

ENVIRONMENTAL IMPACT ASSESSMENT

PRINCE ICON

SURVEY 90, DEPOT LINES, KARACHI CANTT.



Environmental & Analytical Solutions

Marvi Enterprises

Environmental Impact Assessment (EIA)



Survey 90, Depot Lines,
Karachi Cantt.

FINAL REPORT

December, 2019

Marvi Enterprises



Environment, Health & Safety Services

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Environmental Impact Assessment (EIA)



Survey 90, Depot Lines,
Karachi Cantt.

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Date:

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Executive Summary

- Presented in this report are the findings of the Environmental Impact Assessment (EIA) study submitted to the Sindh Environmental Protection Agency (SEPA) for its approval to construct a G+21 storeys high rise commercial tower in Karachi Cantonment Board area.
- The proposed Prince ICON Tower Project would involve construction and commissioning of a 21-storey high rise building meant for offices & recreational space over an area of 3,740 Sq. Yards. The project concept is based on a self-sustained office tower unit; it will be easily accommodated in the built environment that is already enjoying safety, security and better quality of life. The proposed site is, for environmental & social reasons, an ideal location for clients aiming at shifting their activities from congested areas of the central districts and establishment of their corporate offices to a single modern 21st century state of the art facility.
- Located at the main M.A Jinnah Road having connectivity with the green line bus rapid transit corridor on the immediate South, the plot is enclosed in a network of roads namely Rizvi Shaheed Road on the East, Depot Lines road on the West, Kiyani Shaheed road on the North. The proposed BRT network has been designed to cater to the needs of traffic movement as envisioned under the Karachi Transport Masterplan 2030.
- The project entails construction of a 21 storey high-rise building comprising basement (services), ground floor (06 showrooms + services), 1st to 3rd Floor (parking), 4th Floor (amenities), 5th Floor (mechanical area), 6th Floor to 21st Floors (192 Offices) & Roof Top (utilities + services). Total built-up area and covered area of the project (F.A.R) is 456,869 sq. ft and 197,683 sq. ft respectively.
- The project addresses the issues of energy & environment and provides the most effective solutions. The green systems integrated in the building design will create positive and sustainable urban image to the environment and improve social and ecological resources of Karachi.
- The project is proposed on a by-birth commercial plot fully described in introductory chapter supra. It was leased for building shops, showrooms, offices and cinema by the Karachi Cantonment. The lease of the plot is valid with provision of renewal.
- The proponent has obtained necessary no objection certificates or letters showing intention to provide amenities. The proponent has so far obtained NOC for electrical connection from KE vide letter No.S&BD/201910307 dated 02nd December 2019; SSGC vide letter No.Sales/NOC/MK-Sur90/12/19 dated 4thDecember 2019; KWSB vide letter No.Secy/NOC Committee/RRG/2019/478 dated 5th December 2019; CAA height clearance of 500 feet Above Ground Level (AGL) or 536 feet Above Mean Sea Level (AMSL) vide letter No.HQCAA /1117/003/ ARAS/KHI-895/750 dated 11th July 2019.



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- While the proponent has valid lease of by-birth commercial plot and no objection certificates from all main utility agencies but still he has to undergo litmus test to prove that the project does not fall under orders of Honorable Supreme Court of Pakistan passed recently. Honorable Supreme Court of Pakistan has always been protecting right to life under a safe environment and environmental protection. In landmark decision in Shehla Zia versus WAPDA, the Supreme Court of Pakistan held that the right to a clean and healthy environment was part of the fundamental right to dignity provided in Article 14 of the Constitution of Pakistan.
- In recent past, the Supreme Court of Pakistan has passed orders in two different petitions, which provide litmus test for all proponents of construction projects in Karachi. In 2016 a practicing lawyer Mr. Shahab Usto filed a constitution petition No.38 of 2016 in Supreme Court of Pakistan for supply of clean and safe drinking water and sanitation in district Shikarpur of Sindh province. Recognizing importance of the matter, the Court increased scope of the petition to whole province of Sindh and constituted a judicial commission of a sitting judge of Sindh High Court, who besides several recommendations for different departments recommended in his report ban on construction of high rise building in Karachi till provision of water supply and sanitation is provided and existing infrastructure is improved. Honorable Supreme Court initially imposed complete ban on construction of building above ground plus two floors but later on modified order to allow construction up to ground plus six floors plus floors for parking. This ban on construction was imposed with a view to improve water supply and sanitation infrastructure in the city, which was a gigantic task. On 11th December 2018, the Court retracted ban on construction and ordered that new high rises can be built in accordance with the law. Supreme Court had lifted ban on construction but the situation on which the Court imposed ban still persists and approval to any project can be refused on those grounds by the approval granting agencies. The second case is Constitution Petition No.815-K/2016. In this petition the Court vide order dated 22nd January 2019 imposed complete ban on land use change in whole Karachi. In compliance of this order SBCA issued a Notification on 24th January 2019 whereby complete ban on conversion of plots was imposed and all pending cases of change of land use and approval of construction permits/building plans/NOCs on converted plots shall be deemed rejected as unconsidered.
- Examining suitability of the project in view of above two decisions of the Supreme Court of Pakistan, the project can be termed doable as all utility agencies have already confirmed availability of infrastructure to cater with the project through the no objection certificates details of which are given above, and the project is proposed on a by-birth commercial plot and there is no conversion of land.
- The main stakeholders for the Prince ICON Project have been identified in Figure EX-1.



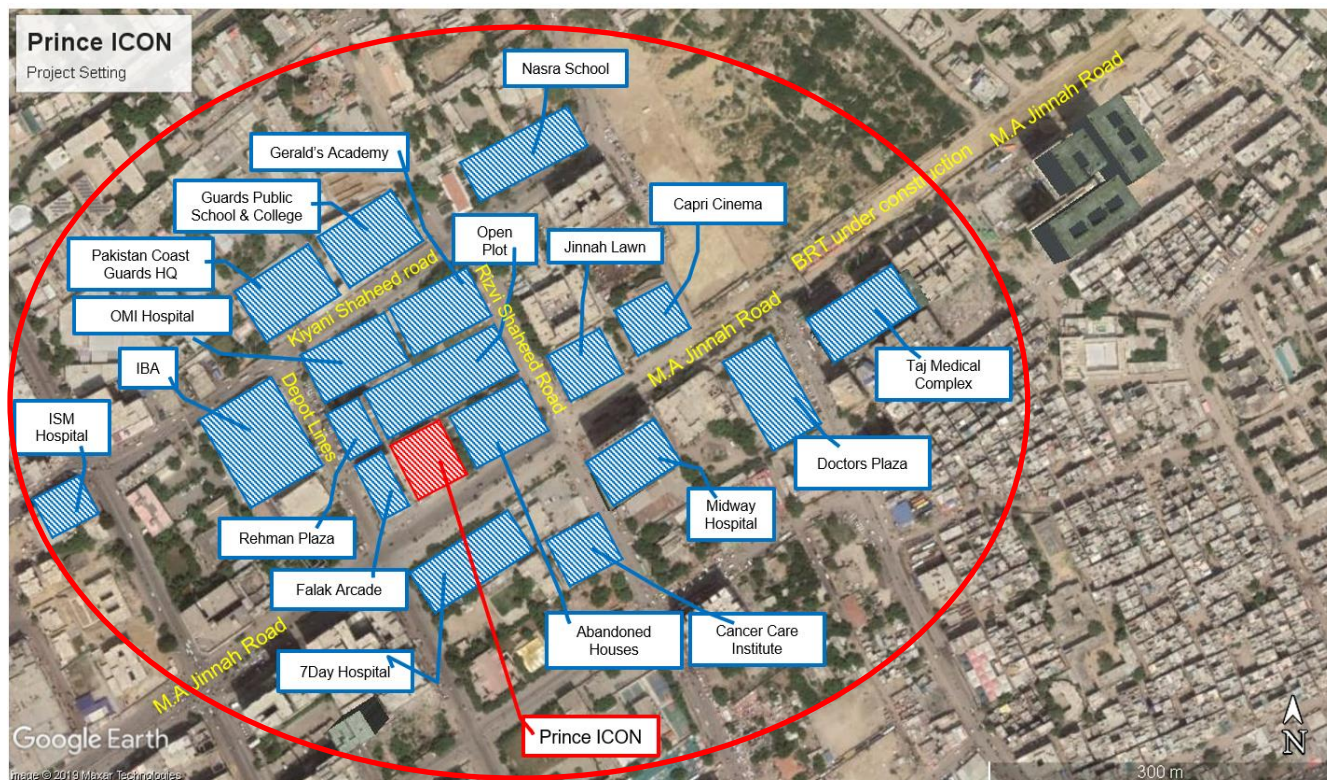


Figure EX-1: Primary stakeholders in the Project area

➤ Other Important stakeholders include the following:

1. Sindh Environmental Protection Agency (SEPA)
2. Sindh Building & Control Authority (SBCA)
3. Karachi Cantonment Board
4. Culture, Tourism & Antiquities Department, GoS
5. Office of Commissioner District South
6. K-Electric
7. Sui Sothern Gas Company (SSGC)
8. Karachi Water & Sewerage Board (KW&SB)
9. Sindh Infrastructure Development Company Ltd (SIDCL)
10. SUPARCO
11. IUCN-Pakistan
12. WWF Pakistan
13. Shehri-CBE
14. National Forum for Environment & Health (NFEH)
15. Institute of Engineers, Pakistan (IEP)
16. Urban Resource Center
17. Academia



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- The comments, concerns and suggestions received from stakeholders during the consultation meetings have been collated in this section. The concerns and suggestions of stakeholders have been segregated into two specific categories based on the responses during the consultation process: i) Residents & Business Operators, and ii) Professional Engineers & Experts from Institutions.
- All representatives of private schools were complaining about the miserable situation of solid waste management system in their respective areas; waste collection points have been created in front of schools which is not only creating health issues to the school children but affects the aesthetics of the surrounding of an school building which is considered a sensitive receptor.
- The residents in general were very apprehensive of the sluggish progress of construction work along the green line corridor. According to them, green line project should have been completed 02 years ago because in view of the traffic situation which has become worst due to lack of Public Transport infrastructure. Some of them very vehemently emphasized that the concept of densification of the roads has been grossly politicized since the roads have been allowed huge structures without considering the acute shortage of infrastructure facilities including burden on utility services.
- There was general agreement among the residents that the agony faced during the period of construction could be painful if suggested measures are not implemented with letter & spirit. Some business operators mentioned about the environmental & socioeconomic problems faced during the construction of green line project; businesses were lost, the school children & visitors to the hospitals were stressed, and the affectees were forced to migrate. The main reason is that the responsible authorities do not care to implement the management and monitoring plan and hence the contractors are left scot-free to degrade the social and physical environment.
- The residents & business operators appreciated that the Prince ICON project has more than the required provision for parking which takes care of the problems created by densification of the plot of such a large size. This arrangement appropriately responds with the parking facility for the residents and their visitors. According to businessmen of the area, parking issues and traffic management should not be viewed in isolation but being of comprehensive nature all densifiers should join hands and formulate a traffic management system unique to the process of densification.
- Densification and indiscriminate removal of vegetation/trespassing of open space have gone hand in hand. Most of open space has been lost during the construction of green line project. The parks have playgrounds have been forced to abandon land in the name of development. The private developers do promise provision of recreation facilities inside buildings as a compensatory measure to but that is not enough. They were of the opinion that the CSR plan should include supervision of the green spaces so that the objectives of promised recreation is available for the neighborhood.





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- It was observed by the residents that it was unfair on the part of the land owning agencies to have received the development and service charges from the builders which is a public money and not spending any amount towards the betterment of the infrastructure or providing the amenities. The amount paid in the form of service charges are more than sufficient for construction of adequate services in the area but the amount seems to have been deposited in dead account.
- The stakeholders in the neighborhood including schools & hospitals management identified several precautionary measures that must be in place to ensure the peace of their area. Most importantly, the stakeholders want to ensure that their security and privacy is not breached. Similarly, noise from the construction activities is bound to become a nuisance; construction should be carried out strictly in accordance to specific timings and there should be no construction activities at night. The residents should be taken into confidence regarding all developmental activities. Dust is another issue that usually results from construction activities and pollutes the surrounding areas. There was a suggestion that dust should be minimized as much as possible, at least the initial work with respect to site preparation should be covered to the maximum extent possible.
- Noise pollution especially during the initial construction activities and dust should be minimized. One of the stakeholders recommended construction vehicles to enter and exit the area only during the night-time when traffic volume is low.
- The stakeholders were pleased that the proposed building is an office set-up that has its own parking space. However, they also observed that the majority of the projects have been completed in violation of the approved plans because there is no provision for parking and the space for parking has been unauthorizedly allotted for more shops in the basements.
- Construction debris must be disposed of on continuous basis through proper waste contractor. Care must be taken to restore the construction site and the immediate surroundings to acceptable degrees of aesthetics.
- The sewerage system has been improved but the blockage of storm water drains is creating and submergence issues with every heavy rainfall. Authorities should see to it that all projects must have provision for sewerage treatment system with provision for recycling.
- The business operators observed that they had duly followed the building bye-laws by paying the betterment charges to the concerned agencies. However, the commercial activities carried out in the non-commercial area are responsible causing major damages to the infrastructure because the bye-laws are not being followed in total disregard of the mandatory requirement of obtaining permission for operating their business. The residential plots are housing illegal commercial activities which are adding to the burden of congestion on road and the amenity/utility services. This is unfair with regard to its unauthorized nature and causing losses to the government exchequer besides being cause for severe civic problems.





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- The business operators also observed that the high-rise structures being constructed in the vicinity areas have kept provision for extra parking space which is much more than the requirement of Karachi Cantonment Board but it is also true that parking plazas are a necessary component of commercialization and densification of roads all over the world. It is for the master plan department to conceive the necessity of parking plazas on densified roads of Karachi. There is still time for the planners to take necessary steps for mandatory provision of parking plazas on densified roads.
- The stakeholders appreciated that the Prince ICON project has several floors dedicated to parking of cars and motorcycles in view of the demand for parking stalls. The stakeholders preferred that the exit and entrance to the facility is properly planned to avoid disturbance to existing traffic. Entry & Exits should be properly designed to avoid any issue during peak-hours.
- The business community as well as residents welcomed the new development as they were of the view there is a need to have good office buildings and recreational areas because commercial activities will see a significant rise future as soon as the mass transit system will become operational. However, if mismanagement prevails as in other areas of Karachi, overcrowding and haphazard planning will actually deter the public from visiting due to parking ques and long waiting hours.
- The Prince ICON site is an open land with no permanent structure at the site or in the neighborhood. As such the construction activity will proceed straight away with land development and excavation. The SEPA and Karachi Cantonment Board will be kept informed of the proceedings during the construction stage.
- A study of boreholes show that top substrata consist of loose to medium dense, silty SAND / sandy silt and dense, sandy GRAVEL / gravelly SAND deposits up to 10 feet depth. This is underlain by stiff, clayey SILT and dense, sandy GRAVEL deposits in clayey matrix. This is followed by medium hard, SANDSTONE and hard, CONGLOMERATE deposits.
- Taking into account the subsoil condition and anticipated structural loads, it is recommended that the proposed structure be supported on raft foundation placed as 14-15 feet depth below the existing ground level.
- Allowable (gross) bearing capacity of raft foundation (with basement) placed at 14-15ft depth below the existing ground level must be adopted as 3.50 tons/ft².
- Bearing capacities have been computed for the condition that about 14-15ft overburden soil will be permanently removed for the construction of basement.
- Before placing foundation concrete the excavation should be carefully inspected to ensure that footings are being placed at in competent stratum. This precaution is necessary to guard against localized fills and inhomogeneities.



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- Modules of subgrade reaction at 14 – 15feet depth may be adopted as 140kef.
- The site plan shows that on one side of the plot there is an empty plot whereas, on other side, there is (B+G+18 storeys) building which has an offset of 10feet from the property line. On the other two sides of the plot there exist roads. During basement excavation, special precautions must be taken to protect the slopes and foundation of adjacent structure. This may be done by proper shoring / bracing. It is essential to keep the excavation dry and excavation should be performed during dry season.
- According to the uniform Building Code (1997), the soil profile falls in 'Sc' category corresponding to 'very dense, soil and soft rock'.
- The microenvironment has no sensitive areas such as protected sites including wildlife sanctuaries, game reserves or national parks, or any archaeological, historical or cultural heritage in its immediate neighborhood; as such its siting would have no sensitivity in this regard. No significant flora and fauna will be disturbed, as the site is located in the commercial area, where no flora and fauna of significance exist.
- The Project responds to the need of the segment of population that is seeking safety, security and improvement in quality of life. Advantage of this aspect has already been taken by other builders and developers who have gone ahead with the construction of residential and commercial ventures all along the major roads and strategic corridors of Karachi.
- The project when completed would require about 23, 520 gallons water per day and 900 KW of electricity. The proposed project is a self-contained building having its own back-up power generation, water supply supplemented by hyper filtration system and sewage treatment, grey water recycling and disposal system in addition to provision of more than required parking space. The concerned authorities have already received the due amount for provision of utility services and development of the area. They are expected to plan and implement augmentation of the facilities in advance, otherwise plan for densification would, instead of facilitating improvement in quality of life, be a burden on the environment.
- All the electrical resistivity values show less considerable water presence in the area. However, the drilling location can be demarcated with 100ft radius of probe 3. Test borehole of 400ft-500ft deep is recommended to get average yield of brackish water from Manchar Formation. Test borehole of 800ft-1000ft deep is recommended to get maximum yield of saline water from Gaj Formation.
- Option for recycling of the wastewater and regeneration of the potable water from groundwater resources by adequate treatment may have to be explored since adequate water supply to the Karachi residents the core areas is not assured despite the fact that the authorities are aware that the needs remain unfulfilled while the exorbitant taxes are unbearable.





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- The actual parking demand of the facility is of 472 cars and 792 bikes considering the parking demand for offices, showrooms and cinema. However, this demand is minimalized providing that the show starting time of the cinemas will be at 06:00 pm and onwards for weekdays excluding Saturday and Sunday. This will reduce the maximum demand limit up to 347 cars and 732 bikes.
- Considering the minimalized demand, the deficiency of parking spaces is of 158 cars and 546 bikes. To accommodate for this at least two basement parking maybe developed.
- Or in other case, rest of the deficiency may be catered into a separate parking lot in the surrounding area of project. This location must be identified and after its identification a plan has to be developed for better traffic management (both vehicular and pedestrian) to and from the parking lot.
- Furthermore, as mentioned in the reports of BRT Blue Line and Green Line, the BRT Corridors will reduce vehicular demand of cars and motorcycles up to 10%. Therefore, we can fairly say that the deficiency of available parking slots, if mode of transportation is shifted to BRT as planned, will be further reduced to 144 cars and 492 motorcycles.
- One of the major attractions of the business and work trips of Karachi is Saddar and nearby areas. Travel demand on the roads and streets of Saddar Area is growing day by day. Now the present situation is, that at most of the locations there is no room for additional lanes and grade separation structures. This situation has happened in metropolitans of many countries. To overcome the deficit of demand and supply travel demand management and demand control techniques are applied across the world. One of the best solutions is shift the mode of transport from private vehicles and two, three wheelers to an integrated bus network. This is the only possible and effective way for Saddar Region to manage the demand and supply gap.
- The design of life safety systems is a multidisciplinary solution with the architect detailing the fire stairs, evacuation routes, areas of refuge as well as the fire rating of the shafts and internal fire separation within the building. The structural engineers will specify the fire-retardant materials that will protect the structure. MEP Consultants have designed the active systems in the building to provide a comprehensive fire detection and management system in line with the overall fire and life safety strategy.
- With 24-hour security system all over the building the designers have ensured that the concerns on invasion of privacy are alleviated and eased. The Project would thus achieve its objective of providing a secure and safe residential cum commercial building at an attractive location. This being a positive impact would be an indicator of achievement of the objectives of the Project.
- Realizing that the city has overgrown its sustainability limits, it is imperative that the Builders and Developers take cognizance of the cumulative effect





Environmental Impact Assessment (EIA)

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of the current pace of rapid development. Consequently, each project is required to keep the sustainability principles in view and go an extra mile beyond the present approach which is confined to bare survival. Their projects have so far been profit oriented, now they will have to share the profit with net zero energy and net zero discharge approach in the project design.

- The study recommends that the Environmental Impact Assessment (EIA) report should be approved with the provision that the suggested mitigation measures will be adopted and the Environmental Management Plan will be followed in letter and spirit.





Environmental Impact Assessment (EIA)

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1. Introduction

Name of the Project:	Prince ICON
Name of the Proponent:	Marvi Enterprises
Location of the Project:	Survey 90, Depot Lines, Karachi Cantt
Total area of the plot:	3,740 Sq. Yards

Presented in this report are the findings of the Environmental Impact Assessment (EIA) study submitted to the Sindh Environmental Protection Agency (SEPA) for its approval to construct a G+21 storeys high rise commercial tower in Karachi Cantonment Board area.

The project location and its architectural view are shown in figure 1.1 and 1.2.

Marvi Enterprises (hereinafter referred as Project Proponent) have formulated a team of highly qualified, experienced and dedicated professionals, & experts who are striving continuously on building, construction & development ventures.

The Project has been undertaken by a consortium of following Groups:

- Khalid & Associates Architects, Structural & Plumbing Consultant
- Bilgrami & Partners Electrical Consultant
- M/s EHS Services EIA & Traffic Consultants

1.1 Project Overview

The proposed Prince ICON Tower Project would involve construction and commissioning of a 21-storey high rise building meant for offices & recreational space. The project concept is based on a self-sustained office tower unit; it will be easily accommodated in the built environment that is already enjoying safety, security and better quality of life. The proposed site is, for environmental & social reasons, an ideal location for clients aiming at shifting their activities from congested areas of the central districts and establishment of their corporate offices to a single modern 21st century state of the art facility.

Located at the main M.A Jinnah Road having connectivity with the green line bus rapid transit corridor on the immediate South, the plot is enclosed in a network of roads namely Rizvi Shaheed Road on the East, Depot Lines road on the West, Kiyani Shaheed road on the North. The proposed BRT network has been designed to cater to the needs of traffic movement as envisioned under the Karachi Transport Masterplan 2030.





Figure 1.1: Location of Prince ICON on main M.A Jinnah Road



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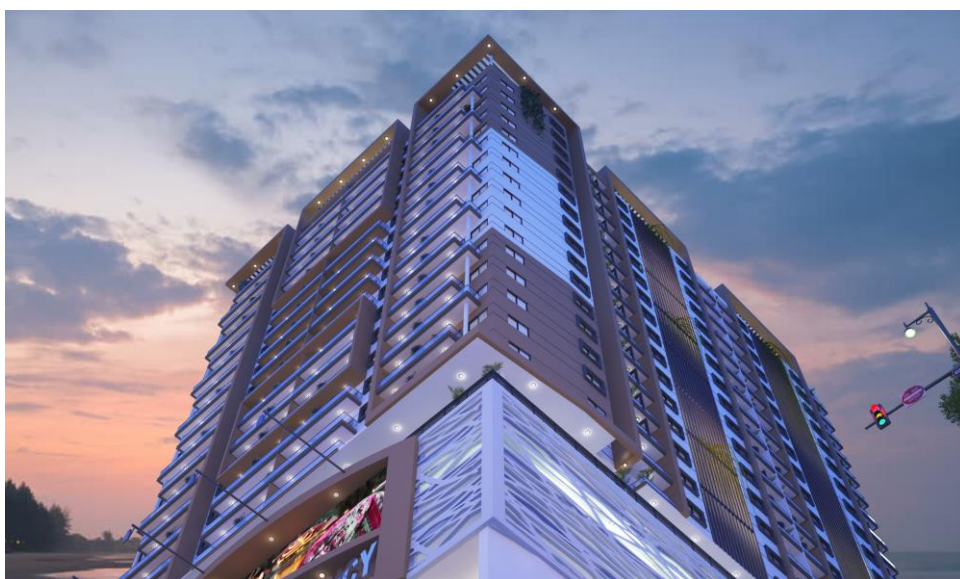


Figure 1.2: Architectural view of Prince ICON



1.2 Need for Environmental Impact Assessment (EIA)

The EIA study is a mandatory requirement under the provisions of Sindh Environmental Protection Act 2014 and the rules made thereunder. Sindh Environmental Protection Act, 2014 under section 17 (1) mandatorily requires proponent of project to file an IEE or EIA, as the case may be, and obtain approval from the SEPA before commencing construction or operation of the project. Section 17 (1) of the 2014 Act is reproduced herein under for ready reference:

“17. (1) No proponent of a project shall commence construction or operation unless he has filed with the agency an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA), and has obtained from the Agency.”

Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations, 2014 (“2014 Regulations”) made in exercise of powers conferred under section 37 of the Act 2014 categorizes projects in three categories provided in Schedule I, II and III of the 2014 Regulations. Projects have been classified on the basis of expected degree of adverse environmental impact. Project types listed in Schedule II of the regulations are designated as potentially seriously damaging to the environment and require EIA, and those listed in Schedule I as having potentially less adverse effects and require an IEE.

The proposed project falls in category I (2) of the Schedule II (List of Projects requiring EIA) of the 2014 Regulations, which provides:

I. Urban development and tourism

(1)

(2) Residential/commercial high-rise buildings/apartments from 15 stories and above.

Accordingly, the requirement of an EIA study is justified in view of the project of the Plot Area > 2000 sq. yards and the number of storeys > 15. It is therefore necessary to prepare a detailed account of environmental impact of the proposed high-rise development so that appropriate interventions could be taken. This assessment focuses on various parameters covering all environmental & social issues including building stability, water & waste water management, sewage treatment plant, source of water, depth of ground water, solid waste management, traffic management, adequacy of parking area, safety & security, nearest sensitive zones/receptors and overall settlement density. The plan seeks to define the project in a holistic manner and suggest possible mitigation measures for development. It has been learnt that through early planning before the start of the project as well as through all phases of the project’s development, if environmental concerns are considered



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simultaneously with other technical and economic criteria, it may be possible to develop the housing projects with the safeguard of environmental and socioeconomic resources of microenvironment & macroenvironment of the area.

The assessment was conducted with the following objectives:

- Identify the regulatory requirements that apply to project activities in the proposed area, in the context of environmental protection, health & safety;
- Assess proposed project activities in terms of their likely impacts on the environment during the construction & operation phases of the project, in order to identify issues of environmental concern; and
- Recommend appropriate mitigation measures that can be incorporated into the design of the project to minimize any adverse environmental impacts identified.

1.3 Methodology for Environmental Assessment

EHS Services team was formally inducted in October 2019 to perform the Environmental Impact Assessment (EIA) of proposed Prince ICON project. This study has adopted the following methodology for assessment of impact of different activities:

- Team of EHS Services experts, including the Environmental Assessment Specialist conducted the reconnaissance survey to identify the critical environmental, social and ecological aspects of the area.
- Collection of information related to production activities on the impacted area to delineate the microenvironment of the Project
- Use of collected data for identification of hazards posed to safety, health and the environment and risks involved in different activities during the Project.
- Screening the potential environmental impacts by applying the checklist method to prepare the EIA report according to SEPA guidelines.

The environmental assessment is based on comparative evaluation of the environmental quality before and after establishment of the Project. For this purpose, the baseline or the profile of the project area was developed by collecting data, records and information on physical, ecological as well as socioeconomic environment of Depot Lines area which forms the microenvironment of project. Following screening of potential environmental impacts, the requirement for mitigation measures to address the impacts is presented. The report also includes the Environmental Management Plan that will be implemented during the





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construction & operation phases. Environmental Management Plan (EMP) has been prepared to guide Project Proponent through the lifecycle of the project, and to enable them to maintain the environmental, social and work place conditions in conformity with the Health, Safety and Environmental legislations in vogue. The management plan outlines the details required to manage environmental, safety and occupational risks arising from the project activities as well as social issues.

Finally, the report has been compiled according to the guidelines for preparation and review of environmental assessment reports. The report includes description of the project, description of microenvironment and macroenvironment, public consultation and screening of potential environmental impact of activities during the pre-construction, construction and operation phases.

The report has been presented in the following sections:

Section 1 - Introduction to Project and EIA Processes

Section 2 - Description of Project

Section 3 - Overview of National and Provincial Legislation & Guidelines relevant to the project and to this EIA

Section 4 - Description of Environment of Project Area

Section 5 - Public Consultation & Participation

Section 6- Screening of Potential Environmental Impacts & Mitigation Measures

Section 7 - Environmental Management and Monitoring Plan (EMP)

Section 8 - Conclusion and Recommendations





2. Description of Project

2.1 Project Setting

The Project: Prince ICON site is situated at Survey 90, Depot Lines, Karachi Cantt measuring 3,740 sq. yards in the midst of CBD, M.A Jinnah Road where Karachi Cantonment Board has introduced its densification plan. It is ideally served by the network comprising: (i) M.A Jinnah Road having connectivity with the green line bus rapid transit corridor on the immediate South, (ii) Rizvi Shaheed Road on the East, (iii) Depot Lines road on the West, and (iv) Kiyani Shaheed road on the North. Karachi Cantonment Board (KCB) has adequately developed the area with necessary infrastructure facilities. The infrastructure development works along green line BRT corridor including Bus Stations, Depot, OCC building is near to completion while main corridor, elevators & escalators and lighting works have already been completed by Sindh Infrastructure Development Company Limited (SIDCL), GOP.

Topographic map of the project area is shown in figure 2.2.

2.2 The Project

The project entails construction of a 21 storey high-rise building comprising basement (services), ground floor (06 showrooms + services), 1st to 3rd Floor (parking), 4th Floor (amenities), 5th Floor (mechanical area), 6th Floor to 21st Floors (192 Offices) & Roof Top (utilities + services). Total built-up area and covered area of the project (F.A.R) is 456,869 sq. ft and 197,683 sq. ft respectively.

Submission Drawings are shown in figure 2.3.

The project addresses the issues of energy & environment and provides the most effective solutions. The green systems integrated in the building design will create positive and sustainable urban image to the environment and improve social and ecological resources of Karachi.

2.3 Statutory Approvals

The project is proposed on a by-birth commercial plot; it was leased for building shops, showrooms, offices and cinema by the Karachi Cantonment Board. The lease of the plot is valid with provision of renewal. Currently this site is an open plot (Figure 1.2) free from all encumbrances.

The proponent has obtained necessary no objection certificates or letters showing intention to provide amenities. The proponent has so far obtained NOC for electrical connection from KE vide letter No. S&BD/201910307 dated 02nd





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December 2019; SSGC vide letter No. Sales/NOC/MK-Sur90/12/19 dated 4th December 2019; KWSB vide letter No. Secy/NOC Committee/RRG/2019/478 dated 5th December 2019; CAA height clearance of 500 feet Above Ground Level (AGL) or 536 feet Above Mean Sea Level (AMSL) vide letter No. HQCAA / 1117 / 003 / ARAS/KHI-895/750 dated 11th July 2019.

Statutory approvals / NOCs are attached at Annex-I.



Figure 2.1: Current status of the Plot

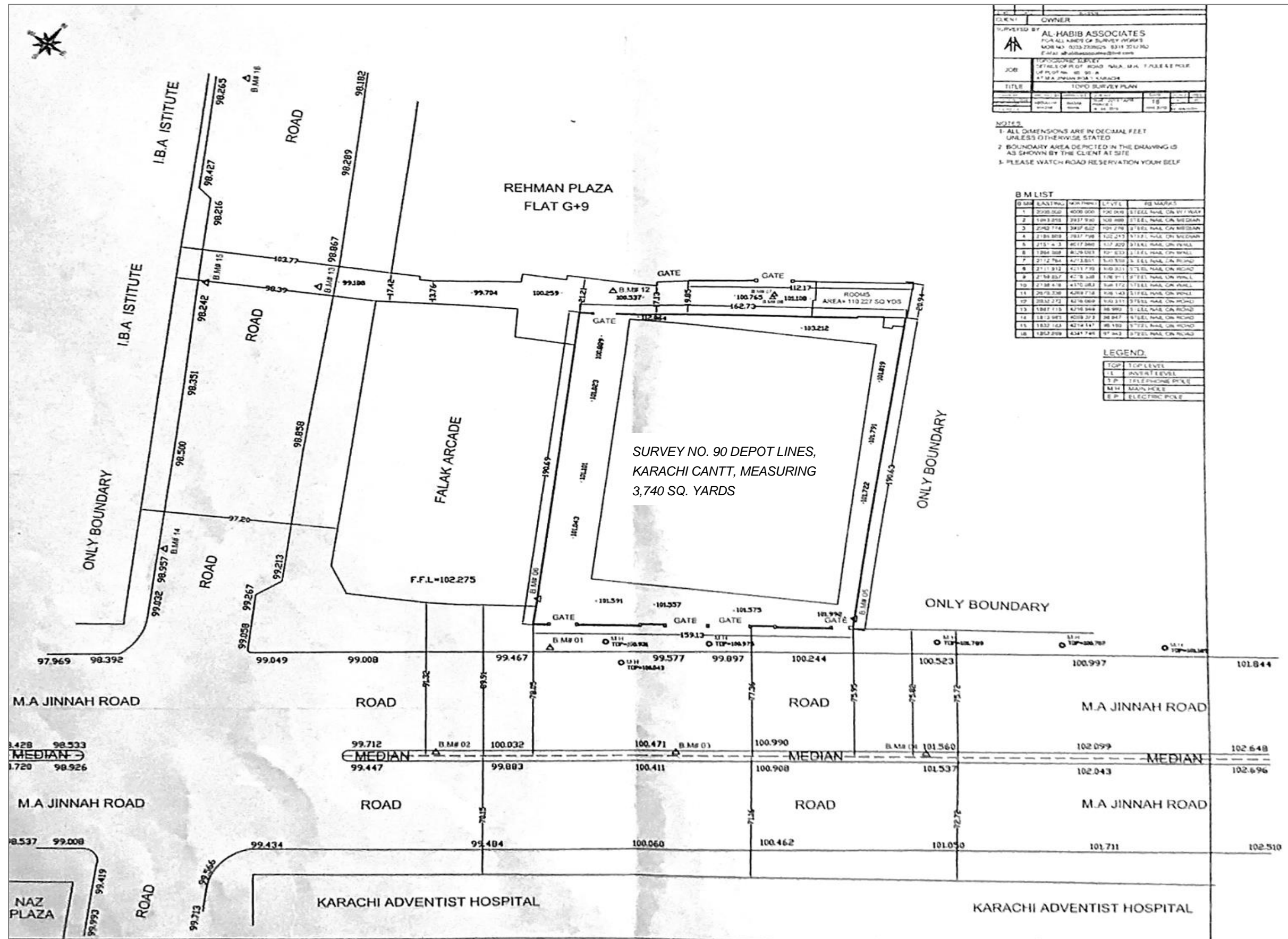


Figure 2.2: Topographical map of the project area



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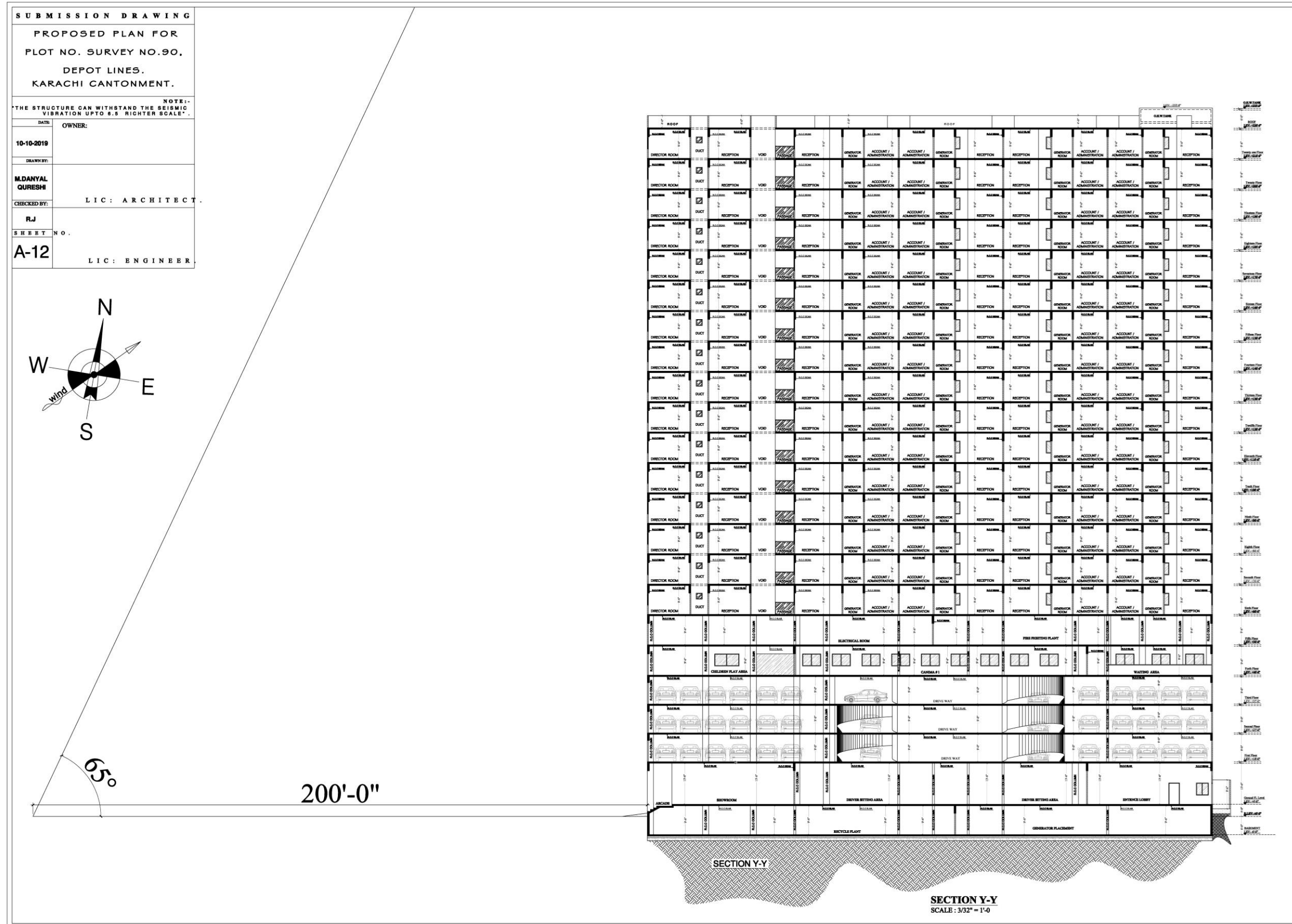


