



King Fahd University of Petroleum & Minerals

# **SPATIAL ANALYSIS AND GUIDELINES FOR THE IMPROVEMENT OF OUTDOOR AREAS IN THE K.F.U.P.M. ACADEMIC COMPLEX**

**A Report by the Task Force Formed by  
The Campus Planning & Development Committee**

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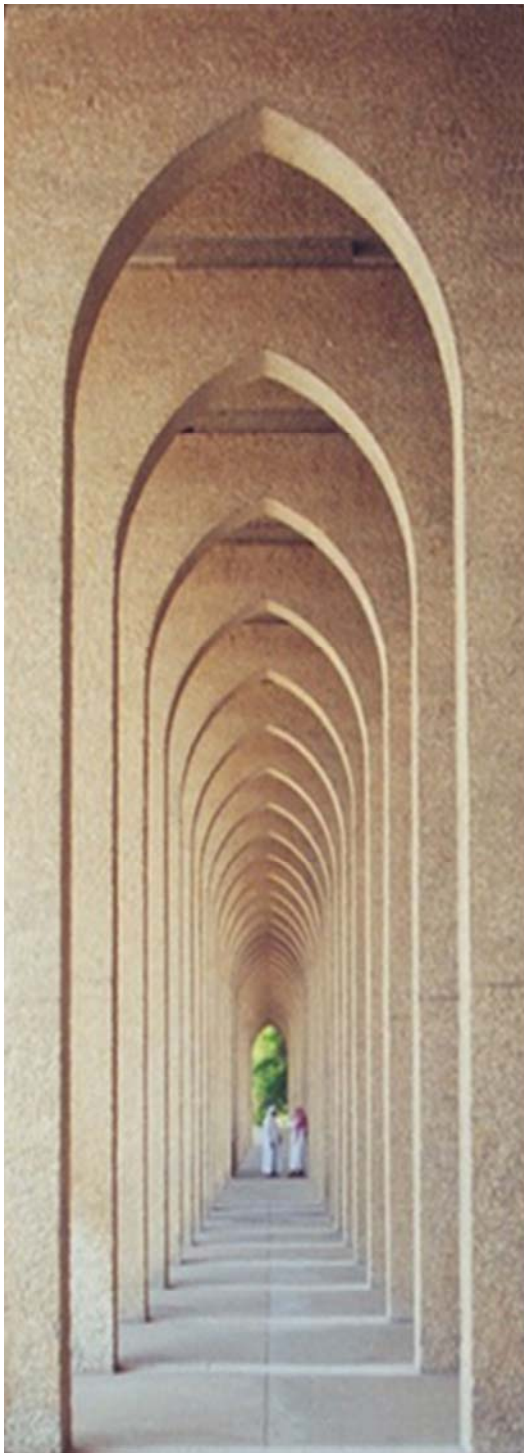
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### ***About the report:***

This report is the final outcome of a Task Force that was formed by the KFUPM Campus Development and Planning Committee. The objective of this task force was to analyze the quality of outdoor areas that surround the KFUPM academic complex. The decision of establishing such a task force displays a sense of sensitivity of the KFUPM administration towards the spatial environment to which the KFUPM community is exposed. Such a bold step is highly appreciated by the community in general and specifically by the members of the task force. We thank the Chairman of the Campus Development and Planning Committee Dr. Ismail Budaiwi and all the members of this committee for initiating such a process.

The issues and comments compiled in this report, as a first step should be able to pave a way towards the improvement of the visual and spatial ambiance of KFUPM built environment. Finally I thank the members of the Task Force for their time, patience, efforts and valuable comments/discussions that led to the compilation of this report.

Mir Sabeer Hamid

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## ***INTRODUCTION:***

The built environment at KFUPM has a unique and distinctive architectural character which makes it essential to understand the urban fabric of the academic complex and, analyze the spatial relationships between various outdoor spaces, keeping in view the pedestrian movement patterns. To accomplish this, a physical survey was conducted which included interviewing students who are the main users of the university. Students throughout their stay at the KFUPM campus take courses in various buildings which forces them to walk around the complex. Similarly is the case with the faculty and staff. However, lack of physical connections and weak spatial transitions between buildings discourages pedestrian movement resulting in non-uniform circulation pattern within the academic hub. Most of the outdoor spaces and pathways are not used at all while most of the users try to avoid walking and take the shortest route that enables them to walk through building interiors and their basement floors. This abnormal behavior does not comply with the outdoor environmental ambience that a university should support and at the same time is against the basic concept of the KFUPM overall planning which ideally advocates pedestrian movement and interaction in the outdoors

In order to find solutions to improve the linkages between buildings and suggest improvement ideas, it is essential to analyze the usage and movement around the outdoor spaces of the academic buildings. The following paragraphs analyze the KFUPM outdoors and describe the weakness of the linkages between buildings which discourages the unification the whole built environment into one entity. In addition, various areas are highlighted which once developed will result in the creation of interesting external spaces around the buildings and will enhance pedestrian movement within the academic complex.

Figure 1 shows the KFUPM academic complex site plan which was elaborately studied. The major connections and movement patterns are distinguished using two color scheme with red color specifying high concentration circulation while yellow suggesting a very low pedestrian usage pathway. The drop-off points which are the mostly used entry spots into the academic entity are also shown using a pink color arrow sign. These spots are important spaces which welcome visitors and users to enter into the complex and are responsible for generating the so called 'first impression' of the campus and its interiors. Also, such spaces behave as introductory zones allowing a visitor or a user to build up expectations regarding



the areas that will follow and get acquainted with the kind of elements and circulation that is allowed in the spaces following the drop-off zone. To highlight issues regarding various areas and describe their weak points, various zones of the KFUPM site plan in Figure 1 are circled and a brief criticism provided within the extended arrows. These also are areas with high development potential; enhancement of which would guarantee integration of outdoor spaces, creation of interesting usable open areas and formulation of transition zones that act as catalyst to pedestrian motion.

Detailed analysis of these areas of considerable improvement potential is described in the following sections of the report. The whole of the academic complex outdoors is divided into six zones for better area wise analysis and the description of each zone is supported by an expanded sketch of the site plan. For the sake of classification each of the zones is labeled with a numeric value. The numeric value suggests the ordering of the zone as the observer moves from one end of the complex to another. In order to highlight the issues concerning each zone and suggest possible improvement measures, further description for each zone is classified into three sections headings as follows:

- a. Importance of the area to KFUPM academic complex outdoors
- b. Existing state of the outdoor environment of this zone
- c. Guidelines for improvements

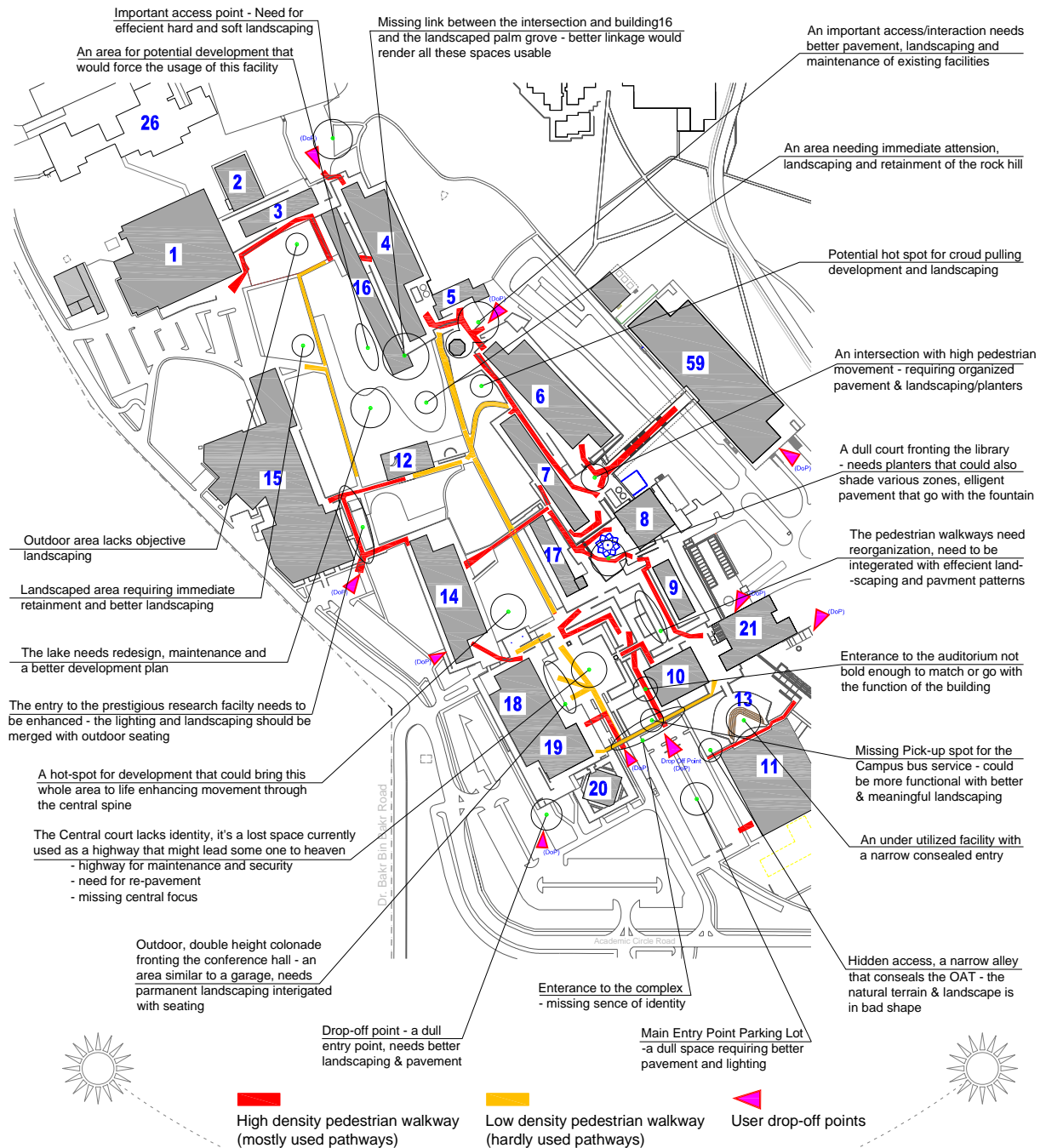
The point wise description allows easy understanding of the issues and their solutions for improvement. The suggested solutions are illustrated as guidelines that would direct a designer towards an optimum design for a particular area. These guidelines also act as seeds for a final design solution allowing conceptual initialization of the overall design scheme. Certain conceptual themes are proposed for each zone and explained as guidelines that could be utilized as a base concept for further development by the designer.

***At the end of the report, an Appendix section is provided which consists of images that could be used as a reference while reviewing or designing alternative proposals for various design elements.***





## SPATIAL ANALYSIS AND MOVEMENT PATTERN



The out door space and pedestrian movement pattern analysis of the KFUPM academic complex displays a loosely knit pattern of connections. Various out door areas seem to be meaning less and could be developed to be used as valued spaces. An overall improvement in the whole outdoor environment is needed for better value.

Figure 1. The Analysis of the KFUPM academic complex urban fabric. Poor linkages and missing transition zones are evident.



