-2001, the Faculty of Agriculture and Food Sciences, housed on the west side of the Lower Campus, had an enrollment of approximately 155 (FTE) students.
- The Faculty of Arts and Sciences, split between the Upper and Lower Campuses, had a combined enrollment of 2,598 (FTE).
- The Faculty of Business, the fastest-growing faculty, is housed in the Old Medical Building and enrolled 522 (FTE) students.
- Engineering and Architecture, on the east side of the Lower Campus, had an enrollment of 977 (FTE).
- Health Sciences had a fall 2000-2001 enrollment of 105 (FTE) and is located in Van Dyck Hall.
- The School of Medicine, with facilities at the Medical Center and in DTS, enrolled 430 (FTE).

The distribution of students being served is concentrated on the west side of campus and, historically, the facilities to support this enrollment were developed near the offices of the faculties. To optimize the use of space on campus and the potential for growth, the facilities to accommodate teaching will need to be dispersed throughout campus.

However, much the dispersed pattern of the libraries gives the impression of a system serving the campus equally, libraries on the Lower Campus are not staffed and open to the same extent as the Medical Library and Jafet. In reality, library services are offered primarily from these Upper Campus locations.

Figure 9. Existing Building Use: Faculty Distribution
Classroom and Lab Distribution

A graphic representation of classroom and lab distribution shows that the majority of classrooms are located in clusters, with a preponderance of classrooms in Nicely Hall. Research labs are located, for the most part, in the Agriculture and Science buildings, with a large number of labs in DTS Hall serving the faculty of the School of Medicine. Classroom laboratories are located in all four major sections of campus, with the most in the schools of Engineering, Agriculture, and Science areas of campus.

This plan demonstrates that the center sections of the Upper Campus and Lower Campus have no active teaching facilities and are, instead, reserved for administrative and service functions on the Upper Campus and athletic functions on the Lower Campus. This structure is the inverse of the typical university, where athletic and service functions are typically located on the periphery of campus (classroom and lab distribution information did not include the Medical Campus).

General classrooms should be more dispersed to provide for convenience and more efficient use of all space resources on campus.
Pedestrian Circulation

AUB has a strong pedestrian character—one that is, for the most part, uninterrupted by automobiles. All pedestrian access to the campus is controlled through guarded gates and is limited to the AUB community. The major pedestrian network runs east/west along the Upper Campus, from the Medical Campus Gate at the east to the Green Oval and liberal arts buildings at the west end of campus. Stairways traverse the escarpment and connect the Upper Campus with the Lower Campus in eight main locations; there is no definitive primary pedestrian link between the Upper Campus and Lower Campus.

In contrast to the strong pedestrian network on the Upper Campus, the Lower Campus has less definition and clarity. Especially tenuous is the link between the east and west districts of the Lower Campus. Off the Main Campus, there are heavily traveled routes that parallel AUB. The heavily used Corniche to the north serves as a public promenade, while Bliss Street to the south is a vibrant commercial street. Less clear public pedestrian links exist between the Corniche and Bliss Street. In the Medical Campus, pedestrian circulation is much less clearly defined, and pedestrian connections between the Medical Campus and the Main Campus are weak.

Figure 11. Existing Pedestrian Circulation
Vehicular Circulation and Parking

Current AUB policy prohibits students from driving on campus at any time. As a result, automobile traffic on campus is less than that usually found on most campuses; yet, faculty-owned and service vehicles are present on campus. Major vehicular entrances include the Sea Parking Gate, Bliss Street Gate, and the New Women’s Dorm Gate, and all vehicles enter the campus through limited access gates with guards. Appropriately, parking is restricted to the edges of campus, with the bulk of parking in the Sea Parking Lot. However, much of the supply is still accommodated in small, inefficient lots in central locations throughout the campus, characterized by the parking spaces dispersed among the Faculty of Engineering and Architecture buildings.