Figure 2.3: Submission Drawing

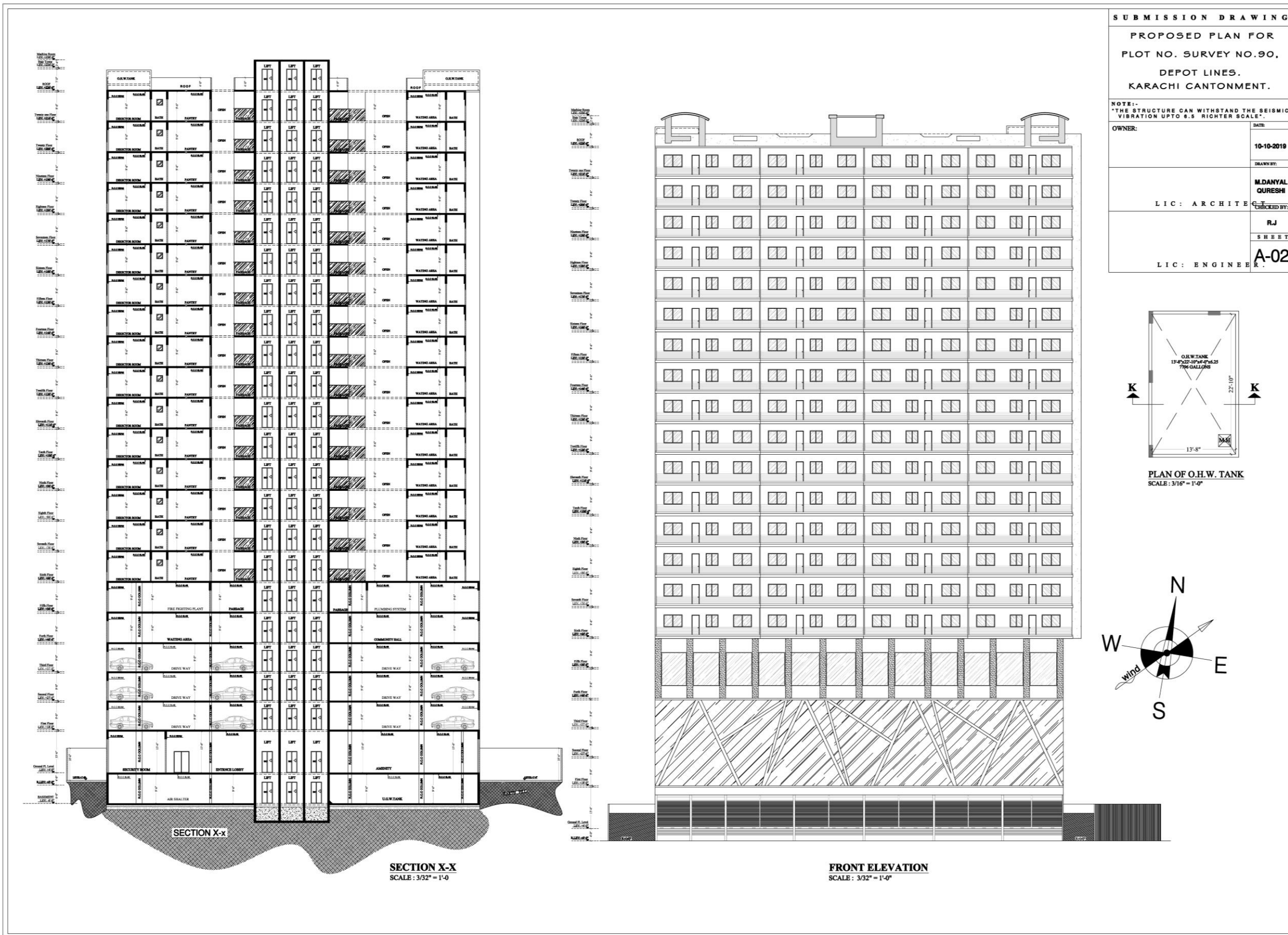


Figure 2.3: Submission Drawing



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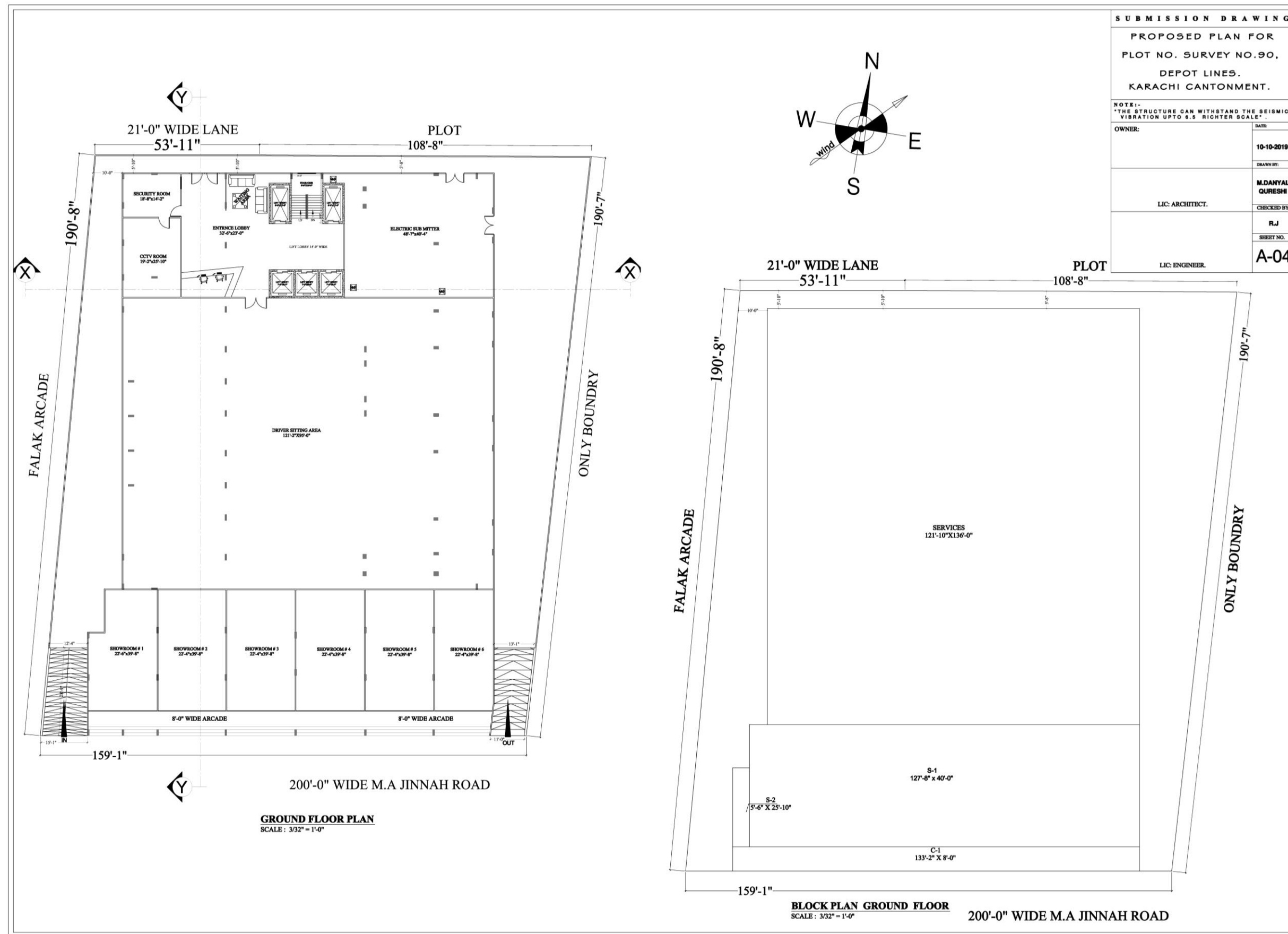


Figure 2.3: Submission Drawing



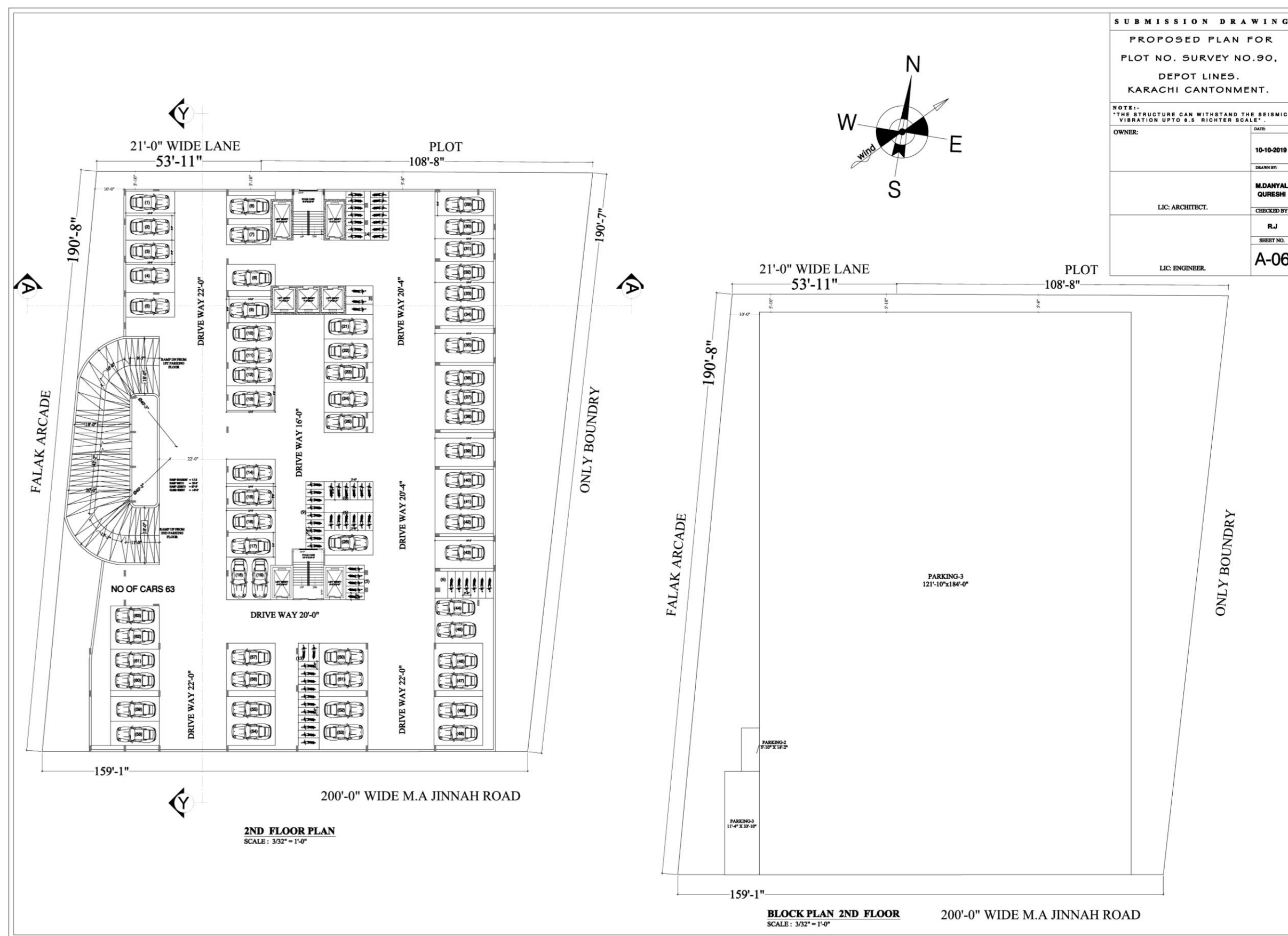


Figure 2.3: Submission Drawing

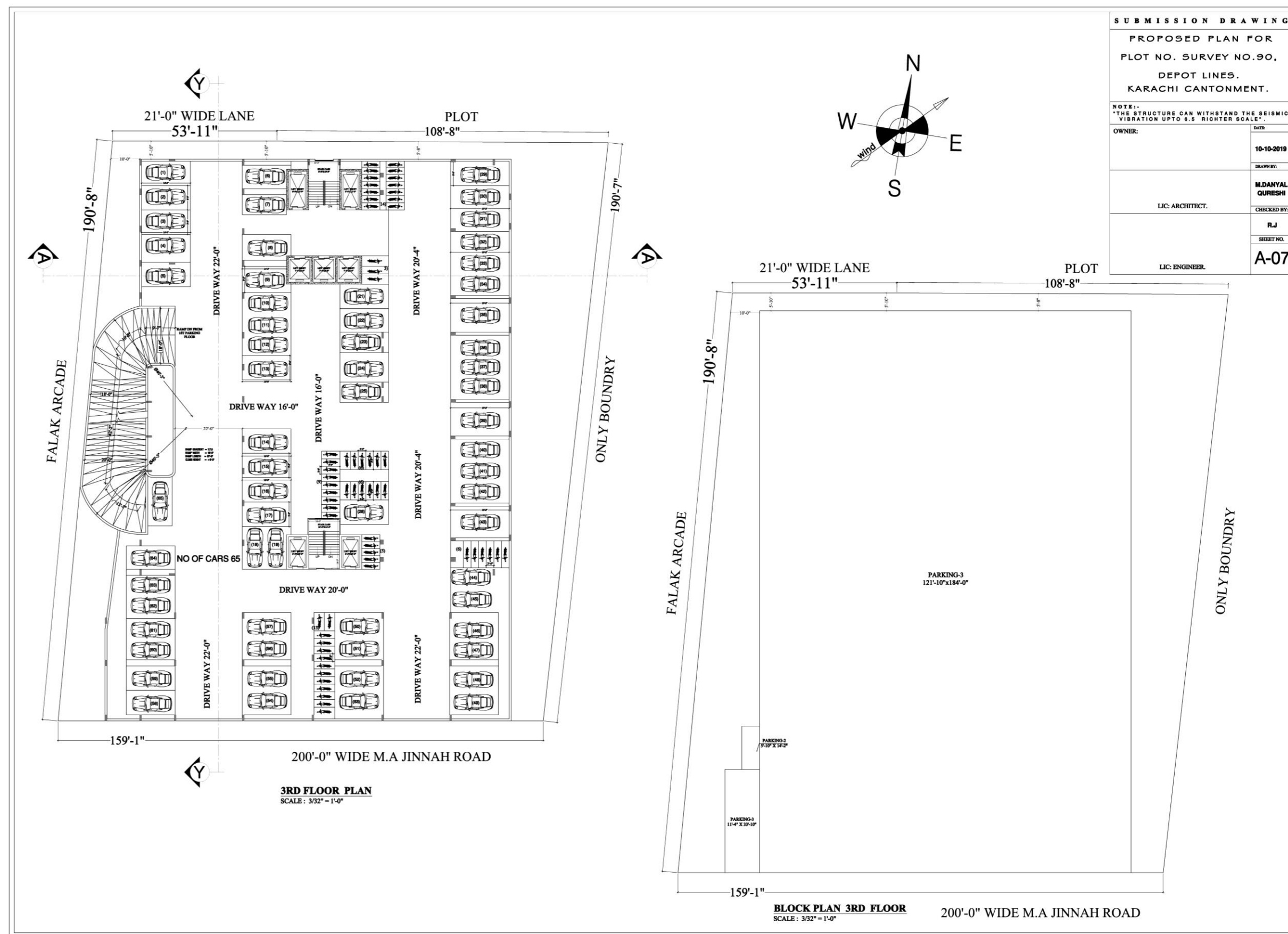


Figure 2.3: Submission Drawing

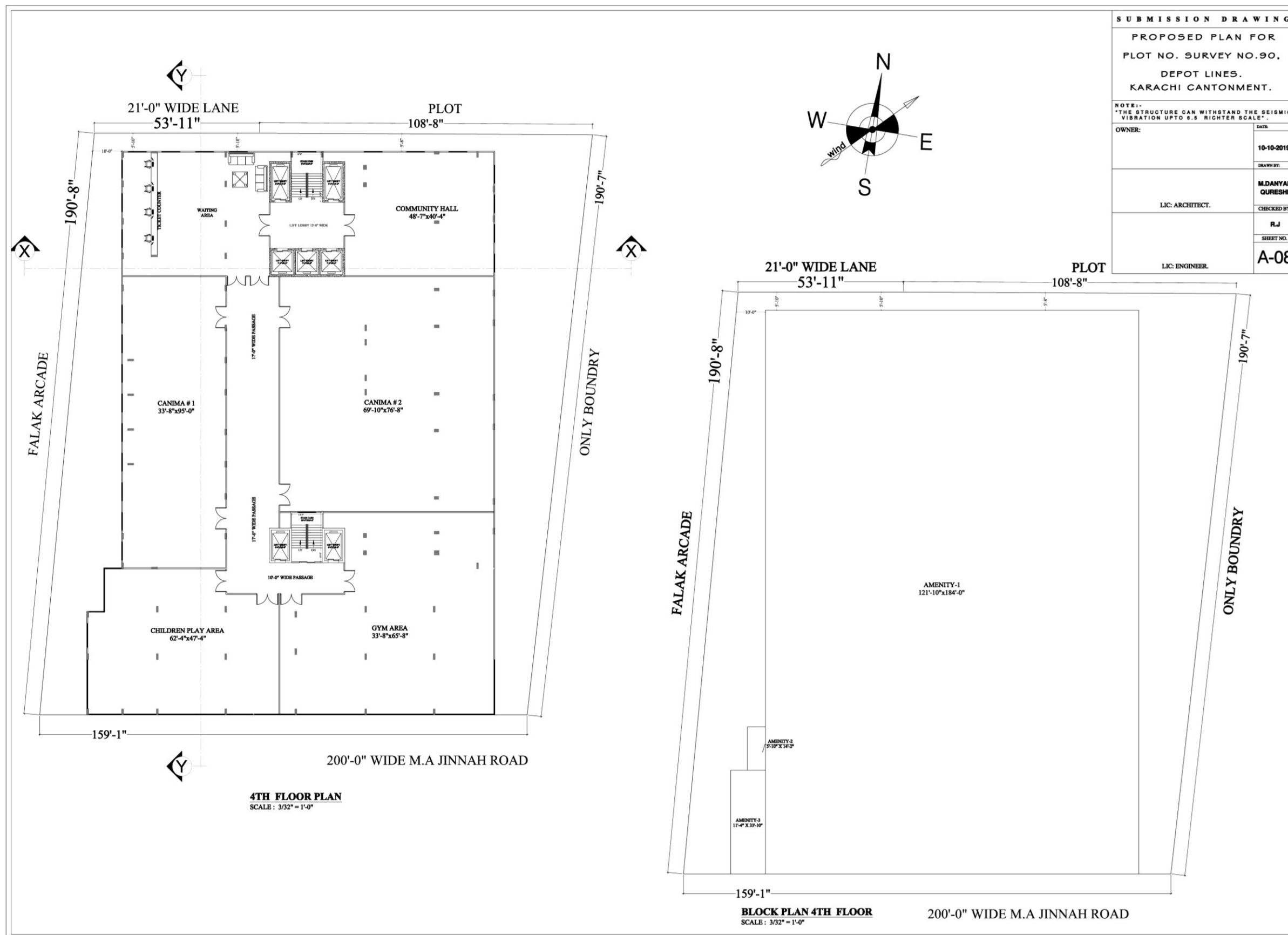


Figure 2.3: Submission Drawing

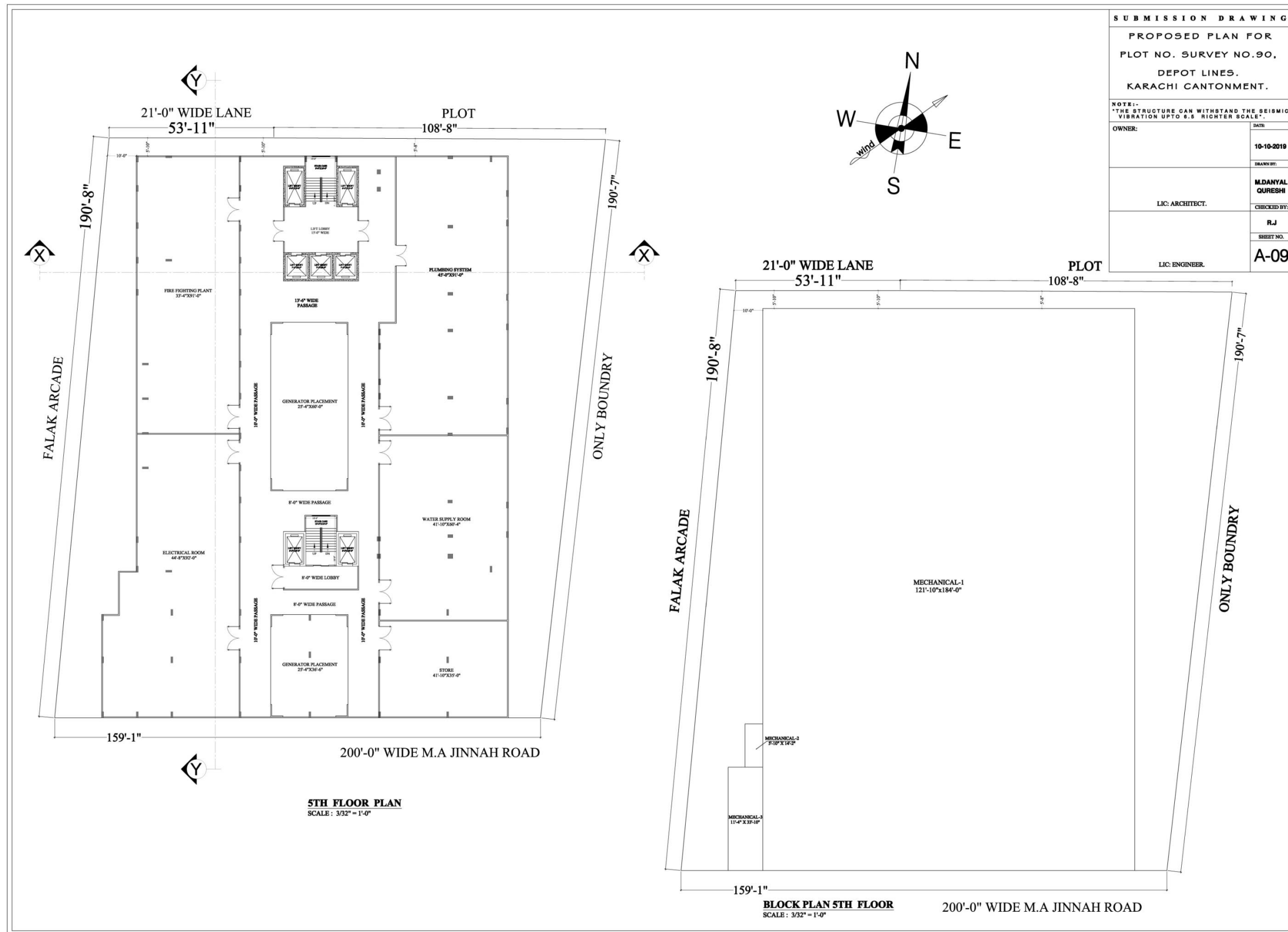


Figure 2.3: Submission Drawing

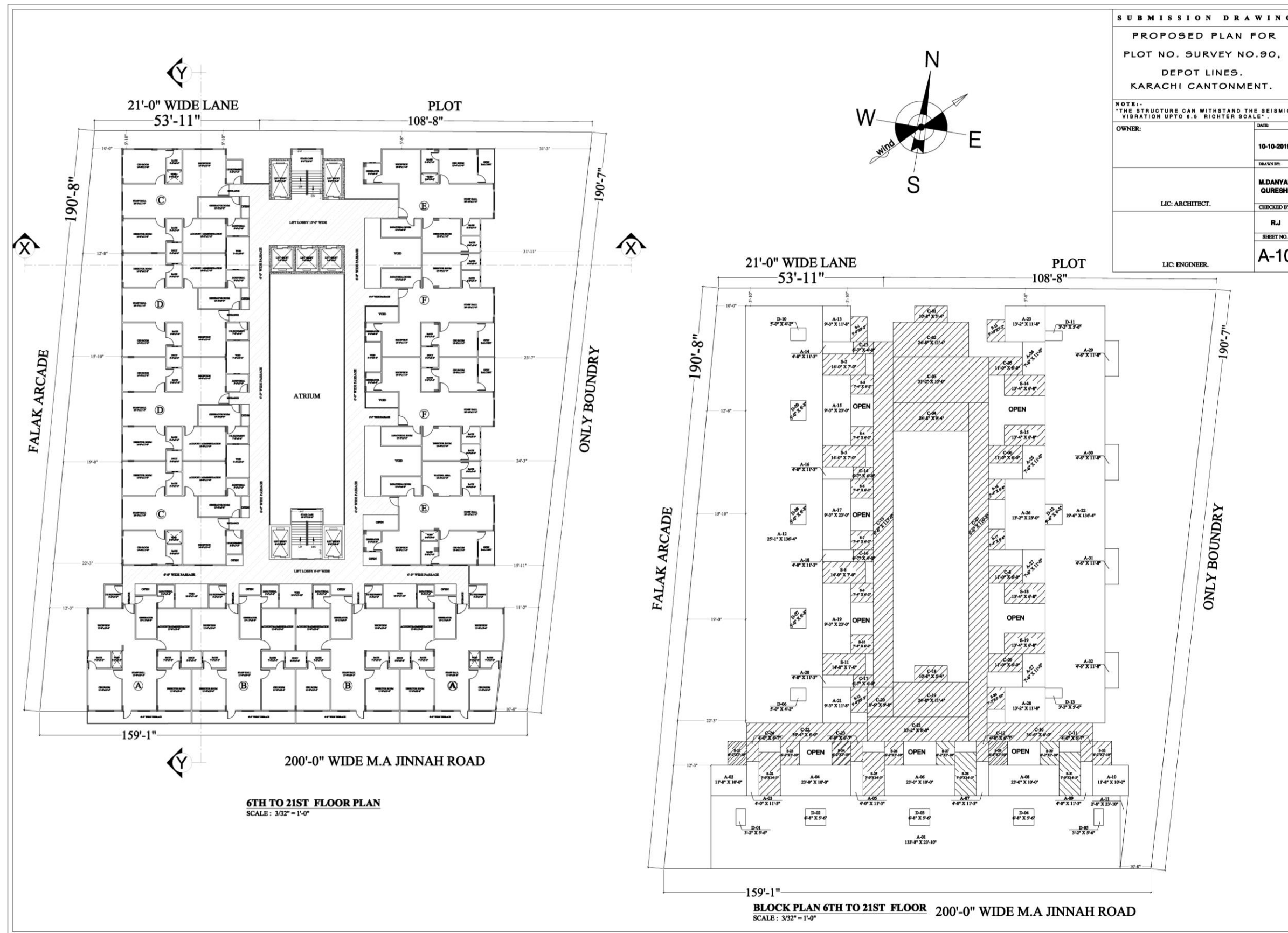


Figure 2.3: Submission Drawing

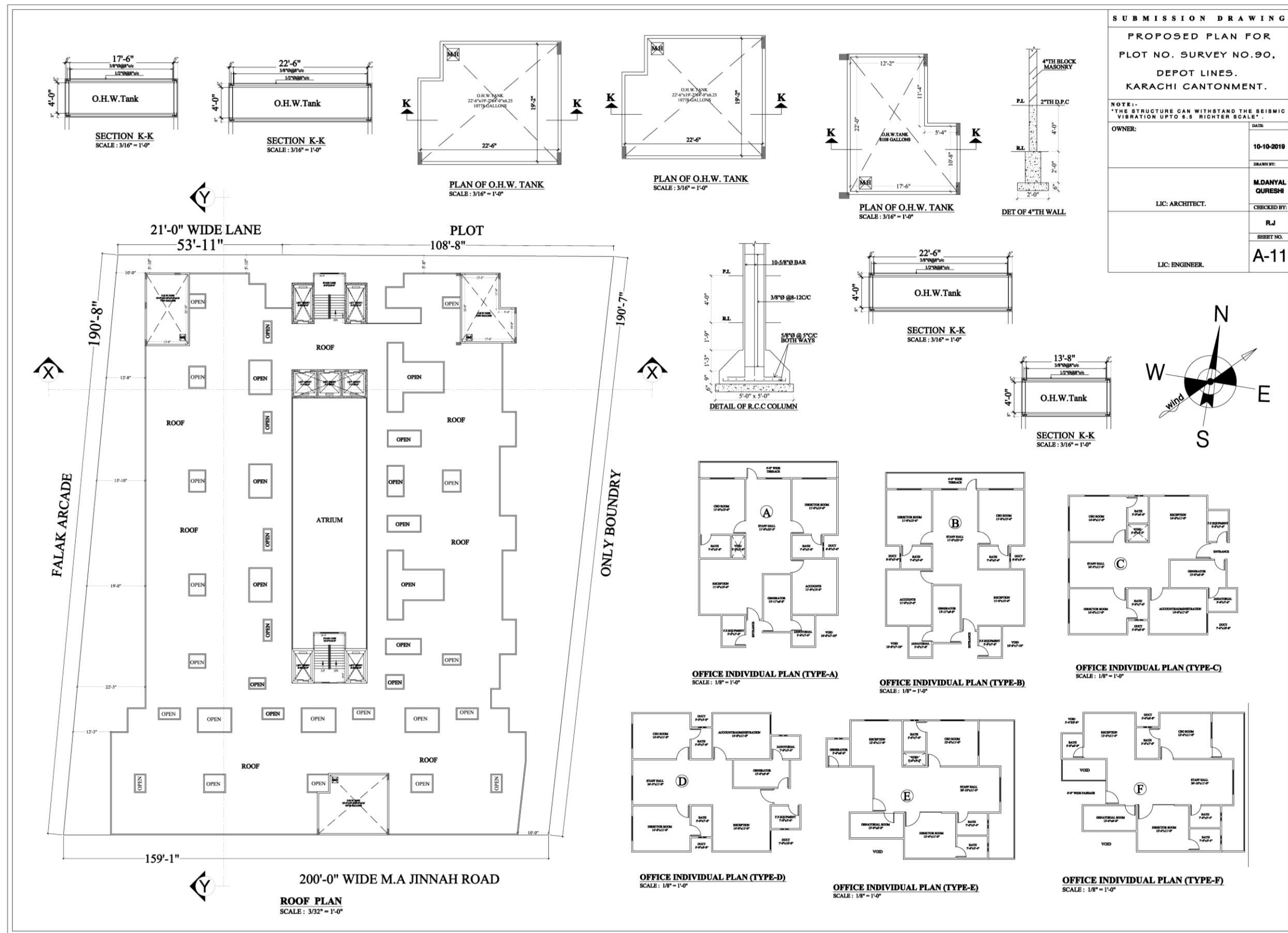


Figure 2.3: Submission Drawing



2.4 Construction & Commissioning

2.4.1 Pre-Construction Phase

This is an essential phase that provides the basis for the construction program, the methodology to be adopted and the technologies to be involved. The project site has been assessed in terms of its geology, seismicity and seismo-tectonics. A detailed geo-technical investigation was conducted and load bearing capacity of the soil was established.

A detailed soil investigation report of the project site is attached at Annex-II.

2.4.2 Construction Phase

The construction activity on the Project will commence with the approval from Sindh EPA. Besides, all necessary formalities will be fulfilled and NOCs from different departments will be obtained.

Standard & environmentally compatible construction materials (cement, sand, steel reinforcement, bricks etc.) and techniques/construction practices will be employed besides adopting Standard Operating Procedures (SOPs).

2.4.3 Standard Operating Procedures (SOPs)

2.4.3.1 Structure Works

2.4.3.1.1 Dismantling of Pile Heads:

- Correct cutting levels will be marked using survey instrument and a cut along the marking will be made with cutting disk at least 4 centimeters into the core. Pile heads will be cut using hilti breaker machines up to required depth. Debris will be removed from site using trolleys.



2.4.3.1.2 Excavation, Backfilling & Dewatering:

- Excavation of raft foundation and footings shall be carried out with mechanical means by using excavators and front-end loaders in one go. All excavated material which is unsuitable, and or is not required for backfilling, shall be disposed of from the site as directed by the Engineer through mechanical dump trucks. Earth shoring/retention for the excavation during the entire period of construction shall be carried out as required.
- After excavation for foundation removal of water (dewatering) will be performed using Donkey Pump to avoid rise of water level which may weaken strength of foundation. For backfilling works, excavated material will be backfilled in layers and compaction will be done on every layer.



2.4.3.1.3 Laying of OFM Concrete Works:

Lean Concrete:

- All non-structural concrete such as lean concrete and other binding concrete shall be carried out using ready mix concrete where cement shall be provided by Owner. This being a non-structural concrete does not require vibration however Roding, ramming and floating as required shall be performed. Curing of such concrete shall be carried out by making bunds with sand/earth on all surfaces of the concrete and pounding it with water.

Raft Foundation, Columns/Shear Wall, Beams, Slab, Lift Wall & Stairs, UG, OHWT & Septic Tank:

- All formwork activities will be carried out in accordance with the specification.



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- After studying the structural drawings, the Project Engineer will plan for sizes, numbers and type of formwork to be used in consultation with the Structural Engineer, if required. Depending upon the programme, the number of repetitions will be decided.
- Availability of formwork will be checked with the Procurement Manager and decision will be taken to buy, hire or reuse formwork material.
- During fabrication of formwork shutters, all dimensions shall be cross-checked with a view to avoiding corrective action during erection.
- Paint reference numbers on all panels to ensure their use in correct positions.
- Ensure that the props, shores, waling, bearers, clamps and tie rods are the right size and at the correct spacing. The Formwork designer shall check the formwork system with respect to load imposed on it and design parameters as laid down in the specification.
- Check quality of shutter lining, tightness of bolts and wedges, built-in items, inserts and other embedment.
- Tie – rod holes to be made in the formwork shall be neat so that they can be patched or plugged later on.
- Particular attention will be paid to the rigidity and line of stop ends and joint formers.
- Remove all tie-wire clippings and nails, which may stain both the formwork and the concrete.
- Ensure that adequate access and working platforms are in place for the concreting gang and that toe boards and guardrails are provided.
- A spreader or lifting beam shall be used to prevent distortion when placing formwork.
- Adjustable steel props shall be erected in plumb and verticality of props checked using a spirit level.
- A prop should not be used if it is bent, creased or, rusted or has a bent head or base plate, damaged pin etc.
- Proper release of agent shall be used so that it can be removed without damaging the surface finish of the concrete.
- A close watch shall be kept on all wedges and fastenings. Make sure that they do not work loose. Grout loss is an indication that some movement has occurred.

Safety during Formwork Operations:

- The weights of large prefabricated sections of formwork should be marked on them so that the lifting capacity of the crane at the working radius is not exceeded. Lifting points are usually provided.
- Fire extinguishers in working order shall be in close proximity to the stored formwork.