## ***PEDESTRIAN MOVEMENT PATTERN***

As shown in Figure 1, the academic complex can be divided by a long axis that passes through the service road that leads towards the central mosque fronting the Research Institute (RI). As seen in the figure, concentration of red colored linkages are high on the right side of this axis and very weak yellow colored links exist between the rest of the academic complex. This suggests that very few users walk around 70 % of the academic complex. Also from the survey and student interviews, the fact that students barely walk around the campus was substantiated. The users take the shortest possible route through a convenient drop-off point which could be a car park basement floor and avoid passing any general outdoor areas. Another obvious reason for this behavior is that the outdoors lack interesting spaces that would pull people around and force them to use the outdoor built environment. Although few very interesting landscaped areas exist around the complex but these areas are never used due to poor connections. Most of these areas especially around the lake are almost inaccessible to the users and do not have facilities that would allow efficient usage of such spaces.

### ***The Entrance to the Academic Complex: ZONE 1***

This area acts as the main entrance to the KFUPM buildings. It is the first drop-off point where students, faculty, staff and visitors come to. During conferences and other events; professionals, event participants, visitors and dignitaries are all exposed to this area. Although it is such an important outdoor space, it lacks the required spatial character befitting the KFUPM image. Figure 2 shows this zone with circles and extended arrows pointing out the weaknesses of this zone.

As a drop-off point when one is exposed to this outdoor space, unorganized elements are seen on all sides that lack identity & general maintenance. For such an area, the landscaping, art work and lighting is really undermining and does not come up to the expectations. The parking is not defined and the asphalt soling on the road is rough. On one side is a large windowless building (gymnasium) with a narrow alley next to it followed by a nice natural element that relates well to the surroundings and finishing however, this natural element is giving way and is disintegrating at its base. Landscaping and lighting is poor. Straight ahead is a large horizontal (the pedestrian bridge) member the functionality



of which to a visitor is hard to imagine unless someone is seen walking over it. The walkways lead to areas that do not have a focus while signage's are absent. In short, unless one is told to go in a particular direction, there are more chances of getting lost in this area. Element-wise weaknesses of this zone are as follows:

- **The Parking:** Parking is not well defined as dividing lines have faded, the asphalt surface is rough, and curb stones are out of shape and the pavements around are in dilapidated state. Landscaping is not maintained, lighting level is low and the whole in general does not match with spatial ambience of such an introductory space that leads to the KFUPM academic complex.
- **The OAT:** A narrow alley leads to one of the best outdoor spaces of the complex i.e. the Open Air Theater (OAT). This facility is totally concealed, under used and is in a dilapidated state.
- **Pick-up Point:** Although shuttle busses commute through this area, there is no shelter for sheltering commuters.
- **Missing Entrance:** A large scale horizontal element i.e. the foot bridge acts as an entrance gateway to the academic complex nevertheless; this feature lacks the sense of identity. Its function is not unclear to a visitor nor can it be perceived as an entrance portal.
- **Auditorium Entrance:** An out of scale concrete mass acts as a welcoming building block i.e. the auditorium (building 10) whose function is uncertain as this building lack focus. The main entrance of this major facility is small in comparison to the scale of the façade and is not highlighted at all which makes its presence go unnoticed.
- **Landscaping:** Terraces for landscaping are present but a cohesive landscaping theme is missing. A 'bare minimum' landscaping principle is utilized which once again does not go along with this outdoor space.
- **Signage:** Signage and maps that would guide a visitor through the academic complex are missing.



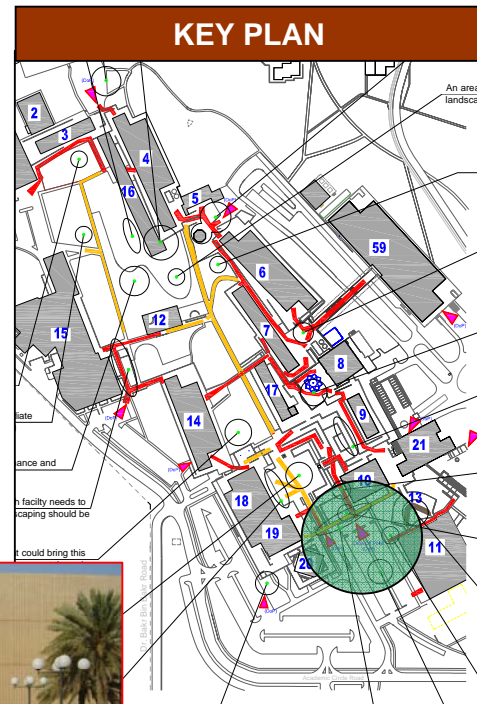
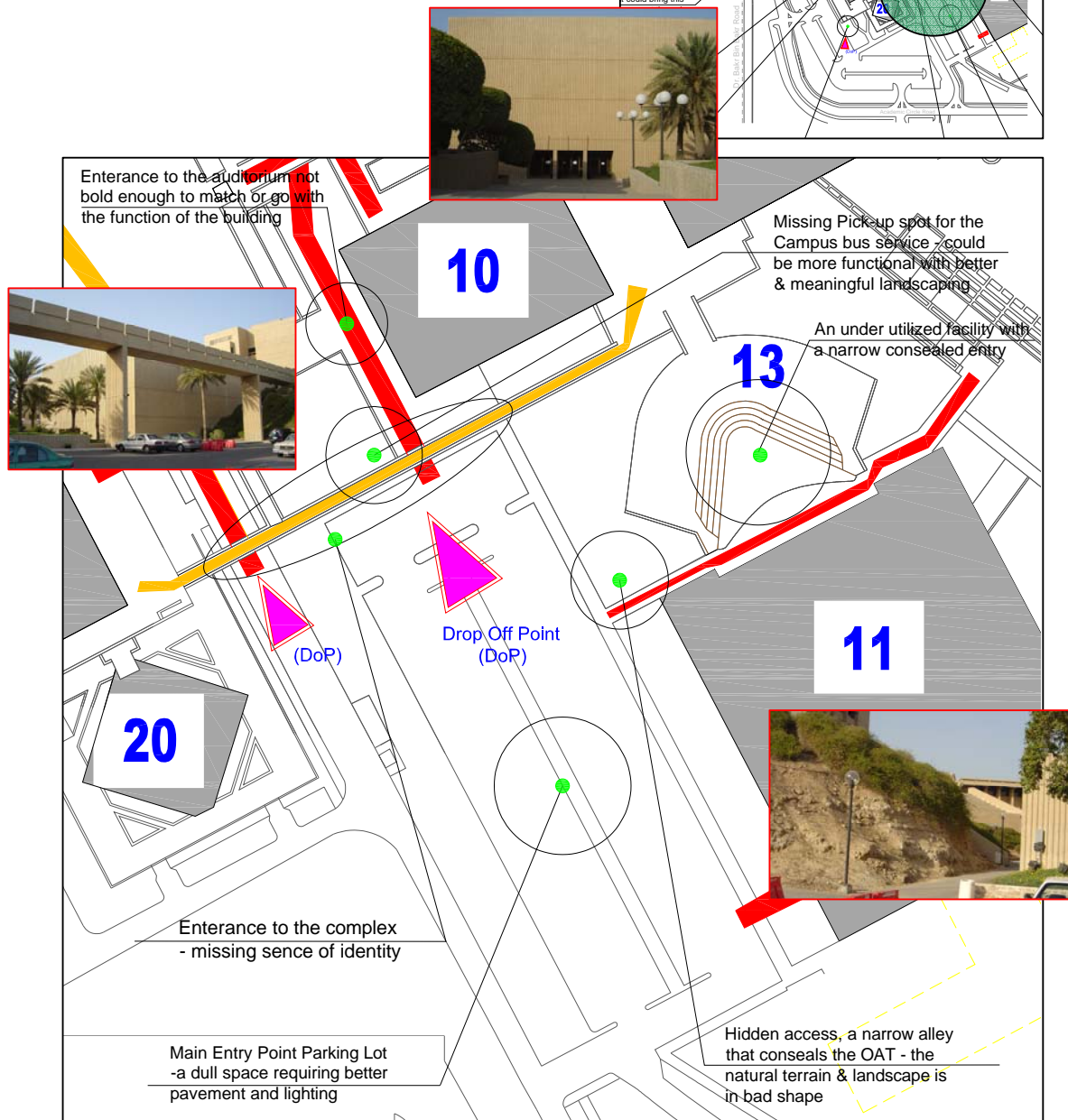


Figure 2. Site Plan of Zone 1-A, areas of weakness are circled and the categorization of this area as a drop-off point is shown by a colored arrow





### **Importance of the area to KFUPM academic complex outdoors**

- The area acts as a main entrance to the complex for guests, students and faculty
- This area leads to almost all major public, academic and administrative buildings of KFUPM
- The environmental features that occupy this zone are perceived as introductory elements to the university
- This area leads to the most important public buildings of the campus that is building 10 & 20. The outdoor areas at the entrance of both these buildings have to be bold enough to suit their function

#### **a. Existing state of the outdoor environment of this zone**

- a. The pavement and road surfacing is rough, uneven and does not portray an appropriate image fit for such an introductory zone
- b. The landscaping and outdoor lighting is not up to the standard
- c. Artwork, signage and a grand entrance feature to the academic complex is missing
- d. Facilities such as a shaded bus stand, direct access to building 21 from the outdoors etc. are absent while certain facilities like the open air theater are under utilized and in a bad state of maintenance
- e. The entrance to building 10 is concealed and out of scale compared to the mass of the building façade
- f. Transition spaces that ideally lead to public buildings such as building 10 and 20 are missing

#### **b. Guidelines for improvement**

**Parking Area:** (these guidelines could be used for all the parking areas in the campus)

- The pavements around the parking and pathways that lead to various building blocks need to be re-casted. Colored tiled borders and partitions could be used to enhance the visual quality of the pathway



- ▶ The curb stones around the parking need to be re-casted or new pre-fabricated ones installed
  - ▶ Markings and dividing lines on the parking area need to be re-done
  - ▶ Light weight steel seating should be installed at locations for bus commuters to wait in. An example of such seating is shown in figure 3
- Better quality of globe type lamp posts need to be installed in an organized manner providing an even outdoor lighting and are consistent with the name plates all over the campus
    - ▶ Low standing lights should be used at areas that are adjacent to any green area or any naturally retained rock profile
    - ▶ Focused lighting that evenly lights up the edges of the building needs to be provided to highlight the built environment
    - ▶ Earth bed concealed lights that light up the foliage of trees should be installed to give a more dramatic ambience to the green areas.
  - The retained natural terrain and rock hills should be reinforced with natural stone retaining wall at the base to prolong its life, following a naturally stamped rock instillation pattern
  - An artistic landscaping configuration needs to be established in the already defined green areas
    - ▶ Art work mostly of cast iron, black colored aluminum or steel and black marble should be integrated with the landscaping along with an appropriately incorporated artificial lighting scheme

### **Foot Bridge Connecting Building 19 and 21**

- The foot bridge that connects the left wing at building 19 to the right wing of the complex at building 21 needs to be formulated into an imposing element of the KFUPM outdoors. This walkway which is visualized as a long horizontal member, could be treated as an entrance gateway to the complex by reinforcing its vertical columns with 'arch blocks' similar to the ones that exist in the central mosque as compared in figure 4 and 5. Figure 4 shows the existing elevated walkway while figure 5 displays a conceptual sketch highlighting the additional



elements that would convert this walkway into an entrance gateway to the academic complex. Installation of these elements would also eliminate the structural problems that presently persist with the stability of this horizontal structure, at the same time; these arched elements would visually and spatially transform this element into a grand entrance to the complex