Vehicles are allowed to traverse between the Upper Campus and Lower Campus, which calls into question what type of vehicles should be allowed this privilege. Vehicular traffic in front of College Hall is prohibited except on special occasions. In contrast with the Main Campus, the Medical Campus has serious traffic problems, with high-traffic roads running through the campus center. Traffic jams lead to noise and air pollution that poses a problem next to the hospital.

Figure 12. Existing Vehicular Circulation and Parking
Service Vehicle and Shuttle Circulation

Currently, service vehicles have a relatively minor impact on campus. There are three major entrances for service vehicles: the Sea Parking Gate, the Bliss Street Gate, and the New Women’s Dorm Gate. Many service vehicles park in lots adjacent to these entrances and then use hand-carts to bring goods directly to buildings.

Other vehicles use the main campus roads to access buildings directly; the existing campus roads, while largely used by pedestrians, are useful for this purpose. Another type of service vehicle is the campus shuttle, which currently transports riders between the Lower Campus and Upper Campus. Originally intended for elderly and disabled faculty and staff, the shuttle is now frequently used by students.

Figure 13. Existing Service Vehicle and Shuttle Circulation
Environmental Analysis

The topography and location of AUB significantly influence living conditions on campus. A limestone escarpment separates the Upper Campus from the Lower Campus, providing the backbone for what we have termed the Middle Campus. Over time, soil has accumulated along the escarpment as vegetation has been irrigated and flourished there. Samples that were taken during the construction of the new Faculty Apartments reveal that the soils in this area are sandy clay with rock fragments and gravel, with approximately 2 meters of soil cover.

Winds on campus affect the climate significantly, and prevalent winds from the Mediterranean Sea cool the campus. Summer breezes from the southwest also provide a cooling effect, but not to the extent that of those from the sea. Buildings with primarily north/south orientations have a high summer solar heat gain on their western facades. Because mean daily temperatures in Beirut are above the comfort level from June until September, buildings with this orientation need to lessen summer heat gain through sun shading or vegetation from landscape. Buildings oriented east/west are preferred in this climate, with southern facades receiving beneficial solar heat gain during the winter months.

Figure 14. Environmental Analysis
Topography

Probably the most definitive element of the campus is its topography. The Upper Campus sits at about 38 meters above sea level, with a 30-meter drop from the Upper Campus to the Lower Campus. The result is both a physical and psychological split between the two halves of the campus. Slopes on the Upper Campus and Lower Campus range from 3 to 9%, while the Middle Campus has slopes of up to 40%. Getting water to shed off the site is not an issue, yet excess water drainage is an issue, for instance, on the eastern area of campus by the women’s dormitories.

Two promontories on the Upper Campus are significant in the topography, with two major buildings perched atop them: the Observatory and Jafet Library. Between the Observatory and Jafet Library lies a significant bowl where the tennis courts open up to the main athletic field.
Cross Sections

Three sections that cut through the main campus, from Bliss Street to the Corniche, depict the massive impact of the topography on university grounds, particularly in regard to views and access. The first section shows the sequence of spaces from the Green Oval, through the bird sanctuary and down to the science cluster. The second section is a cut from West Hall, down the natural amphitheater and across the Green Field. Finally, the third section examines the spaces from the Main Gate, through College Hall and Jafet Library, and down the slope to the Bechtel Building. What is revealed from this exercise is how the quality of the spaces differ as one moves down the hill towards the sea.

Figure 16. Cross Sections: The topography of the campus descends from an elevation of 37 meters above sea level at Bliss Street to 4 meters at the Corniche.
Open Space and Vegetation

Seen by many in the community as a green oasis—and even a botanical garden in a very urban setting—the landscape of AUB is one of the strongest features of the campus. The diversity, caliber and amount of vegetation on campus are truly remarkable, creating a rich resource for the university. We can understand the open spaces and vegetation on campus in a hierarchy—as those that affect the campus on a university, a district, or a building level. Between the Upper Campus and Lower Campus lies the steep and heavily-vegetated escarpment—the Middle Campus.