- The quantity of concrete is calculated and requisition will be made. On the approval of requisition, the batch mix is ordered to the ready-mix concrete supplier provided with the required Compressive strength of concrete.
- The ready-mix supplier calculates the design mix of concrete required to achieve the specified strength. The required revolutions for mixing of concrete and slump are calculated by estimating the distance of ready-mix plant with the placement site. The concrete is then placed in the tilting mixer, which then transports the concrete to the required job site.
- The arrangements for placement of concrete are done at site in due course of batching and transportation of ready-mix concrete at job site. The labours are equipped with proper PPE's and required tools are provided to them for effective placement of concrete at the required area. Before the arrival of ready-mix vehicle, proper pathway is maintained to ensure the operation of vehicle at the designated location.
- The concrete shall be compacted by using mechanical vibrator for the required time. Over vibration shall be avoided in wet concrete mix to avoid segregation of concrete. On the other hand, lesser vibration might result in air voids/ pockets left in concrete which may result in honey-combing of concrete.
- Approved admixture is used during large concreting activities to increase the setting time of concrete. The slump test is carried out at site to check the required slump of concrete for the activity and water-cement ratio to obtain the required workability of concrete.
- The concrete cubes/cylinders are prepared for the standard testing procedures in order to check the required compressive strength of concrete via the approved testing laboratory/in the on-site lab. A pour slip/check request shall be prepared and signed by the Engineer prior to every concreting activity for official documentation of the type and location of concrete.
- The finishing of concrete shall be done as per the required surface. If the concrete is to be placed in foundation.
- The curing of concrete will be done by wet jute bags (vertical members) or by ponding over the slab (horizontal members). The concrete shall be cured for

the required amount of time depending upon the type of structure in order to achieve its desirable strength. The curing of concrete can also be done by using self-curing compounds during the preparation of concrete (as specified /approved by the Engineer).



Fixing of Steel Reinforcement

- A bar bending schedule will be prepared by project engineer according to IFC drawings. Then it will be checked and verified by consultant's representative. After the approval of bar bending schedule, steel bars will be cut in required sizes by laborers. Steel bars will be transported to required location using hoist/ tower crane. Steel will be fixed according to drawing and will be bind using binding wires. All safety precautions will made in cutting, transporting and fixing of steel bars. Once the steel will be fixed, it will be check by consultant's representative, and will get approved for pouring of concrete.



2.4.3.2 Finishing Works

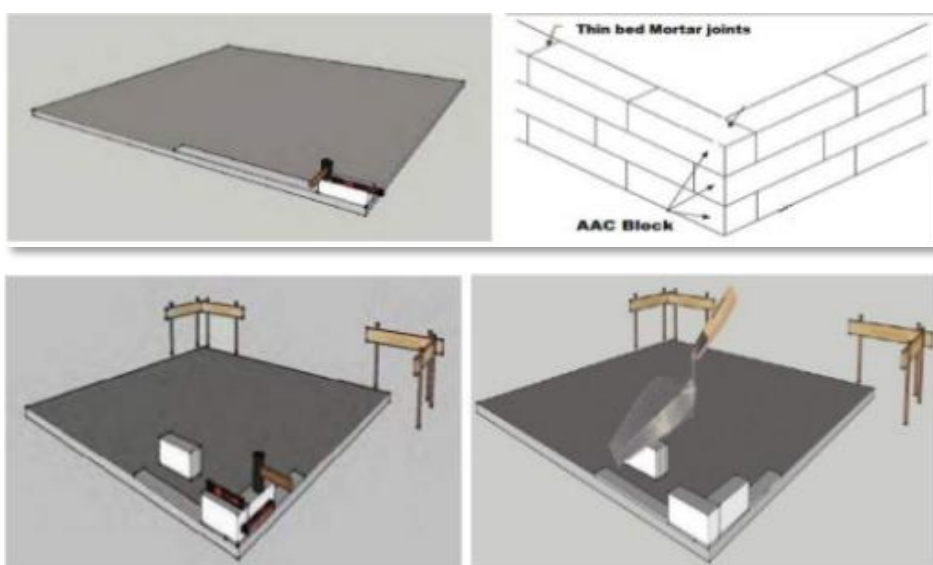
2.4.3.2.1 Masonry Works

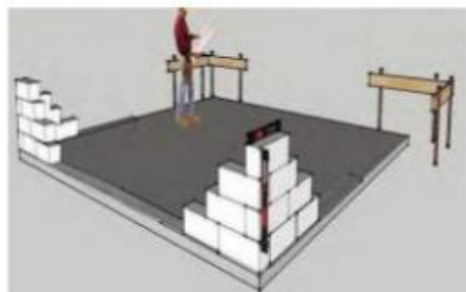
- OFM ACC Blocks installation shall start by laying out wall lines on building slab by control lines. At the highest corner of the slab, a full width ½" deep sand-cement mortar joint shall be placed using a masonry trowel. If moisture and

wicking occur, water resistance mixtures shall be added to sand-cement mortar ensuring top level of all blocks to be at the same height.



- First corner block shall now be set in sand-cement mortar and adjusted as needed. To achieve the required height, the block shall be raised or lowered by tapping down with a rubber mallet or by adding additional mortar beneath. Similarly, second corner block shall be set with $\frac{1}{4}$ " notched trowel. Subsequent steps shall be repeated for each corner using a builder's level to maintain an equal elevation. Triple check at each lead corner in all three planes shall be done.

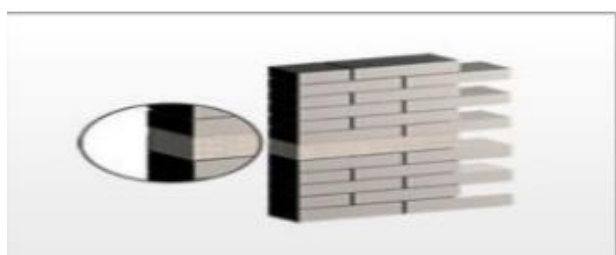




- After setting up the corners, remaining wall shall be built up with the proper measure so that no space is left between the blocks. An overlapping of the block shall be done with the center of the other blocks. After every 5-6 level of blocks a lintel has to be made with just two 6-8mm iron rod and a proper measurement has to be done to get the wall completely horizontal.

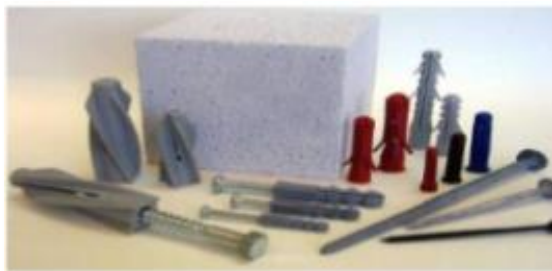


- Lintels where required shall be installed with a minimum 8" bearing (overlap). End bearings for lintel should normally be not less than 8". Concrete spreaders or pad stones shall be incorporated where stresses under lintel will exceed permissible values. Lintels shall be provided on top of doors and windows. Concrete in fill shall be recommended where door is attached to the wall.



- Anchors used with AAC shall be made of plastic or nylon. To make holes for fasteners power drills shall be used. For electrical conduits and piping

installation, a chase shall be cut using an electrical router or a chasing tool. A power drill or router can be used to install an electrical box.



2.4.3.2.2 Internal Plaster ½" thick

- Application of plaster is the final surface of structure provide leveled and / or designed surface to beautify, hide defects or repairs and protect structure, must have an appealing look. It is mainly based on the surfaces prepared prior. ½" thick plaster with a ratio of 1:4 cement sand internal plaster will be applied including approved water proofing chemical. It is important to prepare the prior surfaces well in level and plumb.



- Ceiling plaster will not be done due to use of marine ply in formwork.

2.4.3.2.3 Tiling Works

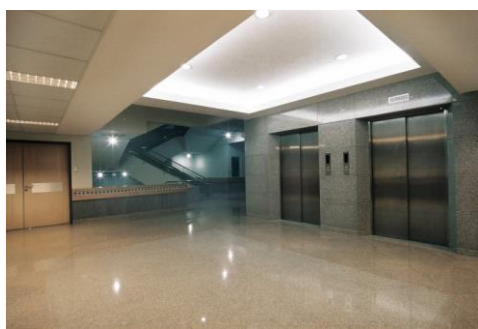
- Different floorings are proposed for multiple uses. The Tiling works include ceramic tiles in bath & kitchen and, porcelain tiles for flooring and skirting.



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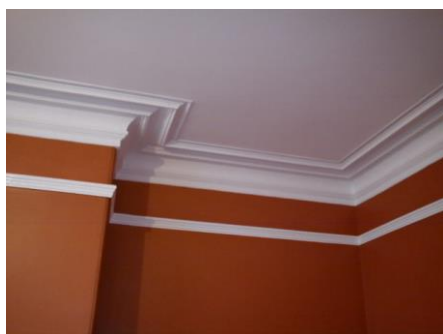
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- Chemically pre polished readymade marbles would lay on a 1-1/2" thick (for flooring) and 3/4" thick (for skirting) fresh layer of mortar, stuck tiles by spreading rich cement slurry over base leaving grooves between tiles grouted with colored cement slurry to match tile shade.
- Plain CC floor will spread to maintain the proper slope towards floor traps or as directed, and will make them nonporous by spreading cement slurry then would divide in squares by marking a straight string.



2.4.3.2.4 Internal Paint Works

- Application of painting of approved shades on prepared surfaces gives building a beautiful appearance to eyes; as well it protects plastered surfaces from atmospheric changes and may renew the appearance without any loss of structure.
- Process of painting will start by preparing plastered surfaces free of dents and cracks by spreading putty coat evenly and then will level by rubbing with sand paper. Plastered surfaces will be treated with lime wash before application of distemper. Where weather shield paint will be applied on exterior plastered walls or tapered surfaces.



2.4.3.2.5 Polish Work for Doors Frames Only

- Application of polishing is the process of creating a smooth and shiny surface by rubbing it or using a chemical action, leaving a surface with a significant specular reflection.
- Polish material will be shake well and then sprayed onto the surface of doors frames. Then it will be wiped immediately with a clean cloth and buffing will be continued until the required shine is achieved.



2.4.3.3 Plumbing Works - OFM

2.4.3.3.1 Water & Drainage Piping including Valves

- Pipe lines will be marked in ground line with operating drawing and supply barricading.
- Trenches will be excavated to needed depths as per operating drawings.
- Base of trench will be prepared for laying pipes, as per technical specifications.
- Pipes will be laid on the prepared base and support them at adequate intervals.
- Pipes will be tested for leaks harassed within the presence of consumer's representative and maintain a 'test certificate' punctually signed by the representatives of the client and contractor.
- Provide encasement with sand/granular material, if specified.
- Trenches will be backfilled in layers including compaction.
- Pipes will be hanged from ceiling using hanging accessories and will be joined with each other using suitable material.
- For plumbing works inside building area, pipe lines will be marked on walls as shown on the working drawing.
- The walls will be chiseled to required depth using a chiseler machine.
- Piping will be assembled beginning from branch left in shaft and introduce in the wall with braces.

- Fixture will be located according to working drawing and tile-module drawings. Title modules will be marked on walls by the civil contractor.
- All openings will be plugged and pipe work will be tested for leaks under specified pressure and for required duration.
- Hot water pipes will be insulated with the specified material.
- Positions of waste outlets will be located and marked, and core drills will be made where necessary.
- Pipe headers will be assembled and connected to branches left in the shaft for this purpose.
- All open ends will be plugged to prevent ingress of construction debris.



2.4.3.3.2 Fixing of Bathroom Fixtures

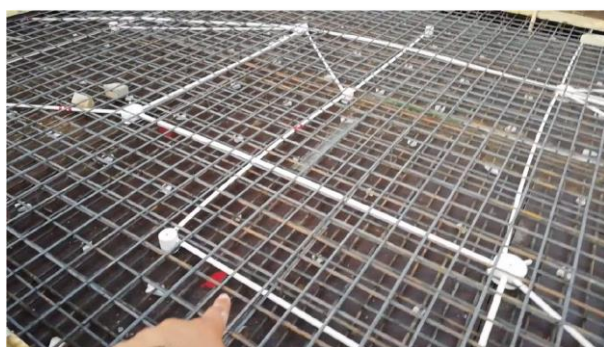
- Fixtures, taps and toilet accessories will be installed. Screws with nylon washers will be used to repair vitreous crockery and PTPE tape for installation of taps to pipe work.
- CP fittings will be checked for leaks and firmness. Proper tools will be used, so that no scratches or any other kind of damages on the chrome plated fixtures should occur.
- All bathroom fixtures including taps, basin, commode, etc. will be handled and fixed with great care to avoid its damage.



2.4.3.4 Electrical Works - OFM

2.4.3.4.1 Electrical Conduits

- Electrical conduits will be laid on shuttering, prior to the laying of concrete. Additional security will be provided near to every box and at intervals by binding short lengths of binding wires, twisted around the conduit and reinforcing steel. The conduits shall be adequately fixed to prevent excessive movement and damage during the pouring and setting of concrete and shall be protected from mechanical damage.
- Where conduits are left "open ended" prior to wiring they shall be protected by caps or plugs to prevent the ingress of building material.
- All conduits run will be designed to permit wiring to be readily installed after the complete erection of the conduits through the available draw-in, accessory and luminary suspension boxes.
- It will be ensured that conduits are not concealed until works has been inspected and approved. Ensure that conduit and fittings buried in concrete or behind plaster are protected against corrosion or electrolytic action prior to rendering.



2.4.3.4.2 Wiring

- A loop in form of wiring shall be used as far as practicable or unless otherwise indicated. Joints in conductors shall be made using insulated terminal blocks complying with requirements of this specification.
- At expansion joints adequate slack shall be left in the cable.
- Where conduits are installed for wiring by others, a draw wire shall be provided between each draw in position.
- Where three-phase circuits comprising single-core cables are installed in trucking, all cables shall be tied together at intervals.
- Cables forming part of alarm, control, communication or monitoring circuits shall have identification sleeves at their terminations. Identification shall be consistent with the relevant wiring diagrams.



2.4.3.4.3 Fixing of D.Bs Boards, Switches & Holders

- Switch boards will be fixed on previously installed boxes and wires will be connected to switches and sockets.
- Distribution boards will be fixed on locations indicated in working drawings as per approval of consultant.



2.4.3.4.4 Wiring & Fixing of Intercom

- An intercom system has one major focal point: the master station. It contains the electronic circuitry for the voice communications.
- A typical installation consists of a master station installed at a convenient location, several indoor substations, and an outdoor substation.
- In some intercom sets, all operations are controlled by the master station: power on/off, radio on/off, and call station selection.
- Wiring for intercom will be done in the same manner as electrical wiring and owner provided intercom sets will be placed/ fixed at required locations.



2.4.3.5 Construction Material and other Supplies

Main construction material to be used during the construction phase will include ready mix concrete that will be sourced through reputable companies. Additionally, paints, glass, wood, tiles, aluminum, PVC/GI pipes, concrete/cement pipes, electric cables, etc. will be used during the different phases of construction. The materials will be transported by trucks to the project site, where they will be stored until moved to different locations as and when required.

Materials including paving stone, crush, gravel and sand will be brought from commercial quarries located in the Sindh Province. Other general supplies transported will include office & camp supplies (food etc.) fuels, oils & equipment maintenance parts.

2.4.3.6 Site Restoration

On the completion of the construction phase, the entire site will be built-up thus no site restoration to original condition is required. External sites will not be used.

2.5 Plumbing System

2.5.1 Design Codes & Standards

The plumbing system will be based on the following codes & standards:

- International Plumbing Code 2012.



- American Society for Plumbing Engineers (ASPE) Handbook – 2010.
- Karachi Cantonment Board Bye Laws.

2.5.2 Scope of Plumbing System

The scope of plumbing services is as follows:

- Potable Water Supply
- Soil & Waste Water Drainage
- Septic Tank/Waste Water Treatment Plant
- Storm Water Drainage
- Natural Gas Supply.
- Irrigation Water Supply

2.5.3 Estimation of Water Requirements

- The estimated daily water demand of the project is 23, 520 gal/day.
- The above is based on an average commercial usage of 5 gal/person/day.
- Water requirement for recreational and amenity species has been estimated at approx. 10,000 gal/day.
- Project will have water storage reservoir of ~83,800-gal capacity to store water for 2.5 days
- Project will also have provision of a separate fire water reserve of ~75,000 gal.

2.5.4 Potable Water Supply System

2.5.4.1 Source of Water

- It was informed by the client that even if the water supply connection from KW&SB is given for the project, there will not be any supply from KW&SB mains.
- Therefore, the sustainable source of water supply will be tube wells with provisions for tanker water supply as well as city water supply.
- All the electrical resistivity values show less considerable water presence in the area.
- Study area is covered with Alluvium Deposits/Manchar Formation and Gaj Formation beneath them.
- The perch water level lies between 35 -95 Ft.
- Resistivity curves shows brackish water presence in Manchar formation.
- Resistivity curves shows saline water presence in Gaj formation.
- Test borehole of 400ft-500ft deep is recommended to get average yield of brackish water from Manchar Formation.



- Test borehole of 800ft-1000ft deep is recommended to get maximum yield of saline water from Gaj Formation.
- To meet the peak flow demand, it is proposed to install 2 Nos. Tube Wells
- Expected TDS of Tube Well Water will be 5,000-10,000 ppm thus raw water needs to be passed through the RO Plant in order to reduce the TDS.
- RO Plant will treat the Raw water and reduce the TDS to 500 ppm (Approx.).
- The treated water will be stored in Under Ground Water Tank.

2.5.4.2 Underground Water Storage Tanks (UGWT)

- Based on the fact that sub-soil water storage is continuously available, from where it can be pumped out as needed, it is recommended to make provision for 2.5 days storage in UGWT.
- The Capacity of UGWT for domestic use will be ~84,000-gal.
- The UGWT is sub-divided into two parts, to allow tanks to be isolated for maintenance.
- Each part of the UGWT's will have 44,000 gal.
- The inlet to the UGWT from tube wells after treatment through RO shall be metered.
- Arrangements to fill the UGWT's with water from tankers & city water will be provided, & all inflow shall be metered.

2.5.4.3 Water Supply Distribution System

- Submersible Pumps 2 Nos. (1 Standby) are proposed to be installed in the UGWT at Ground Floor.
- The supply from the Pump shall be routed up to the Roof. Vertical riser will fill the OHWT.
- The supply from OHWT shall be given to each office through the vertical riser.
- Separate lines will be installed for flushing water.
- Separate connection from OHWT to amenities will be provided which will be metered.
- For hot water supply, a gas operated geyser will be placed in the service yard.

2.5.5 Soil & Waste Water Drainage System

- All sanitary and waste water shall be collected through a system of horizontal drains that run-in slope and connect to vertical stacks.
- The design shall be based on a double stack system.
- All piping to run below slab and false ceiling will be done to hide these pipe runs.
- The drains from the kitchen sinks, floor drains and wash basins shall be connected to the waste piping.



- The waste water through the waste water risers will be stored in waste water storage tank.
- The waste shall flow by gravity to the Waste Water Treatment Plant (WWTP).
- The treated water will be pumped to the treated water tank.
- The treated water is then pumped to OHWT specifically designated for non-potable water storage. This waste water will be used for Flushing of WC's.
- A makeup water supply line will be provided to the non-potable in case the waste water treatment plant is not operational for any reason.
- The soil risers will be combined at the ground floor level via series of manholes and will then divert into a septic tank which shall be designed for a retention period of 24 hours.
- From the septic tank, the discharge will be connected to the nearby drain/nalla.
- Vents shall be taken from the main soil and waste risers.
- All balconies will have a drain outlet.

2.5.6 Storm Water Drainage System

- The storm water stacks shall be designed for a 15-minute storm water duration with a storm intensity of 3.5 in/ hour.
- The roofs of the development shall be sloped to the edges where rain water gutters shall direct the water to drainage stacks through roof drains.
- The ultimate disposal will be from 1st floor to ground floor from where it will be lead out of the property either to the main drain channel or to the hard landscape area outside the plot.

2.5.7 Natural Gas

- Project will have provision of gas connection from SSGC.
- Natural gas supply to each office shall be metered by installing individual gas meters.

2.5.8 Irrigation System

- The client will have the landscape designed by a specialist landscape designer.
- Design for water supply and drainage for the landscape areas shall be carried out subsequently.
- Currently, it is proposed that the irrigation for external landscape shall be carried out via treated waste water.



2.6 Fire Fighting System

2.6.1 Design Codes & Standards

Following standards have been followed in the design of fire suppression system.

- NFPA-10 – Standard for Portable Fire Extinguisher.
- NFPA-13 – Standard for the Installation of Sprinkler Systems.
- NFPA-14 – Standard for the Installation of Stand Pipe, Private Hydrant, & Hose Systems.
- NFPA-20 – Standard for the installation of Stationary Pumps for Fire Protection.

2.6.2 Scope of Fire Fighting System

- Portable Fire Extinguishers
- Fire Hose Reels
- Fire Hydrants and Landing Valves
- Automatic Fire Sprinklers
- Automatic Fire Pumps

2.6.3 Portable Fire Extinguisher

- Portable Fire Extinguishers shall be strategically located next to the fire hose reels throughout the building to cover all the spaces.
- Two types of extinguishers shall be installed
 - Dry Powder
 - Carbon Dioxide

2.6.4 Fire Hose Reel

- 1-inch dia. x 100 ft long hose reels shall be located near to stairs/in the lobby at each floor, to provide complete protection at each point on the floor for first-aid firefighting. Fire hose reels are designed to allow all occupied areas to be within the range of 20ft of the nozzle.

2.6.5 Fire Hydrants & Landing Valves

- Fire Hydrants shall be installed as per NFPA-14 and shall be located in every mid-landing in stair-cases
- These shall be provided with the quick – connect couplings compatible to Pakistan Fire Brigade use.



2.6.6 Fire Brigade Inlet Connection

- Fire Brigade inlet connection shall be provided at the Ground Level.
- These connections shall allow the Fire Brigades to their water supplies & pump into the Fire Suppression System.

2.6.7 Automatic Fire Sprinkler

- Automatic fire sprinklers shall only be installed in retails at ground floor.
- Automatic fire sprinklers operate selectively wherever there is a fire, and are the best defense against fire; one that works automatically without human intervention.

2.6.8 Automatic Fire Pumps

- Fire Pumps shall be installed and connected to the tank having fire reserves of 75,000 gal to provide one hour of in-house firefighting capability.
- Secondary reserve is also provided on roof.
- Main Pump shall be operated electrically with controller.
- Standby Pump shall be Diesel Engine operated with controller.
- Jockey Pumps shall be electrically operated with controller.
- All the Pumps shall be UL listed and FM approved.

2.7 HVAC System

2.7.1 Scope of Works

- Refrigerant Piping
- Condensate Drain Piping

2.7.2 Refrigerant Piping Works

- Refrigerant piping shall be done in each office from the locations proposed by architect for the placement of indoor units to the outdoor units.
- All piping will be surface mounted and will only be concealed via architectural elements and features. No pipes shall be concealed in the wall.

2.7.3 Condensate Drain Piping Works

- Surface run drain line shall be connected to the nearest drains in the toilets or to the balcony drain.



2.8 Electrical Works

2.8.1 Design Codes & Standards

- BS 7671 Requirements of Electrical Installations. IET Wiring Regulations
- National Electric Code
- Pakistan Electricity Rules
- Pakistan Building Code

2.8.2 Scope of Works

The scope of work related to Electrical Works is as follow:

1- Electrical Works

- Main Electrical Distribution system
- Standby Power Supply/D. G Sets
- Earthing/Lightning Protection
- Illumination Design/Small Power
- ELV Systems comprising of:
 - Data/Tel./Cable TV/Internet
 - CCTV (In Common Areas/External Area)
 - Fire Alarm (In Common Area)
 - Intercom System

2- Vertical Transportation

2.8.3 Electrical Distribution Network

- Space for KE Sub Station as per KE specs/requirement, has been marked on ground floor.
- Individual Metering to be provided by KE.
- Meter Locations has been proposed on ground floor. Common facilities Meters also be placed in same location.
- KE power supply to individual Locations (Appt. Distribution Boards) shall be done by LV power cables running through dedicated Shafts/Electrical Rooms provided on all floors.
- For the Common Areas/Services, DB shall be located in the respective Elect Rooms/Elevators Machine Rooms.



2.8.4 Emergency Power Supply

- The Emergency power supply for the showrooms & offices shall be through dedicated DG SETS.
- All lights of common areas/facilities/ elevators, Water Pumps and other critical loads to be identified will also be on emergency power supply.
- The DG sets shall be auto start/synchronized with Load.
- While KE supply shall be charged /payable to KE, Emergency Power Supply bill for the common areas /facilities shall be shared among all owners.

2.8.5 Earthing and Lightning Protection

- Earthing Design shall be based on a TN-S system in compliance with requirements.
- Lightning protection shall be designed on Faraday Cage principle or protected by Early Streamer Protection device.
- Earthing/Lightning protection shall be designed in consultation with Client's Team.

2.8.6 Lighting and Small Power

- For Offices - light points/Fan Points shall be provided in coordination with Architect and Furniture layout. Switches & sockets shall be part of furnishings by Developers.
- Parking/Common Areas /Elect. and Mechanical Spaces and Landscape, Security lighting etc. shall be designed to meet the recommended levels utilizing LED lights with individual group switching controls.
- Battery backed maintained exit lights and 10% of the lights for Emergency purposes shall be provided.
- Obstruction Light as per recommendation of CAA, if required, shall be provided on roof top.

2.8.7 Extra Low Voltage (ELV) Systems

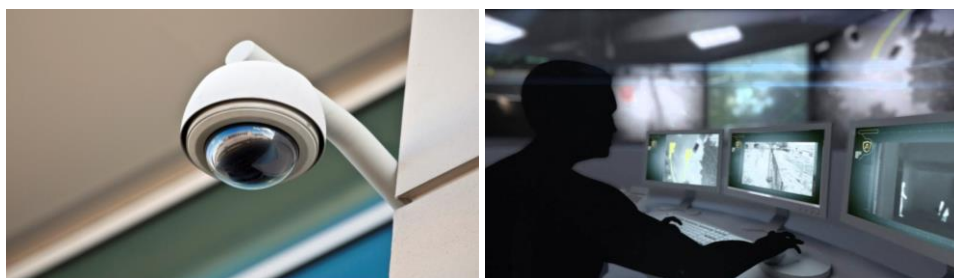
- A complete ELV system covering VOICE/INTERNET/CABLE TV shall be provided through STRUCTURED CABLING/DISTRIBUTION DEVICES to each occupant.
- For these requirements, a flexible system shall be opted in order to minimize any additional rework on completion of infrastructure. Fiber Back Bone/PRI from PTCL and coordination with other service Facility Providers shall be done for finalization.
- For the Proposed ELV system cabling riser and passive device, ELV cabinet has been proposed on each floor. Individual Cables run and further distribution from here to each office at designated location.



- Fire Alarm system shall be provided in common areas/recreation area.
- Manual call points/fire bell shall be provided near emergency stair cases / sensitive locations. Main FACP shall be located in the control/ security room for monitoring.

2.8.8 Building Security

- Intercom from security desk at ground floor to each individual office for facilitation to visitors/ occupants shall be provided.
- CCTV cameras at Bldg. entrance/perimeter/Lift Lobbies/stair cases shall be provided with monitoring at Security Desk on 24 Hrs. basis.
- A close circuit television (CCTV) surveillance system shall be provided to monitor activities in a large number of diverse locations simultaneously. The system will be PC based with recording facility. A bank of monitor screen will be provided in the security control room. 24-hour recording facility will also be provided.
- CCTV cameras shall be strategically placed to monitor not limited to following locations:
 - External Entrances
 - Parking Exit/Entrances
 - Lift/Stair Lobbies
- Cameras shall be of the color type and generally with fixed mounting. All cameras signals shall be wired back to a Console located at the ground floor. The Console shall house the following basic equipment.
 - Digital Video Recorders
 - LCD Monitors



2.9 Vertical Transportation

- CODES: BS / EN-81
- Building shall have 02 Nos. passenger elevators (G.F to top level) with a separate 01 elevator as a service/stretchers elevator to handle the patient during emergencies.
- Service/Stretchers Elevator shall be also being Fire Rated and shall serve as a purpose of rescue in case of Fire – Optional.



2.10 Solid Waste Disposal

The solid waste generated on site will be collected daily by a solid waste contractor who will dispose of it in a responsible manner. Numbers of trash bins will be located inside the building and people will be appointed for collection of solid waste. Provision of a garbage chute system is built into the project design.

2.11 Illumination

Combination of low consumption, high efficient TLD and Compact fluorescent lamps shall be used for offices and showrooms (Lift Lobbies, Staircase, Electro-mechanical plant rooms, car parks, corridors and passages). The lighting layout shall be designed to meet the recommended lighting levels as per prevailing international standards.

2.11.1 Internal Lighting

The general principles that underpin the lighting scheme are listed below.

- Maximize the opportunities afforded by natural light.
- Provide adequate and appropriate levels of light for the functions and activities of different areas.
- Provide a balance between functionality, colour, texture and contrast.
- Provide an appropriate expression of the architecture within the building and outside of the building.
- Limit environmental impact and light pollution.
- Use low energy technologies wherever possible and appropriate without compromising visual comfort and utility.
- Use of long-life source to assist in the reduction of maintenance costs.
- Limit the number of lamp and equipment type to assist in the reduction of maintenance costs.
- Use automated lighting control, presence detection and similar facilities to manage energy.
- Integrate with other systems to provide for the requirements of emergency lighting, fire alarm, security and cleaning, etc.
- Integration with ceiling systems and mechanical designs.
- The appropriate lamp selection will take account of:
 - Lighting output
 - Colour rendering index
 - Colour temperature
 - Life
 - Cost in use
 - Environmental impact



- Recommended applications
- Flexibility of the system

2.11.2 External Lighting

The exterior lighting system serves three functions for the movement of vehicles and pedestrians over frequented route and places:

- Security
- Safety
- Representational lighting

Provide lighting for all primary & secondary roadways and other areas where pedestrian and vehicular traffic occurs. Circuits are arranged so that no single circuit failure will cause any two adjacent lights to fail.

2.11.3 Emergency Lighting

Emergency lighting is part of the safety network of any premises which also includes fire alarm, sprinkler, firefighting equipment, etc. the purpose of emergency lighting is to ensure that lighting is provided promptly, automatically and for a suitable time in a specified area when the normal power supply to the normal lighting fails (or switched “off” during fire conditions).

The emergency lighting is categorized in three sections as follows:

- Emergency escape lighting – for safe exit from location;
- Open area lighting – reducing the likelihood of panic & enabling safe movement towards escape routes;
- High risk task area lighting – illumination for the safety of people involved in a potentially dangerous process.

The emergency lighting installation will be designed to comply with the above – mentioned standards. A minimum of 1 Lux is required within defined escape routes and 0.5 Lux in open plan areas. The emergency lighting will have a minimum duration of three hours.

Emergency lighting is designed and placed on the escape route, fire alarm call points, all firefighting equipment and indicating the various obstructions to escape. The design of the escape lighting fulfils the following functions:

- To indicate clearly and unambiguously the escape routes;



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- To provide illumination onto and along such routes as to allow safe movement towards and through the exists provided to a place of safety;
- To ensure that fire alarm call points and firefighting equipment provided along escape routers can be readily located and used.
- An emergency resulting from breakdown of the automatic lighting system will be dealt with by the contingency plan.

2.12 Telephone System

- Multi-pair Copper cable from PTCL will be terminated at Main Distribution Frame (MDF). This MDF will be under control of PTCL.
- Multi pair telephone cable for each floor shall run from MDF and terminated at floor IDF from where 4-pair UTP CAT-6e cable will be provided to users.
- RJ-11 telephone, simplex, telephone outlet will be provided to all offices.



3. Statutory Requirements

Presented in this section are the Policy, Legal and Administrative Framework applicable to Project in the context of sustainable development. All legal provisions relevant to environmental protection applicable to the planning, construction and operation were identified under the scope of the EIA. The proponent has to be well aware of these requirements and comply with the provisions as applicable and necessary. Besides applicable laws orders of the Courts passed in recent past which have direct implications for building construction industry have also been discussed in this chapter. Legal status of the title documents, no objection certificates issued by or required from concerned departments are also vetted in this chapter.

3.1 Legal Status

The project is proposed on a by-birth commercial plot fully described in introductory chapter supra. It was leased for building shops, showrooms, offices and cinema by the Karachi Cantonment. The lease of the plot is valid with provision of renewal.

The proponent has obtained necessary no objection certificates or letters showing intention to provide amenities. The proponent has so far obtained NOC for electrical connection from KE vide letter No.S&BD/201910307 dated 02nd December 2019; SSGC vide letter No.Sales/NOC/MK-Sur90/12/19 dated 4th December 2019; KWSB vide letter No.Secy/NOC Committee/RRG/2019/478 dated 5th December 2019; CAA height clearance of 500 feet Above Ground Level (AGL) or 536 feet Above Mean Sea Level (AMSL) vide letter No.HQCAA /1117/003/ ARAS/KHI-895/750 dated 11th July 2019.

While the proponent has valid lease of by-birth commercial plot and no objection certificates from all main utility agencies but still he has to undergo litmus test to prove that the project does not fall under orders of Honorable Supreme Court of Pakistan passed recently. Honorable Supreme Court of Pakistan has always been protecting right to life under a safe environment and environmental protection. In landmark decision in Shehla Zia versus WAPDA, the Supreme Court of Pakistan held that the right to a clean and healthy environment was part of the fundamental right to dignity provided in Article 14 of the Constitution of Pakistan.

In recent past, the Supreme Court of Pakistan has passed orders in two different petitions, which provide litmus test for all proponents of construction projects in Karachi. In 2016 a practicing lawyer Mr. Shahab Usto filed a constitution petition No.38 of 2016 in Supreme Court of Pakistan for supply of clean and safe drinking water and sanitation in district Shikarpur of Sindh province. Recognizing



importance of the matter, the Court increased scope of the petition to whole province of Sindh and constituted a judicial commission of a sitting judge of Sindh High Court, who besides several recommendations for different departments recommended in his report ban on construction of high rise building in Karachi till provision of water supply and sanitation is provided and existing infrastructure is improved. Honorable Supreme Court initially imposed complete ban on construction of building above ground plus two floors but later on modified order to allow construction up to ground plus six floors plus floors for parking. This ban on construction was imposed with a view to improve water supply and sanitation infrastructure in the city, which was a gigantic task. On 11th December 2018, the Court retracted ban on construction and ordered that new high rises can be built in accordance with the law. Supreme Court had lifted ban on construction but the situation on which the Court imposed ban still persists and approval to any project can be refused on those grounds by the approval granting agencies. The second case is Constitution Petition No.815-K/2016. In this petition the Court vide order dated 22nd January 2019 imposed complete ban on land use change in whole Karachi. In compliance of this order SBCA issued a Notification on 24th January 2019 whereby complete ban on conversation of plots was imposed and all pending cases of change of land use and approval of construction permits/building plans/NOCs on converted plots shall be deemed rejected as unconsidered.

Examining suitability of the project in view of above two decisions of the Supreme Court of Pakistan, the project can be termed doable as all utility agencies have already confirmed availability of infrastructure to cater with the project through the no objection certificates details of which are given above, and the project is proposed on a by-birth commercial plot and there is no conversion of land.

3.2 Administrative Framework

Before the 18th amendment in the Constitution of Pakistan, the environmental issues were governed under the federal regime through Pakistan Environmental Protection Act, 1997. As a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government. The Ministry of Environment at the federal level was abolished. Its functions related to national environmental management were transferred to the provinces. To manage the international obligations in the context of environment, a new ministry - the Ministry of Climate Change – was created at the federal level. As of now, all four provinces have enacted their own environmental protection laws.

For Sindh province, the Sindh Environmental Protection Act, 2014 (SINDH ACT NO.VIII OF 2014) was passed by the Provincial Assembly of Sindh on 24th February, 2014 and assented to by the Governor of Sindh on 19th March, 2014 and



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published in official gazette on Thursday March 20, 2014. (Hereinafter the Sindh Environmental Protection Act, 2014 is referred to as the “2014 Act”).

Under the 2014 Act, the Environmental Protection Council (the “EPC”) has been formed consisting of Chief Minister as Chairman with Minister in charge of Environment Protection Department, Addl. Chief Secretary, Planning & Development Department, Government of Sindh and Secretaries of Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Livestock & Fisheries Forest & Wildlife, Energy, Education Departments Government of Sindh and Divisional Commissioners of Sindh. Non-official members are also included (i.e. representatives of Chamber of Commerce & Industry and from medical or legal professions etc.) along with DG, EPA & two Members of Provincial Assembly also form part of EPC.

The EPC within the framework of the 2014 Act acts as a policy making body. The functions and powers of EPC include coordination & supervision of provisions of Act, approving provincial environmental & sustainable development policies & SEQS, provide guidance for protection & conservation, consider annual Sindh Environmental Report, deal with interprovincial and federal provincial issues, provide guidance for bio safety & assist Federal Government in implementation of various provisions of UN Convention on laws on Seas (UNCLOS).