### **Entrance to Building 10**

- The main entrance to the auditorium that is building 10 is linked to the parking area and rightly so since it is one of the main public buildings of the complex however, its entrance sublimates such a major function as seen in figure 6. The following are the guidelines for enhancement of this area:
  - ▶ The openings leading to the auditorium are too meager compared to the façade mass and needs to be more emphasized. One method of doing so would be to install an artificial stained (colored) glass opening (depressed) embedded with KFUPM logo and lit by lights from behind, over the door openings as shown in figure 7. This concept increases the proportions of the entry compared to the rest of the façade
  - ▶ The entrance should be further enhanced by installing a semi-open roof or pergola over the area fronting the entrance and converting the whole walkway as shown in figure 7. This would also create a transition zone between the building and its outdoors which can also be integrated with some outdoor seating
  - ▶ The pathway leading to building 10 should be finished with better flooring tiles and patterned hard landscaping while the area of the walkway fronting the entrance should be laid with even better pavement

### **Open Air Theater (OAT)**

- The landscaping area around the OAT area should be enhanced and its base should be well retained by hard and soft landscaping elements
  - ▶ The stepped seating should be finished in a manner that the seating area and the walkway visually differ from each other



- ▶ Addition of two rows in the lowest level could be beneficial to the facility
- ▶ A projection system should be installed into this facility so that it could be used by faculty and students for presentations and other uses
- ▶ A light weight structure such as a space frame roofing system (foldable/automated) should be designed over the OAT seating and its proscenium for enhanced usage making this area one of the hot spots in the campus.

### **Signage**

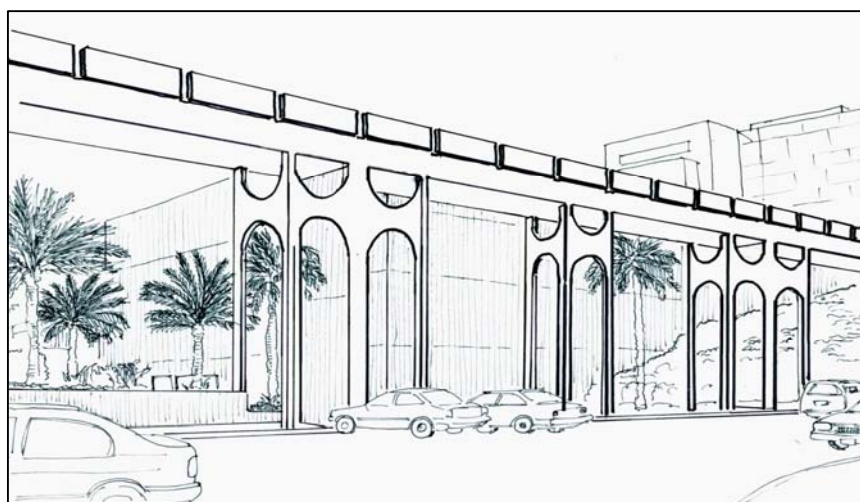
- Signages and maps should be placed at key location especially in this area
  - ▶ Map boards could be installed on the blank walls of the buildings at key locations and to maintain the visibility of the finishing of the buildings, KFUPM map could be etched on clear glass with black & white color and mounted using steel bolts at the corners. Figure 8 shows an example location for this concept



*Figure 3. Example of light weight steel seating unit for bus stand*



*Figure 4. The foot bridge, a meaning less horizontal member*

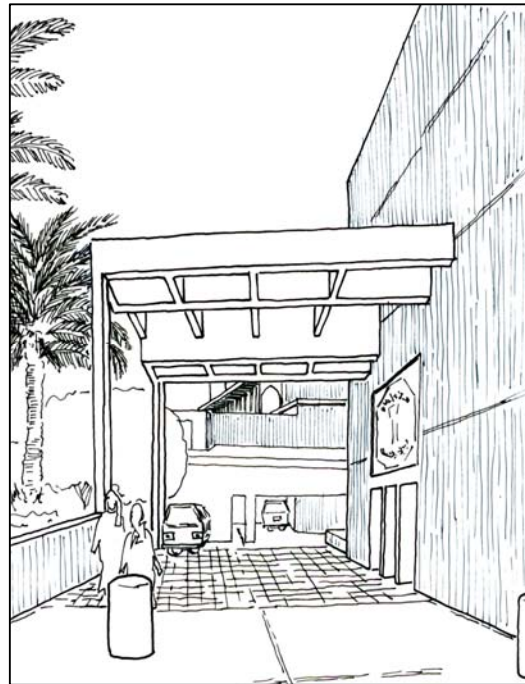


*Figure 5. The foot bridge could be converted into a gateway*





*Figure 6. The entrance to building 10, an out of scale façade.*



*Figure 7. Sketch showing the concept to enhance the entrance to the auditorium*



*Signage, a map of KFUPM  
academic complex*

*Figure 8. The proposed scheme and location for signage such as a KFUPM academic complex map*



## ***The Central Plaza: ZONE 2***

The central court or the Plaza is one of the most important outdoor open spaces that can occupy a large number of users and can be used as a gathering area. The Plaza on its side has another area of major importance that is the Conference Hall (building 20) which is fronted by a fabulous semi-open transition zone of double height scale and architectural character that merges with the building that follows. However, this area as a whole has lost its meaning and at present constitutes a group of under used spaces which ideally should be a focus of the whole academic complex. Often times it is used as a parking lot and during events like conferences and presentations, cars & busses are seen parked in this area as is shown in Figure 9 and 10.



*Figure 9. The central Plaza presently used as a parking area.*

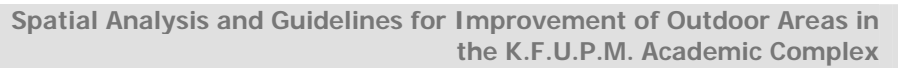


*Figure 10. The outdoor area fronting building 20 used at present as a shaded parking garage*

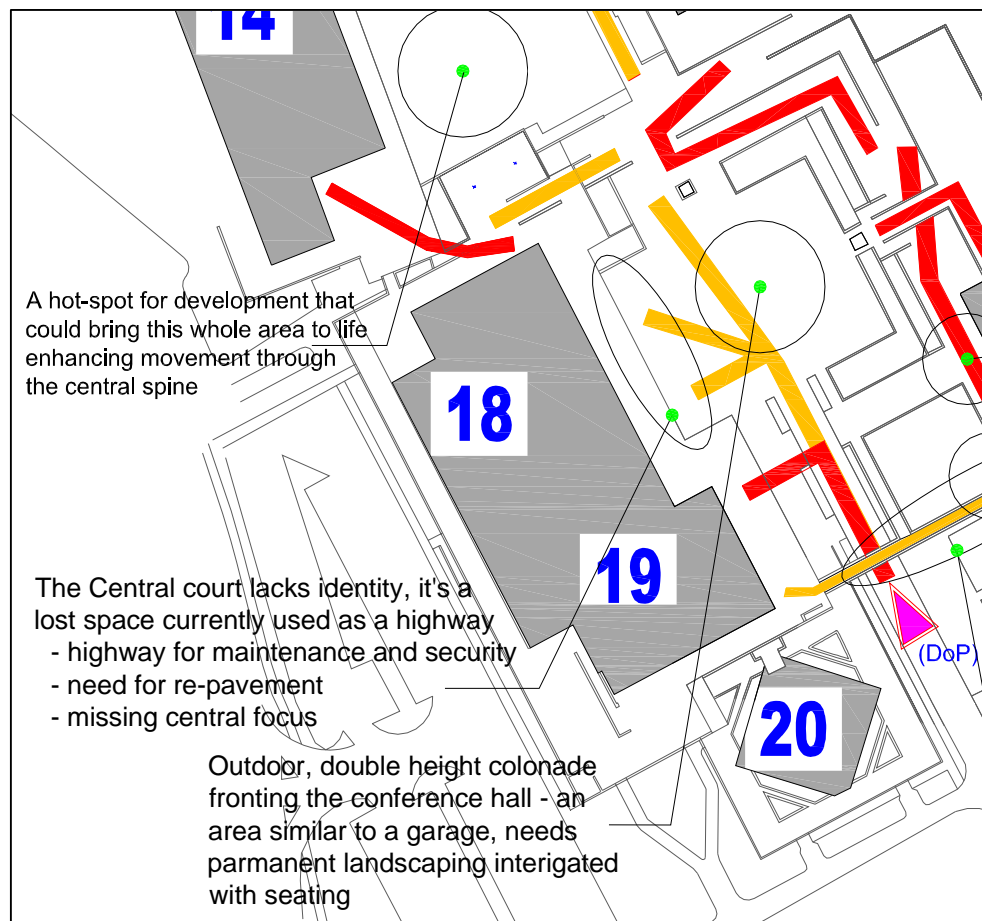


The plaza is also used as a thoroughfare to access other areas of the complex with maintenance and other vehicles seen running up and down throughout the day. The courier vans pass through this area to reach building 9 even if just an envelope is being delivered. Similar is the case with other services. Figure 11 displays the plan showing the critical spatial issues for this area. These issues are described below in detail.

- **Central Plaza:** The central space of the plaza lacks character and its finishing and detailing makes it more of a highway for vehicles to reach various areas of the compound. The pavement is unorganized and ugly lacking any kind of direction and pattern. Such an area should have a bold focus which once again is missing. The image currently displayed surely renders this area to be conceived as a parking lot.
- **Shaded Area:** The colonnaded double height space fronting the conference hall building 20 and building 19 is an excellent breathing space for both the buildings but lacks any kind of detailing which once again makes it look like a garage or a fire station. This area is also a space of high importance but its image does not depict such functionality.
- **Landscaping in the Plaza:** In terms of the quality of landscaping in and around this zone and comparing to the importance of this area, the area does not come anywhere closer to the basic requirements. Also one side of this geometric court has some landscaping that encloses this space while on the other there are huge concrete blocks and columns without any kind of detailing and landscaping. During events, planters and carpets are brought in to fill in this visual gap.
- **Linkages to Buildings:** Because of its poor linkage to the mostly used buildings in the complex, the central plaza is not utilized by the KFUPM community as it should ideally be used. Similarly the linkage that connects the central mosque and Research Institute (RI) to the plaza is under utilized although this pathway is well landscaped on both sides and has the best views/vistas as one approaches towards the tower.
- **Hot Spot for Development:** A hot spot for development exists at the corner towards the left of the road that connects central mosque and plaza. This area at present is a lost space which is fronted by palm trees and could house a nice outdoor seating area that could support a well planned building of general functionality.