With a character all its own, this Middle Campus affects the entire university. The adjacent open spaces below—the main athletic field and tennis courts—also affect the entire campus on a university level by their position and placement within the veiled at the core of the campus. On the Upper Campus, a series of popular plazas creates a network from the Medical Campus Gate to the Green Oval and liberal arts buildings at the western edge of campus, influencing the campus at a level below that of the entire university, but at that of the district. There is potential to extend this plaza network to the Medical Campus, yet Bliss Street provides a serious obstacle in this path.

Finally, there are smaller open spaces at the building level consisting of gardens and plazas that tend to be more manicured on the Upper Campus and less defined and maintained on the Lower Campus. Specifically, the Medical Campus has much potential to have a more clearly defined pedestrian environment—one that is obviously connected with the Main Campus.

Figure 17. Existing Open Space and Vegetation
Campus View Corridors

Perhaps the single most memorable feature of AUB is its broad views of the Mediterranean Sea and the Lebanese mountains. Although some views have been obstructed by the tall towers built along the Corniche, the most significant view corridors occur at the top ridge of the natural amphitheater, and these ought to remain unobscured. In fact, the amphitheater ridge is the only place on the higher plateau that affords views back at the slope and the Upper Campus.

An additional feature of the campus is the number of internal view corridors that are created as a result of portals within the campus. These may be views that are framed on either side by buildings, trees, or some other landscape element, or some combination of any two.

Gateways and Edges

The edge of the university—i.e., the face that AUB shows to the surrounding community—is far from uniform. At some places it is a two-meter-high wall, impossible to see beyond. In other places, the wall is taller, sometimes reaching the level of a two-story building. In some places, a short wall with an iron fence or a chain link fence. It may behoove the university to consider creating a common edge. Moreover, the university may want to consider the appropriate degree of visual penetration from the outside.

The gateways, or entrances, to AUB are similarly heterogeneous, ranging from the grandeur of the Main Entrance to the ad hoc appearance of the Women’s Dorm Gate. This, too, is an opportunity to create an image for the university to present to the community.

Internally, there is a series of variegated edges within the campus as well. These edges serve a number of different functions. In some cases, they are intended to demarcate semi-private territory (e.g., faculty or administrative residences), while in other cases they are a by-product of retaining walls or landscape elements.

Similarly, the types of gateways within the campus vary greatly. Some, like the passage through College Hall, are formal portals, while others are a happy accident, like that created between Nicola and Jessup Halls on approach to the Green Oval.
Water, Stormwater and Sewerage

Potable Water
The AUB campus relies on two sources of potable water: the Beirut Water Authority (BWA), and from tanker trucks. The BWA supplies the campus with approximately 1,700 cubic meters per day to the main reservoir (10,000 cm³) under the tennis courts and the Medical Center (700 cm³). Water not utilized by the Medical Center is diverted to the main reservoir.

The amount of water from the BWA entering the campus varies seasonally. During the summer of 2000, the university experienced disruption of water supply. Therefore, the campus water supply network is supplemented with nearly 300 cubic meters daily transported by tankers. Of this, approximately 30 to 50 cubic meters is set aside for irrigation of the Green Field.

There are two main potable water storage facilities. The larger of the two, the main reservoir, is located under the tennis courts above the Green Field and has a capacity of approximately 10,000 cubic meters. This reservoir requires rehabilitation; the compartments of the reservoir have not been well maintained, and drain valves are non-operational and require replacement.

The second reservoir, the Kerr reservoir, is located on top of Kerr Hall. This 200-cubic-meter-capacity reservoir supplies the campus network through a 100-mm pipe. The Kerr reservoir receives water from the main reservoir.

The treatment system is primitive at best and should be improved.