Sindh Environmental Protection Agency (the “SEPA”) establishes under the provisions of the 2014 Act is headed by Director General (DG) with the aim to exercise the powers and perform the functions assigned to it under the provisions of the 2014 Act and the rules and regulations made there under. The SEPA acts as the executive body of the provisions of the 2014 Act. It has technical and legal staff and may form advisory committees. SEPA requires preparing environmental policies, taking measures for implementation of environmental policies, preparing Sindh Environment Report and preparing or revising Sindh Environmental Quality Standards. It also establishes systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation research, inspection and audit to prevent and control pollution and to estimate the costs of cleaning up pollution and rehabilitating the environment and sustainable development. SEPA would also take measures for protection of environment such as to promote research; issues licenses for dealing with hazardous substances, certify laboratories, identify need for or initiate legislation, specify safeguards etc. SEPA would also encourage public awareness and education regarding environmental issues. SEPA has powers to enter or inspect under a warrant issued by Environmental Protection Tribunal or a Court search at any time, any land or building etc. where there are reasonable grounds to believe that an offence has been or is being or likely to be committed. SEPA may also take samples, arrange for testing or confiscate any article in discharge of their duties.





The 2014 Act also provides for establishing Sindh Sustainable Fund derived from various sources such as voluntary contributions or fees generated etc. This fund is utilized for protection, conservation or improvement of environment.

Under the 2014 Act and rules and regulations made there under a complete framework for pre and post approval is given, which a proponent of project requires to comply with.

3.3 Statutory Framework

As stated supra after 18th Amendment in Constitution of Pakistan, 1973 subject of environmental protection is devolved to the provinces and all provinces have enacted their own provincial environmental protection acts, rules and regulations. Now all matters related to environmental protection are governed under respective provincial environmental protection laws. However, it would apposite to give here a brief history of the development of statutory environmental framework in the Country. Prior to the 18th Amendment to the Constitution of Pakistan in 2010, the legislative powers were distributed between the federal and provincial governments through two 'lists' attached to the Constitution as Schedules. The Federal list covered the subjects over which the federal government had exclusive legislative power, while the 'Concurrent List' contained subjects regarding which both the federal and provincial governments could enact laws. The subject of 'environmental pollution and ecology' was included in the Concurrent List and hence allowed both the national and provincial governments to enact laws on the subject. However, as a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government. The Ministry of Environment at the federal level was abolished. Its functions related to national environmental management were transferred to the provinces. To manage the international obligations in the context of environment, a new ministry - the Ministry of Climate Change – was created at the federal level. The PEPA 1997 is no longer applicable to the provinces. The provinces have enacted their own environmental protection laws. These provincial laws are largely based on PEPA 1997 and, hence, provide the same level of environmental protection as the parent law. Between 1993 and 2010, the Pak-EPA promulgated several rules, regulations, standards, and guidelines to implement the provisions of the PEPA 1997. The province of Sindh has made its own rules and regulations. However, sectorial guidelines made under PEPA 1997 are still useful document to benefit from.

Sindh EPA has taken lead in finalizing and notifying the Sindh Provincial rules, regulations and standards.



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- On December 16, 2014, SEPA enacted the Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2014 (the “IEE-EIA Regulations”).
- On December 19, 2014, SEPA enacted the (i) Environmental Sampling Rules 2014, (ii) Hazardous Substances Rules, 2014, (iii) Sindh Environmental Protection (Composition of Offences and Payment of Administrative Penalty) Rules 2014, (iv) Sindh Environmental Protection Tribunal Rules, 2014, (v) Sindh Hospital Waste Management Rules, 2014, (vi) Sindh Environmental Quality Standards (Certification of Environmental Laboratories) Rules 2014, (vii) Sindh Prohibition of Non-degradable Plastic Products (Manufacturing, Sale and Usage) Rules 2014, (viii) Sindh Sustainable Development Fund (Procedure and Utilization) Rules 2014, and (ix) Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules 2014.
- On June 28, 2016, the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Air, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015 have been notified.

For purpose of this report, the 2014 Act, Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2014 (“2014 Regulations”) and other relevant rules and regulations made under the 2014 Act are applicable.

3.4 Constitutional Provision

The Constitution of Pakistan is supreme law of the Country. It is one of the few constitutions in the world, which covers environmental protection and considers it one of the fundamental rights of citizens of Pakistan. Article 9 & 14 of the Constitution bestows fundamental right to life and dignity to every citizen. The Supreme Court of Pakistan in landmark judgment in the case of Shehla Zia and others versus WAPDA (1994) referred to both these Articles and laid down the foundation of modern environmental law in Pakistan. The august Court held that the word “life” in the constitution has not been used in a limited manner. A wide meaning should be given to enable a man not only to sustain life but to enjoy it. Under the Constitution, Article 14 provides that the dignity of man and subject to law the privacy of home shall be inviolable. The fundamental right to preserve and protect the dignity of man under Article 14 is unparalleled and could be found only in few Constitutions of the world. The Constitution guarantees dignity of man and also right to “life” under Article 9 and if both are read together, question will arise whether a person can be said to have dignity of man





if his right to life is below bare necessity like without proper food, clothing, shelter, education, health care, clean atmosphere and unpolluted environment.

3.5 Sindh Environmental Protection Act, 2014

The 2014 Act as stated above is the basic legislative tool empowering the provincial government to frame regulations for the protection of the environment. The Act envisages protection, improvement, conservation & rehabilitation of environment of Sindh with the help of legal action against polluters and green awakening of communities. It equally lays emphasis for the preservation of the natural resources of Sindh and to adopt ways and means for restoring the balance in its eco-system by avoiding all types of environmental hazards. The act is applicable to a broad range of issues and extends to air, water, industrial liquid effluent, marine, and noise pollution, as well as to the handling of hazardous wastes.

The following articles of the SEPA 2014 have a direct bearing on the proposed Project:

- Article 11(1): ‘Subject to the provisions of this Act and the rules and regulations therein, no person shall discharge or emit or allow the discharge or emission of any effluent, waste, pollutant, noise or any other matter that may cause or likely cause pollution or adverse environmental effects, as defined in Section 2 of this Act, in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards...’
- Article 11(2): ‘All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.’
- Article 14 (1): ‘Subject to the provisions of this Act and the rules and regulations, no person shall cause any act, deed or any activity’, including;
 - (b) disposal of solid and hazardous wastes at unauthorized places as prescribed;
 - (c) dumping of wastes or hazardous substances into coastal waters and inland water bodies; and



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- (d) release of emissions or discharges from industrial or commercial operations as prescribed.
- Article 15 (1): 'Subject to the provisions of this Act, no person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6'.
- Article 17(1): 'No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof'
- Article 17(2): The agency shall;
 - a) review the initial environmental examination and accord its approval, subject to such terms and conditions as it may prescribe, or require submission of an environmental impact assessment by the proponent; or
 - (b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.
- Article 17(3): 'Every review of an environment impact assessment shall be carried out with public participation and, subject to the provisions of this Act, after full disclosure of the particulars of the project'.
- Article 17(4): 'The Agency shall communicate its approval or otherwise within a period of two months from the date that the initial environmental examination is filed, and within a period of four months from the date that the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations'.
- Article 20(1): 'The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental





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management plan containing a comprehensive appraisal of the environmental aspects of the project’.

- Article 20(2): The report of a project prepared under sub-section (1) shall include:
 - (a) analysis of the predicted qualitative and quantitative impact of the project as compared to the actual impact;
 - (b) evaluation of the efficacy of the preventive, mitigation and compensatory measures taken with respect to the project; and
 - (c) recommendations for further minimizing or mitigating the adverse environmental impact of the project.
- Article 20(3): ‘Based on its review of the environmental audit report, the Agency may, after giving the person in charge of the project an opportunity of being heard, direct that specified mitigation and compensatory measures be adopted within a specified time period and may also, where necessary, modify the approval granted by it under section 17’.

3.6 Sindh EPA (Review of IEE and EIA) Regulations 2014

Sindh Environmental Protection Agency (Review of IEE / EIA) Regulations, 2014 (“2014 Regulations”) made in exercise of powers conferred under section 37 of the Act 2014 provide the necessary guidelines on the preparation, submission, & review of Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs). The regulations categorize projects in three categories provided in Schedule I, II and III of the 2014 Regulations.

The project falls in category I (2) of the Schedule II (List of Projects requiring EIA) of the 2014 Regulations, which provides:

- I. Urban development and tourism
 - (1).....
 - (2) Residential/commercial high-rise buildings/apartments from 15 stories and above.

The submission and approval procedure for the EIA is summarized below:

- The EIA report shall be submitted, together with a review fee and form included as Schedule-V of the Sindh IEE/EIA Regulations 2014.





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- The SEPA shall conduct a preliminary scrutiny and reply within 15 working days of the submittal of the report a) confirming completeness, or b) asking for additional information, if needed, or c) returning the report requiring additional studies, if necessary.
- The SEPA is required to make every effort to complete the EIA review process within four months of the issue of confirmation of completeness.
- SEPA shall call for a Public Hearing for the project to invite all the concerned persons to raise concerns on the project.
- Following the Public Hearing, SEPA shall constitute a Committee of Experts to assist the agency in review of the EIA.
- The approval granted at the end of the review process is valid for three years for start of construction.
- Once project construction has been completed, the proponent is required to submit a request to the SEPA for confirmation of compliance. An environmental management plan for the operation phase is to accompany the request.
- The SEPA is required to communicate its decision within four months of receipt of the request. The project can commence operation only after it has received approval from the SEPA.

The overall flow of obtaining the approval of EIA is shown in figure 3.1.

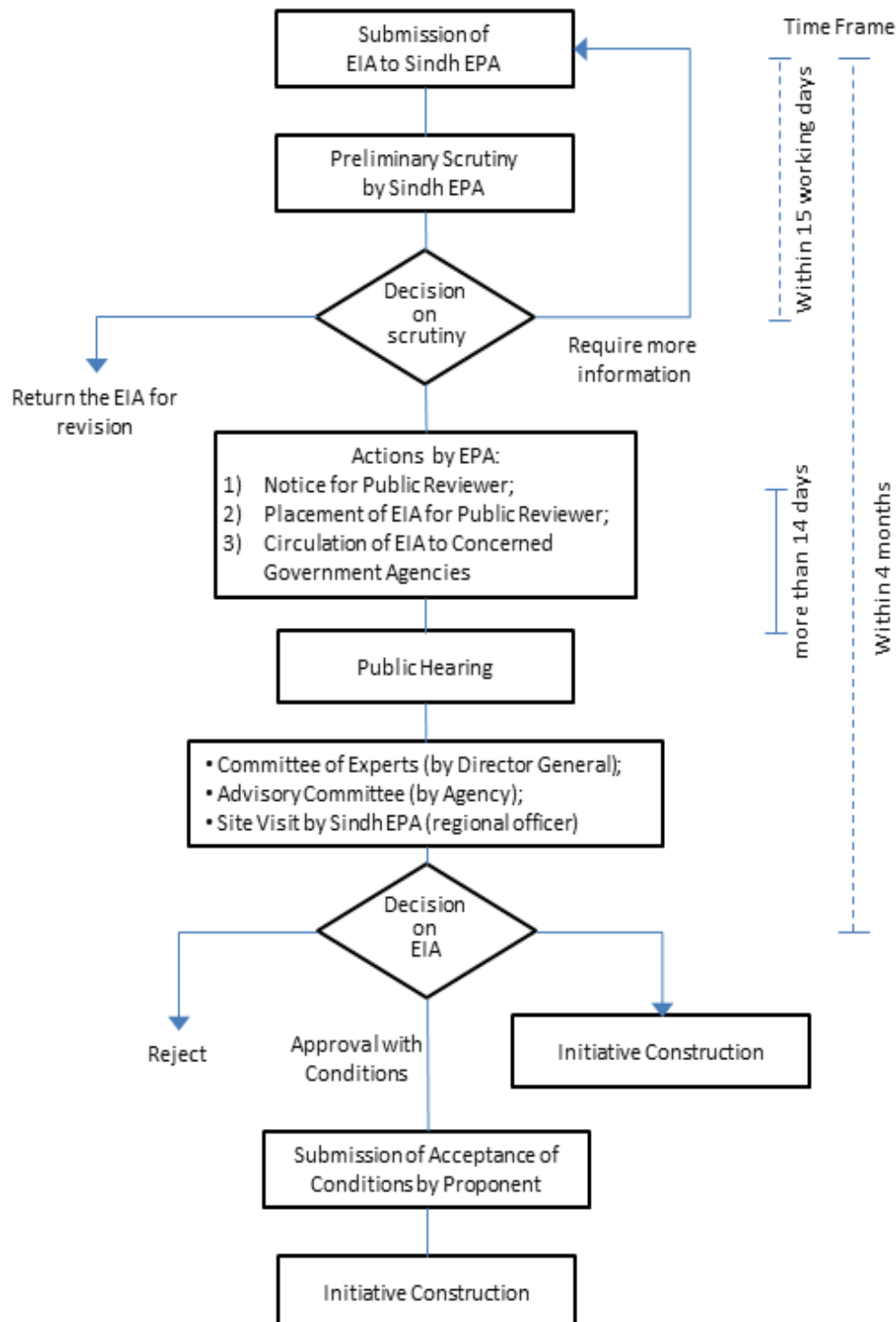


Figure 3.1: EIA Review and Approval Procedure

Source: EIA Study Team



3.7 Guidelines for Public Consultation

Public consultation is mandated under Sindh's environmental law. Regulation 11 of the 2014 Regulations provides the general requirements whereas the sectoral guidelines indicating specific assessment requirements are provided in the Guidelines for Public Consultation 1997 (the 'Guidelines'). These are summarized below:

- **Objectives of Public Involvement:** 'To inform stakeholders about the proposed project, to provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision making, creating a sense of ownership with the stakeholders';
- **Stakeholders:** 'People who may be directly or indirectly affected by a proposal will clearly be the focus of public involvement. Those who are directly affected may be project beneficiaries, those likely to be adversely affected, or other stakeholders. The identification of those indirectly affected is more difficult, and to some extent it will be a subjective judgment. For this reason, it is good practice to have a very wide definition of who should be involved and to include any person or group who thinks that they have an interest. Sometimes it may be necessary to consult with a representative from a particular interest group. In such cases the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of a proposal, but should also include those who can affect the outcome of a proposal';
- **Mechanism of consultations:** 'Provide sufficient relevant information in a form that is easily understood by non-experts (without being simplistic or insulting), allow sufficient time for stakeholders to read, discuss, consider the information and its implications and to present their views, responses should be provided to issues and problems raised or comments made by stakeholders, selection of venues and timings of events should encourage maximum attendance';
- **Timing and Frequency:** Planning for the public consultation program needs to begin at a very early stage; ideally it should commence at the screening stage of the proposal and continue throughout the EIA process;
- **Consultation Tools:** Some specific consultation tools that can be used for conducting consultations include; focus group meetings, needs assessment, semi-structured interviews; village meetings and workshops;



- **Other Important Considerations:** 'The development of a public involvement program would typically involve consideration of the following issues; objectives of the proposal and the study; identification of stakeholders; identification of appropriate techniques to consult with the stakeholders; identification of approaches to ensure feedback to involved stakeholders; and mechanisms to ensure stakeholders' consideration are taken into account'.

As above, the Guidelines for Public Consultation introduce effective ways to inform the contents of the project to the general public during the planning stage and that eventually consensus building toward the implementation of project is reached.

Incorporating public involvement into the stages of environmental assessment is explained in the guidelines that public consultation meeting has to be carried out after the works on "developing options, and assessing and mitigating impacts" for comments and assessment.

3.8 Sindh Environmental Quality Standards (SEQS)

On June 28, 2016, the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Air, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015 have been notified by Sindh EPA.

Table 3.1 shows Sindh environmental quality standard for ambient air.

Table 3.1: Sindh Environmental Quality Standard for Ambient Air			
Pollutant	Time-weighted average	Concentration in Ambient Air	Method of measurement
Sulfur Dioxide (SO ₂)	Annual Average*	80µgm ³	Ultraviolet Fluorescence Method
	24 hours**	120µgm ³	
Oxides of Nitrogen as (NO)	Annual Average*	40µgm ³	Gas Phase Chemiluminescence
	24 hours**	40µgm ³	
Oxides of Nitrogen as (NO ₂)	Annual Average*	40µgm ³	Gas Phase Chemiluminescence
	24 hours**	80µgm ³	
O ₃	1 hour	130µgm ³	Non dispersive UV absorption méthode
Suspended Particulate Matter (SPM)	Annual Average*	360µgm ³	High volume Sampling, (Average flow rate not less than 1.1m ³ /minute)
	24 hours**	500µgm ³	
Respirable Particulate Matter (PM ₁₀)	Annual Average*	120µgm ³	B Ray absorption method
	24 hours**	150µgm ³	
	Annual Average*	40µgm ³	B Ray absorption method



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Respirable Particulate Matter (PM2.5)	24 hours**	75µgm³	
	1 hour	15µgm³	
Lead (Pb)	Annual Average*	1µgm³	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5µgm³	
Carbon Monoxide (CO)	8hours**	5mg/m³	Non Dispersive Infra Red (NDIR) method
	1hours	10mg/m³	
*Annual arithmetic means of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.			
**24 hourly / 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.			

Table 3.2 shows the standards for motor vehicle noise.

Table 3.2: The Motor Vehicle Ordinance (1965) and Roles (1969)		
Parameter	Standards (maximum permissible limit)	Measuring method
Noise	85dB(A)	Sound-meter at 7.5meter from the source

Table 3.3 shows the Sindh Environmental Quality Standard for noise.

Table 3.3: Sindh Environmental Quality Standard for Noise			
S. No.	Category of Area / Zone	Limit it in dB(A) Leq*	
		Day Time	Night Time
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65
4	Silence Zone (D)	50	45
Note: 1	Day time hours: 6.00 a. m to 10.00 p. m		
2	Night time hours: 10.00 p. m to 6.00p. m		
3	Silence zone; Zone which are declared as such by competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.		
4	Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.		
*dB(A)Leq	Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.		

The SEQS for effluents are shown in Table 3.4.

Table 3.4: Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents					
S. No.	Parameter	Into Inland Waters	Into Sewage Treatment	Into Sea	unit
1	Temperature or Temp. increase	<3	<3	<3	°C
2	pH value (H ⁺)	6-9	6-9	6-9	





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3	Biological Oxygen Demand (BOD) ₅ at 20 °C	80	250	80	mg/l
4	Chemical Oxygen Demand (COD) _{Cr}	150	400	400	mg/l
5	Total Suspended Solids (TSS)	200	400	200	mg/l
6	Total Dissolved Solids (TDS)	3500	3500	3500	mg/l
7	Oil and Grease	10	10	10	mg/l
8	Phenolic Compounds (as Phenol)	0.1	0.3	0.3	mg/l
9	Chloride (as Cl ⁻)	1000	1000	SC	mg/l
10	Fluoride (as F ⁻)	10	10	10	mg/l
11	Cyanide (as CN ⁻) total	1.0	1.0	1.0	mg/l
12	An-ionic detergents (as MBAS)	20	20	20	mg/l
13	Sulphate(SO ₄ ²⁻)	600	1000	SC	mg/l
14	Sulphide (S ²⁻)	1.0	1.0	1.0	mg/l
15	Ammonia (NH ₃)	40	40	40	mg/l
16	Pesticides	0.15	0.15	0.15	mg/l
17	Cadmium	0.1	0.1	0.1	mg/l
18	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	mg/l
19	Copper	1.0	1.0	1.0	mg/l
20	Lead	0.5	0.5	0.5	mg/l
21	Mercury	0.01	0.01	0.01	mg/l
22	Selenium	0.5	0.5	0.5	mg/l
23	Nickel	1.0	1.0	1.0	mg/l
24	Silver	1.0	1.0	1.0	mg/l
25	Total toxic metals	2.0	2.0	2.0	mg/l
26	Zinc	5.0	5.0	5.0	mg/l
27	Arsenic	1.0	1.0	1.0	mg/l
28	Barium	1.5	1.5	1.5	mg/l
29	Iron	8.0	8.0	8.0	mg/l
30	Manganese	1.5	1.5	1.5	mg/l
31	Boron	6.0	6.0	6.0	mg/l
32	Chlorine	1.0	1.0	1.0	mg/l

The SEQs for drinking water are shown in Table 3.5.

Table 2.5: Sindh Environmental Quality Standards for Drinking Waters (mg/l)

S.#	Properties/Parameters	Standard Values for Pakistan	S.#	Properties / Parameters	Standard Values for Pakistan
Bacterial			Chemical		
1	All water intended for drinking (E.Coli or Thermo)	Must not be detectable in any 100 ml sample	Essential Inorganics (mg/liter)		
			3	Aluminum (Al) mg/l	≤ 0.2

	tolerant Coliform bacteria)		4	Antimony (Sb)	≤ 0.005
2	Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	5	Arsenic (As)	≤ 0.05
			6	Barium (Ba)	0.7
			7	Boron (B)	0.3
3	Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform bacteria)	Must not be Detectable in any 100 ml sample. In case of large supplies, where sufficient samples are examined, must not be resented in 95% of the samples taken throughout any 12-month period.	8	Cadmium (Cd)	0.01
			9	Chloride (Cl ⁻)	< 250
			10	Chromium (Cr)	≤ 0.05
			11	Copper (Cu)	2
			Organic (mg/L)		
			12	Phenolic compounds	<0.0002
			Toxic Inorganics (mg/liter)		
			13	Cyanide (CN) ⁻	≤ 0.05
			14	Fluoride (F)	≤ 1.5
			15	Lead (Pb)	≤ 0.05
			16	Manganese (Mn)	≤ 0.5
Physical			17	Mercury (Hg)	≤ 0.001
4	Color	< 15 TCU	18	Nickel (Ni)	≤ 0.02
5	Taste	Non-objectionable/ Acceptable	19	Nitrate (NO ₃) ⁻	≤ 50
6	Odor	Non-objectionable/ Acceptable	20	Nitrite (NO ₂) ⁻	≤ 3
7	Turbidity	< 5 NTU	21	Selenium (Se)	≤ 0.01
8	Total Hardness as CaCO ₃	< 500 mg/l	22	Residual Chlorine	0.2-0.5 At consumer end 0.5-1.5 at source
9	TDS	<1000			
10	pH	6.5-8.5			
Radioactive			23	Zinc (Zn)	5.0
11	Alpha Emitters bq/L	0.1			
12	Beta emitters	1			

3.9 Sindh Prohibition of Child Employment Act, 2017

Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mines or any other hazardous employment. In accordance with this Article, the Prohibition of Child



Employment Act (PCEA) 2017 disallows the child labor in Sindh. The PCEA defines a child as a person who has not completed his/her fourteenth years of age, and an adolescent means a person who has completed fourteenth year of age but has not completed eighteenth years of his age. No child shall be employed or permitted to work in any establishment including construction but an adolescent can be employed or permitted to work under strict guidelines provided in the PCEA and rules. An adolescent shall not be employed in any hazardous work included in the schedule to the PCEA.

3.10 Land Acquisition Act, 1894

The Land Acquisition Act, 1894 (LAA) governs land acquisition against compensation for public interest projects. It is termed as draconian law because it gives complete powers to the government to acquire the land and there is no provision for landowner to refuse transferring the land. Only remedy to a landowner is to challenge quantum of compensation, that too, through a civil court where decades pass in deciding the matter. The Act gives power to the Government to acquire the land under emergency clause under which requirement of prior public notice is exempted.

3.11 Cutting of Trees (Prohibition) Act, 1975 and the Protection of Trees and Bush Wood Act, 1949

The Cutting of Trees Act prohibits cutting or chopping of trees without prior permission of the Forest Department. Section 3 of this Act states “No person shall, without the prior written approval of the local formation commander or an officer authorized by him in this behalf, cut fell or damage or cause to cut, fell or damage any tree.”

Similarly, the Protection of Trees and Bush wood Act, 1949 prohibits cutting of trees and bush wood without permission of the Forest department. The Act was enforced to prevent unlawful removal/clearing of trees and green area for any reason without the consent of the Forest Department”.

3.12 Pakistan Panel Code, 1860 (PPC)

Chapter XIV of the PPC deals with the offences affecting the public health, safety, convenience, decency and morals. Person may be guilty of public nuisance if his act or omission causes common injury, danger or annoyance to the public or results in spread of infection of disease dangerous to life. The chapter also deals with environmental pollution.



3.13 Sindh Solid Waste Management Board Act, 2014

A board established under the Act for management of collection and disposal of all solid waste, to arrange for effective delivery of sanitation services, and to deal with other relevant matters. Under the Act, the board shall have the right over the solid waste related issues, assets, funds and liabilities of the Councils and shall possess sole rights on all kinds of solid waste within the limits of all Councils.

The Supreme Court of Pakistan in recent judgment passed on 16.03.2017 in C.P. No.38 of 2016 (Shahab Usto vs GoS & Ors) has shown serious reservation with regard to the continuation of the Board. The Court has observed in Para No.49 that if this Board is allowed to exist, it would be a permanent liability of the Sindh Government. In the circumstances, the Act has not been reviewed in detail.

3.14 Disaster Management Act, 2010

This Act was enacted to provide for the establishment of a National Disaster Management System for Pakistan. Sindh Disaster Management Authority enforces the Act. The Act defines ‘disaster’ as a catastrophe or a calamity in an affected area, arising from natural or man-made causes or by accident which results in a substantial loss of life or human suffering or damage to, and destruction of, property. Disaster management includes preparedness and response. The Act provides establishment of disaster management authorities at national, provincial and district levels. The authorities require preparing and implementing disaster management plan for their area.

3.15 The Sindh Occupational Safety and Health Act, 2017

The Sindh Occupational Safety and Health Bill 2017 has been approved by the Provincial Assembly of Sindh (Ref. Sindh Bill No. 27 of 2017) and enacted as the Sindh Occupational Safety and health Act, 2017. The Act makes provision for Occupational Safety and Health conditions at all workplaces for the protection of persons at work places against risk of injury arising out of the activities at work places and the promotion of safe, healthy and decent working environment adapted to the physical, physiological and psychological needs of all persons at work.

3.16 Laws on protection of Archaeological Sites & Cultural Heritage

After the Eighteenth amendment in the constitution the subject of “Ancient and historical monuments, archaeological sites and remains” the entry No.37 of the concurrent legislative list has also devolved to provincial legislations. There are two laws that are directly relevant for archaeological relics. The first is The Antiquities Act, 1975, which ensures the protection of Pakistan’s cultural



resources. Since separate provincial Act has not been enacted yet the Antiquities Act, 1975 shall remain enforce in Sindh under Article 270AA(6) of the Constitution of Pakistan, 1973. The second is The Sindh Cultural Heritage (Preservation) Act, 1994, which is the provincial law for the protection of cultural assets. Its objectives are similar to those of the Antiquity Act.

3.17 Antiquities Act, 1975

The act ensures the protection of cultural resources in Pakistan. It is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The Act prohibits new construction in the proximity of a protected antiquity and empowers the Government of Sindh to prohibit excavation in any area, which may contain articles of archaeological significance. The developers are obligated to ensure that no activity is undertaken within 61 m (200 ft) of a protected antiquity, and to report to the GoPS's Dept. of Archaeology if any archaeological discovery made during the course of the project.

3.18 The Sindh Cultural Heritage (Preservation) Act, 1994

The Sindh Cultural Heritage (Preservation) Act, 1994 is the provincial law for the protection of cultural assets. According to KB&TPR 2002, any building declared as a Heritage Building by the GoS, under the above-mentioned preservation Act (1994) shall not be considered for approval by the KBCA, except with the prior approval of the department designated as such by the Government of Sindh. Under the Act an Advisory Committee is formulated to overlook and subsequent right of Acquisition of a protected heritage of architectural, historical, archaeological or national value, custodian/guardianship rights for preservation and declaration of protected heritage, evaluation of ownership rights, take legal action against any offender who attempts to damage, destroy, remove, deface, alter or imperil the protected heritage or to build on or near the site. It also details the purchase, maintenance and repair works of a protected heritage under the government's jurisdiction. The advisory committee may also receive voluntary donations towards the cost of maintenance of a protected heritage site. The act also establishes the right of access to certain protected heritage sites, penalties for violators, formulation of rules and provides protection to the persons working under this Act.

3.19 Sindh Condominium Act, 2014

The purpose of Act is to regulate the services, amenities, façade, parking and common areas in public sale projects by the residents, union or society of the



project through the registered maintenance companies in the Province of Sindh. Under the Act maintenance of the project for one after obtaining completion certificate shall be the responsibility of the builder against prescribed maintenance fee charged from the allottees. Section 3 of the Act provides complete mechanism how builder will maintain the building for one year, and who will maintain thereafter etc. The Act further provides for responsibilities and rights of maintenance societies, and company, provision for insurance of the building.

3.20 Cantonment Act 1924

This Act enacted to consolidate and amend the law relating to the administration of cantonments. The Act consists of 292 sections and six schedules, which governs establishment of cantonment boards, duties and discretionary functions of board, appointment of officers including executive officer, election, taxation (property), public safety, water supply, drainage and lighting, burial and burning grounds, hospitals and dispensaries, markets etc, power and procedures for penalties and appeals, and rules and regulation making powers. Chapter XI of the Act relates to control over building, streets, boundaries, trees etc. and details powers of the Board in respect of building construction permission and procedure thereof. Section 178A prohibits erecting or re-erecting a building without previous sanction of the Board. Section 186 of the Act confers powers to make bye-laws for building erecting and matters ancillary thereto.

3.21 Civil Aviation Rules, 1994

The Civil Aviation Rules 1994 has mandated it for all the builders and developers to obtain No Objection Certificate (NOC) from Civil Aviation Authority (CAA) under rule 68, section-3 of Civil Aviation Rules, 1994 for “Height Clearance” for projects/buildings within the radius of 25km of all airports. The rule 68, section 3 (Safe Guarding at Aerodromes (68) Limitation of obstructions) reads as under: “No person shall erect any temporary or permanent structure, nor position a vehicle or other mobile object on or in the vicinity of any aerodrome to which these rules are applicable, that will be within the clearance area, or will protrude through an obstacle limitation surface, at that aerodrome”.



3.22 Sindh Drinking Water Policy, 2017

Public Health Engineering & Rural Development Department, Government of Sindh, with the approval of Chief Minister Sindh issued the drinking water policy on 3rd May 2017.

Principles: The main principles of Sindh Drinking Water Policy, adopted from the National Drinking Water policy 2009, and aligned with the Sustainable Development Goals, are as follows:

- Access to safely managed drinking water is a fundamental right of every citizen and that it is the responsibility of the Government to ensure its provision to all citizens,
- Water allocation for drinking purpose shall be given priority over other uses,
- In order to ensure equitable access, special attention shall be given to removing the existing disparities in coverage of safe drinking water and for addressing the needs of the poor and the vulnerable on priority basis.
- Recognizing that inadequate and unsafe water supply and sanitation are a major cause of diarrhea and nutritional deficiency in children, which as a consequence contribute towards child mortality. Safely managed drinking



water supply and sanitation shall be integrated in health, nutrition and school health programs.

- Access shall be increased to high quality nutrition-sensitive services, including access to water, sanitation facilities, and hygiene.
- Key hygiene actions (safe drinking water, hand washing with soap, safe disposal of excreta, food hygiene) shall be integrated as essential components in all nutrition programs.
- Realizing the fact that access and availability of safe drinking water affects all aspects of life of a citizen, a multi sectoral approach, involving different departments of the government, shall be adopted to address the issues related to safe drinking water.
- Being cognizant of the fact that women are the main providers of domestic water supply and maintainers of hygienic household environment, their participations in planning, implementation, monitoring and operation & maintenance of water supply systems shall be ensured, and WASH shall be integrated in maternal and neonatal health programs.
- Responsibilities and resources shall be delegated to local authorities to enable them to discharge their assigned functions with regard to provision of safe water supply.
- A supportive policy framework shall be developed that encourages alternate options through private provision, public private partnerships, the role of NGOs and community organizations
- The execution of component-sharing model for government programs and projects shall be promoted to ensure financial sustainability and community and private sector involvement in development and O&M.
- Low cost technologies in water and sanitation, that are easy and cost-effective to maintain shall be developed and used.

Goals and Objectives:

Overall Goal: The goal of the Sindh Drinking Water Policy is to improve the quality of life of people of Sindh by reducing morbidity and mortality caused by water-borne diseases through provision of safely managed and potable drinking water to the entire population that is located on premises, available when needed, and free from contamination, affordable and of sufficient quantity, and in a way, that is efficient, equitable and sustainable.





Objectives:

- Introduce legislative measures and regulations to create an enabling framework for safely managed drinking water supply, regulation of water usage, extraction, treatment, transportation and distribution.
- Ensure that all drinking water resources and supply systems are protected with community involvement.
- Develop district level drinking water availability plans for urban and rural areas to ensure improved planning for equitable access.
- Enhance the coverage of safely managed drinking water supply in the province to achieve the Sustainable Development Goals (SDGs) targets of universal access.
- Develop criteria for installation of new drinking water supply schemes and ensure that all new schemes are safely managed, rationalized and constructed through need-based criteria so that all areas and communities are served.
- Develop standardized service delivery models for both urban and rural drinking water supply schemes to improve efficiency, cost-effectiveness, monitoring & sustainability.
- Develop mechanisms for reuse, recycle and recharge of wastewater for other municipal and productive uses.
- Ensure that all drinking water supply systems are designed and constructed in line with the national drinking water quality standards and all municipal discharges comply with National Environment Quality Standards (NEQS).
- Install water treatment plants at existing drinking water supply schemes where required and incorporate water treatment facilities in all new drinking water supply schemes.
- Ensure development of water safety plans for all drinking water supply systems.
- Develop and sustain regular drinking water quality monitoring & surveillance, and institute mechanisms for remedial action.
- Increase public awareness about water borne and water related diseases (including polio), nutrition and hygiene, and enhance the role of



communities for household water treatment/storage, water safety and conservation, and safe hygiene practices.

- Ensure that drinking water supply projects are nutrition sensitive and integrated in health, nutrition and school health programs.
- Institutionalize Water, Sanitation & Hygiene (WASH) in schools (infrastructure and 3 starts) and introduce curricular change to incorporate health, nutrition and hygiene and improve safe water and sanitation practices among school children.
- Institute adaptation measures and disaster risk reduction and mitigation strategies to minimize the impact of climate events on drinking water supply system.

3.23 Sindh Sanitation Policy, 2016

The goal of the Provincial Sanitation policy is to ensure that the entire population of Sindh has access to a safely managed sanitation service and sanitary environment that is also nutrition-sensitive and hygienic. The motto of the policy was 'Saaf Suthro Sindh' (Neat and Clean Sindh). The Policy sets targets to achieve its motto. For instance, eradication of Open Defecation from Sindh Province by 2025, while 70% villages of 13 high priority districts achieve the status of open defecation free by 2020; create and develop wastewater treatment mechanisms to cover 75% of urban areas and 40% in rural areas by 2025, and implement integrated solid waste management with 100% coverage in urban areas and 60% in rural areas of Sindh by 2025. A WASH behavior change and communication strategy has also been developed for sustainable and safe hygiene environment by 2025 to enhance the living standards of the people of Sindh.

3.24 Sub Soil Water (Extraction and Consumption) Regulations, 2018

Besides many one big achievement of the Supreme Court appointed water commission was ensuring making of regulations on sub soil water. The Regulations are made in exercise of the powers conferred under section 16 of the KW&SB Act 1996. The Regulation introduces license regime for sub soil water extraction and consumption by industrial consumers. It empowers the Board established under KW&SB Act 1996 to ask for carrying out hydrological study and tests to qualify for applying for the license. The Regulations prohibit transportation of extracted water through water tankers and discourages water extraction in excess. The Board retains power of inspection of the water abstraction facility and cancellation of license in case of violation of the terms and conditions of the license.





3.25 Laws and Regulations on Urban Development

Sindh Government also has some laws and regulations for building control:

- 1) Buildings Control Ordinance, 1979
- 2) Karachi Building Control Licensing Regulations, 1982
- 3) Sindh Regulation & Control (Use of Plots & Construction of Buildings) Ordinance, 2002

Karachi Building Control Authority (KBCA) has been established under these ordinances, in order to implement and enforce the above regulations. The Government of Sindh on 14th February 2011 notified extension of the jurisdiction of KBCA to the whole of Sindh and renamed the KBCA to Sindh Building Control Authority (SBCA). The SBCA (Karachi region) is responsible to oversee that the land development process & construction activities do not violate the Karachi Building and Town Planning Regulations, 2002.

Karachi Building and Town Planning Regulations, 2002 is the fundamental regulation for 'Building & Town Planning' for the whole City District of Karachi, except for the cantonment areas and the projects of National Security declared by the Federal Government, which supersedes 'Karachi Building and Town Planning Regulations-1979'. Eight (8) public agencies are individually designated as 'Concerned Authorities for respective areas and purposes', following City District Government Karachi (CDGK), such as:

- Cantonment Boards of the Ministry of Defense
- Karachi Port Trust (KPT)
- Pakistan Railways (PR)
- Ministry of Works, Government of Pakistan (GOP)
- Sindh Industrial Trading Estates, Karachi (SITE)
- Sindh Katchi Abadis Authority
- Board of Revenue

For reference, there are many agencies holding lands in Karachi and no dominant ones. An outline of existing condition of land holdings in Karachi is illustrated as follows.