- Figure 11. The site plan of central Plaza area showing weak links and spatial problems that discourages the usage of this area as one of the best are in the complex.*







#### **a. Importance of the central Plaza to KFUPM academic complex outdoors**

- This area can be considered to be the main outdoor “salon” and may be the only main large outdoor gathering area on campus. It is the only large main space providing an outdoor reception area for different annual academic occasions
- Its importance of this area comes from the buildings surrounding it i.e., building 20; the main auditorium building, building 18; the structural parking, and building 19; the CED on one side and buildings 9 and 10; student affairs, university facilities and the old auditorium on the other side. With the large outdoor parking area located on one end, it acts as a reception area along with being the pedestrian route towards outdoor lake and central mosque.
- Almost all the buildings surrounding this space overlook into this plaza thus having a very important visual impact on all the spaces inside these buildings.
- All buildings surrounding this open space have systematically graduating terraces which add to its importance.
- It is an important linking area for restricted use vehicular traffic for services and security purposes. It does provide the main access through the only gate located at building 20 to many other nearby points on campus.
- It is an important pedestrian linking area between all buildings surrounding the plaza.

#### **b. Existing state of the outdoor environment of this zone**

- The existing pavement of the plaza has eroded and has lost its color reducing the definition of this outdoor space. This area is boring and dull and does not match with the planned utility of this outdoor court.
- There is a very critical intersection between two different types of vehicular traffic by services/ security vehicles and pedestrian movement. The present condition of the hard landscaping of this area does not help in defining this aspect.



- The area is well enclosed architecture and landscape wise and it yet lack a space identity as well as falls short of a focal point except the existing flag post. The landscaping around this area is not up to the standard and lacks creativity.
- Shading devices both natural and man-made are absent except few the medium size trees on its east side edge.
- Furniture, sculptured and merged with the landscaping is missing and same is true with seating around the building outdoors.

### **c. Guidelines for improvement**

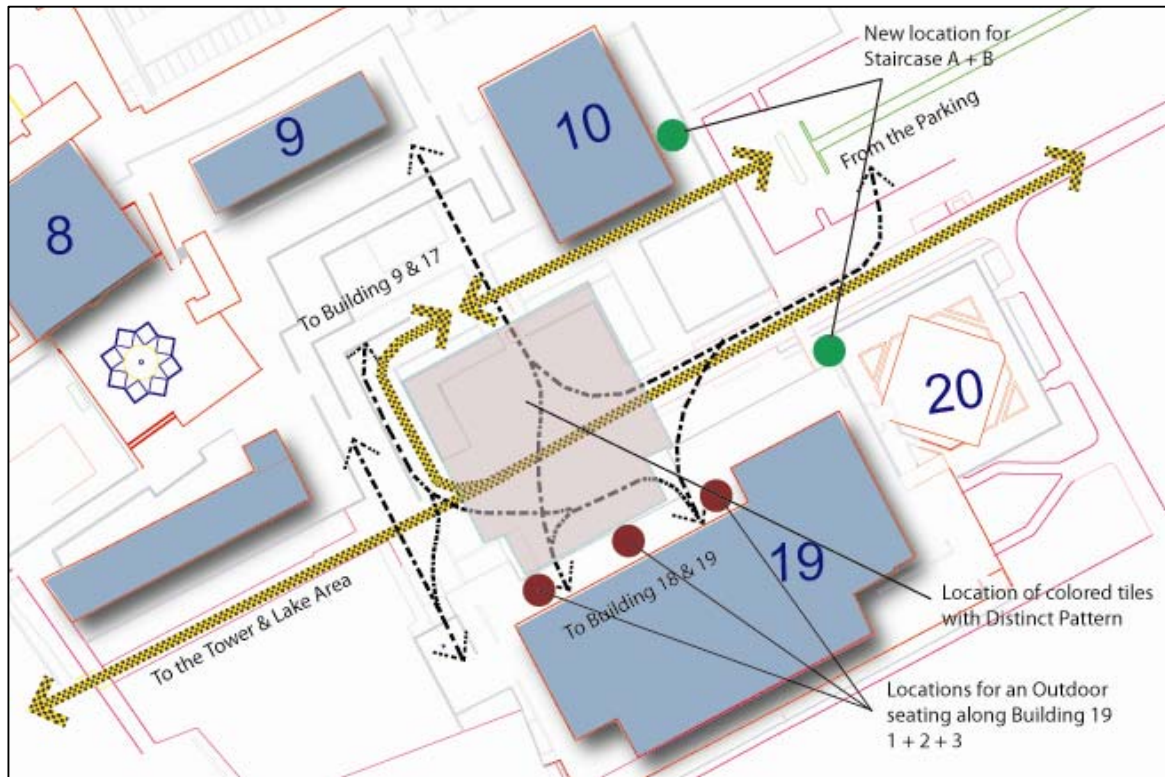
#### **Central Open Space**

- The character of the plaza needs to be emphasized with well defined edges. Pavement with colored tiles in form of a well designed geometrical pattern in the central portion should be provided to add interest in this area and at the same time allow functional identification of traffic movement through the central plaza as shown in Figure 12.
  - ▶ Introduction of hard and soft landscaping elements at appropriate locations as shown in figure 12 would render this space more pleasing and at the same time certain shading devices could provide more interesting shaded areas.
  - ▶ The movement of traffic and pedestrian in this area should be studied in detail which would result in clear definition to all type of circulation, making it more controlled and safe for all type of users.
  - ▶ The areas around the plaza should be incorporated with more element of attraction having a better esthetic appearance of color and contrast. Sculptures and artwork of general as well as scientific themes with consistent characteristics such as color, material etc. should be installed at various hot spots around the plaza.
  - ▶ Well designed and defined hard furniture that merges with the outdoor environment and landscaping should be introduced at various locations in and around the plaza.





- The lighting in this area should be enhanced and composed in a manner that enhances the character of this area and provides focus on the highlighted spaces or elements.



*Figure 12. The circulation around central plaza needs to be studies and using pavement patterns, the movement routes should be classifies.*

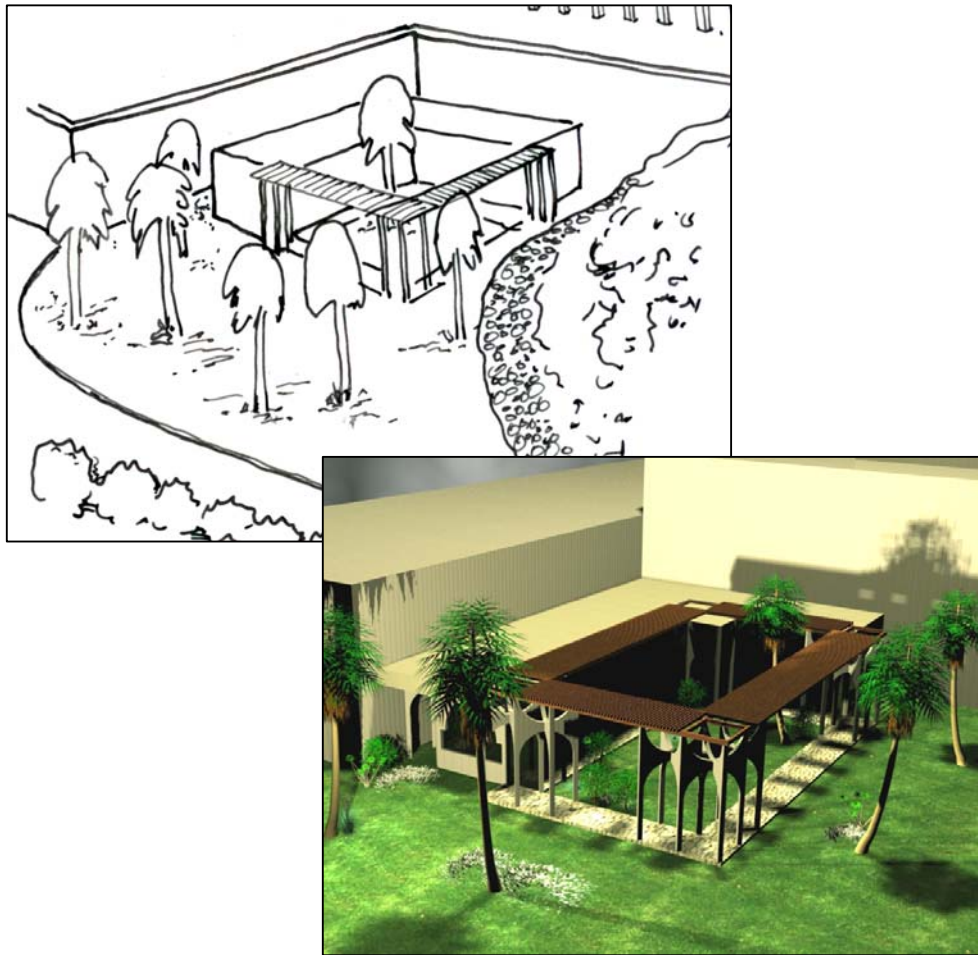


### Hot Spot for Development:

A hot spot for development exists on the left side of the roadway connecting the central plaza to the central Mosque. This area at the lowest level by the side of building 14 as shown in Figure 13, at present is a left out and under-utilized corner filled in with few palm trees. A light structured development that houses general functions such as a stationary, computer products, a coffee shop and out door seating integrated with the exiting palm trees similar to the conceptual sketches shown in Figure 14 would prove to be very beneficial to the KFUPM community. Such a development would act as a crowd pulling built environment which would allow users to visit, gather, and socialize in this area at the same time make them walk around the central plaza and its adjacent outdoor areas, thus allowing usage of the central spine.



*Figure 13. The under-utilized outdoor area by the left side of the road leading to the central Mosque from the plaza could be used for a crowd pulling development.*



*Figure 14. The outdoor area by the side of the road way leading to the central Mosque from the Plaza could be developed with general function utilities as conceptually displayed in these sketches.*

### ***The Academic Spine - ZONE 3 and ZONE 4:***

The outdoor areas around the Main Library Building 8 and the KFUPM Tower are the most used intersections that lead to various academic buildings of the complex. These zones can be spatially identified as the intersection of the central horizontal axis of the compound connected via a bridge from building 14 and the main movement spine that links the academic buildings on the upper level. The open terrace levels adjacent to the main library and the areas connecting the other buildings including the most recent addition that is building 59 are highly utilized pedestrian zones of the campus. However, this area lacks spatial hierarchy and functionality in terms of breathing spaces, seating areas, landscaping



and transition zones that lead to various academic enclosures. Some of the main issues related to these outdoor spaces are as follows:

- All the terrace levels have similar floor finishing with no identifiable area that separates the walkways from the rest of the space.
- Maize of pathways surrounds these terraces while the clear identification of the directions for pedestrian circulation is obstructed by the absence of clear visual lines.
- An elegant feature that is the water body fronting the library building is out of order and its finishing/detailing does not present an appropriate visual ambience suitable to this area.
- The terrace levels have areas of high development potential which at present are dead spaces.
- The intersection that connects the new building # 59 to the academic complex via a bridge needs immediate attention as this is a highly used perpendicular intersection the hard and soft landscaping of which does not support such circulation.
- A clear definition of the intersections and outdoor spaces in this academic zone is missing. These open spaces could be very well articulated spatially as well as visually if an over all theme that would unify all these spaces was utilized.