Fire Fighting
The campus fire fighting network consists of 14 fire hydrants with nearby hoses located on the potable water network. Minimum pressure at the fire hydrants ranges from 2.5 to 3 bars.

Brackish Water Network and Landscape Irrigation
The brackish water network is the main source of water for the irrigation of the landscaped areas on the AUB campus.

Figure 19. Existing Water System
The campus suffers from a lack of irrigation water and, as a result, landscape planting has been limited. The irrigation network is primitive, relying primarily on hose irrigation—inefficient in its use of water and human resources; only the Green Field has an automatic sprinkler irrigation system.

The source of the brackish water is a well near Faculty Apartment Block 3. Water quality varies seasonally; high levels of salinity, which peak at about 1,150 ppm in September, may damage plants. To help mitigate the effects of salinity, a plan has been devised to mix potable water with the brackish water for irrigation needs.

Stormwater Drainage Network

The stormwater drainage network is almost entirely comprised of side ditches that drain to the lower campus. Several discharge locations are spread throughout the campus perimeter. While there are no major problems associated with this network, there are a number of minor problems and maintenance issues that must be addressed. The discharge locations are rather haphazard and require better definition and consolidation in terms of location and for any potential reuse. Drainage among some buildings is inadequate, leading to runoff into the storm pipe channels during heavy rain. In West Hall, some rainwater gutters are connected to the sewer system rather than to the stormwater drainage system, causing floods during heavy storms, sometimes inside the building. This combined system use is not good practice as it may overload the sewerage network.

A large channel runs from Abdul Aziz Street to Ain Mreisseh, passing in the areas between the DTS and Van Dyck Buildings, and then between Laura Bustany Hall and Jewett Hall to the sea. This channel does not serve the AUB, and responsibility for its maintenance and service—whether by AUB or the municipality—must be resolved.
Steam Network

Since two water-tube-type boilers were installed in 1960, steam has been used to heat space and water at the AUB. Steam is also used to operate the central laundry equipment, kitchen equipment at the Medical Center, and the absorption cooling units of the DTS Building. The AUB steam system feeds the Medical Center and the International College.

The central steam plant is located in the Lower Campus and constitutes part of the Physical Plant facility. In 1990, a Cleverbrooks fire-tube-type boiler was installed. Each of the three central steam boilers can provide up to 30,000 lb/hr of steam, with two operating at any one time and one serving as a stand-by. The central steam plant also includes a fuel oil supply and water treatment systems. The fuel oil supply includes a 250-cubic meter underground bulk storage tank; the water treatment systems include water softeners and chemical dosing units. As part of the five-year program, AUB’s physical plant will be replacing the original boilers between 2002 and 2004.

Steam is supplied to all buildings through an external distribution network. This network is divided into two main sub-networks, with one serving buildings to the west of the Physical Plant facility up to the International College, and the second serving the eastern part of the campus up to the Medical Center. There are no pressure-reducing stations at a point of use except for the kitchen equipment of the Medical Center. Where pipes are exposed, they are insulated with rigid fiberglass and protected with aluminum jacketing.

The central steam plant can be expected to accommodate any future expansion since one boiler alone can handle the current steam production (boilers are particularly underutilized during the summer season). However, the suitability of the external distribution network needs to be considered in terms of pipe size and condition, and additional accessories that may enhance operational efficiency. Also, due to seasonal differences in steam production, the use of absorption cooling units should be considered.

Sewerage Network

The sewerage network, which discharges directly to the sewer running along the Corniche at the Lower Campus, is comprised of a series of pipes made predominantly of concrete but with some of PVC and cast iron, in sizes ranging from 100 mm to 200 mm. No lift stations are used in the network, and only one sump pit, located in the College Hall second basement, is used.

The sewerage network is old and has not been cleaned or properly maintained for some time. It exhibits signs of wear and tear; there are problems with overflow; sewers are blocked by tree roots or suffer reduced capacity due to sedimentation. There have been reports of sewerage effluent contamination in the abandoned wells.