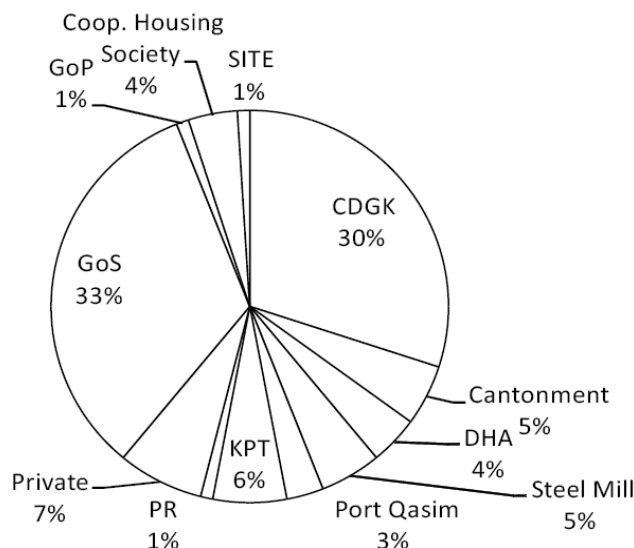


Figure 3.2: Land Holdings by Agency in Karachi

Source: KMP 2020

The above-mentioned regulations have been quite frequently amended as needs arose, since its commencement, especially among the detailed provisions. Since the project is situated within the limits of a Cantonment area therefore building and town planning regulations and other provincial rules and regulations are not discussed here.

3.26 Karachi Strategic Development Plan 2020

Karachi Strategic Development Plan (KSDP) 2020 was formulated in 2007 as the official development plan of the City District Government of Karachi (CDGK). This is the first ever approved development plan which has now a legal status under Section 40 of the Sindh Local Government Ordinance 2001 in contrast to the previous master plans. The contents of KSDP 2020 consist of following 7 chapters and they are summarized as follows:

(1) Introduction/Outline

1) Coverage of the Plan: Whole City District of Karachi, consisting of 18 Towns, 6 cantonments, and Federal and provincial governments land-holding agencies; approximately 3,600 sq.km, of which 1,300 sq.km is urbanized (built-up) area.

2) Critical Issues in Land Planning and Municipal Control: The land planning and municipal control is fragmented into about twenty agencies, such as 6 Cantonment Boards, Karachi Port Trust, Port Qasim Authority, Defence Housing Authority, Pakistan Steel, Pakistan Railways, Export Processing Zone, Sindh Industrial Trading Estate, Government Sindh, City District Government Karachi,



Lyari Development Authority, Malir Development Authority, cooperative housing societies and private owners, with overlapping powers/functions and utter lack of coordination. The share of CDGK is only 31% of the total area.

3) Vision for Karachi: “Transforming Karachi into a world class city, an attractive economic center with a decent life for Karachiites”.

4) Plan Objectives: In order to achieve the vision, the Plan consists not only of physical renewal plans but equally invoking the spirit and commitment of both leaders and citizens to realize a more prosperous, secure & sustainable future.

- Finding out Karachi’s advantages/potential for future development
- Promoting a holistic vision towards sustainable growth
- Identifying and addressing key issues in social, economic, environment & urban infrastructure sectors
- Setting out strategic framework against the backdrop of current conditions
- Framing the development plans and programs
- Putting in place an effective, collaborative institutional arrangement with participation of all stakeholders

5) Status and Role: KSDP 2020 has a legal status under SLGO for guiding city’s growth in a planned and coordinated manner, and is mandatory for all agencies, stakeholders to follow the plan.

6) Time Span of the Plan: The operational time span for the plan extends to the year 2020 within the scope of Pakistan’s Vision 2030. The plan will be further extended to 2030 to cover the city’s region that includes part of surrounding districts of Thatta, Jamshoro and Lasbella.

(2) Summary of Land Use Plan, KSDP 2020

Major points of land use plan/strategy are:

Page 1-4 “The spatial needs for commerce, industry, housing and infrastructure development to cope with future population growth (15.2 million in 2005 to 27.6 million in 2020; 4% of AAGR) will be provided through a set of policies and programs, as follows”:



1) Spatial Growth Strategy (Basic)

- **Densification:** Saddar, Jamshed, North Nazimabad, Gulberg, SITE and Shah Faisal Towns
- **Densification & Infill:** Gulshan-e-Iqbal, Landhi, Korangi, New Karachi Towns, DHA & Cantonments
- **Infill and Expansion:** Baldia, Malir, Orangi and Gadap Towns
- **Status Quo:** Lyari and Liaquatabad Towns

2) Various Land development policies and Strategies

In addition to the basic strategy (spatial growth), following several individual land development policies/strategies were considered and proposed in the plan.

- **Regeneration of the Inner City**
- **Promotion of Mixed-Use Development**
- **Permit and Guide Vertical Development and Densification**
- **Enable Densification and Vertical Development of Existing Residential Areas**
- **Development of New Urban Centers**
- **Policy for Urban Renewal**
- **Integration of Civil Areas of Cantonment and other Land-Ownning Agencies**
- **Incorporation of Existing Goths into the Urban Fabric**
- **Development of Industrial Zones**
- **Decentralization of financial districts**
- **Additional site for international airport**
- **Special Purpose Zone along Northern bye-pass**
- **Development of Education city**
- **Additional spaces for graveyards and landfill sites for garbage**



3.27 Building Code of Pakistan, Fire Safety Provisions 2016

The Building Code of Pakistan-Fire Safety Provisions-2016 provide rules for fire prevention, life safety in relation to fire and fire protection of building and structures as prescribed. All the federal and provincial governments, organizations, authorities, both public and private are mandated to adopt and implement Building Code of Pakistan-Fire Safety Provisions-2016, as notified. Any construction and modification of buildings in violation of Building Code of Pakistan (Fire Safety Provisions-2016) shall be considered as violation of professional engineering works as specified under clause (xxv) of section 2 of the Act.

The implementation and enforcement of this bye-law shall vest with the Authority Having Jurisdiction (AHJ) within their respective jurisdictions and circles as follow:

- (1) Building Control, Housing and Development Authorities
- (2) District Administration
- (3) Tehsil or Town Administration
- (4) Municipal Administration
- (5) Station Headquarters (Army, Air Force and Navy)
- (6) Cantonment Administration
- (7) Union Council Administration
- (8) Autonomous Bodies
- (9) Industrial Estates
- (10) Directorates of Civil Defense
- (11) Export Processing Zones
- (12) Other Federal/Provincial Authorities as and when notified

This Bye-law shall come into force upon being notified and all the concerned AHJs shall implement the same immediately in the prescribed manner.



All relevant AHJs shall ensure compliance and implementations of this Code and accordingly adopt or amend their relevant regulations, Bye-laws or rules as the need be.

This Bye-law shall apply to both new and existing buildings.

- buildings permitted for construction after the adoption of these Provisions shall comply with the provisions stated herein for new buildings forthwith.
- existing buildings constructed prior to adoption of these provisions shall comply with the provisions stated herein as soon as possible but not later than three years of notification of these provisions; and
- minimum fire protection requirements such as provision of fire alarm and detection system, fire extinguishers, emergency response plans and fire drills shall however be in place as soon as possible but not later than one year of notification of these provisions.

Any person who fails to comply with this Bye-law or fails to carry out an order made pursuant to these provisions, or violates any condition attached to a permit, approval, or certificate shall be subject to the penalties in accordance with the regulations of AHJ.

3.28 Guidelines for Sensitive and Critical Area, October 1997

The above guidelines list up a number of areas subject to protection in terms of sensitive ecosystems and archaeological importance. In Appendix II of the Guidelines, a list of eight Archaeological Sites and Monuments, of which four of them are National Monuments, in Karachi is provided. Further, there are 203 sites declared as “Protected Heritage” within Karachi District.

None of such sites however exist within the microenvironment of the proposed Project.

4. Description of Environment

This section describes the current environmental and socioeconomic conditions of the microenvironment and macroenvironment of the Project area.

The project site falls in the macroenvironment of District South which also constitutes the central business district of Karachi. Depot Lines forms the microenvironment of the project which is part of Karachi Cantonment; it serves as a military base and residential establishment. It was established by the British Indian Army in August 1942, and taken over by the Pakistan Army in 1947. The cantonment maintains its own water supply and electricity infrastructure and is outside the jurisdiction of the Karachi Metropolitan Corporation. The biggest and busiest railway station of Pakistan, Karachi Cantt, is also located here. It is bounded on the north by the built environment of Garden area, Faisal Cantonment and Karachi Cantt station on the south, S.M.C.H.S on the east and the arts council of Pakistan and Sindh Assembly Buildings to the far west.

Major landmarks of the Karachi Cantt include:

- Karachi Cantonment Railway Station
- Muhammad Ali Jinnah Road
- Shahr-eh Faisal
- Finance and Trade Centre
- Fleet Club
- Services Club

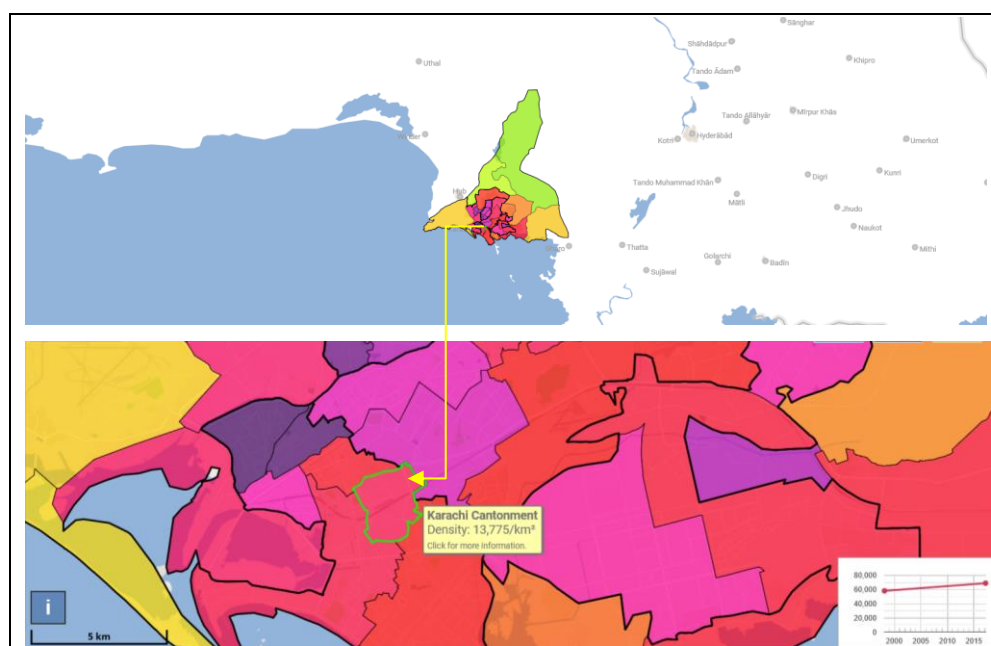


Figure 4.1: Karachi Cantonment



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The build environment of the microenvironment comprises the Muhammad Ali Jinnah Road, in short M.A. Jinnah Road, formerly known as Bunder Road. Originally known as Bunder (or Bandar) Road (meaning "Port Road"), it is one of the city's oldest and most important, running through the city to the docks. It was later renamed in honor of Pakistan's founder, Muhammad Ali Jinnah. Numerous landmarks are sited along this road, including the Merewether Clock Tower, Karachi Municipal Corporation Building, Shri Swaminarayan Mandir temple, and the Mazar-e-Quaid (Jinnah Mausoleum).

The macroenvironment has several renowned and some of the oldest areas of Karachi such as Kharadar, Meethadar, Jodia Bazar, Bolton Market, and Nanakwara. In fact, the history of Kharadar (Salty Gate) and Mithadar (Sweet Gate) dates back to pre-colonial times. These two places have been named after two gates that were built in 1792. Sweet Gate opened towards the Lyari River and Salty Gate opened towards the Arabian Sea. Both the gates were dismantled later by the British. Many examples of colonial architecture are present in the area such as:

- Frere Hall
- Karachi Grammar School
- Empress Market
- Sindh Club
- St. Andrews Church

4.1 Microenvironment

The microenvironment comprises a Block of 07 plots; this Block is bounded by road network from all sides. The Block has following Projects: Site of Prince ICON tower → Abandoned Houses on a disputed Plot on the east → Open Plot, Gerald Academy and OMI Hospital on the immediate North, and → has The block faces M.A Jinnah Road having connectivity with the green line bus rapid transit corridor on the immediate South, Rizvi Shaheed Road on the East, Depot Lines road on the West, Kiyani Shaheed road on the North. The buildings along the lane facing the Block have multi-storeys as well as single storey units housing educational, financial and health care institutions. The microenvironment of the project is already commercialized and a number of commercial and financial centers are well established there. On the further south, southeast and east the Block has buildings accommodating commercial and financial institutions with residential high risers. The built-environment of the microenvironment is also served by bus rapid transit corridor that has been designed to cater to the needs of traffic movement as envisioned under the Karachi Transport Masterplan 2030.

The microenvironment of Project: Prince ICON is shown in following photos:





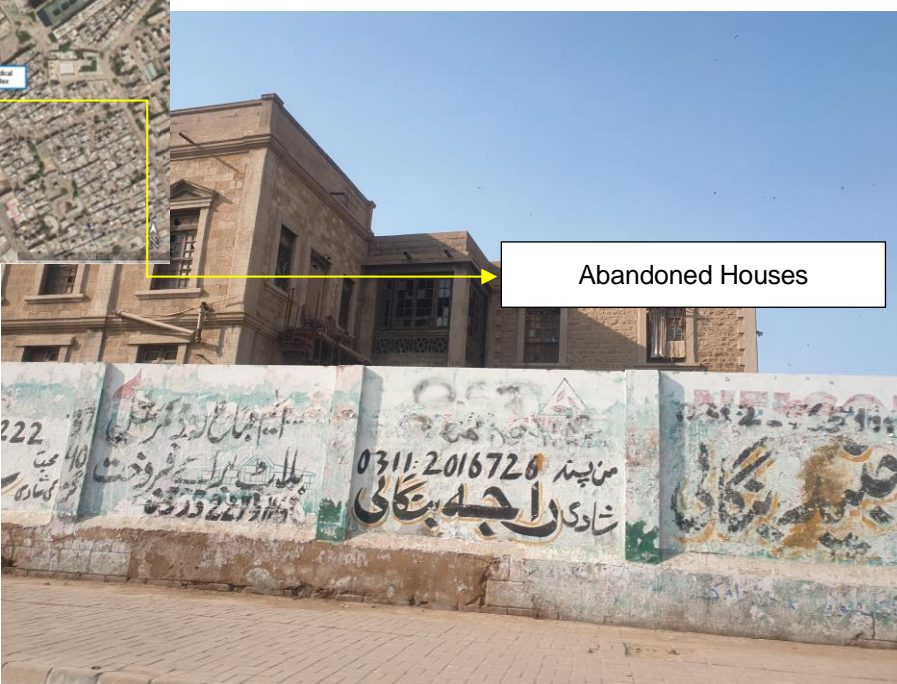
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Fig 4.1: Land use in the Microenvironment of Prince ICON Project site



Project Site of Prince ICON



Abandoned Houses



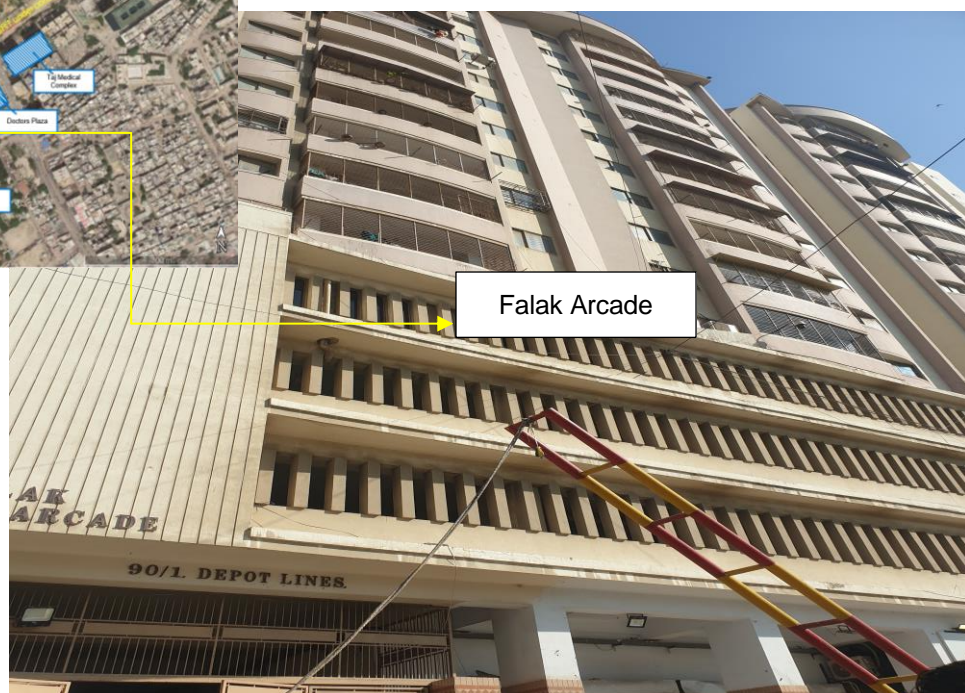
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Fig 4.1: Land use in the Microenvironment of Prince ICON Project site



Fig 4.1: Land use in the Microenvironment of Prince ICON Project site





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Fig 4.2: Road Network in the Microenvironment of Prince ICON Project site



M.A Jinnah Road



Rizvi Shaheed Road

Fig 4.2: Road Network in the Microenvironment of Prince ICON Project site



Kiyani Shaheed Road



Depot Lines



4.2 Physical Resource

Detailed description of the physical resources existing in the area is stated in the following sections. Major areas covered under physical resources are; topography, geology, soil conditions, climate, surface and ground water resources, and seismology. Most of the information is collected from the authentic secondary resources besides primary data collection for critical aspects. Respective departments were contacted by the project team members and information was collected with the help of checklist. Other studies and reports were referred and reviewed for the verification of information.

4.2.1 Climatic Condition

The climate of the macroenvironment is characterized as hot and dry during summer, and mild during winter with heavy, sporadic, rainfall during the monsoon. The southwest monsoon prevails from April to October. The monsoon is characterized by a reversal in wind direction during the remaining months; and heavy rainfall over most of the Indian Subcontinent. The hottest months are between mid-March to June. The winters are mild with temperature dropping to 10°C in January. Karachi receives approximately 217.3 mm of rain annually. Almost 80% of the rain is concentrated in the monsoon season. **Error! Reference source not found.**

The general characteristics of the seasons based on this data is described as follows:

- **Summer (mid-March to mid-June):** Characterized by high temperatures, moderate rainfalls with moderate atmospheric humidity and high speed-winds that blow from southwest towards northeast.
- **Summer Monsoon (mid-June to mid-September):** Characterized by high temperatures, high rainfalls with high atmospheric humidity and high speed-winds that blow from southwest towards northeast.
- **Post-Monsoon summer (mid-September to mid-November):** Characterized by moderate temperatures, low rainfalls and low speed-winds that normally blows from southwest towards northeast with direction of wind changing in the end of post-monsoon summer from southwest to northeast.
- **Winter (mid-November to mid-March):** Characterized by low temperatures, dry conditions with low atmospheric humidity and significant reduction in wind speeds that blows from northeast to southwest with the direction of wind changing in the end of winter from northeast to northwest.

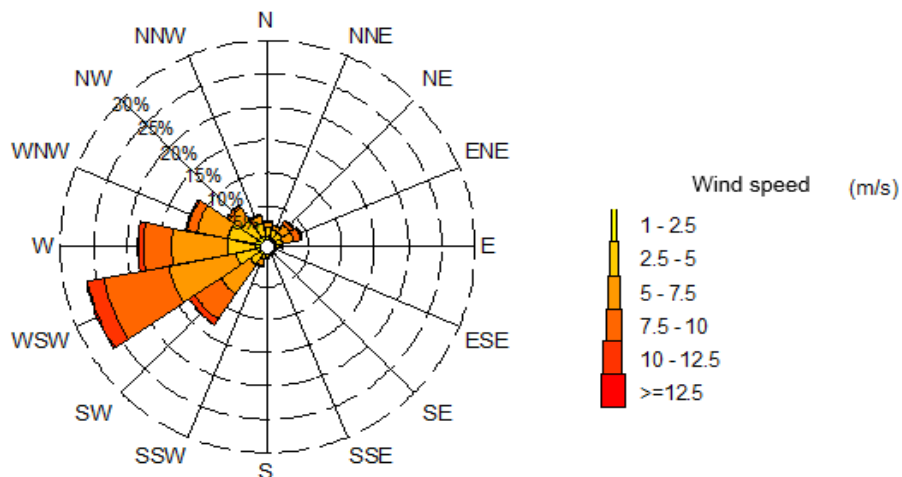


Figure 4.3: Annual Wind Rose

4.2.2 Geology & Soil Conditions

According to AH Kazmi, the entire lower Indus plain whose fringes comprise the Karachi Plain is underlain by Eocene limestone¹. It was deposited in a shallow sea, the remnant of the Tethys seaway, which was gradually eclipsed as a result of northward drifting of the Indo-Pakistan plate and its ultimate collision with the Eurasian plate to the north. The shoreline of the Indus plain had, during the Oligocene and Miocene era, a north-south orientation and extended from the area presently occupied by the Kirthar fore deep up to Karachi and beyond. A relatively shallow sea washed its shores. According to Kazmi as well as DeJong², it is likely that a number of offshore islands, formed parallel to the coastline as a result of the earliest phase of Himalayan Orogeny, dotted this sea. Between these islands and the Indus coastline the sea formed a relatively shallow and narrow gulf which is most likely the Kirthar Gulf. The Middle Miocene phase of Himalayan orogeny suddenly obliterated the Kirthar Gulf, moving the coastline rapidly to the vicinity of Karachi. The Kirthar Fore deep replaced the Kirthar gulf. This fore deep may have been occupied by one of the major streams of the Indus plain, most probably the Lyari, if not by Indus itself. Geological investigations of coastal area suggest the presence of only Middle and Tertiary rock formations comprising fresh and slightly weathered recent and sub-recent shoreline deposits. Principal constituents of these deposits are the inter-bedded

¹ (Geology of the Indus Delta, AH Kazmi, in Marine Geology & Oceanography of Arabian Sea and Coastal Pakistan, ed. BU Haq, JD Milliman, Van Nostrand Reinhold Company, New York 1984)

² (A. Farah and KA DeJong, Geodynamics of Pakistan, 1979)

sandstone and shale together with subordinate amounts of large size gravels or conglomerate.

Subsurface Characteristics: Soil investigation has revealed that top substrata consist of loose to medium dense, silty SAND / sandy SILT and dense, sandy GRAVEL / gravelly SAND deposits up to 10 feet depth. This is underlain by stiff to very stiff, clayey SILT and dense, sandy GRAVEL deposits in clayey matrix. This is followed by medium hard, SANDSTONE, hard, CONGLOMERATE and medium hard, SILTSTONE deposits that continue up to the investigated depth of 100 feet.

It must be noted that in BH-1, top 3 feet consist of fill material.

- Major subsurface deposits can be described as follows:
- Brown, loose, sandy SILT
- Grayish brown, medium dense, fine to coarse SAND
- Brown, dense, sandy GRAVEL in clayey matrix
- Brown, medium hard, SANDSTONE
- Grayish brown, hard, CONGLOMERATE
- Brown, medium hard, SILTSTONE

Ground water table was encountered at a depth of about 70 feet below existing ground level.

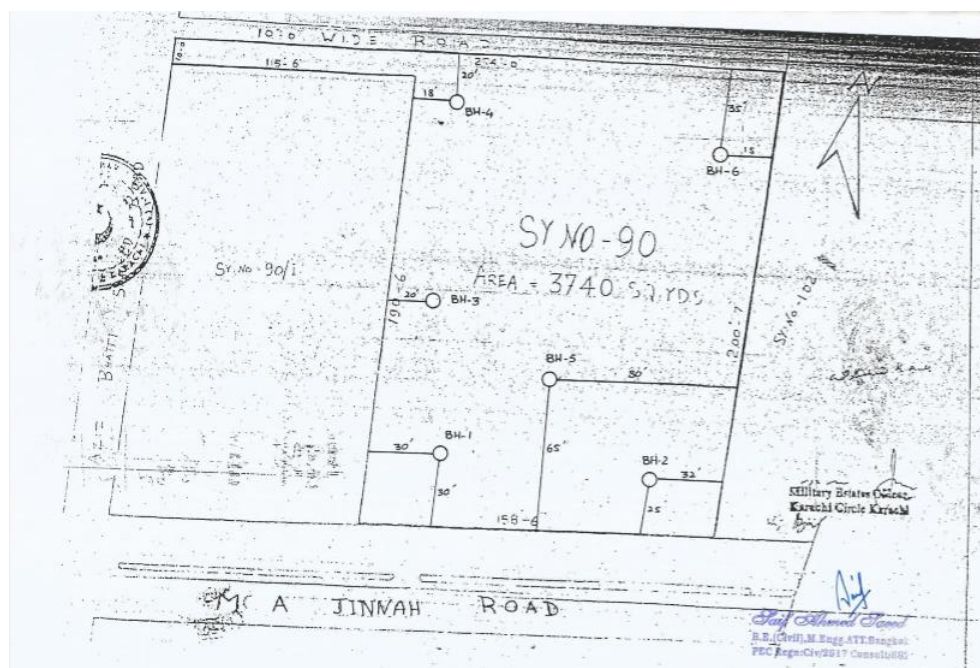


Figure 4.4: BH Locations at the site

4.2.3 Seismicity

Seismic activity in the Indus Delta and its estuarine area, which include the creeks, resulting from ancient deltaic activity, and hence the Malir River bed as well as Lyari River are all located on the passive continental margin, is due to and mainly from intra-plate active faults, particularly the Rann of Kutch & Pab Faults and their strands. There are four active fault lines in the vicinity of Karachi coast. They are Karachi-Jati, Allah Bund-Rann of Kutch Fault, Surjan-Jhimpir, and Pab.

According to a map created by the Pakistan Meteorological Department, the country is divided into 4 zones based on expected ground acceleration. The areas surrounding Quetta, along the Makran coast and parts of the NWFP, along the Afghan border fall in Zone 4. The rest of the KPK lies in Zone 3, with the exception of southern parts of this province, which lie in Zone 2. The remaining parts of the Pakistani coast till Karachi also lie in Zone 3. The remaining parts of the country lie in Zone 2. Karachi Building Control Authority has placed Karachi in Zone 2B, based on the actual events, the past observance of fault movement and other geological activities it has been inferred that Karachi is situated in a region where moderate earthquake of magnitude 5.0 to 6.0 equivalent to intensity between VII and VII on Modified Mercalli Scale may occur. On the basis of correlation of different scales and zoning, Karachi has been established as being situated in a noticeably moderate earthquake zone.

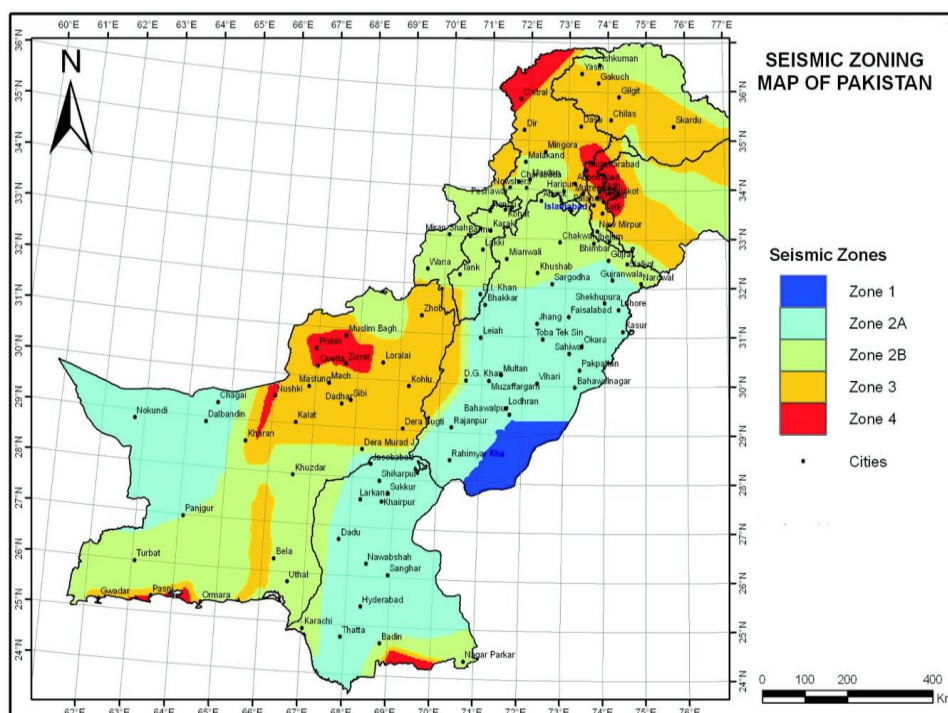


Figure 4.5: Seismic Zones of Pakistan



According to Uniform Building Code (1997), the soil profile falls in **Sc** category corresponding to **very dense, soil & soft rock**. Following table gives seismic zone, seismic zone factor, soil profile type and seismic coefficients.

Seismic Zone	Zone Factor (z)	Soil Profile Type	Seismic Coefficient (Ca)	Seismic Coefficient (Cv)
2B	0.20	Sc	0.24	0.32

4.2.4 Tsunamis

Major damages done by Tsunamis, the impulsively generated seawater waves that are a result of underwater earthquakes, have not been recorded for the coastal area of Karachi which forms the macroenvironment of project area. There are, however, evidences of a 1.2 m tsunami generated by an offshore earthquake of intensity 8 M in 1945, which caused minor damages in Manora and Port Qasim area. This event was followed by another Tidal wave that was recorded in 1953. The Tsunami of December 26, 2004 had no impact on the coastal area, the macroenvironment of project site in Karachi Cantonment.

4.2.5 Ambient Air & Noise Quality

Primary source of air pollution on and along the major corridors of Karachi is transport sector, so the primary pollutants in ambient air quality in the City in general and project area in particular are directly linked with fuel consumption.

According to available estimates, country's consumption of petroleum products has shown exponential growth, of which one-half is consumed by the transport sector. The high content of Sulphur in diesel (0.5-1 %) and furnace oil (1-3.5 %) is a major contributor to air pollution. Vehicular emissions are major source of PM_{2.5} and these fine particulates are responsible for respiratory problems in Karachi. The number of diesel trucks and buses have increased and a major share of the emission load from motor vehicles can be attributed to low quality diesel fuel and oil burning two-stroke engines.

Karachi has also witnessed an increase in vehicles fueled by compressed natural gas (CNG) in recent years and many formerly diesel fueled vehicles have been converted to run on CNG which has added another burden on the existing airshed besides causing public safety issue. Buses and trucks cause significant air pollution and since the main sources of pollutants are traffic, and traffic has increased on the major corridors including the mass transit corridors (project area), it is assumed that air quality has deteriorated as a result.



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The primary pollutants Oxides of Nitrogen (NO_x), Sulphur dioxide (SO₂) particulate matter (PM₁₀, PM with diameter of 10 microns or smaller and PM_{2.5}, i.e. PM 2.5 microns or smaller) and carbon monoxide (CO). Most of the PM emissions (>80%) comes from diesel-run vehicles. Sindh Environmental Quality Standards (SEQS) for these parameters in addition to lead (Pb) and ozone (O₃) are set by the Government and have been promulgated at provincial level by the Government of Sindh as well as standards for vehicle emissions in line with Euro II. Finally, the Government has promulgated tailpipe emissions standards. All these standards are discussed in Section 03 of this EIA.

Studies undertaken between 1987 and 1994 had raised concern on the deteriorating air quality and noise levels. Studies over the past decade, had quantified the problem and identified the tremendous growth in volume of traffic as the main factor responsible for increasing congestion all over Karachi roads and aggravating the problem. A 1990 survey³ monitored CO at 9-10 ppm along the busy urban streets; maximum NO₂ concentrations were 0.3-0.5 ppm during the daytime; with an ozone maximum around noon of 40 ppb and 50 ppb, below WHO's interim quality guideline. A 2005 study⁴ that shows hourly readings over 24 hours for O₃, SO₂, CO and NO₂ measured at five locations in Karachi. O₃ concentrations were well within the WHO guideline of 100 µg/m³ 8-hr average; NO₂ and SO₂ also were well within the WHO guideline of 200 µg/m³ (1-hr average) and 20 µg/m³ (24-hr), respectively.

The Feasibility Study and Development of a Transport Control Plan of Karachi Metropolis (May 2007) presented data for these parameters of air quality for three locations on M A Jinnah Road between Numaish and Tower. At that time all five parameters (NO_x, SO₂, PM₁₀, PM_{2.5} and CO) were found to exceed the NEQS. This study has highlighted the increasing level of NO_x, PM & CO to critical limits as the major environmental problem created by the Transport Sector. The main findings of this study are that the pollution load that is being mainly contributed by operation of trucks and buses on diesel oil, and the rickshaws on two stroke engines is composed of NO_x and PM whose concentration has increased to critical limits while that of CO is approaching these limits at almost all the intersections in the Metropolitan area. High Noise level and rise in temperature and humidity are other irritants that are annoying for the living environment in general but the corridor of impact along the middle and northeast sections of the roads in particular.

³ Ghauri et.al. 1994

⁴ Hashmi et.al.