## **Concept for Academic Spine**

For the purpose of elaborating and emphasizing the need to study and develop the outdoor areas fronting the upper level 'Academic Spine', an example describing a conceptual idea for developing this area is highlighted in the following paragraphs. The outdoor areas considered in this spatial illustration are the KFUPM Tower node, the area fronting the main Library and the connecting pedestrian axis between them. The functional concept could simply be defined as follows:

*“The outdoors around the KFUPM Water Tower and Fountain fronting the Library are important nodes of the academic area. The link between these two main nodes, (the axis) should be spatially and visually strengthened and enriched. These locations (Tower Node and Fountain Node) have the potential to serve as functional and social spaces. The relaxation and casual academic needs of library users should be considered as a priority while re-designing these common public areas.”*

Utilization of such over all themes as described above forces a designer to think and solve issues that are very delicate in nature involving basic concepts of urban design and enhancement of movement patterns and development of interest within an academic outdoor environment. Figure 15 graphically highlights the concept of unifying the pedestrian links within the Academic Spine allowing creation of interesting and usable outdoor spaces which would be enhanced with pleasing views and vistas of the campus.

The following paragraphs elaborates the spatial issues of the fountain node (the area around Library) that need to be addressed at a macro level to achieve the above described overall concept. **For the sake of clear identification, the issues and guidelines for Zone 3 and Zone 4 are described separately in the following sections although these zones and other similar outdoor areas that constitute the academic spine should be integrated utilizing the above mentioned over-all concept.**



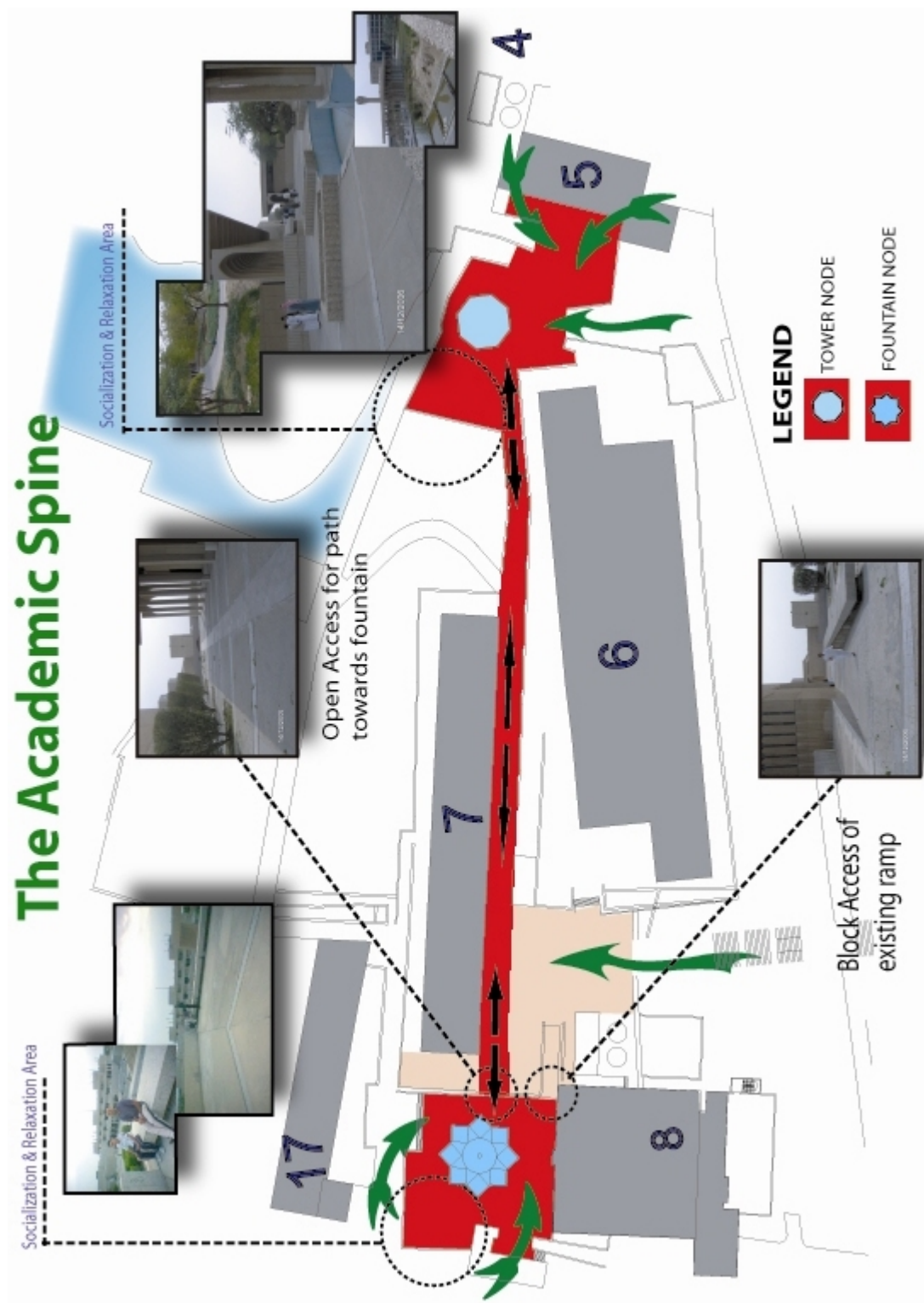


Figure 15. The outdoor areas around the academic buildings at various terrace levels that is "the Academic Spine" can be unified utilizing a single concept that enhances the visual ambience of these outdoor spaces maximizing its usage.





## ***The Library Fountain Node***

### **a. The importance of the project to university academic community:**

- This area is important to library users due to the extended work hours of the library. Library being the most common building used by all the users of KFUPM and their families, its essential to maintain the outdoors around this building up to an acceptable standard.
- It is a main hub between different zones of the academic area and connects various academic buildings.
- The area fronting the Library has the potential to serve as a place of outdoor relaxation for library users. It has the potential to serve a place for a quick snack for hungry users of library and thus be identified as an outdoor space that encourages social interaction and collaborative learning.
- This zone has one of the elegant landscaping feature that is the geometrically layer water body which is an aesthetically pleasing element needing up gradation and improvement.

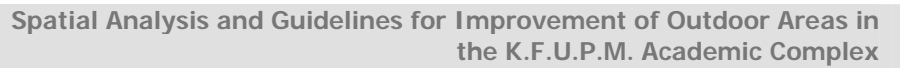
### **b. The existing condition of the project:**

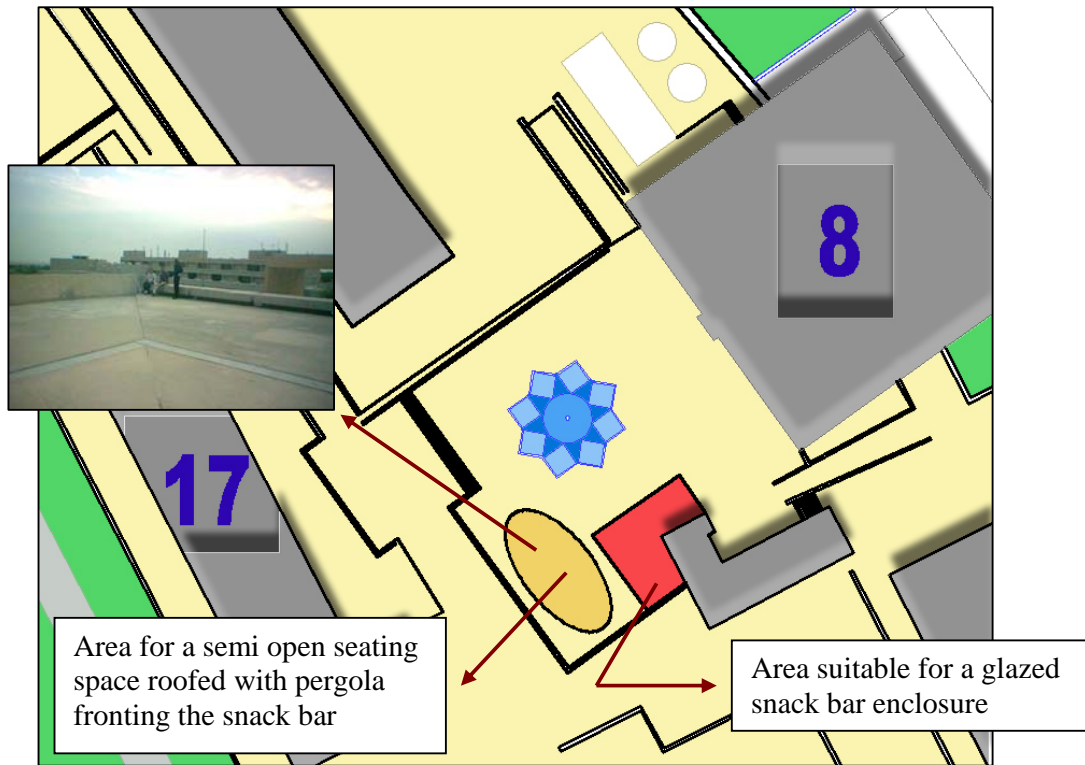
- The fountain that exists in the terrace fronting the Library is in a general state of disuse and disrepair.
- The concrete flooring around this area is in bad shape needing immediate repair and maintenance.
- The space usage of the outdoor areas in this zone is not maximized. The terrace level lacks interest as shown in Figure 15 and is rendered useless due to its boring characteristics.
- Various pedestrian pathways and routes connecting buildings are not used due to the absence of interest along these routes that would attract users to walk through them.



**c. The suggested solution to upgrade the existing condition:**

- The area should be made livelier socially and educationally by introducing features that will support relaxation and socialization between and among students and faculty.
- This area should be re-designed to consider prolonged users of the library who need to have a quick bite without having to go far to find food/snacks. The end of the terrace that overlooks the central plaza as shown in Figure 17 could be used as an outdoor seating area with a glazed enclosure housing a snacks bar, fronted with a semi-open sit out that looks into the central plaza.
  - ▶ The glazed enclosure should occupy the space adjacent to the back wall of the existing lift lobby and the roof of this enclosure could project outwards towards the terrace end formulated into a pergola that would form a semi open seating area along the edges of the terrace as shown in Figure 17.
- The fountain should be a focal point for pedestrian movement along the fountain-tower axis. It could provide a vista from the shaded corridor of buildings 7. Pedestrians should be channeled to approach the fountain and library from the corridor of building 7 before distributing to other spaces. This could enhance the walking experience, as well as emphasize the focal point and the spine as a whole.
- The flooring should be composed of colored tiles with distinct pattern that classifies the walkways from the seating and other uses.

[illegible]



*Figure 17. An enclosed snacks bar and an outdoor seating area could be located on the terrace fronting library enhancing the socio-learning environment around the campus.*

### Solutions for Nodes and Connecting Axis

The walking experience along the axis and in the nodes can be enriched by:

- Well-designed light poles at human scale
- Seasonal advertisement panels and displays.
- Art works (sculptures, shaded outdoor aquariums, outdoor exhibits of artifacts)
- Display of students projects, trophies and models.
- Colored pattern of tiles on the floor
- Human scale signage systems to direct pedestrians



### ***The KFUPM Tower and the Lake: ZONE 4***

This zone houses the most scenic and bold elements of the KFUPM complex. A well defined entry point via a number of steps provides entrance to a complicated built environment with buildings of similar architectural vocabulary surrounding a paved court. This hard landscaped court houses the boldest of the structures that is the KFUPM tower which over powers the scale of its surroundings. This terrace is located at the highest usable level of the campus and overlooks the lake, the central mosque and the landscaped area fronting building 16 as shown in Figure 18. This interesting outdoor space at present is not maintained in that manner that justifies the best usage. The pavement and landscaping features are missing and so is the water body under the tower. This area has a great potential and needs to be re-redesigned. Similar is the case with the lake the edges of which have dilapidated and the concrete ledges are giving way. The pathways around the lake need maintenance and so does the natural landscaping elements that surround the water body. An elegant landscaped path populated with palm trees surrounds the lake. This outdoor area is shaded almost all the year round but due to poor linkages to buildings on all sides, it has developed into an unused zone which is never visited by any of the campus users. More detailed analysis of this zone and the spatial concerns that are associated with this area described in points below.