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Electrical and Communication Networks

Power Plant and Network

Housed in the same complex as the central steam plant, the power plant includes nine generators: three 2,350-kW Caterpillar generators, one 1,000-kW Ruston generator, four 900-kW GEC generators, and one 300-kW Cummins that serves as an emergency standby. Two of the Caterpillar generators are fitted with a heat recovery system that generates high-pressure steam, which augments the heating plant’s capability.

Normally, the AUB purchases some power from Electricite Du Liban (EDL), and funds are available for the university to increase its purchase of electricity and upgrade necessary equipment. However, EDL power disruptions, although less frequent and of shorter duration, continue, and rationing coincides with the annual peak power demand. No official data are available on the frequency and magnitude of the service interruptions. In any event, if power is not available from EDL, it must be generated by the AUB.

The maximum theoretical capacity of the power plant is 11,650 kW; however, for good operational practices, the generators should not be loaded beyond 80%, making the practical capacity 9,320 kW—very close to the summer peak load when the use of air conditioning causes usage to increase. Major maintenance and overhaul procedures are scheduled prior to the summer months.

EDL power is brought in at 11 kV. It emanates from the main switchgear located in the power plant and is distributed at 3.3 kV (except at the Medical Campus, where it is distributed at 11 kV). Transformer substations are located near each building. These transformers are of the outdoor type, with ring main units at the MV side. They step the voltage down for utilization at either 220/380 or 110/190 V. The loads at the buildings are then fed via a low-voltage distribution network.

Figure 21. Existing Electrical Network

Outdoor Lighting

The street and pedestrian walkway lighting on campus utilizes 3- to 4-meter-high poles fitted with mercury vapor lamps. Some wall-mounted fixtures on buildings supplement the outdoor lighting. In general, the lighting level is very dim, and the low mounting
Telephone Network

The AUB has two Northern Telecom SL1-XT Private Automatic Telephone Exchanges (PABX): one located in the Medical Center and the other in the Architecture Building, linked by a fiber backbone. Both PABXs were purchased in 1992, and approximately 25% of the lines are digital. There is a total of 241 city trunk lines distributed almost evenly between the two exchanges. Ten operator consoles located in the hospital respond to all incoming calls.

To accommodate new applications such as voice mail and automated attendant, among others, the telephone exchanges will require upgrading, including new common equipment, a new central processing unit CPU (81C), hard disks and software.

The telephone cable network is old but still functional. With the exception of the Agriculture Building and faculty apartments, wiring inside buildings has been upgraded.

Data Network

Between 1995 and 1998, AUB invested nearly $1 million in network infrastructure. AUBnet was built using asynchronous transfer mode (ATM) to provide campus communications data network to every resident student and campus classroom, as well as to all faculty, staff and administrator desktops. Since then AUBnet has undertaken many technology upgrades, keeping an up-to-date status.

Today, AUB counts over 4,000 gigabit certified Category 5 data outlets providing campus-wide connectivity. AUBnet's backbone relies on over 600 strands of multi-mode fiber optic cable forming redundant fiber optic mesh and ensuring the capability of high-speed connectivity to every building.

The enterprise networking solution selected by AUB provides a multi-switch meshed non-blocking ATM OC-3 backbone with ATM OC-3 uplinks to 48 nodes.

AUBnet’s backbone will shift completely to a meshed non-blocking layer 3 gigabit by end of 2002.

Figure 22. Existing Telephone Network
AUBnet Wireless Data Network
CNS is currently in the process of installing several wireless network access points. Future wireless expansion will cover many student areas.

AUBnet Internet Connection
AUBnet Internet connection is via four redundant links via local ISPs.

Security Systems
There is no security network on campus. The only facility on campus fitted with a security system is College Hall, which has access control, intrusion detection, and closed circuit television (CCTV) systems.

Figure 23. Existing Fiber Network Route
Figure 24. Existing Data Network Schematic