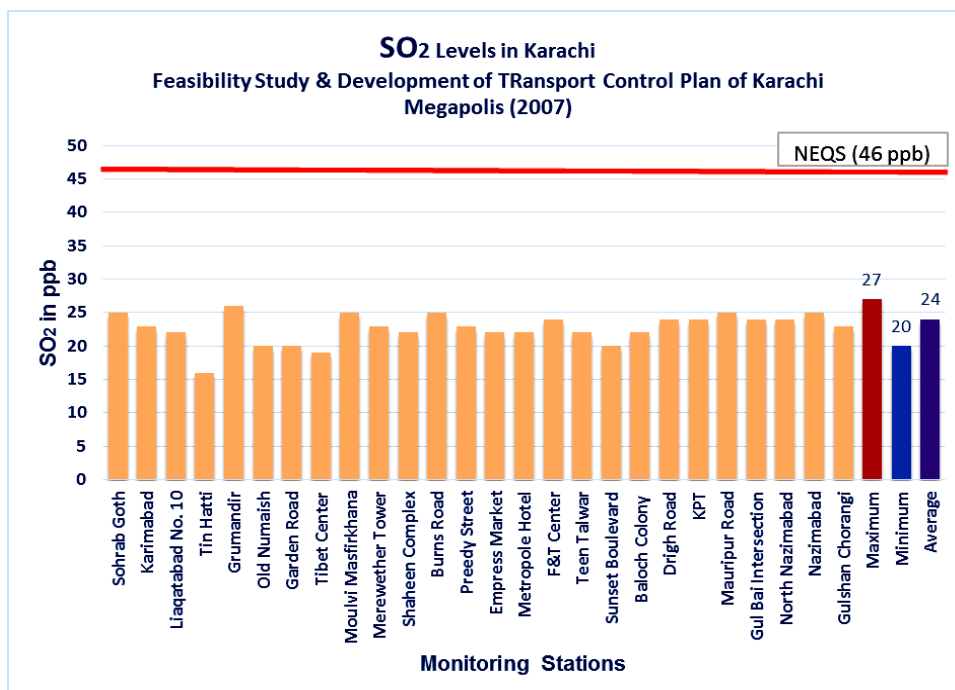


Figure 4.6: SO₂ Levels in Karachi

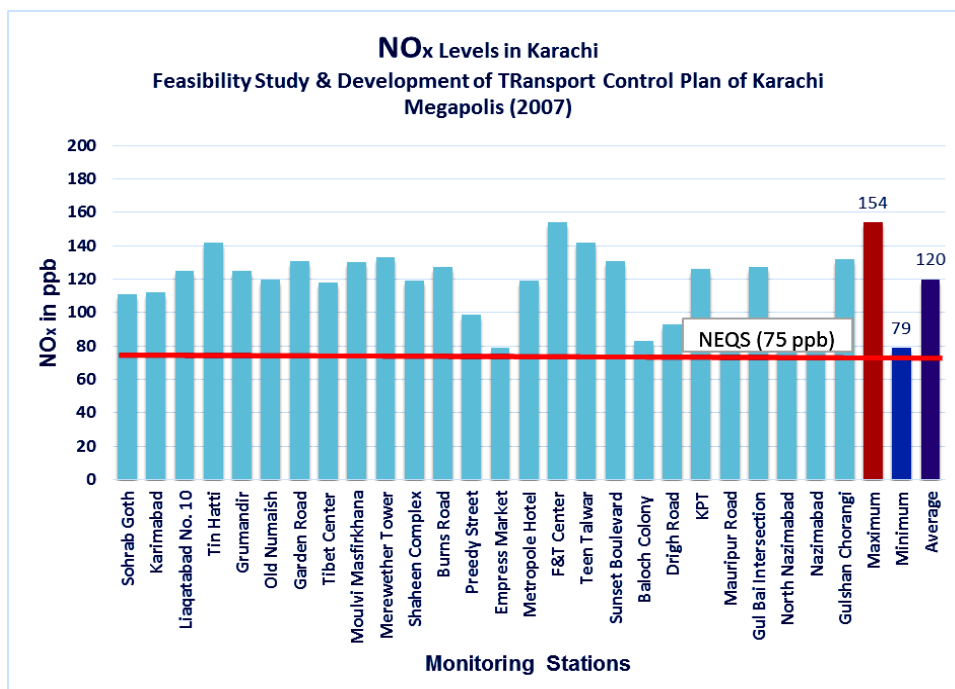


Figure 4.7: NO_x Levels in Karachi

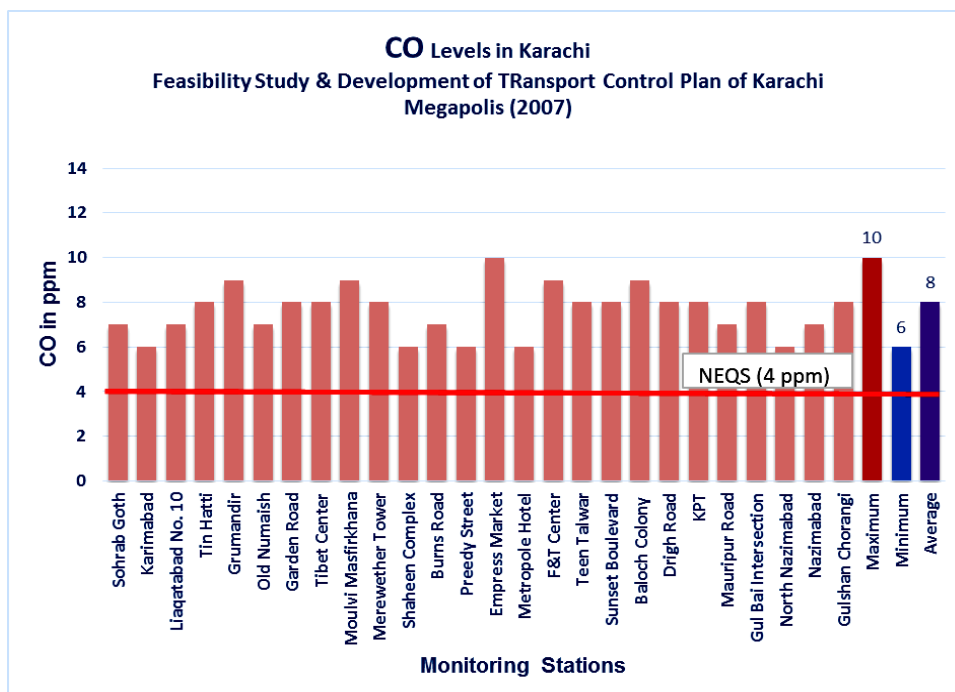


Figure 4.8: CO Levels in Karachi

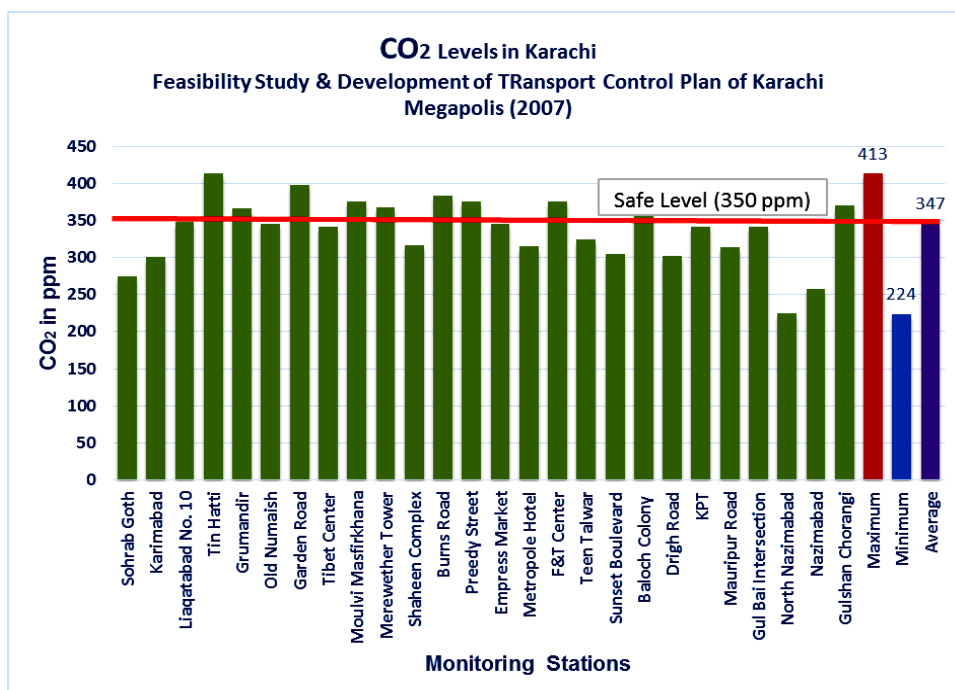


Figure 4.9: CO₂ Levels in Karachi

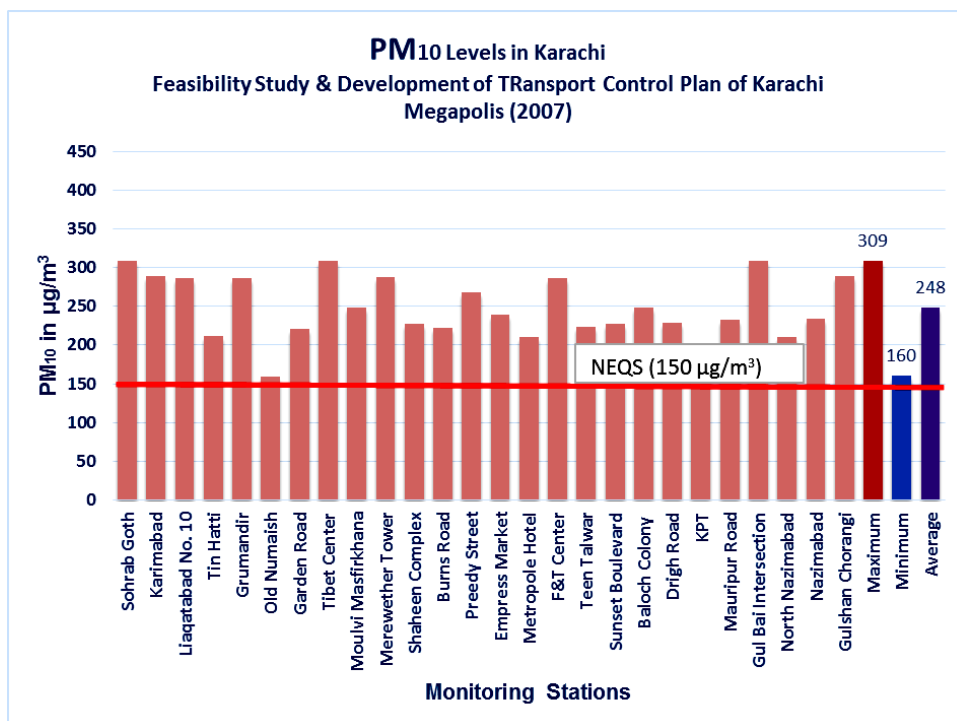


Figure 4.10: PM₁₀ Levels in Karachi

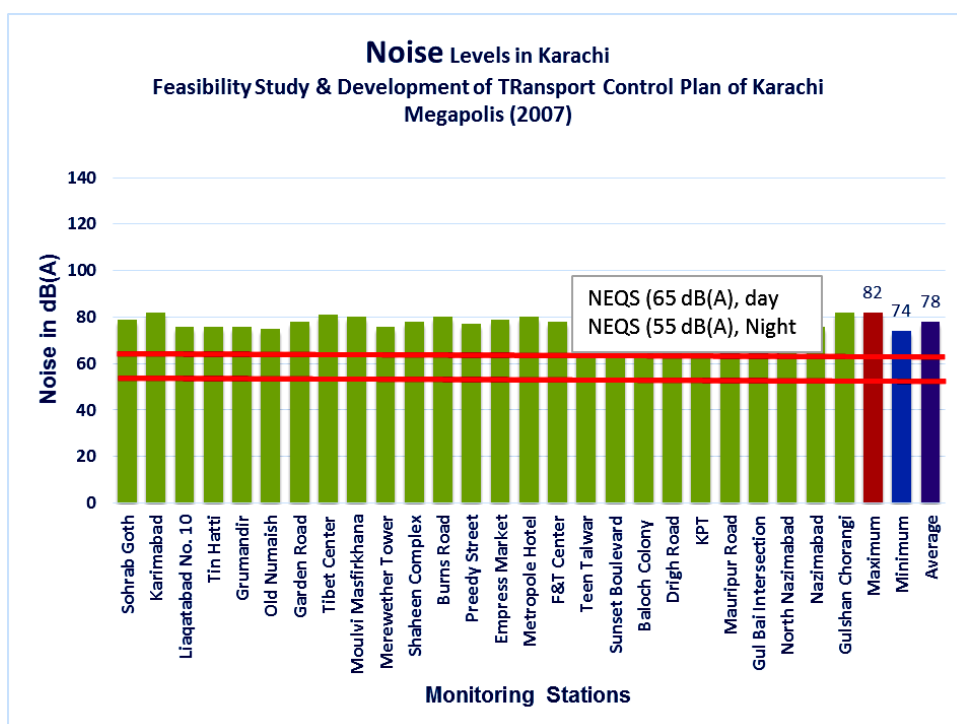


Figure 4.11: Noise Levels in Karachi



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Karachi Cantt.

Finally, another report⁵ quotes the World Bank's data with the following maximum values: PM_{2.5} 201 $\mu\text{g}/\text{m}^3$; SO₂ 173 $\mu\text{g}/\text{m}^3$; NO₂ 122 $\mu\text{g}/\text{m}^3$; O₃ 86 $\mu\text{g}/\text{m}^3$; CO₂ mg/m³. For reference, WHO's interim target for PM_{2.5} is 35 $\mu\text{g}/\text{m}^3$, whereas its guideline is 10 $\mu\text{g}/\text{m}^3$. WHO guideline for O₃: 100 $\mu\text{g}/\text{m}^3$ 8-hour mean. Both NO₂ and SO₂ are within WHO's guideline for short term average concentration. (200 and 400 $\mu\text{g}/\text{m}^3$ respectively). Data by this same author show excessive levels of PM at major intersections, including some along the BRT corridor, as well as SO₂, NO_x, O₃ and CO, all exceeding WHO limits, based on data taken by SUPARCO in 2004.

PAQI has been measuring particulate matter (PM_{2.5}) levels in Karachi since October 2016. The measurements show a PM_{2.5} concentration of 47 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) for October to December 2016. The World Health Organization (WHO) prescribes 10 $\mu\text{g}/\text{m}^3$ as the guideline value for ambient air. Exceeding this value leads to serious public health issues.

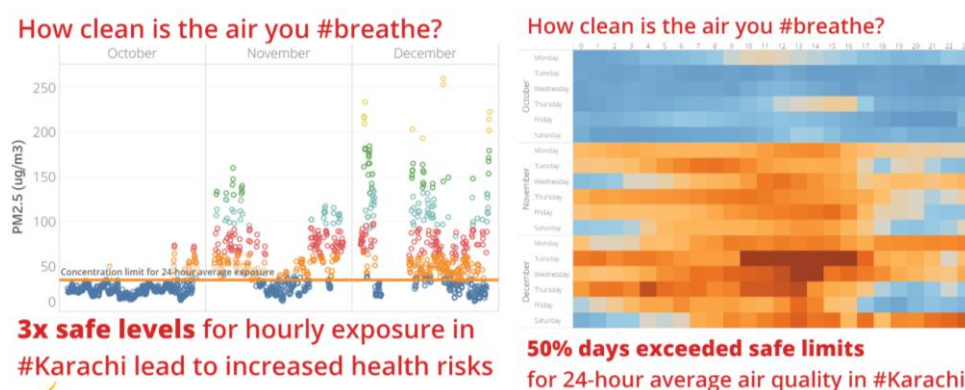


Figure 4.12: How Clean is Karachi's Air

Karachi's air quality is nearly 5x above this level, and twice the value for daily exposure. That is also 3x the safe levels recommended by the National Environmental Quality Standards for Ambient Air by the Pakistan Environmental Protection Agency (Pak-EPA).

Sindh Environmental Protection Agency (SEPA) has been uploading the data of ambient air quality on their website (www.epasindh.gov.pk) received from the monitoring stations of SEPA and analyzed by SEPA Laboratory team. The results presented below clearly show the levels of dust are far exceeding the limits set by SEQS. The reasons are obvious; indiscriminate cutting down of trees and vegetation on and along major corridors of Karachi as well the vehicles plying on

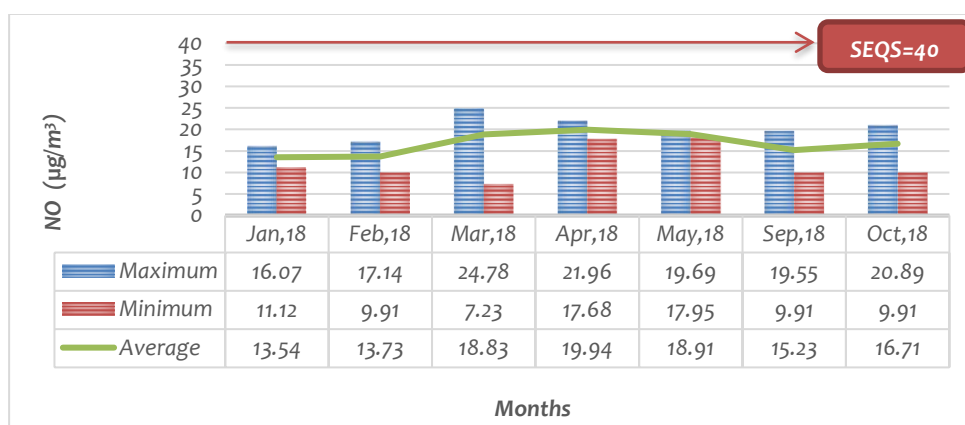
⁵ Kalwar 2014



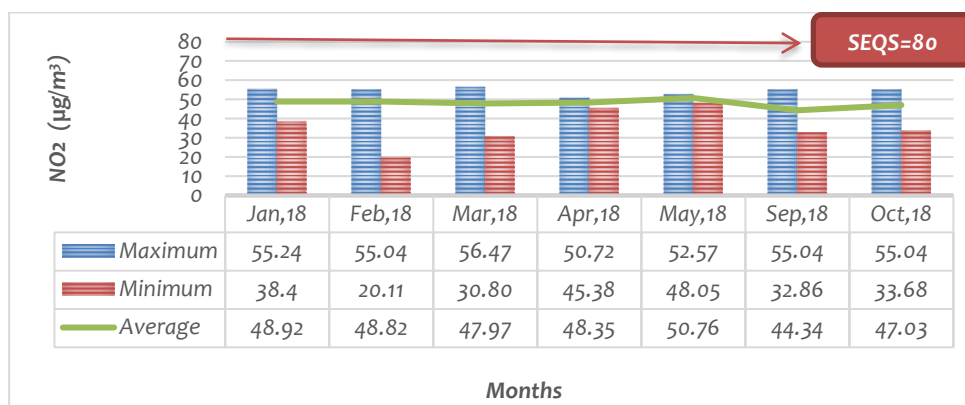
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road with no control. According to the report of Vehicular Emission Control Programme (VE COP) by the SEPA, regular monitoring and inspection was started from January 2010 and during the first 18 months, about 11,384 vehicles of all categories have been inspected and tested for their emission levels. Out of them, about 3,503 did not comply with the NEQS for vehicles and 1,947 were challenged by the traffic police for violation of the standards.



Source: EPA Sindh

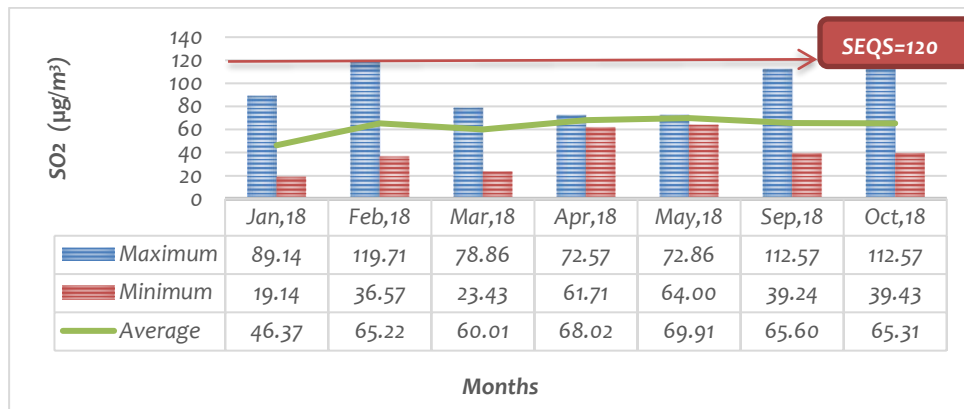


Source: EPA Sindh

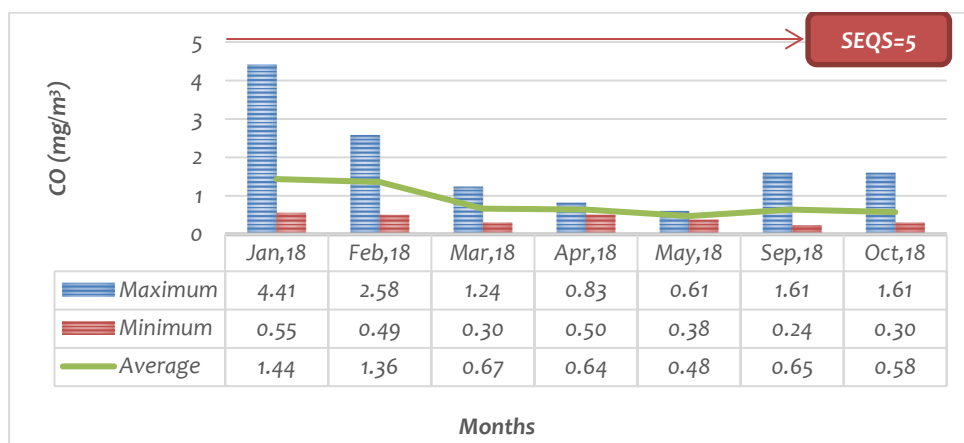


Environmental Impact Assessment (EIA)

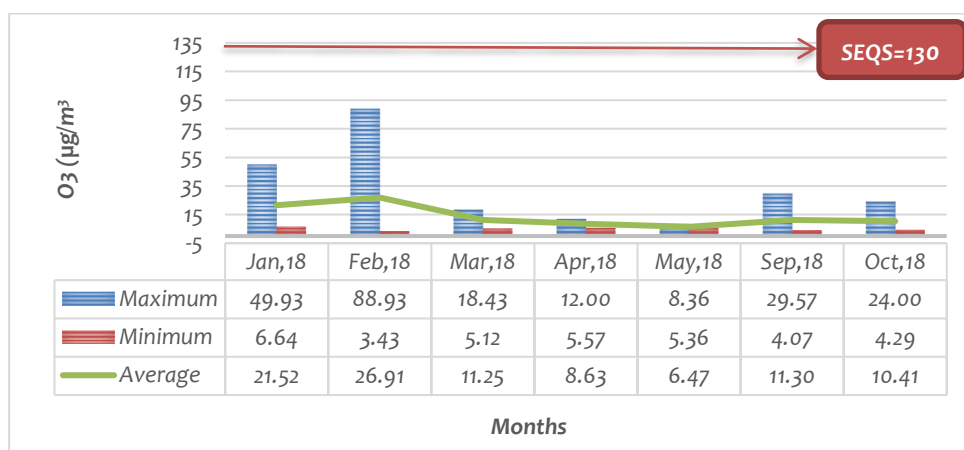
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Source: EPA Sindh

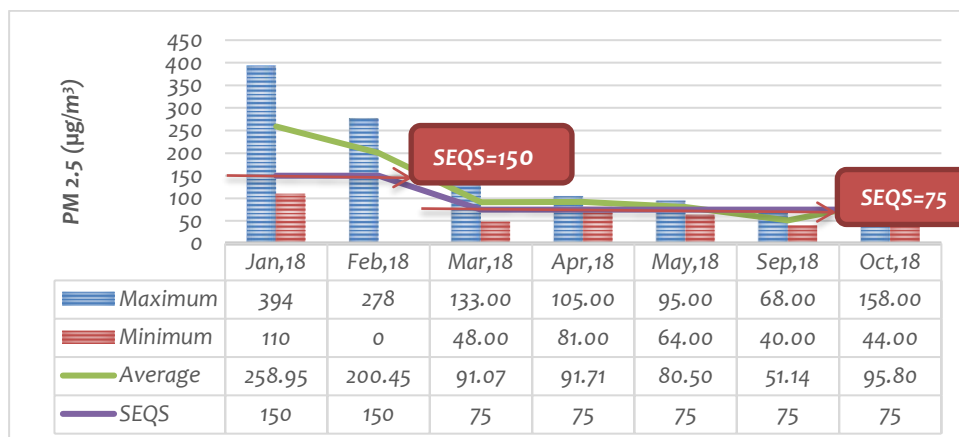


Source: EPA Sindh



Source: EPA Sindh





Source: EPA Sindh

Figure 4.13: Ambient Air Quality of Karachi (Source: SEPA Monitoring Station)

Air quality data was collected (23-26 Jan 2018) during the Detailed Engineering Design and EIA of BRT Project by MMP at Tayyab Mosque within the most heavily traveled section adjacent to People's Secretariat Chowrangi and the Mausoleum. Gaseous parameters are 24-hour averages compiled from hourly readings taken by SUPARCO using its mobile monitoring van. Particulates and lead are measured based on a high-volume sample taken over a 24-hr period. All values are within the relevant SEQS limits, though particulate parameters are high throughout with PM₁₀ at 128 µg/m³, PM_{2.5} at 49 µg/m³ & SPM at 390 µg/m³.

EHS Services also monitored the critical parameters in ambient air quality in the microenvironment of project area of Prince ICON. The air-shed of the site of Prince ICON site has, according to the assessment of ambient air quality been classified as polluted in terms of dust levels with SPM/TSP, PM₁₀ and PM_{2.5} at 327 µg/m³, 151µg/m³ and 74 µg/m³. The levels of SO₂ → 22.7 µg/m³, NO → 29.4 µg/m³, NO₂ → 48.7 µg/m³, CO → 3.7 mg/m³ and O₃ → 19.4 µg/m³ were found with the permissible limits of SEQS however the levels of pollutants of concern (SPM/TSP, PM₁₀ and PM_{2.5}) do not comply with WHO limits. It is only the moderate velocity wind in Karachi that is saving the residents from the hazards of air pollution. The noise levels ranging from 77.3dB(A) to 88.9dB(A) that in excess of SEQS⁶. As such contribution of the traffic related emissions and noise levels on the adjoining roads of the project site will be a major nuisance and will

⁶ SEQS Limits: 55/45 dB(A) Leq Day/Night. These are the SEQS Limits for Residential Area (A) Category Zone Sindh Environmental Protection Act, 2014 No. PAS/Legis-B-06/2014



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have to be mitigated in the project architectural design as well as construction and operation stages.



Figure 4.13(a): High level dust deposition on local vegetation along BRT construction sites (Source: EHS Services)



Figure 4.13(b): Open burning of Solid Waste in Open Plot
(Source: EHS Services)

4.2.6 Water Resources, Water Quality and Drainage

4.2.6.1 Hydrogeology of Karachi

Hydrogeologically, the city of Karachi lies in the Hab River Basin and the Malir River Basin. The Malir River Basin is drained by the Malir River and the Lyari River. The aquifer of Karachi is, therefore, mainly recharged by seepage from Hab River, Hab Dam as well as the Malir and the Lyari Rivers. The Hab River lies on the western frontier of Sindh and for some distance the boundary between Sindh and the Baluchistan provinces. It located about 30 km to the west of Karachi, along the Karachi- Lasbela boundary. It falls into the Arabian Sea near Cape Monze, with a total drainage course length of 336 km. During the past several years, a number of pumping wells have been installed to meet requirements for the irrigation-water supply (to raise vegetables, fruits, dairy and poultry) and drinking-water supply for Karachi. Excessive pumping of groundwater and continuous lowering of water-table is likely to result in intrusion of seawater into the Malir Basin under natural seepage conditions and under artificially induced conditions of recharge of saline seawater in the coastal aquifer(s) of Karachi.



Recharge Sources: Five possible water-sources are contributing to the groundwater recharge in Karachi. The first possible source is the rainfall. As the city of Karachi suffers from deficit of precipitation (only rainfall), the contribution to shallow groundwater storage from rain is very little. However, rainfall in the hinterlands and other areas surrounding Karachi may significantly contribute to the groundwater flow-system. The two freshwater sources are the Hab Lake/Hab Dam and the Indus River. Water from Hab Dam and the Indus River is piped to various residential zones in Karachi for drinking and irrigation purposes. The spring water discharges into Malir River and Lyari River and the municipal/industrial waste effluents added to these rivers are also contributing to groundwater storage as a fourth recharge source. Seawater intrusion along Karachi coast is the fifth possible source.

Shallow Groundwater: Physico-chemical data of shallow groundwater (depth less than 30 meters) shows that the shallow wells, located in the vicinity of coast and in the proximity of polluted rivers, have relatively higher values of electrical conductivity, salinity and population of Coliform bacteria. The shallow groundwater is moderately saline, representing electrical conductivity values in the range of 1.1 to 1.9 mS/cm and salinity in the range of 1 ppt. The pH of shallow groundwater varies from mildly acidic (~6.3) to mildly alkaline values (~7.9). Areas with quite poor sanitary conditions have relatively low values of pH (~6.3 to 6.8). Shallow groundwater below 20 meters is slightly reducing. The dissolved oxygen is in the range of 1.5 to 7.9 mg/L. Turbidity of shallow groundwater varies between 3.6 NTU and 95 NTU. The concentration of HCO_3^- (356-514ppm, n=4), Cl^- (82-169 ppm, n=4) and SO_4^{2-} (38-117 ppm, n=4) in shallow groundwater is very reasonable. The mean chemical concentrations of Cl^- , SO_4^{2-} and HCO_3^- in shallow groundwater are as follows:

- Mean Cl^- (Shallow Groundwater): 132.8 ± 36.5 ppm (n=4)
- Mean SO_4^{2-} (Shallow Groundwater): 63.3 ± 36.7 ppm (n=4)
- Mean HCO_3^- (Shallow Groundwater): 423 ± 67.4 ppm (n=4)

The range of variation in stable isotope content of total dissolved inorganic carbon (TDIC) and oxygen in Lyari River water is as follows:

- $\delta^{18}\text{O}$ (Shallow Groundwater) -6.3 to -5.8 ‰ V-SMOW (n=8)
- $\delta^{13}\text{C}$ (TDIC-Shallow Groundwater): -16.5 to -5.5 ‰ PDB (n=8)

The mean stable isotope content of ^{18}O and ^{13}C in shallow groundwater is as follows:

- Mean $\delta^{18}\text{O}$ (Shallow Groundwater): -5.9 ± 0.32 ‰ V-SMOW (n=8)
- Mean $\delta^{13}\text{C}$ (TDIC-Shallow Groundwater): -10.1 ± 3.3 ‰ PDB (n=8)



The stable-isotope results indicate that the shallow / phreatic aquifers are recharged by a mixture of fresh waters of Indus River and Hab River (draining spring water and flooded rainwater), as well as polluted Lyari and Malir rivers and their feeding drains (both under natural infiltration conditions and artificially induced infiltration conditions) and, to a much smaller extent, from direct recharge of local precipitation.

Deep Groundwater: In general, Deep groundwater is mostly saline and has high electrical conductivity (range: 1.9- 19.1 mS/cm) and salinity (range: 1.7-7.4 ppt), as compared to shallow groundwater.

Based on hydro chemical data of water samples collected from pumping wells, it is assumed that the shallow mixed deep groundwater discharged by large-scale pumping wells mainly represents the deep groundwater from confined aquifer. The mean chemical concentrations of Cl^- , SO_4^{2-} and HCO_3^- in shallow mixed deep groundwater are as follows:

- Mean Cl^- (Deep Groundwater): 2169.2 + 1828.0 ppm (n=9)
- Mean SO_4^{2-} (Deep Groundwater): 458.4 + 691.4 ppm (n=9)
- Mean HCO_3^- (Deep Groundwater): 353.6 + 215.4 ppm (n=9)

The range of variation in stable isotope content of total dissolved inorganic carbon (TDIC) and oxygen in shallow mixed deep groundwater is as follows:

- $\delta^{18}\text{O}$ (Deep Groundwater): - 6.2 to -4.2 ‰ V-SMOW (n=10)
- $\delta^{13}\text{C}$ (TDIC – Deep Groundwater): -13.2 to -0.3 ‰ PDB (n=10)

The mean stable isotope content of ^{18}O in shallow mixed deep groundwater is as follows:

- Mean $\delta^{18}\text{O}$ (Deep Groundwater): -5.3 + 0.7‰ V-SMOW (n=10)
- Mean $\delta^{13}\text{C}$ (TDIC- Deep Groundwater): -10.5 + 3.7‰ PDB (n=10)

The hydro chemical and stable isotope results indicate that the confined aquifer hosts a mixture of rainwater from hinterlands and surrounding regions around coastal Karachi, as well as sea trapped water / seawater, through intrusion under natural infiltration conditions or under induced recharge conditions.

Groundwater Recharge Characteristics/Sea water Intrusion: Presently, coastal Karachi is known to have five sources of recharge to its groundwater reserves.

- (i) Rainfall,
- (ii) Indus River water supply
- (iii) Hab-River & Hab Lake water supply



- (iv) Polluted Lyari and Malir rivers/ contributory channels draining mixtures of domestic industrial and agricultural wastewater, composed of pre-said three sources
- (v) Seawater.

The possibilities of major contribution to groundwater recharge of shallow/phreatic aquifer directly by local rainfall seems very small, due to very poor frequency of rainfall events and rainfall intensities in the Karachi and high evaporation rates. The long-term (15 years annual record) mean monthly average precipitation for Karachi is between 0-15 mm during the months of January to June, 23 – 91 mm during the months of July to September, and 0-7 mm during the months of October to December. The remaining four sources play a significant role in recharge of the shallow aquifer-system and deep groundwater system (confined aquifer) in coastal Karachi. Unpolluted seawater of Karachi coast is characterized by a $\delta 18O$ value of $\sim +1\%$ VSMOW and a chloride content of ~ 23000 ppm. Both the Lyari River and Malir River waters, as well as the Indus River water and the Hab Lake water, have extremely very low aqueous contents of chloride and sulfate ions as compared to seawater. The average mean value of $\delta 18O$ in polluted river waters is $\sim 5\%$ V-SMOW and in shallow groundwater is -5.9% V-SMOW. The relatively deeper ground waters representing confined aquifer have a mean $\delta 18O$ value of -4.3% VSMOW and excessively high values of aqueous chloride and sulfate.

4.2.6.2 Greater Karachi Bulk Water Supply System

To supply the city of Karachi with 280 MGD of water supply, the Greater Karachi Bulk Water Supply Scheme was designed in 1953. The scheme was modeled and divided into four equal phases on the basis of population projection till the year 2000. Each scheme, with the design rate of 70 MGD, comprised of open canals, covered conduits, a tunnel, siphons, pumping stations and mains to supply water from the Keenjhar Lake. The details are discussed below and shown in Figure 4.14.

1st Phase

- Proposed raw-water pumping at Dhabeji to bring 70 MGD of water from Keenjhar Lake and water treatment plant of 70 MGD at COD Hills, Karachi.
- Development of complete water conveyance system comprising of a 280 MGD lined canal, a conduit of equal capacity up to Pipri and of 140 MGD capacity up to Karachi.
- Work on 10 MG reservoir at COD Hills along with the distribution net-work.
- It started in 1954 and completed in 1961 at a total cost of PKR 185 million.

2nd Phase

- It included construction of a 70 MGD pump house at Dhabeji, laying of 84" dia pre-stressed pipe siphons, a 25 MGD pump house at pipri and two water





treatment plants of 25 and 45 MGD along with 10 MG reservoirs at Pipri and COD Hills respectively.

- Work for this phase was awarded in 1969 and completed in early 1971 at a total cost of PKR 200 million.

3rd Phase

- It included the construction of a 70 MGD pumping station at Dhabeji, two pumping stations along with water treatment plants of 25 MGD capacity each at North East Karachi and Pipri, 84" dia pipe siphons, three balancing reservoirs and the distribution mains.
- - A reservation for supply of 22 MGD of un-filtered water to Karachi Steel has also been made under this phase.
- - Work for this phase started in 1975 and completed in 1978 with the total cost of PKR 750 million.

4th Phase

- Due to financial constraints, 4th Phase works were divided into two parts.
- Under this phase improvement of lined canal, modifications of the present Dhabeji Pumping Stations, laying of 84" dia pipe syphons, construction of a 25 MGD pump house and clarification units at Pipri were commissioned.
- Also, improvement of the secondary distribution network and installation of domestic meters in K.D.A. Scheme No.1 & 5 were taken up with the assistance of World Bank and all the works were completed in June, 1987 at a total cost of PKR 360 million.
- After this phase, the city's water supply increased by 50 MGD.

Hub Water Supply System

- The Hub dam was constructed by WAPDA on Hub River to from 1963-1981
- At Stage-I, 90 MGD pump house, two steel pressure mains one 20 MG reservoir, trunk mains and primary treatment of lake water by screening and chlorination were completed in August, 1982 at a total cost of PKR 260 million.
- Stage-II included the improvement of secondary distribution network and construction of a 90 MGD water treatment plant.

5th Phase (Greater Karachi Bulk Water Supply Scheme)

- Karachi's water supply system has expanded considerably in this phase. As discussed in initial four phases, Karachi was getting 280 MGD of water.
- Then 100 MGD water were added to the system through K-II supply project which were completed in 1998 with the assistance of World Bank.
- Through a bulk water supply project, the city got another 40 MGD of water in 2000.
- K-III 100 MGD Water Supply Project, further added into the existing supply which were completed in 2006 with the assistance of GoP.

- Now, the K-IV water project has been planned to fill the gap between the city's demand and supply of water.
- Approved on July 10, 2014 with the proposed design capacity of supplying an additional 650 MGD of water to Karachi. K-VI will be completed in three phases at a cost of PKR 25.6 billion rupees.