- The pathways around the lake are broken and cracked at places needing immediate maintenance.
- The concrete edges of the lake are corroded and chipped off. All the edges of the lake along with the ledges need to be re-designed and re-casted after appropriate water proofing. A more natural approach towards the surface finishes of this artificial water body would enhance the visual image of this feature allowing it to merge with the surrounding built environment.
- Various pockets of the artificial lake have stagnant water with almost no aeration. The water circulation system of these spots of the lake need to be re-designed.
- The shape of the lake along with the pedestrian circulation walkways around it also need to be reviewed and improvised.



- The water re-cycling mechanism along with its filtration plant is not working as required and needs to be re-furbished with a better/efficient mechanism.
- The existing water body (fountain) is not aerating the lake as is expected and due to its upward pressure throw mechanism, is responsible for corrosion of concrete structures surround the lake. This element needs to be replaced with a subtle water body system that would look elegant and at the same time fulfill the requirements.
- Natural hills that form hard landscaping elements around the lake need immediate attention as their edges are eroding and giving way. Some of these spots have high potential of being developed as better landscaping/artwork elements.
- The landscaped area filled with palm trees is an elegant outdoor landscaped space which is mostly unused as movement through or around this area is not encouraged. There are no pathways that would allow a user to pass via this area. This area lacks interesting spatial pockets embedded with outdoor seating that would make a person stop and appreciate this zone. Outdoor lighting in this area is absent which renders this area dark in the evenings.
- The paved court surrounding the KFUPM tower is in need of better floor finishing and landscaping which is embedded with seating and display panels. This area is one of the important zones of interest in the campus and should be portray an image appropriate to such an outdoor space.
- There is a missing link between the tower court and the palm grooved outdoor area in the lower level by the lake. An external connection that leads users to the palm grove from the outdoor areas of upper academic building levels would accessibility to this landscaped area.
- Certain crowd pulling development within this palm landscaped outdoor area would force the users to pass through this zone and utilize it in a better manner.

## ***The Water Tower Node***

### **a. The importance of the project to university academics community:**

- It is the most important symbol of KFUPM.





- It is a major focal point of reference for the academic area.
- It is the main intersection between buildings 4, 5, 6 and 7; as well as people coming from student housing and student cafeteria.
- It provides one of the most important viewpoints from KFUPM towards the Al-Khobar city and Dhahran.
- It also provides a good view to the KFUPM Lake, Mosque and RI.

**b. The existing condition of the project:**

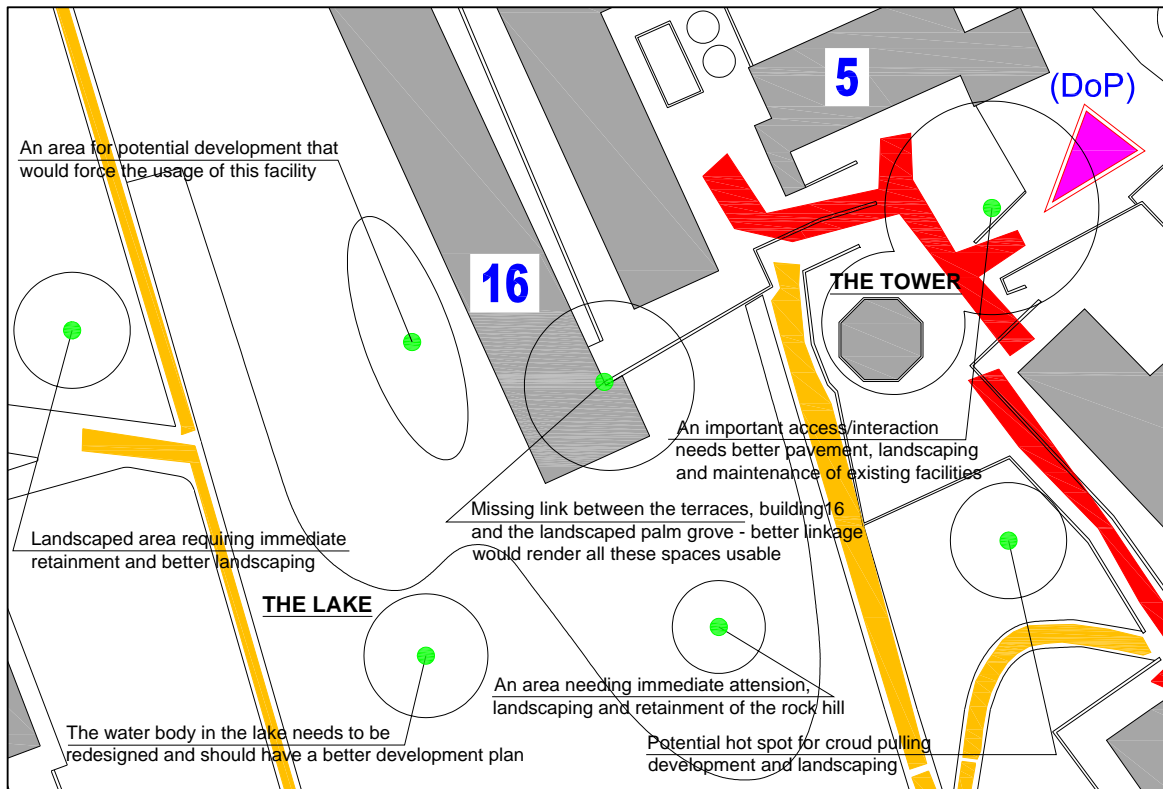
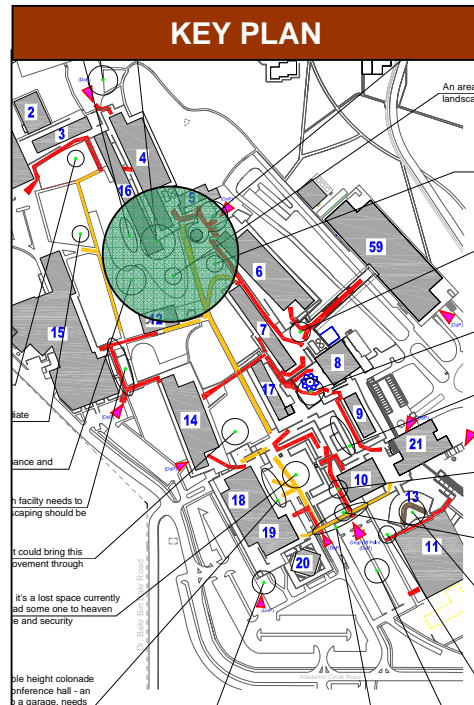
- The water body at the base of the tower is not used. There are no soft landscape features to augment the environment.
- The space around the tower itself is like a dead space with no life around it. This court seems to be an isolated space which is visualized as another walkway around the complex which undermines its importance.

**c. The suggested solution to upgrade the existing condition:**

- Outdoor seating should be provided in this court for the users to appreciate the view towards the city as well as the KFUPM Lake and its surroundings.
- This area should house art work which is integrated with elegant hard and soft landscaping. Placards and electronic graphic boards need to be incorporated which would render this area more academic in nature. Students can use the space for socializing and doing some light work (such as browsing on wireless network).
- The views from Water Tower should be utilized for maximum effect. Students could enjoy using these spaces as waiting areas between classes.
- An external connection via a staircase similar to the ones existing in various areas of the campus should be constructed linking the landscaped area adjacent to the lake with the court around the Tower. A conceptual sketch of the proposed staircase is shown in Figure 19.
- The flooring should be composed of colored tiles with distinct geometrical patterns.

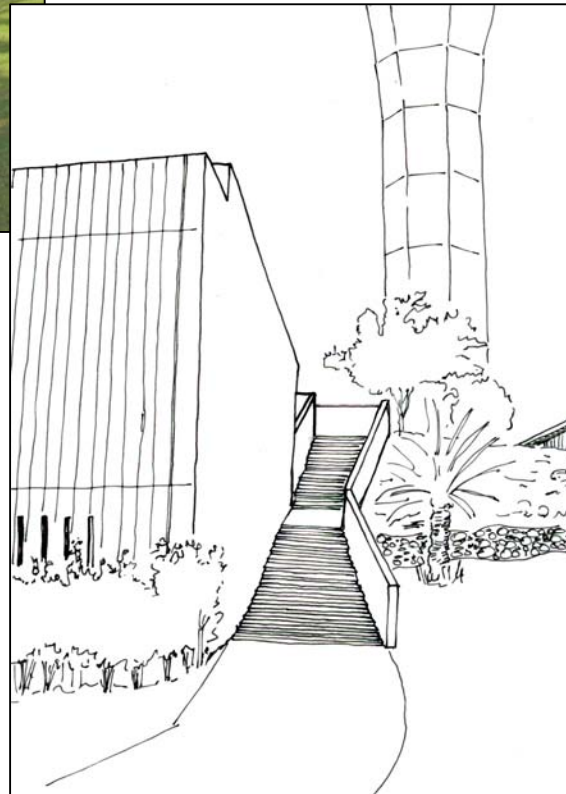


Figure 18. The site plan of Zone 4 shows the poor linkages between the upper levels and the landscaped area around the lake. Various pockets of eminent development potential are also highlighted in the site plan.