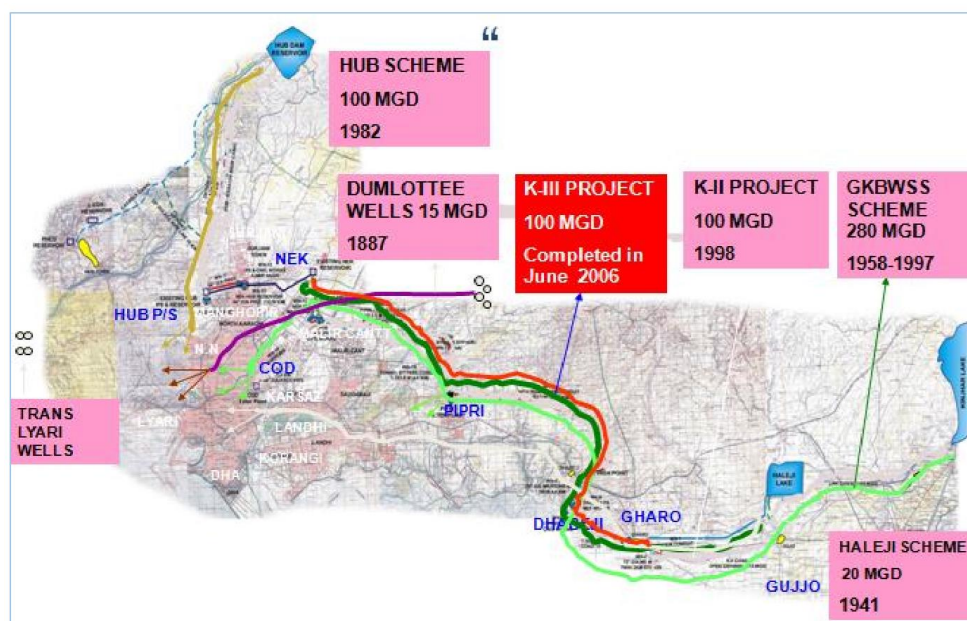


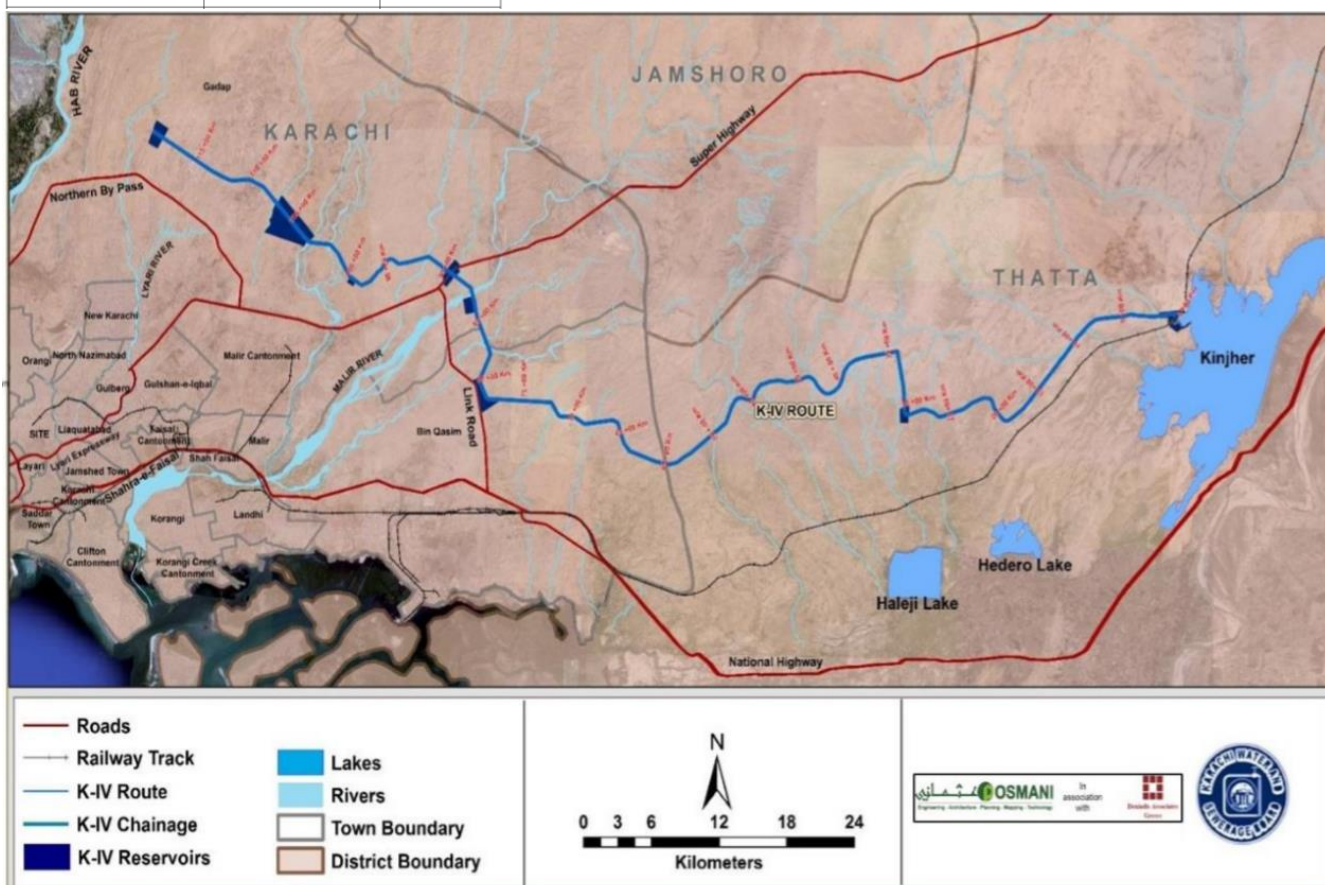
Figure 4.14: Water Supply System of Karachi (Glimpse from Past to Present)
Source: KW&SB (2019)

4.2.6.3 Proposed Bulk Water Supply Scheme

K-IV, is a municipal infrastructure project being jointly developed by the Provincial and Federal Governments in Karachi, Pakistan, to augment the city's daily water supply. This project is divided into three phases and each phase will increase water supply capacity. Details of K-IV are shown in Figure 4.15.

K-IV Project; Part of Greater Karachi Water Supply Scheme, Indus Water from Keenjhar Lake to Karachi City		
Phase	Capacity	Proposed Completion Year
K-IV Phase-1	260 MGD	Year 2018
K-IV Phase-2	260 MGD	Year 2022
K-IV Phase-3	130 MGD	Year 2025

Figure 4.15: K-IV Bulk Water Supply Schemes Karachi



4.2.6.4 Present Water Supply and Sewerage System

The water supply and sewerage system in the macroenvironment is managed by Karachi Water Supply & Sewerage Board (KW&SB). Present water supply system of Karachi City has a supply capacity of 560 mgd. Actually, as of the end of year 2006, the KW&SB supply bulk water of about 630 mgd beyond the capacity as shown in following Table. Out of 630 mgd, water of 209 mgd is supplied without filtration, which is equivalent to one third of actual supply amount of 630 mgd.

Water is collected and treated by the conventional water treatment plants and distributed by a system which is at least 40-45 years old with some new distribution facilities in the city. The outdated system along with improper operation and maintenance causes the issue of revenue loss. In addition, there is no metering for retail customers and only 25 percent of commercial and

industrial customers have a metered supply. The water supply is irregular due to power failure at KW&SB pumping stations which further increases the problems in water distribution system. Moreover, almost 40 per cent of the population lives in slums with limited water supply & poor sanitary infrastructure.

Figure 4.16 presents the detailed water distribution in Karachi.

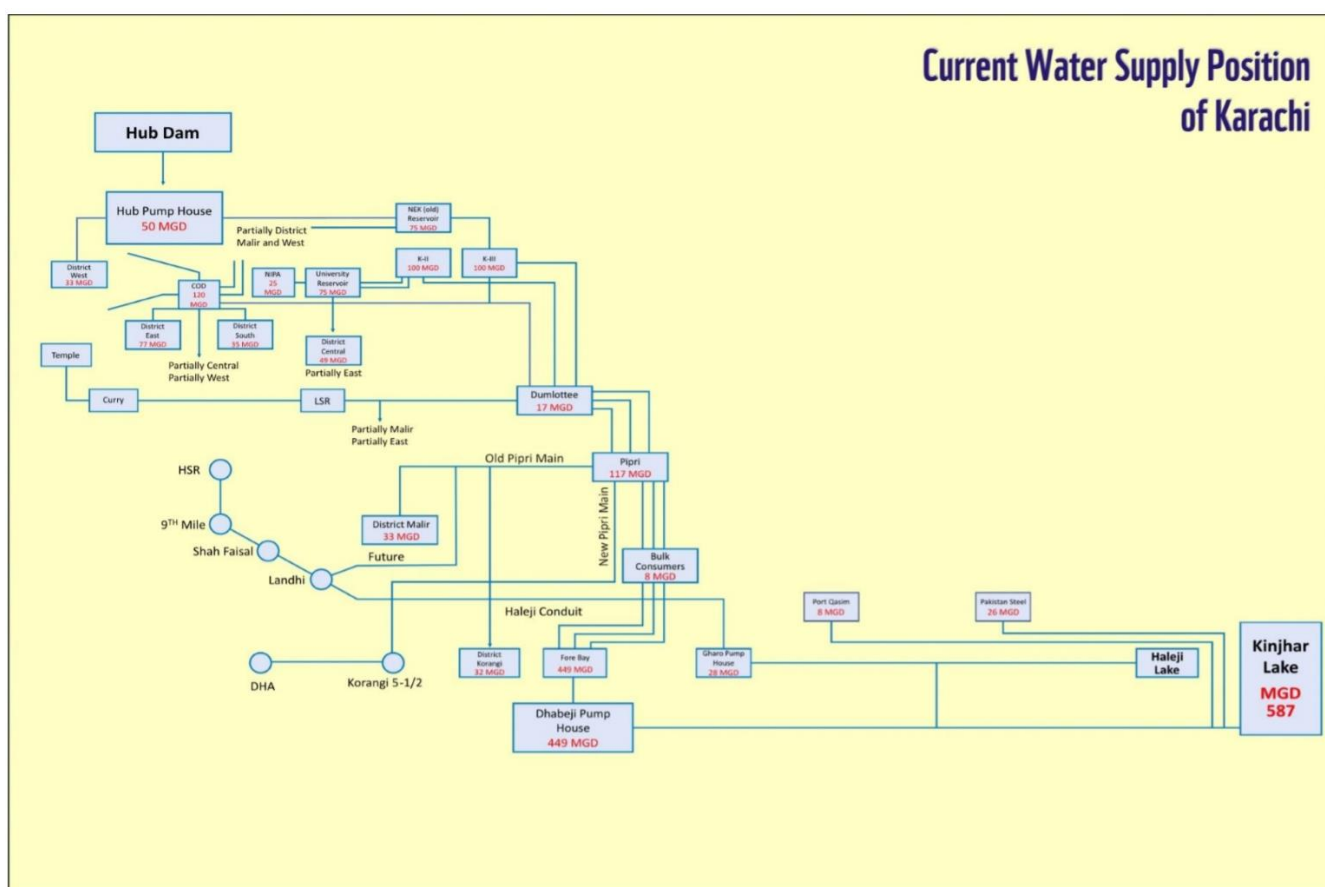


Figure 4.16: Current Water Distribution System in Karachi from Hub Reservoir and Keenjhar Lake

Table 4.1: Present Water Supply Capacity		
Supplied from		Rated Capacity
Gharo Filtration Plant		20 mgd
Pipri Filtration Plant	with Filtration	100 mgd
	without Filtration	-
Dumlottee Conduit (without Filtration)	from Wells	20 mgd
	from GK/K-III Systems	-
NEK Old Filtration Plant		25 mgd
NEK New Filtration Plant		100 mgd



Table 4.1: Present Water Supply Capacity

COD Filtration Plant	with Filtration	115 mgd	104 mgd
	without Filtration	-	48 mgd
Hub Filtration Plant		80 mgd	80 mgd
Supply without Filtration (from K-III System)		100 mgd	95 mgd
Supply without Filtration (from GK System)		-	17 mgd
Total		560 mgd	630 mgd

4.2.6.5 Water Supply Network

Karachi water and sewerage board (KWSB) is the organization responsible for water transmission and distribution across the city. Indus river system authority (IRSA) provides water to Sindh, therefore, this river indirectly becomes part of water supply system for the city. River Indus feeds water to the Lake Keenjhar. From Keenjhar, water through conduits goes to Haleji, Gharo, Port Qasim, Steel Mills and then to Dhabeji pumping station. From Dhabeji Pumping station, water is pumped to different pumping stations to supply water among all six districts of the city by using electrical pumping motors. Water from Hub Dam is supplied to Hub Pump House through Hub Canal and then supplied to NEK, Old Reservoir and different areas of the city. Karachi's water supply infrastructure comprises of 25 bulk water reservoirs, 150 pumping stations, 8 water-filtration plants, 75 kilometers of canals, over 11,000 kilometers of pipeline, 20 sewage-pumping stations, 3 sewage treatment plants, and over 250,000 manholes. Almost 1.13 million domestic connections and 9,317 bulk customers in Karachi are provided water supply and sewerage services (Figure 4.17). In informal settlements and industries, the most of the water demand is met through non-piped systems, including private water tankers. Almost 24 hydrants have been licensed to the private parties by KWSB. Out of these 24 hydrants, only 10 are operational while the rest were closed as per a recent Supreme Court Order. unregulated hydrants are rampantly spread across the city. KWSB introduced amendments to discourage the illegal use of hydrants. Since 2009, it has dismantled over 948 illegal hydrants in an effort to confront the illegal use of water. Now six regulated and meter hydrants supply water to the city. Despite that, the issue of unregulated hydrants needs attention. There are two distribution channels for Karachi, mainly Northern and Southern Channels.

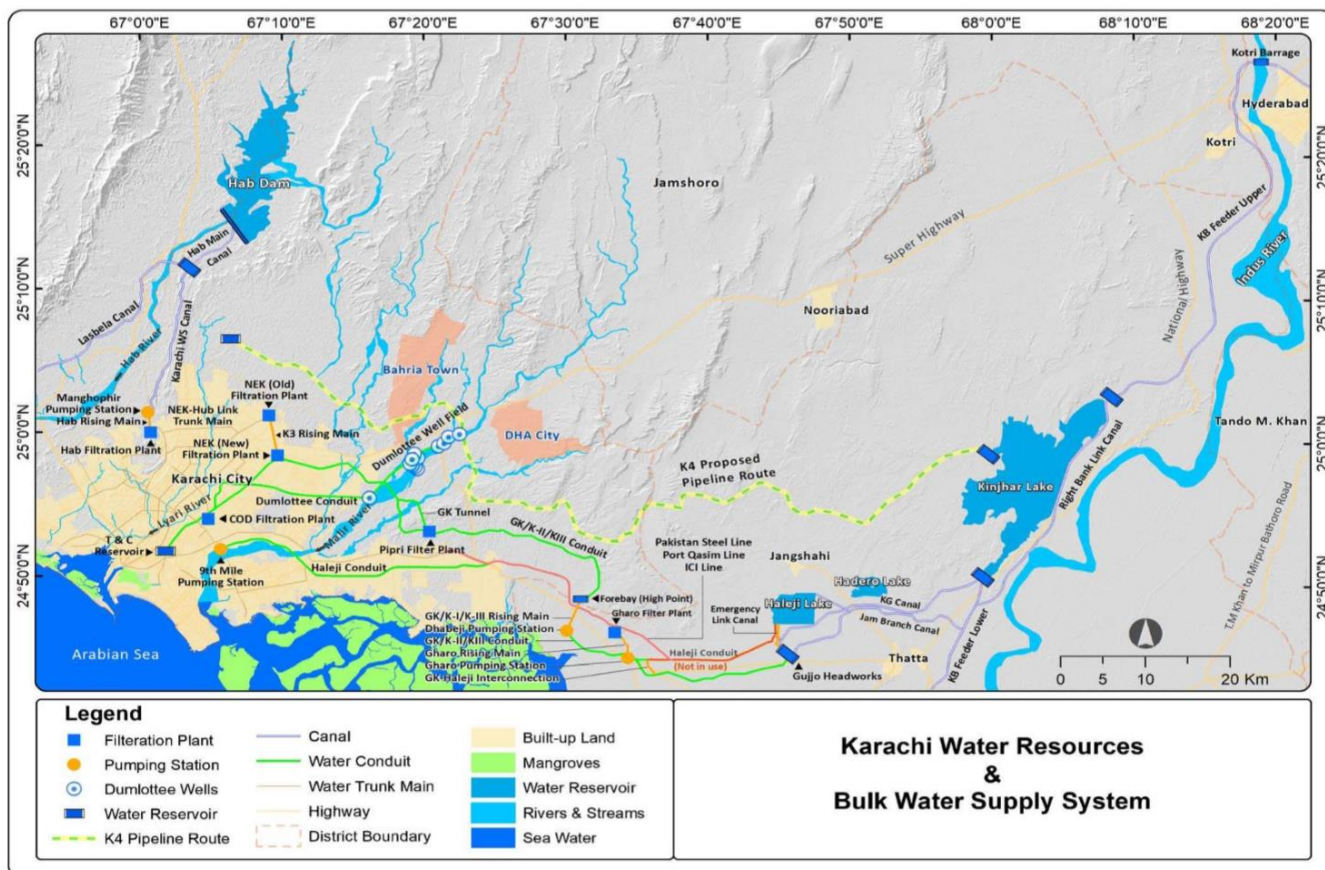


Figure 4.17: Karachi Water Resources and Bulk Water Supply System

4.2.6.6 Water demand and supply with past trends and future trends

Karachi mainly relies on River Indus for water supply due to the decreased level of water from Hub dam. Karachi receives approximately 580 MGD of water from River Indus, but requirement of the city is around 820-1200 MGD according to World Health Organization (WHO) standards. That means Karachi gets almost 50 per cent of its present requirement. Recent studies suggest that population will grow by 30 per cent from 2017 to 2030. This will translate in an increased water demand which will in turn put pressure on the already scarce water resources. Figure 4.18 shows water supply and demand gap till the year 2017.

Year	Population (Million)	Demand (MGD)	Supply (MGD)	Gap (MGD)
1998	11.33	567	410	157
2017	14.9	820	650	170

Figure 4.18: Water Supply and Demand Gap till the Year 2017



4.2.6.7 Surface water and Groundwater Quality Assessment

The shortage of water in Karachi city due to rapid increase in population and industrial activities, has forced people to meet their water requirements from alternative supplies such as privately-owned ground water sources which extract, process and sell groundwater at a very high commercial cost. However, the quality of groundwater is very poor in Karachi mainly due to the excessive pumping of groundwater by farmers, seepage of domestic wastewater in groundwater, huge amounts of chemical constituents in industrial wastewater and sea water encroachment, rendering it medically unfit for human consumption if consumed without prior treatment. A study conducted by PCRWR in 2015-2016 to assess of the water quality of cities of Pakistan revealed that out of 28 samples collected from surface and groundwater of Karachi, 24 were found contaminated with E.coli. This constitutes almost 86 per cent of the total water sources of Karachi rendering it unfit for consumption. The most probable source of bacterial contamination is the sewerage discharge, which is usually flowing in pipelines parallel to that of drinking and household water and poor maintenance and breakages in pipelines lead to the mixing of water supply with the sewerage water. Also, no significant improvement in the water quality was observed from the year 2002-2015. Another study analyzed the surface and groundwater samples of Karachi and found that almost 88 percent of the samples/sources had Lead values higher than the WHO recommended guidelines. According to a world bank study conducted in 18 towns of Karachi, blood lead levels greater than WHO guideline were found in 89 per cent of the samples. Increased lead levels have been related to learning disabilities in children resulting in socioeconomic problems for future generations.

4.2.6.8 Ground Water Potential at Project Site

Vertical Electrical Soundings (VES) with Schlumberger configuration were conducted in order to delineate groundwater potential aquifer zones at Prince Icon, Saddar, Karachi. Main purpose of this investigation is to determine the subsurface resistivity distribution by making measurements on the ground surface to delineate the aquifers. For this purpose, it is necessary to have diagnostic regarding the sub-surface lithological conditions and behavior of groundwater such as lithological nature of different subsurface formations, thickness and lateral extent of sub soil formations.

The survey was conducted on the suggested locations on 13th Nov, 2019. As per requirement, 03 Vertical Electrical Soundings (VES) at site have been conducted to study the subsurface lithology. The results of the investigations obtained by using electrical resistivity software are presented in tabulated form, indicating the interpreted thickness and resistivity of the subsurface layers.



Field Procedure: Measurement of ground resistivity involves passing an electrical current into the ground using a pair of steel or copper electrodes and measuring the resulting potential difference within the subsurface using a second pair of electrodes. These are normally placed between the current electrodes. Typically, current (I) is induced between paired electrodes (C_1 , C_2). The potential difference (ΔV) between paired voltmeter electrodes P_1 and P_2 is measured. Apparent resistivity (Δa) is then calculated (based on I , ΔV , electrode spacing's).

Resistivity soundings involve gradually increasing the spacing between the current/potential electrodes (or both) in order to increase the depth of investigation. The resistance data collected in this way is converted to apparent resistivity readings that can then be modeled to provide information on the thickness of individual resistivity layers within the subsurface. The observations were made by adopting the Schlumberger electrode configuration. Vertical Electrical Sounding has been observed at 3 point. The electrode spacing was increased in steps from 2m to 250m. Observations were taken using the controlled current which was sent to earth between current electrodes, A & B, and Potential thus developed was measured between potential electrodes, M & N.

Computer Based Evaluation of Field Curves: Apparent earth resistivity values are complex function of a number of parameters, i.e.,

- Specific resistance/conductance
- Compactness
- In homogeneities
- Moisture

Therefore, the field resistivity curves of the area give composite resistivity of the subsurface layers of different resistivities through which the current penetrated. In order to determine the thicknesses and the true resistivity values of the individual sub-surface layers, the field resistivity curves were modeled using specific software program.

Coordinates:

- Probe 01 → Latitude 24.8669250 → Longitude 67.0269460
- Probe 02 → Latitude 24.8668370 → Longitude 67.0268160
- Probe 03 → Latitude 24.8667880 → Longitude 67.0271940

Field Data Acquisition: The resistivity values are collected by using Vertical Electrical Sounding applying Schlumberger array at site. The values are tabulated as follows:



Environmental Impact Assessment (EIA)

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ELECTRICAL RESISTIVITY FIELD DATA, PROBE 1

Site: Prince Icon, Saddar

Depth of Investigation: 30m

Project: ER Survey for aquifer delineation

Date: 13/11/2019

Supervised By: Mr. Izaan

Conducted By: Mr. Ayaz/Mubashir

Electrode spacing AB/2 (m)	Electrode Spacing MN (m)	Resistance ohms	Constant K	Apparent Resistivity Ohms-m
2	0.8	5.8	15.08	87.464
4	1.6	4.7	30.159	141.7473
6	2.4	3.1	45.239	140.2409
8	3.2	8.1	60.319	488.5839
8	3.2	8.6	60.319	518.7434
10	4	3.7	75.398	278.9726
12	4.8	4.2	90.478	380.0076
16	6.4	3.7	120.64	446.368
20	8	1.3	150.8	196.04
25	10	0.9396	188.5	177.1146
25	10	2.4	188.5	452.4
30	12	4.7	226.19	1063.093

TABLE 1: ELECTRICAL RESISTIVITY FIELD DATA, PROBE 1

ELECTRICAL RESISTIVITY FIELD DATA, PROBE 2

Site: Prince Icon, Saddar

Depth of Investigation: 30m

Project: ER Survey for aquifer delineation

Date: 13/11/2019

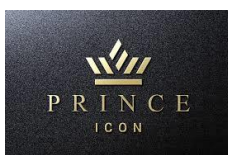
Supervised By: Mr. Izaan

Conducted By: Mr. Ayaz/Mubashir

Electrode spacing AB/2 (m)	Electrode Spacing MN (m)	Resistance ohms	Constant K	Apparent Resistivity Ohms-m
2	0.8	8.7	15.08	131.196
4	1.6	0.8677	30.159	26.1689643
6	2.4	0.1234	45.239	5.5824926
8	3.2	2.3	60.319	138.7337
8	3.2	3.6	60.319	217.1484
10	4	4.1	75.398	309.1318
12	4.8	0.7887	90.478	71.3599986
16	6.4	4.1	120.64	494.624
20	8	5.2	150.8	784.16
25	10	3.6	188.5	678.6
25	10	3.7	188.5	697.45
30	12	4.1	226.19	927.379

TABLE 2: ELECTRICAL RESISTIVITY FIELD DATA, PROBE 2





Environmental Impact Assessment (EIA)

Survey 90, Depot Lines,
Karachi Cantt.

ELECTRICAL RESISTIVITY FIELD DATA, PROBE 3

Site: Prince Icon, Saddar

Depth of Investigation: 250m

Project: ER Survey for aquifer delineation

Date: 13/11/2019

Supervised By: Mr. Izaan

Conducted By: Mr. Ayaz/Mubashir

Electrode spacing AB/2 (m)	Electrode Spacing MN (m)	Resistance ohms	Constant K	Apparent Resistivity Ohms-m
2	0.8	1.1	15.08	16.588
4	1.6	1.4	30.159	42.2226
6	2.4	2.3	45.239	104.0497
8	3.2	0.4555	60.319	27.4753045
8	3.2	3.7	60.319	223.1803
10	4	2.8	75.398	211.1144
12	4.8	7.1	90.478	642.3938
16	6.4	0.7787	120.64	93.942368
20	8	0.9107	150.8	137.33356
25	10	2.4	188.5	452.4
25	10	2.7	188.5	508.95
30	12	8.1	226.19	1832.139
40	16	0.7667	301.59	231.229053
50	20	0.5154	376.99	194.300646
50	20	2.6	376.99	980.174
60	24	3.3	452.39	1492.887
80	32	4.1	603.19	2473.079
100	40	3.2	753.98	2412.736
150	60	3.3	1131	3732.3
150	60	4.3	1131	4863.3
200	80	0.9666	1508	1457.6328
250	100	0.8834	1885	1665.209

TABLE 3: ELECTRICAL RESISTIVITY FIELD DATA, PROBE 3

Field Data Interpretation and Modelling: The number of subsurface lithological layers, their true resistivity values and thickness have been computed through modeling process for field resistivity curve of the area and presented in Tables as follows. The layer numbers are designated in ascending order from surface to the depth of investigation. The trend of the resistivity field curve plotted for each site indicates multiple geo electric layers. The subsurface layers consisting of silt, clay, gravels, sandstone and limestone sequence.



Results of investigation for each site are presented as follows.

PROBE 1

Layer No.	Thickness of layer (m)	Depth (m)	Resistivity (ohms-m)	Lithologies
1	2	2	87.5	Upper Debris
2	2.28	4.28	161	Sand
3	1.63	5.9	94.3	Silt + Clay
4	10.2	16.1	491	Sand
5	14.3	30.4	183	Clay + Silt
6			898	Sandstone

TABLE 4: INTERPRETED GEO ELECTRIC LAYERS, PROBE 1

PROBE 2

Layer No.	Thickness of layer (m)	Depth (m)	Resistivity (ohms-m)	Lithologies
1	2	2	67.9	Upper Debris
2	3.75	5.75	26.2	Silt + Clay
3	5.06	10.8	230	Sand
4	8.86	19.7	68.1	Silt
5	9.01	28.7	931	Sandstone
6			699	Silt + Clay

TABLE 5: INTERPRETED GEO ELECTRIC LAYERS, PROBE 2

PROBE 3

Layer No.	Thickness of layer (m)	Depth (m)	Resistivity (ohms-m)	Lithologies
1	2	2	16.6	Upper Debris
2	5.32	7.32	86.4	Silt + Clay
3	7.46	14.8	657	Sand
4	7.7	22.5	95.2	Silt
5	10.4	32.9	1961	Sandstone
6	34.8	67.7	227	Clay
7	114	181	3625	Limestone
8	97.2	279	1289	Clay
9			2162	Clay + Limestone

TABLE 6: INTERPRETED GEO ELECTRIC LAYERS, PROBE 3

Field & Modeled Curves:

Field Curves: Field data curves are mention below according to the field data acquisition these curves are the true representatives of the field data without any attenuation and processing.

- On x- axis: depth (m)
- On y-axis: apparent resistivity (ohms-m)

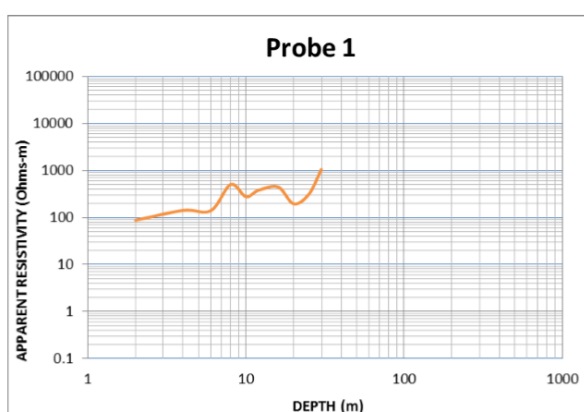


FIGURE 4: FIELD DATA CURVE OF PROBE 1

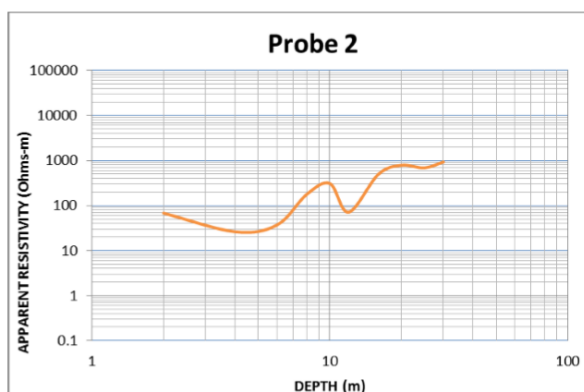


FIGURE 5: FIELD DATA CURVE OF PROBE 2

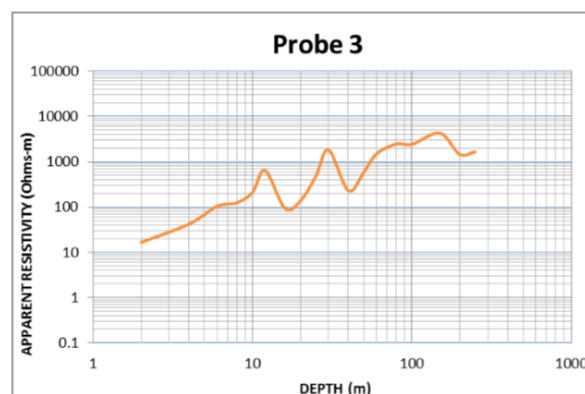


FIGURE 6: FIELD DATA CURVE OF PROBE 3

Figure 4.19: Field Data Curve

Modeled Curves: These curves are representing the resistivity values which receive after attenuation and processing of data by different software and curve matching interpretation process.

- On x- axis: depth (m)
- On y-axis: apparent resistivity (ohms-m).

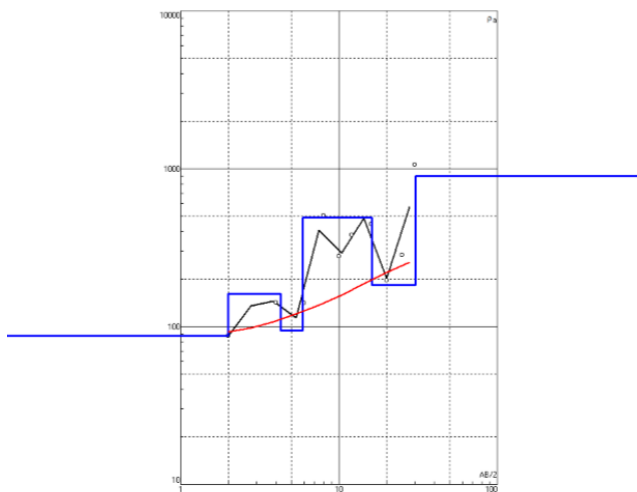


FIGURE 7: MODELED CURVE OF PROBE 1

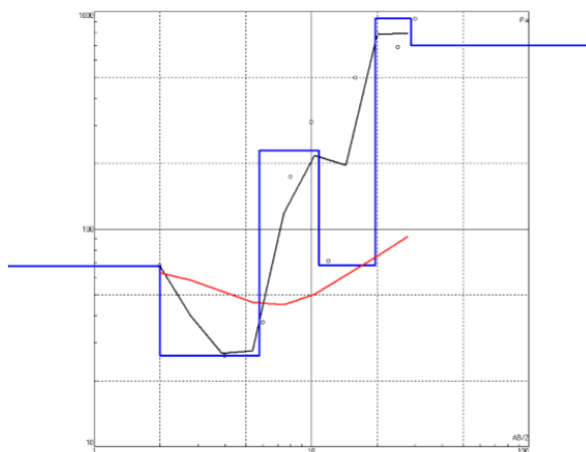


FIGURE 8: MODELED CURVE OF PROBE 2

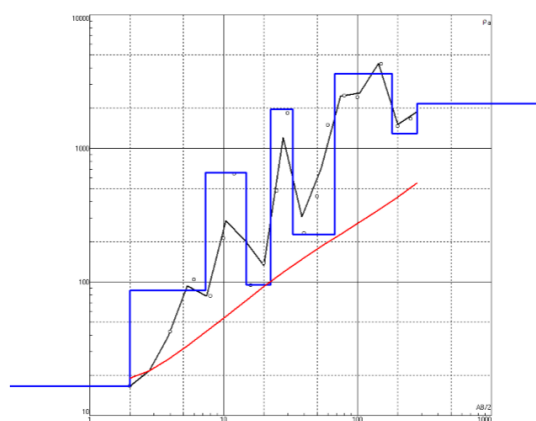


FIGURE 9: MODELED CURVE OF PROBE 3

Figure 4.20: Modeled Curve

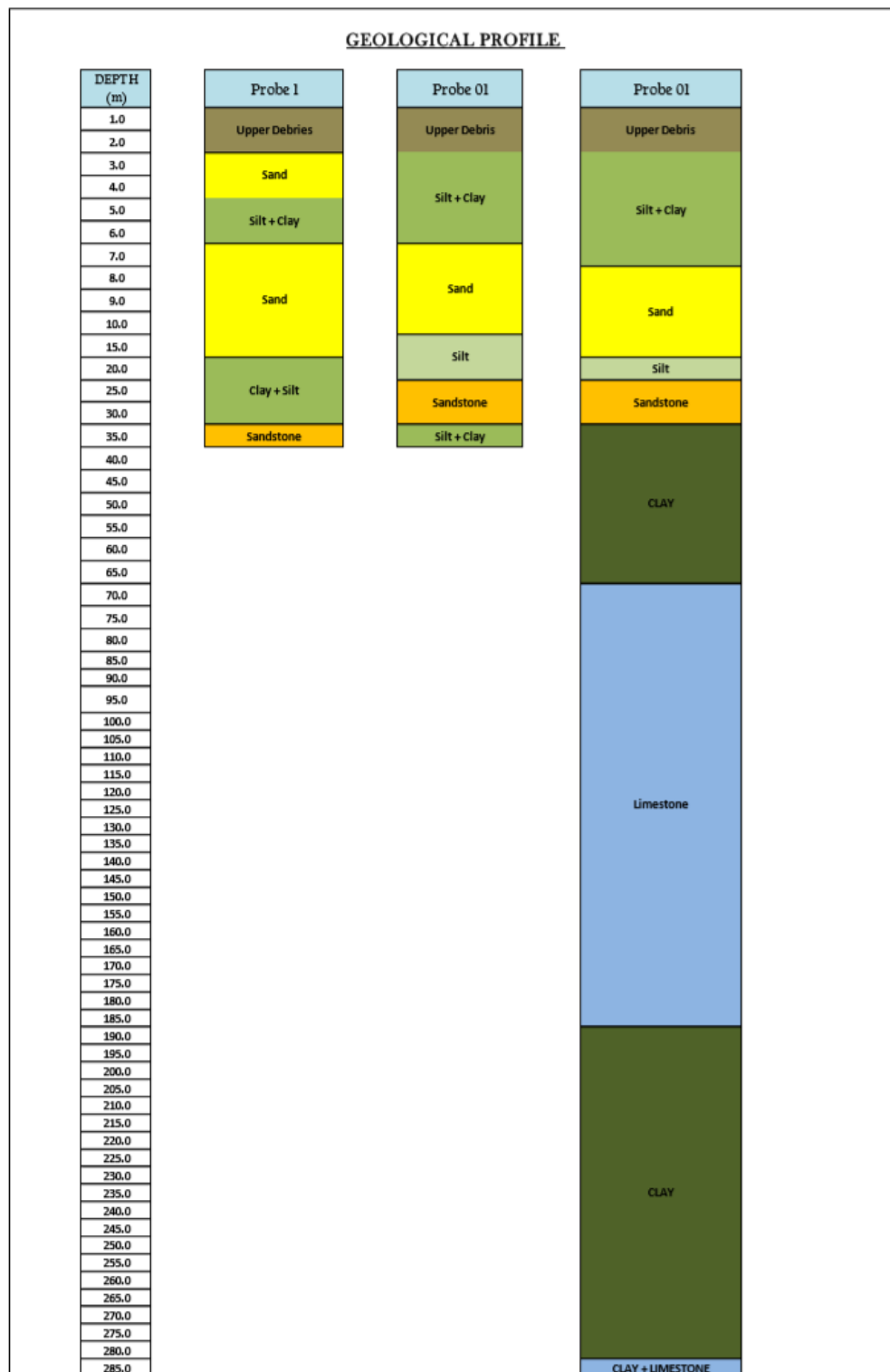


Figure 4.21: Cross Section



Conclusion and Recommendations: After interpretation and attenuation of field data we conclude the following results

- All the electrical resistivity values show less considerable water presence in the area. However, the drilling location can be demarcated with 100ft radius of probe 3.
- Study area is covered with Alluvium Deposits/Manchar Formation and Gaj Formation beneath them.
- The perch water level lies between 35 -95 Ft.
- Resistivity curves shows brackish water presence in Manchar formation.
- Resistivity curves shows saline water presence in Gaj formation.
- The Quantity and Quality of the aquifer zone are assumptions based on the data gathered in the field. Exact values will be known after the accumulation of samples from bore hole.