*Figure 19. The proposed location of the staircase that could connect the Tower Court with the landscaped area fronting building 16. The upper image is the existing status while the sketch at the bottom suggests the idea of the proposed staircase.*





### ***The Lake and Surrounding Areas: ZONE 5:***

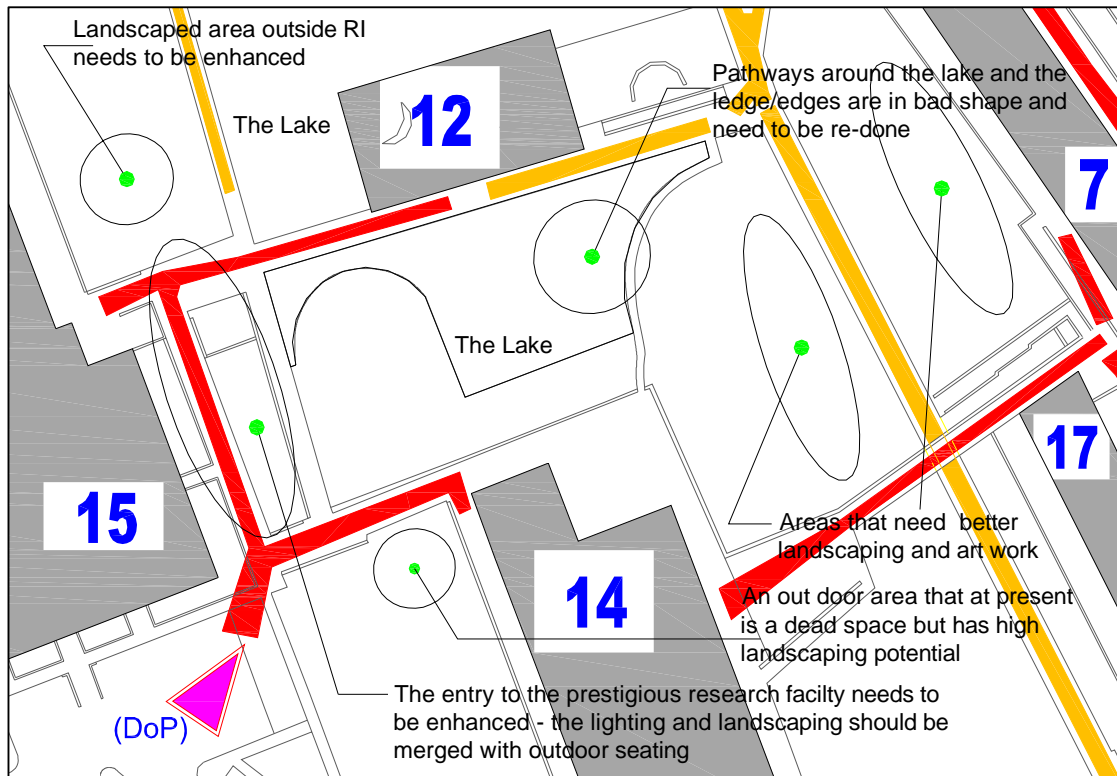
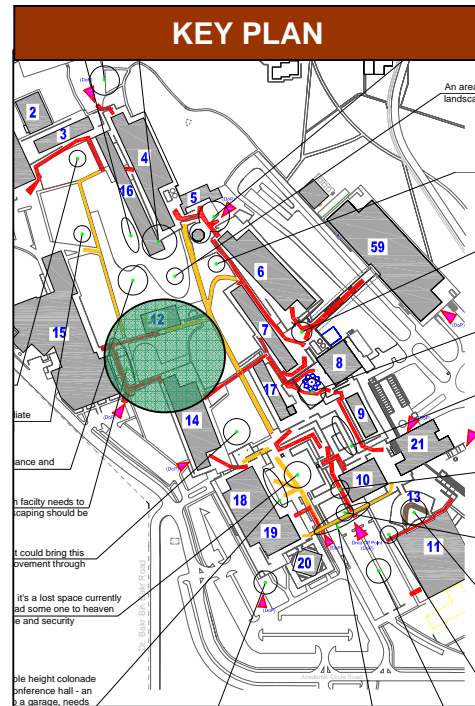
The area around the lake and the KFUPM central mosque is the most scenic zone of the campus. A natural hill is carved out into an artwork and embedded into the artificial with the whole blending with the surrounding built environment as an elegant composition. Once again, the detailing, landscaping and surface finishing of this area are all in bad shape needing immediate maintenance and remodeling. Pedestrian circulation wise, this zone is not too busy as shown by yellow shade on the site plan shown in Figure 20. These scenic walkways are mostly used by few KFUPM staff and faculty who commute between RI and building 9. Very few students use this pathway because of the poor connections between this area and the rest of the academic complex. The service road approaches the basement of building 4 from the plaza passing the central mosque and a pedestrian pathway leads to RI extending straight to building 3 without any proper and attractive linkage to the wing of academic buildings on the right side.

This area houses one of the prestigious buildings of the campus that is the RI which has its own entrance, a drop-off point, and an outdoor parking. The access an imposing building and the landscaping the entry merges with does not do justice to the outlook of this built environment. Similar is the case with the main entrance of the RI building. Imposing steps lead to the doors of the enclosure however, there is no buffer zone between the outdoors and the indoors of the building. An empty dead outdoor space next to these steps gives a feeling of emptiness as one approaches RI.

The most scenic element of the campus that is the artificial lake surrounded by a grove of palm trees on both sides is in a bad state of maintenance. The palm grove is a dead and unused landscaped area. The reinforced concrete edges of the lake that hold the ridged geometrical form of the lake has eroded and the de-fragmentation of the bounding structure presents an unpleasant appearance of the area. The water in the lake is almost stagnant due to next to none or non-optimal aeration which again contributes to the distasteful visual ambience in addition to being a cause of foul smell. **The overall form of the lake portrays an age old concept of rigid geometry and concrete finishing while now-a-days, more naturalistic approach is recommended and utilized in such spaces.** Further analysis and positive criticism about the issues that shadow the physical quality and visual ambience of this zone is described in points below.



Figure 20. The site plan of Zone 5 shows low pedestrian movement in this area due to poor linkages between this area and the rest of the academic buildings. Various pockets of eminent landscaping potential are also highlighted in the site plan.







**a. The importance of the project to university academics community:**

- This zone is the main features of the university campus and its pictures and views are included as a symbol in most of the images of the university. As a matter of fact it is always shown next to the university Tower.
- The artificial lake and its surrounding areas add a soft and natural characteristic to the otherwise ridged-complex concrete urban fabric of the campus. This reasonable large sized landscaping element is one of the main features that give the KFUPM campus its uniqueness.
- It is the only large and well defined landscape element designed to be an actual outdoor relaxing area.
- This area is at the center of the whole academic campus and the main core linking different zones of the academic complex.
- It has high potential to serve as a breathing space and could be used as an outdoor relaxing area by all the KFUPM users.

**b. The existing condition of the project:**

- The existing dilapidated condition of the lake edges has a negative effect on the visual ambience of this area. The water body of this size with minimal aeration and a poorly formulated water body that presently exists in the lake has harmful impact on the surrounding buildings, landscape, and structural elements on site.
- There are many large portions of the lake water body which are stagnant, pockets that are referred to as what we can call “water pockets” where the water is steady and not moving.
- The existing water fountain jet is affecting most structure around it, especially the central mosque on the west side of the lake.
- The lake was built before building 15 the research institute, due to this fact the link between RI and the tower area right opposite at the upper level is missing.



- Pedestrian walk way exists only on one side of the lake. The absence of walkway all around the lake is the main factor that negates the usage of the palm grove landscaped area.
- The poor eroded state of the pavement on the walkways around the lake area has a discouraging affect on the visual condition of the surrounding landscape.

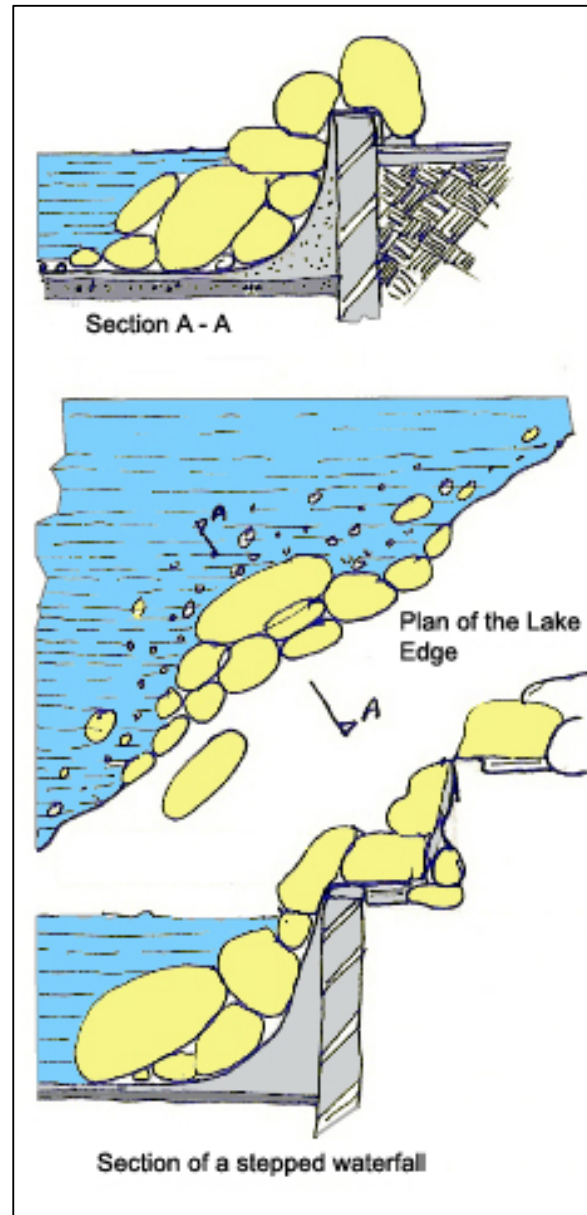
**c. The suggested solution to upgrade the existing condition:**

- The university should seriously consider changing the age old (/1960's/70's) concept of the lakes form and its pathways from an imposing geometrical outlines into a more modern smooth, organic and natural outlines which will go very well with the rocky surroundings of the university.
- The concept of modern rock formations should be utilized which also matches with the main characteristics of the university campus site. Figure 21 shows typical sketches of rock formations enclosing a water body.
- The overall outlines of the existing lake, its different sections, and to the existing pedestrian pathways around it should be changed. The new design scheme should be in line with the above mentioned points and should be formulated to be much more functional, practical, and relevant to the present time. The linkage around the lake should be enhanced by providing a pathway all around the lake with more bridges allowing the lake walkways to be a connection between buildings on both wings of the complex as shown in Figure 22.
- Introduce a number of water bodies of different scale to the lake replacing the existing water jet fountain at the center of the lake. This would give the lake a better look also allow better aeration of the water. As shown in Figure 22, water could be allowed to flow naturally from a higher surface level shown with letter 'H' in the figure to the lower levels of the lake shown with letter 'L'. This would also allow natural movement of water in the lake.
- Modifications need to be made with the layout of the pathways and services lanes making them more functional and practical than the existing situation. Improving the surface finishing and detailing of ledges in addition to incorporating artwork,

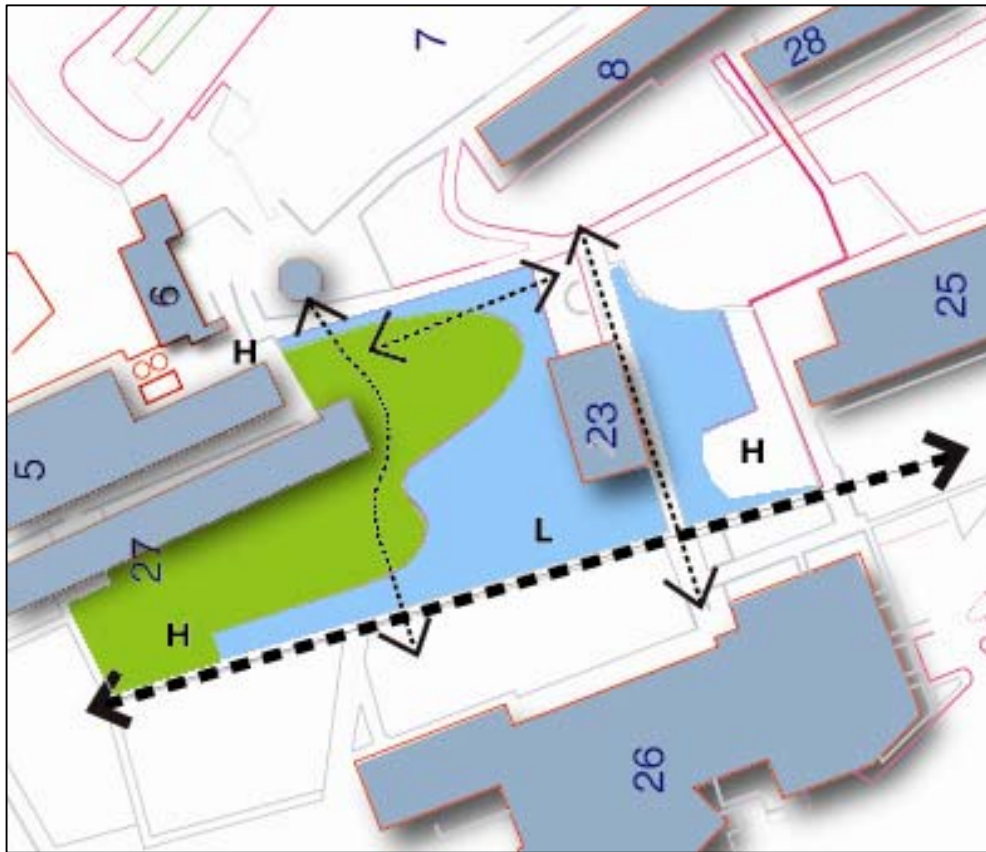


signages and few interesting notice boards would enhance the walking experience around the lake.

- The quality of the landscape around the lake site needs major re-designing. This could be achieved by bringing in more varieties of plantation of various sizes, colors, and forms.
- Seating area and landscape furniture should be introduced at various spots around the landscaped areas of the site.



*Figure 21. Sketching showing the rock formation ledges that bound a water body into a more natural element.*



*Figure 22. The linkages around the lake need to be enhanced by incorporating additional bridges that improve functionality as shown in dashed lines. Walkway on the green side of the lake would also make the green area usable.*



### ***Last but not the Least - ZONE 6:***

This outdoor area forms a spatial terminus of the KFUPM academic complex. A U-shaped open space is enclosed by building number 16, 3 and 1 on three sides and is fronted by a competing green area that leads to this zone. On one side is a major drop-off point with parking for staff and faculty. Another entry to the academic complex allows students to walk from their dormitories and access this zone from a higher level as shown in Figure 23, making this outdoor zone an important transition space for academic buildings surrounding it. However, this zone lacks objective landscaping elements and the drop-off points are not dominant enough to force users in choosing them as access to the compound. Further spatial evaluation of this zone is described below.

- The entrance from the student dormitories is rugged in its visual, physical and spatial appearance. The walkways in this area need to be enhanced and merged with elegant landscaping and lighting so that it would encourage pedestrian movement of students from their hostel blocks.
- The outdoor area fronting building number 3 needs objective landscaping with art work that makes this zone a focus of the campus. The art work could be related to the field of engineering housed by the buildings around this outdoor space.
- The pathways need to be re-designed along with the integration of better outdoor lighting and seating.
- The access point and parking area needs to be enhanced, the road re-asphalted and the existing landscaping enhanced.

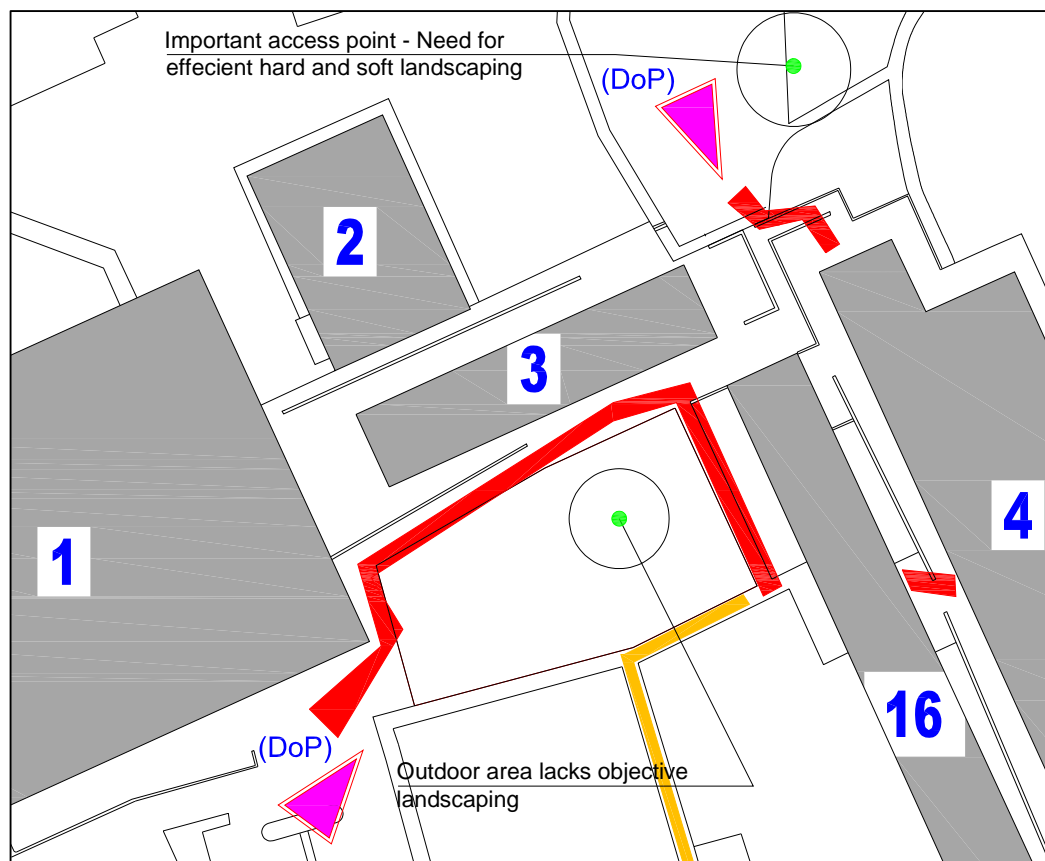
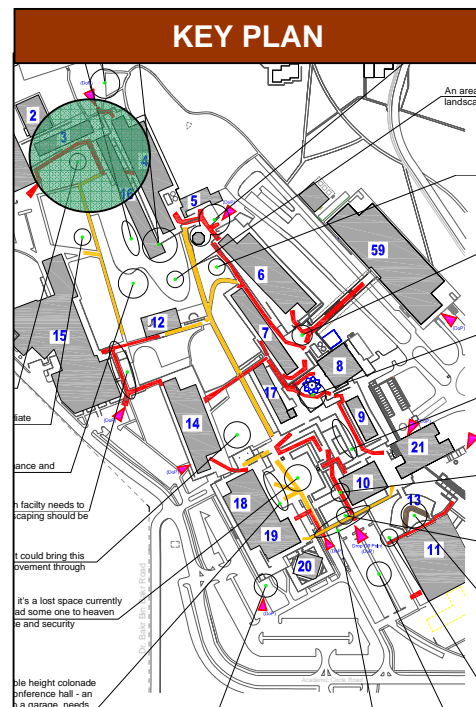
### **The suggested solution to upgrade the existing condition:**

This zone needs to be studied and designed similar to the areas described earlier in this report. These outdoor spaces should visually and functionally match with the other areas of the campus so that the entire academic complex integrates into a single entity under the umbrella of unified overall design concepts.





Figure 23. The site plan of Zone 6 showing the zone as a terminus of the academic complex. The drop-off points are also highlighted in the plan along with the areas that improvement.





## CONCLUSION

Spatial analysis of KFUPM outdoor areas is described in this report. The academic complex is divided into 6 zones and each zone is analyzed, describing the importance of these respective spaces and positive criticism in terms of the deficiencies of these areas highlighted. As is evident from the analysis, various areas of spatial importance in the academic complex seem to have lost their functional characteristics and their physical and visual ambience does not match with the overall image of the university. An uneven pedestrian movement pattern around the building outdoors suggests weakness in linkages and an unbalanced functional distribution with one wing of the academic complex heavily loaded and the other wing being less utilized. To overcome this imbalance, crowd pulling developments need to be proposed that would force KFUPM users to utilize all the outdoor spaces which at present are unexploited and furthermore would encourage pedestrian movement around the whole compound. Each of the 6 zones described earlier need to be reviewed individually by a design team in terms of their deficiencies and concerns keeping in view the issues highlighted in this report. Once the basic study is carried out by the design team, enhancements and developments should be proposed that follow the conceptual guidelines described in this report allowing spatial and visual unification of the whole KFUPM complex.

The nature of designing and construction required for improvement of KFUPM outdoors as described earlier necessitates **phase wise development**. All the major tasks depending on the type and characteristics of work should be synchronized and well managed to achieve the best final output. Management and coordination between the variety of contributors and work force is of essence, the optimization of which will yield better and timely results. The general development stages of the project are described in Table 1. The seasonal timing of the construction tasks should also be kept in mind especially with concreting, asphaltting and water proofing tasks. Efficient management of the development process as a model will thus add up to the efficiency of the built environment at KFUPM.



Table 1. The general steps involved with the phase wise development of the project.

No.	Task	Contributing Players
a.	Exact Problem Identification	KFUPM administration
b.	Identification of Designers and Consultants	KFUPM administration
c.	Coordination with designers and consultants ▪ Refinement and evaluation of solutions	KFUPM representatives and consultants
d.	Series of presentations and approvals	Consultants and KFUPM administration
e.	Identification of contractors and work force ▪ Awarding work contracts	KFUPM administration

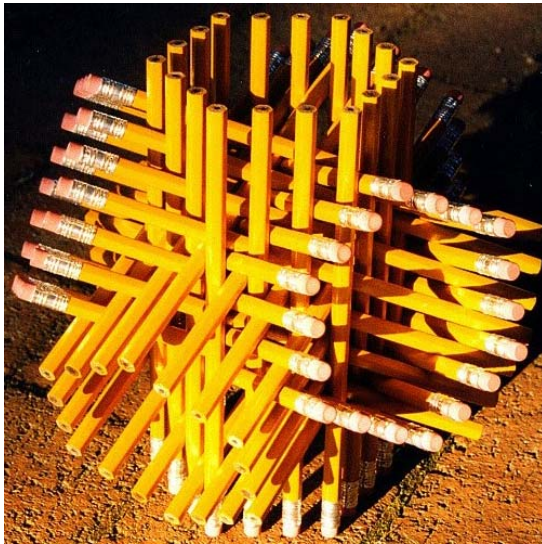
The development work should follow the following Zone wise schedule.

S.No.	Order of Zone (starting with)	Activity
1.	Zone 3 and 4	a. Basic structural and services jobs b. Finishing and instillation of pre-fabricated items
2.	Zone 5	
3.	Zone 1, 2 and 6	



## Appendix

- Images of general art work and sculpture that is related to academics.







- The images of a Persian Garden, similar tile finishing and the concept of water flowing through channels could be used while designing and treating the water body in the court fronting the library.



- Images of hard and soft landscaping in certain academic campuses.











- Images of landscaping and sculptural treatment of water bodies similar to KFUPM lake.