Based on the reconnaissance and electrical resistivity findings and available geological information following recommendations are made:

- Test borehole of 400ft-500ft deep is recommended to get average yield of brackish water from Manchar Formation.
- Test borehole of 800ft-1000ft deep is recommended to get maximum yield of saline water from Gaj Formation.
- The trial hole must be geological and geophysical logged for proper assessment of aquifer zones.
- 24-72 hours continuous pump test should be performed for conformation of water presence, quantity and quality.
- Water sample should be collected and tested.

4.2.6.9 Existing Sewerage Facilities and Drainage System

The existing sewerage catchment area which covers 18 towns in Karachi city is divided into three districts, namely: respective catchment area of T.P-1, T.P-2 and T.P-3. KW&SB formulated the Master Plan of the water supply and sewerage system in cooperation with JICA in 2008. However, most of the projects for rehabilitation and augmentation proposed in the Master Plan study, etc. have not been carried out due to financial constraint of KW&SB. Due its negligence to maintain and operationalize the treatment plants, not only municipal effluent but industrial effluent also is directly going into sea destroying marine life.

In January 2018, the Supreme Court appointed Honorable Justice Amir Hani Muslim, a retired Supreme Court judge, the new head of the water commission with a mandate to ‘implement’ the recommendations of the previous commission that the apex court had formed in December 2016 in response to a constitutional petition. Treatment of sewage, a much-neglected issue, saw a

revival under the commission. Thus, Sewage Treatment Plant-III (77MGD) was restored in June 2018. STP-I (100MGD) could not be completed in 2019 despite time-bound undertaking submitted to Judicial Commission (water). STP-IV (180MGD) is supposed to be operational by December 2020. Five industrial effluent treatment plants are scheduled to be built in the SITE, Trans-Lyari, F.B, Landhi and Superhighway areas.

Another treatment plant is installed in DHA Phase VIII for the treatment of sewage water from the DHA phase VIII and Clifton Cantt. The plant was operational in 2014 with the rated capacity of 2.4 MGD while currently it receives 1.2 MGD of sewage of DHA Phase VIII.

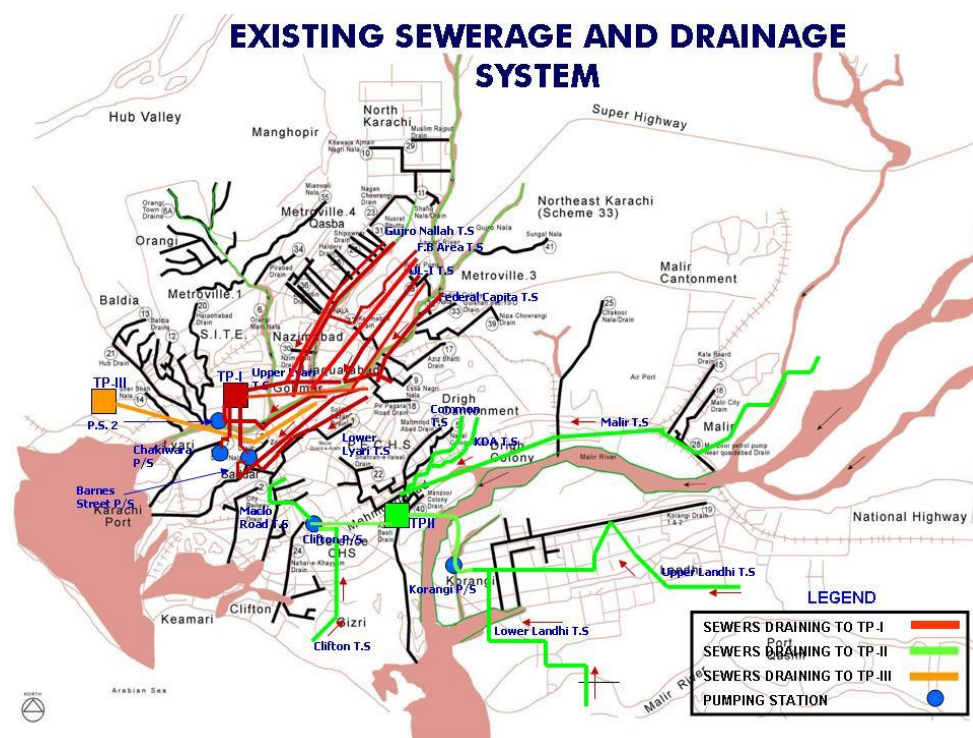


Figure 4.23: Existing Sewerage System of Karachi

4.2.6.10 Collection and Disposal Mechanism

Sewage is gathered through pipes and uncovered channels and drained in water bodies through rivers and nullahs. Karachi's untreated wastewater, including domestic sewage and industrial wastewater is discharged into the Lyari and Malir rivers, and finally disposed to the nearest coastal belt. Out of the 475 MGD of wastewater generated, around 420 MGD of wastewater remains untreated and a part of it is drained into the sea through the 232 km network of Main nullah and 1000 km network of town drains. These nullahs mainly discharge into the two main rivers namely; Malir River and Lavari River.



Currently, there is a huge gap between wastewater generation and treatment. The wastewater generated in Karachi city is beyond the capacity of the existing treatment plants. Approximately 417-425 MGD of wastewater is drained into sea water without any treatment.

4.2.6.11 Greater Karachi Sewerage Plan (S-III)

To improve the sewerage system of Karachi and reduce the pollution load on natural water bodies, KWSB is working on Greater Karachi Sewerage Plan (S-III). This project, through a well-integrated system of collection, treatment and sewage of wastewater from municipal and industrial sources, aims to improve the environmental conditions of Karachi. In this project, sewage will be transmitted to the River Lyari and Malir via a RCC before finally being disposed of in the sea. Following initiatives will be taken under this project

- Malir Trunk Sewer: 05 Contract Packages with overall length of 22.74 km
- Lyari Trunk Sewer: 08 Contract Packages with overall length of 33.32 km
- Upgradation and Capacity Enhancement of Sewage Treatment Plant from 51 to 100 MGD at Haroonabad SITE
- Upgradation and Capacity Enhancement of Sewage Treatment Plant from 54 to 180 MGD at Muaripur
- Construction of New Sewage Treatment Plant at Korangi of 180 MGD

According to the planning commission of Pakistan 862 Million Rupees have been allocated to the project for the fiscal year of 2018-2019. The rehabilitation of the TPIII for 77 MGD has been done while five different packages of sewage transmission in the length of 20.151 km have substantially been completed.

4.2.6.12 Water Governance and Management

- Overstaffing at KWSB; which results in promoting the culture of ghost employees within the board, utilizing excessive funds for salary disbursement and causing an overall financial loss for the board. Obsolete and corroded water supply network results in water leakages and losses which accounts for more than 30 to 35 per cent of the total supplies. Lack of coordination among governmental departments and non-availability of designated water and sewerage corridor is another potential factor which results in supply line damages which at times is not repaired on immediate basis.
- Improvements in the system depends on public financing, for the existing tariffs only generate insufficient revenues to cover operational and maintenance costs. Efficiency of the delivery system is intricately tied up with the financial viability and related management issues.
- The underperformance of KWSB water pumping stations has been observed mainly due to the lack of maintenance works, electricity load shedding and



non-availability of sufficient funds. Therefore, the citizens normally experience low water availability in their areas and suffer with water shortage issues. The situation is worsened during summer season, when electricity load shedding in Karachi is at its peak. Non-availability of water in certain areas of the city has significantly promoted unregulated hydrants across the city. Initially KWSB itself promoted regulated hydrants to supply water to suburbs and remote areas of Karachi. These hydrant operators have now turned into mafia with strong networks.

- Unnecessary delays in K-IV water supply project which is a three phase project; (i) Phase-I which is expected to add additional 260 MGD into the existing supply network has not yet been completed, while on the other hand water demand and supply gap continues to stretch, (ii) Phase-2 which will add additional 260 MGD to the water supply network, (iii) Phase-3 which will add 130 MGD to the existing system are likely to be delayed. It is assumed that even after completion of K-IV the city is likely to experience water shortage, and the situation is likely to get worse if additional controls are not taken into consideration to address the current situation. K-IV project phase-I was supposed to be completed by 2018, however only 20 per cent of the work have been completed till date.

4.3 Description of Ecological Environment

The definitive source of information on Karachi's flora is Jafri (1966). In his taxonomy, he included 72 families, 249 genera and 403 species, excluding some of the commonly cultivated and almost naturalized taxa. Work by Hussain et. al. (2010) and others have documented species loss. Their assessment is that, for more than 35 % of the species mentioned in Jafri's Flora of Karachi can now be included in the Red Data book for threatened species, and categorized as extinct, endangered, vulnerable, rare, indeterminate, or threatened. (Hussain et.al. 2010).

Hussain et.al. (2010) lists 16 native tree species that are threatened, 11 threatened species of shrub, and 29 species of understory shrub species, also considered threatened. Threatened woody climber species number 11, and herbaceous climbers that are threatened number seven (7); while herbaceous plants (herbs) considered threatened number. The authors state that among trees *Tecomella undulata* has become locally extinct, along with three other tree species that are endangered, and one (1) in the rare category (*Mimosa hamata*).

Some time back, Karachi University campus provided the best representation of the flora of Karachi. As of 2010, many have been eradicated, so that the main repositories remaining of Karachi's native and indigenous plants are in the protected and enclosed areas of Malir cantonment, Shah Faisal cantonment, Masroor Airport area and Korangi, and PAF base area. (Hussain et.al. 2010)



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The principal habitats are arid hills and low-lying sandy areas found in and between the courses of the Lyari and Malir rivers that run through Karachi City. Hillside vegetation comprises mainly camelthorn (*Prosopis spicigera*), wild caper (*Capparis decidua*) and large succulents such as *Euphorbia caudicifolia*. Sandy areas are typically vegetated with a sparse cover of small trees such as *Acacia senegal*, *Zizyphus nummularia* and *Prosopis cineraria* (mesquite), and shrubs such as *Leptadenia pyrotechnica*, *Colotropis procera*, *Rhazya stricta*, *Inula grantioides*, *Zygophyllum simplex* and *Sueda fruticosa*. Species on calcareous hills include *Vernonia cinerascens*, *Commiphora wightii*, *Grewia tenax* and *Euphorbia caducifolia*. Shallow slopes with varied soils at low altitudes are populated by (trees) *Zizyphus nummularia*, *Salvadora oleoides*, and *Capparis deciduas*. Shrubs such as *Grewia tenax*, *Seddera latifolia*, and *Rhazya stricta* are the most commonly found species, together with the grasses *Ochthochloa compressa*, *Cymbopogon jawarancuss* and *Aristida funiculata*.

Prosopis cineraria (mesquite), *Indigofera oblongifolia*, a perennial shrub found in a range of habitats including grassland, bushland and sandy soils, and *Euphorbia caducifolia*, a succulent that grows profusely on sandy soils, form the most common combination of native vegetation of Karachi City.

Destruction of native plants occurs through clearing of brush and 'cleanliness drives', where those instigating these moves are unaware of the plants being eradicated. Habitats have shrunk and species numbers been reduced placing many on the threatened species list.

Development activities, in particular construction of BRT Corridor has substantially removed the vegetative cover and reduced the biodiversity of terrestrial fauna and flora of the macroenvironment of Prince ICON Project. The species of flora still in existence at the shoreline are not in the IUCN Red List of Endangered Species. Native terrestrial vegetation if still present comprises a variety of bushes and shrubs. Some vegetation was introduced but could not sustain due to lack of interest from authorities. Keeping the shortage of water in view, the available vegetation is watered with sewage effluent.

EMC (2015) lists some nine types of tree, 10 shrubs, and two grasses as likely to be present in the area of the Green Line alignment. The tree count conducted for the Green Line identified some 72 tree types. Vegetation of the hill slopes and hillsides comprise mainly camel thorn (*Prosopis spicigera*), wild caper (*Capparis decidua*) and large succulents such as *Euphorbia caudicifolia*." It is difficult for animals and plants to survive the natural environment around Karachi due to severe arid conditions, land clearance activities and other impacts of urbanization.





Ecological risk of high order has been induced by land clearance and removal of natural vegetation from the plains during the urban sprawl to make room for urbanization. Signs of extensive drought damages done by land clearing activities are apparent and hence the natural vegetation that has survived in these areas has adapted to harsh conditions. Wide distribution of vegetation ensures survival of botanical species. Promotion of vegetation was neither an objective of any development activity in the Towns, nor was an ecological risk assessment carried out to identify the long term and short-term risks involved in tree felling activities. Furthermore, mitigation measures that need to be taken to minimize the risks were neither recommended nor adopted. Accordingly, no organized re-plantation of the earlier trees or shrubs has been noticed.

Much of the natural fauna has succumbed to the process of urbanization. Few birds are expected to be found roosting in trees along the roadway median.

4.4 Description of Built Environment in Context of Proposed Mass Transit System

Karachi city is passing through an uncontrolled phase of rapid urbanization and motorization. The mitigation of transportation externalities requires a shift towards sustainable transportation system.

The city's present public transport system constitutes a small percentage of total vehicle fleet (4.5%) and serves about 42% of passenger demand yet not dedicated lanes or any other feasible traffic management solution has been provided as compared to private vehicles, which are roughly 36% of the total vehicular traffic but carry only 21% of passengers. The Para-transit mode constitutes 10% of the vehicle fleet and carries 8% of passengers while contract carriages constitute 2% of the vehicle fleet but carry 10% of total passengers (JICA Person Trip Study, 2005).

Proposed route for Green Line starts from Municipal Park, where a rotary U-turn lane is proposed for buses. The plane alignment extends along M.A Jinnah Road towards northeast up to Gurumandir, and after Gurumandir the alignment runs northward along Business Recorder Road, Nawab Siddique Ali Khan Road, Shahrah-e-Shershah Suri and Shahrah-e-Usman passing by some of the major landmarks such as Numaish, Board Office and Nagan Chowrangi.

The Green Line BRT shares the common corridor with Blue line between Municipal Park and Gurumandir.

The main project objectives are defined as under:

- To provide reliable, safe, affordable, high quality and fast BRT Bus Service





- To improve the quality of life of commuters in Karachi
- To vastly improve the quality of public transport system in Karachi
- To provide infrastructure that allows buses to ply in an efficient manner with exclusive right-of-way for a significant portion of their route length, and
- Reduce travel time.

This project will be constructed a busway (dedicated for BRT vehicles) in the median of the roads along the corridor with stations in the center of the median in both at grade and elevated sections which all provide high speed (25 Km/h) and high capacity (29,400 passengers per hour per direction) service. The design capacity of the proposed BRT system with passing lanes provision will increase based on the number of direct / express services run between stations in the future, as required.

The Karachi Strategic Development Plan (KSDP) 2020 described 16 objectives for transport sector, among which following are linked with this project:

- Provide safe and efficient mobility for people and goods, improve public mass transportation system, targeting affordability and convenience,
- Strengthen existing transportation infrastructure & services by considering various alternatives,
- Evolving a comprehensive transportation plan development and modeling to address vehicular traffic, public mass transportation (bus line and rails based), parking to provide for development of roadway and public transport/mass transit infrastructure development priorities for long range, and Develop transport infrastructure to support planned land use changes, especially strengthening links between Central Business District (CBD) and polycentric commercial center nodes.

The Study for Karachi Transportation Improvement Project (KTIP), 2009-2012, JICA, proposed a transport sector master plan up to the year 2030, in which the public transport policies focus on mass transit system such as:

- Mass transit system should provide higher services than existing buses in order to satisfy the need of such transit system and promote modal shift from private mode to public one, and Bus Rapid Transit (BRT) should be introduced on major roads.



The Transport Master Plan prepared under the KTIP, 2030 project by JICA proposes the revitalization of Karachi Circular Railway (KCR) on modern lines, 2 Mass Rapid Transit (MRT) lines (Blue and Brown Lines) and 6 BRT lines (Green, Red, Yellow, Orange, Aqua and Purple).

Green Line is one of the busiest corridors proposed by JICA and is planned to connect with Orange Line BRT at Board Office Chowrangi, KCR near Board Office, Blue Line near Gurumandir, Red Line BRT near Mazar-e-Quaid and Yellow Line BRT near Numaish in Saddar.

Green Line and Blue Line systems share the same corridor on M. A. Jinnah Road from Gurumandir to Municipal Park and connect the population centers to the city center.

4.5 Socioeconomic Environment

The proposed project site administratively falls under Corridor-6 of the Karachi Mass Transit Corridors master plan, 1995. Most of the developed areas in Corridor-6 are concentrated in the inner ring towns of Saddar, Jamshed, Lyari, Liaquatabad, Gulshan-e-Iqbal and Gulberg. These towns contain the most diverse mix of land uses and include most of the governmental and regional-scale industrial and commercial activities.

The KSDP-2020 (August 2007) stated that with mounting pressures exerted by the population growth over the last few decades, the following two basic trends in land use have recently been observed:

- Commercial growth has taken place along major arterials, while most residential neighborhoods have acquired one or two storey structures; significant densification has taken place through construction of upper floors and subdivisions of large plots.
- In many old and new areas, apartment buildings, 5-6 storeys high, have replaced the low-density bungalows and small houses.

Provisional results of the 2017 census show urban Karachi with a population of 14,910,352 capita, an increase of 58% over the 1998 urban population 9,448,808. Karachi's population increase was outstripped over the same period by Lahore (116%), Peshawar (100.4%) and Islamabad (91.8%). Karachi grew at an average annual rate of 2.43%. From a city-wide perspective, two aspects of land use predominate. One is the presence of the katchi abadi, or squatter developments that dominate in some areas of the City. According to ADB (2005), rapid and uncontrolled growth of the city has resulted in unregulated development and inappropriate land-use changes, with an estimated 50% of the population living



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in unplanned, poorly serviced and heavily polluted informal settlements. The growth of 'Abadis' in Karachi has been extensive, increasing from 212 distinct areas in 1958 to more than 500, as identified by Arif and Hamid (2008).

If there's one area in Karachi that's reminiscent of the colonial era, it's Saddar. Situated in the heart of the city, its architecture comprises many buildings that were designed and built by British architects in the 19th century. The word "Saddar" means "head" or "centre" of an organization or a group of people.

The name Saddar Town, therefore, befits the neighbourhood as it's the commercial hub of Karachi. The macroenvironment has several renowned and some of the oldest areas of Karachi such as Kharadar, Meethadar, Jodia Bazar, Bolton Market, and Nanakwara. In fact, the history of Kharadar (Salty Gate) and Mithadar (Sweet Gate) dates back to pre-colonial times. These two places have been named after two gates that were built in 1792. Sweet Gate opened towards the Lyari River and Salty Gate opened towards the Arabian Sea. Both the gates were dismantled later by the British.

The macroenvironment has been described as a VIP town because most important financial, commercial institutions and government offices are located in the area. It is distinct from other towns because of its historical buildings, which include the official residences of the governor and chief minister, the Sindh Assembly, City Court, Sessions Court, and High Court, the Supreme Court's Registry and the Quaide Azam's Residence. The city's main markets and head offices of various banks are located in this Town, besides several diplomatic missions.

The population in and around the Project site can be broadly placed in three categories: the elites, the managers in the higher hierarchy of decision making, and the people in the upper middle class. There does exist a category of persons that provides services as employees of the residents. Majority being literate and highly educated, the people are either decision makers or next in command in their organization or are well placed in the society.

Housing Conditions: As most of the parts of Saddar are of urban nature, all of the buildings in the surrounding vicinity were built of solid concrete and/or cement material. Some buildings on M.A. Jinnah Road's backside were too old and include wooden pillars, windows and supports of roof in their design. Some new residential construction (flats) were also located on M.A. Jinnah Road near Wazir Mansion (birth place of Quaid-e-Azam).

Public Transport: Due to the busy nature of the area, public transport is readily available. However, since ride-hailing services like Uber, Careem and Bykea have been introduced, commuting to and from Saddar Town has become even more





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convenient for the public. Other than that, there are local rickshaws and taxis which are available at various bus and taxi stops like Metro Saddar Stop and Al Madina Bus Stop. Saddar Town connects with the rest of the city through various public buses and coaches. Some of the buses which navigate through Saddar are 4-M, 11-A, 11-E, 11-D, 17-H, 17-I, 17-K, 1-L, 2-K, 4-B, 4-C, 4-G, 4-L, 6-B, C, and W-3. People can pick any of the mentioned buses from Metro Saddar Bus Stop, Al Madina Bus Stop, Frere Market Bus Stop, Tower Bus Stop, Haji Camp and Sultanabad Bus Stop. Apart from the local buses, there are multiple bus stations that provide intercity services via private buses and coaches.

The most popular ones are:

- Daewoo Bus Service Station
- Faisal Movers Bus Service Station
- Blue Lines Luxury Coach Service Bus Stop

Markets: The macroenvironmental is the main business area of Karachi. Naturally, there's an abundance of shopping centers and markets. The most popular market, which is also the oldest in the city, is the Empress Market. It is one of the creations of colonial architecture that still mesmerizes with its beautiful structure, after all these years. It also has a pet market where you can find different breeds of animals and birds. There is a large local market for selling and purchasing of new and used cell phones and their accessories which is known as 'Mobile Market of Saddar.' Then there are bazaars where one can buy unstitched cloth as well as a variety of. One of them is 'Zainab Market' which is the most popular among Karachiites. Other notable spots in the area are Regal Market, Cooperative Market, Leather Market, Electronic Market, and Bohri Bazar. There is a famous market for videocassettes, DVDs and other media equipment called 'Rainbow Centre.'

Mosques, Temples, and Churches: There are several mosques in the old areas of Saddar. One of the most famous mosques in the area is Taheri Masjid, which is a place of worship for the Dawoodi Bohra Muslim community. Then there is Jamia Masjid-e-Khizra, which is also a notable mosque of the town. Residents can also visit Jamia Masjid Makki, Aqsa Masjid, Jama Masjid Salih Sadar, Masjid Ahl-e-Hadees, Minara Masjid, Kutchi Memon Masjid, Jamia Masjid Millia, Jama Mosque Dar us Salam and Qadri Masjid.

A few temples and churches are also present in Saddar. HJ Behrana Dar-e-Meher, one of the largest Fire Temples (places of worship for the Parsi community) in Karachi is located near Daud Pota Road. Moreover, there's a renowned church located near Zaibunnisa Street that's known as St. Andrew's Church. Other churches in the area include Saint Patrick's Cathedral, Holy Trinity Cathedral, and





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St. Lawrence's Church. Apart from that, there are also a few temples such as Shri Swaminarayan Mandir, Panchmukhi Hanuman Temple, and Devi Mata Temple.



Figure 4.24: Church in Project area

Schools, Colleges and Universities: Educational facilities in the surrounding area of the Project are excellent. Availability and access to all levels of education is well provided because of efficient and effective management system to facilitate and promote higher education. Literacy rate among females is comparable with males. Training in technical skills is equally adequate. Skilled labour consisting of drivers, mechanics, water pump attendants are estimated to be less than 10% of the total population in the Project area. Saddar has a number of well-reputed schools that have been fostering academic learning for many years. Some of the well-known schools in the area which offer both Matriculation and O-levels/A-levels are:

- St. Patrick's Girls' High School
- Bai Virbaiji Soparivala Parsi High School (BVS)
- Karachi Grammar School
- The Mama Parsi Girls' Secondary School
- St. Joseph's Convent School
- Habib Girls' School
- Army Public School





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Figure 4.25: NASRA School

Other schools are Husamiyah School, Rose Petal School (AKU-EB), Nasra School Main Campus, Guard Public School, Hyderi Public School, and Gerald's Academy School. It's an indisputable fact that Saddar is home to the best higher education institutions in Karachi. St. Joseph's College for Women, D. J. Sindh Government Science College, Sindh Muslim Government Arts and Commerce College, Government College of Commerce & Economics, and Sindh Muslim Law College are important names in this regard. There is one notable institute for music and arts located in Saddar called 'National Academy of Performing Arts' aka NAPA.

There are few top-ranking institutes in the town which provide professional degrees in business, medicine, and arts such as:

- Dow University of Health Sciences (DUHS)
- Institute of Business Administration (IBA) city campus
- Arts Council Institute of Arts & Crafts (ACIAC)

Banks: For the convenience of the people living in Saddar Town, many branches of major banks are present in the area. Almost all of these banks offer ATM services, along with the functional offices. There's JS bank Ltd and Faysal Bank in Gazdarabad and Advans Pakistan Microfinance Bank Ltd, Soneri Bank and Summit Bank on Zaibunnisa Street. To the west of Empress Market, you can find Muslim Commercial Bank (MCB) Limited, Sindh Bank, Meezan Bank, and United Bank. Habib Bank Ltd (HBL) has at least two branches in the area: one is near Preedy Street and the other is on Mansfield Street. National Bank of Pakistan, a state-owned commercial bank, has several branches in Saddar.





Figure 4.26: IBA City Campus

Clinics and Hospitals: Health issues of the Project Area are generally associated with the lifestyle. Lifestyle-related diseases like hypertension, heart attack, diabetes, liver disease, depression and cancer are commonly reported in this area. Health facilities are quite adequate and of high standard within this town. There are many hospitals and clinics in Saddar Town, which is quite convenient for residents as they don't have to travel long distances to, let's say, get a routine check-up. There are some popular hospitals near the town that provide extensive care and prompt service to the patients. Some of the well-reputed hospitals are:

- OMI (Orthopaedic & Medical Institute)
- Neurospinal & Cancer Care Institute (NCCI HOSPITAL)



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- Hamdard University Hospital in Taj Complex
- 7-Days Hospital
- Civil Hospital
- Sindh Institute of Urology and Transplantation (SIUT)



Figure 4.27: Karachi Adventist Hospital

OMI Hospital is located on Depot Lines M.A. Jinnah Road and it is one of the best hospitals in the city. It provides services in a range of departments like cardiology, obstetrics, radiology, orthopedics, general surgery, pediatrics, urology, gastroenterology, and nephrology. ICU and ER are also available. Another renowned hospital is Civil Hospital that is also a landmark of M.A. Jinnah Road. Then there is the Neurospinal & Cancer Institute (NCCI) that is devoted to cancer patients. It offers numerous services like Gamma Knife, Synergy-S, PET CT, MRI, CT SCAN, Deep Brain Stimulation (DBS), EEG, etc. Another prominent and well-known hospital near the town is Sindh Institute of Urology and Transplantation (SIUT), which is the only institute that offers kidney transplantation in Karachi. It provides services like dialysis and kidney transplantation and ER, among others. Moreover, there are other established hospitals in close proximity to Saddar which include Hamdard University Hospital, Sindh Institute of Skin Diseases, JJ Hospital, Parsi General Hospital, ISM Hospital, and Burhani Hospital. There is a special veterinary care hospital for pets located in the area known as 'RC Veterinary Hospital'.



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Malls: Most of the malls in Saddar Town are not quite as upscale as regular retail malls. You'll find fewer amenities in these places, however, there'll be incredible discounts. If you're shopping on a budget, then you should definitely visit Madina City Mall and The Centre Shopping Mall, both of which are located near Abdullah Haroon Road. The most popular spot in the area is Atrium Mall. It has shops of several international and local brands as well as multiplex cinemas, which were the first to bring 3D movies. Gul Plaza, which is famous for its crockery and garment stores, is located near M.A. Jinnah Road in Gazdarabad.

Restaurants and Bakeries: The cafes and restaurants in Saddar serve a wide range of fare, from desi cuisine to Chinese, Italian and more. These places are especially a blessing for the people who have their offices in the area. Chullu Kabab Sistani is arguably the most popular restaurant in Saddar. Other famous restaurants in the area are Café Darakshan, Zahid Nehari, Nadia Café, Italiano Pizza, Al Harmain Restaurant, Rex Restaurant, and Taj Restaurant & Bar B Q. Moreover, Saddar is famous for bakeries that sell hot cross buns and Easter eggs. Misquita Bakery, near CIA Centre, is worth mentioning here. Crispo Bakery and Bread Centre are also quite famous for baked items in the area. There are many nimco and dry fruits shops present in the area.

Sports Facilities: There is Chain of Flex Gym, YouFit Gym, Shapes Health Club, Get Lean: Men and Women Gym, and Fit Girl Center which provide quality training for your body fitness. Moreover, there are few karate and taekwondo clubs for martial arts enthusiasts. Some of the top-rated karate clubs in this part of the city are Gym and Karate Club, Tai Karate Centre, Karachi Taekwondo Academy, and National Institute of Karate-Do Pakistan.

Parks: Residents of Saddar have access to many parks where they can spend their spare time, stroll or jog on the tracks. There is Jahangir Park near Empress Market, Nishtar Park, and Burns Gardens. Apart from the local parks, there is a famous historical building called 'Frere Hall.' It is located near Fatima Jinnah Road. Frere Hall was once a residence of Fatimah Jinnah that was later transformed into a museum and a park. It has now become a well-known spot for locals and tourists alike.

Employment: The linier area of I.I. Chundrigar Road is a major hub of businesses and government offices in the city. Many important public offices like, State Bank, Stock Exchange, National Bank, Police Headquarter, PTCL, Post Office Head, etc. along with various head offices of banks and private companies are situated on this road. The situation is not too much different on the adjacent M.A. Jinnah Road. During the survey it was identified that most of the people near the project site are non-residents and are involved in either small business or doing jobs in different companies. Small businesses include commercial shops (a lot of mobile shops), food carts, pan shop, small restaurants, auto-service





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shops etc. During our survey it was identified that 92% respondents were retailers that included shop owners, managers, helpers; service providers (telecommunication, internet, TV cable, banks), 3% respondents were providing recreational services while the rest were engaged in restaurants, small vendors, and similar activities in the commercial sector.

Road Network & Traffic Conditions: The project is located at main M.A. Jinnah Road adjacent to Falak Arcade. At present the surrounding area of the project consists of several commercial facilitations and some residential buildings as well. M.A. Jinnah road is a 5+5 lane carriageway separated by a median of minimal width and currently there is a road constructional activity going on in the area which effects the traffic flow up to a very high level. The precisely congested land-use distribution of the area attracts high volumes of traffic on daily basis. The road condition of the area is adequate with provision of footpaths to ensure pedestrian maneuvering however the condition of the footpaths is distorted.

During recon it is observed that at M.A. Jinnah Road there is minimal encroachment but considering the present situations there are on-road parking which are covering some part of the carriageway as well as the footpath. This encroachment seems to be temporary as after the constructional activity is complete, they will be removed.

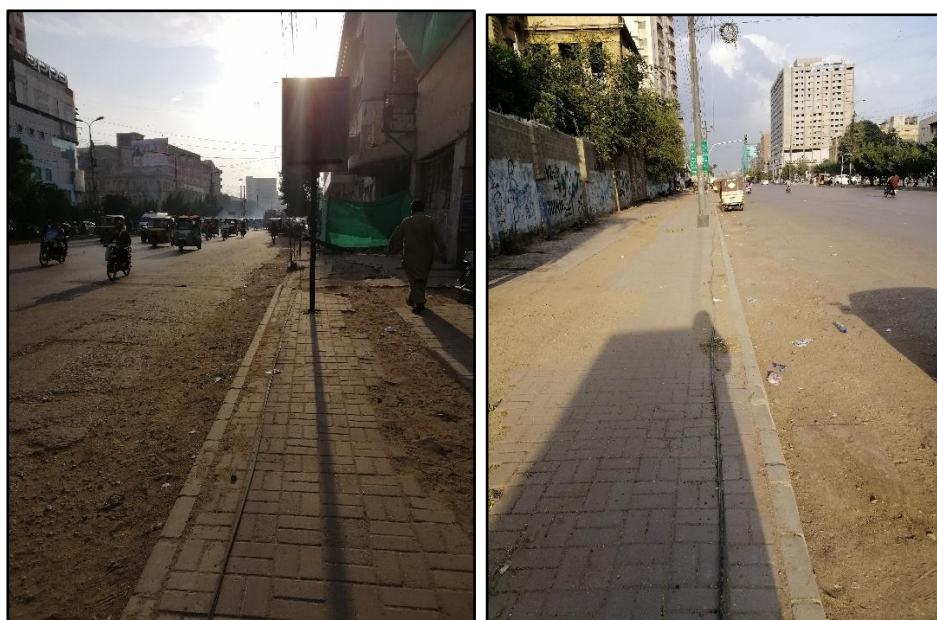


Figure4.28: Project Road Condition

The traffic count conducted at the mid-block of M.A Jinnah Road directed from Tower captured the following volumes as presented in the chart. It can clearly be shown that the peak hour of this direction is at 04:00 – 05:00pm.

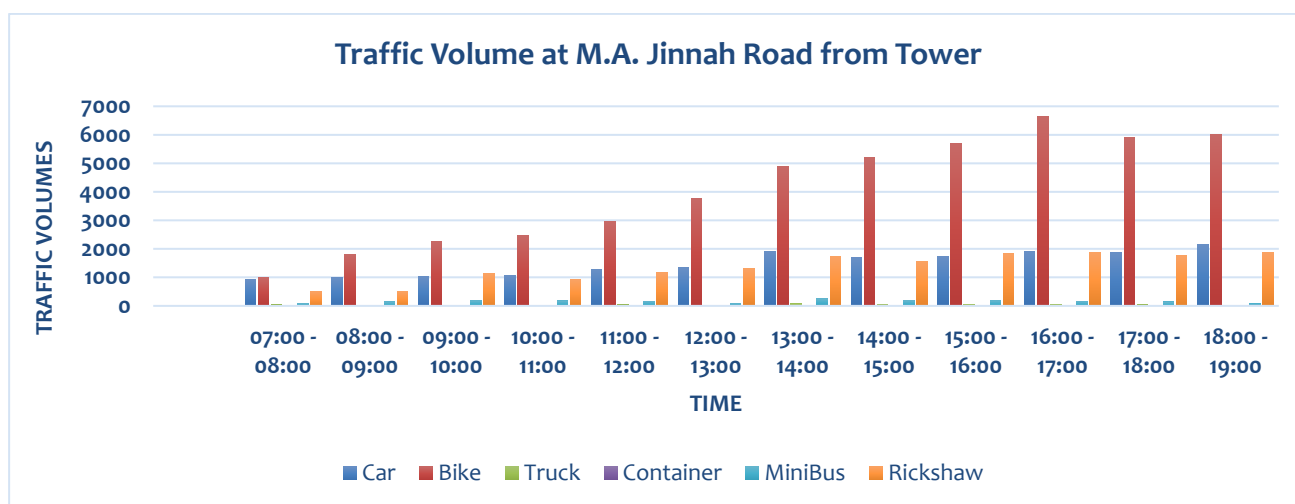


Figure 4.29: Traffic Volume at M.A. Jinnah Road from Tower

The traffic count conducted at the mid-block of M.A Jinnah Road directed towards Tower captured the following volumes as presented in the chart. It can clearly be shown that the peak hour of this direction is at 11:00am – 12:00pm.

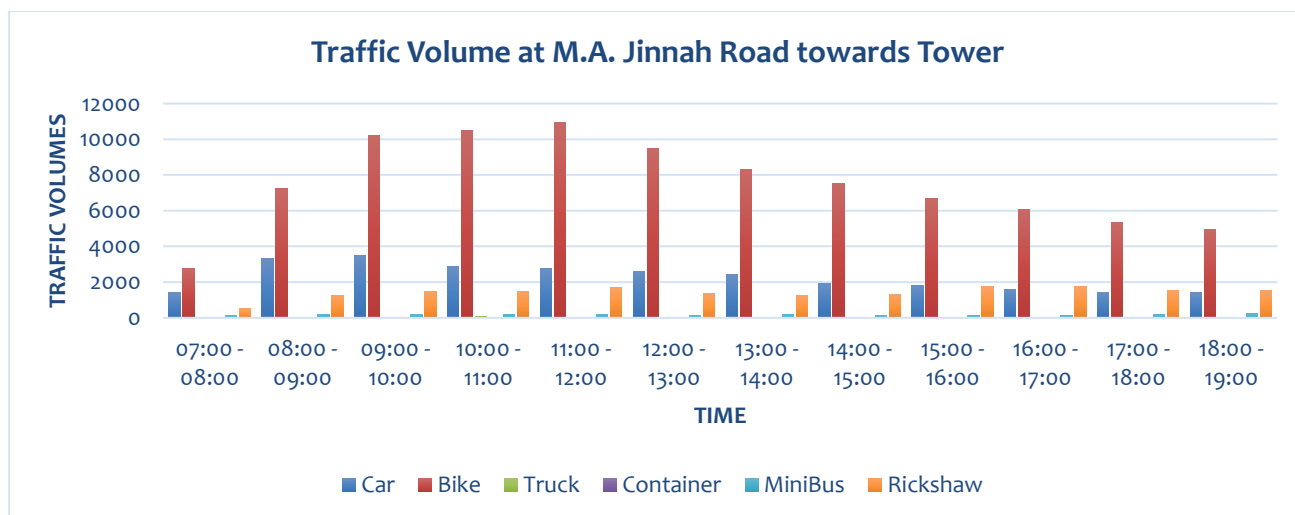


Figure 4.30: Traffic Volume at M.A. Jinnah Road towards Tower

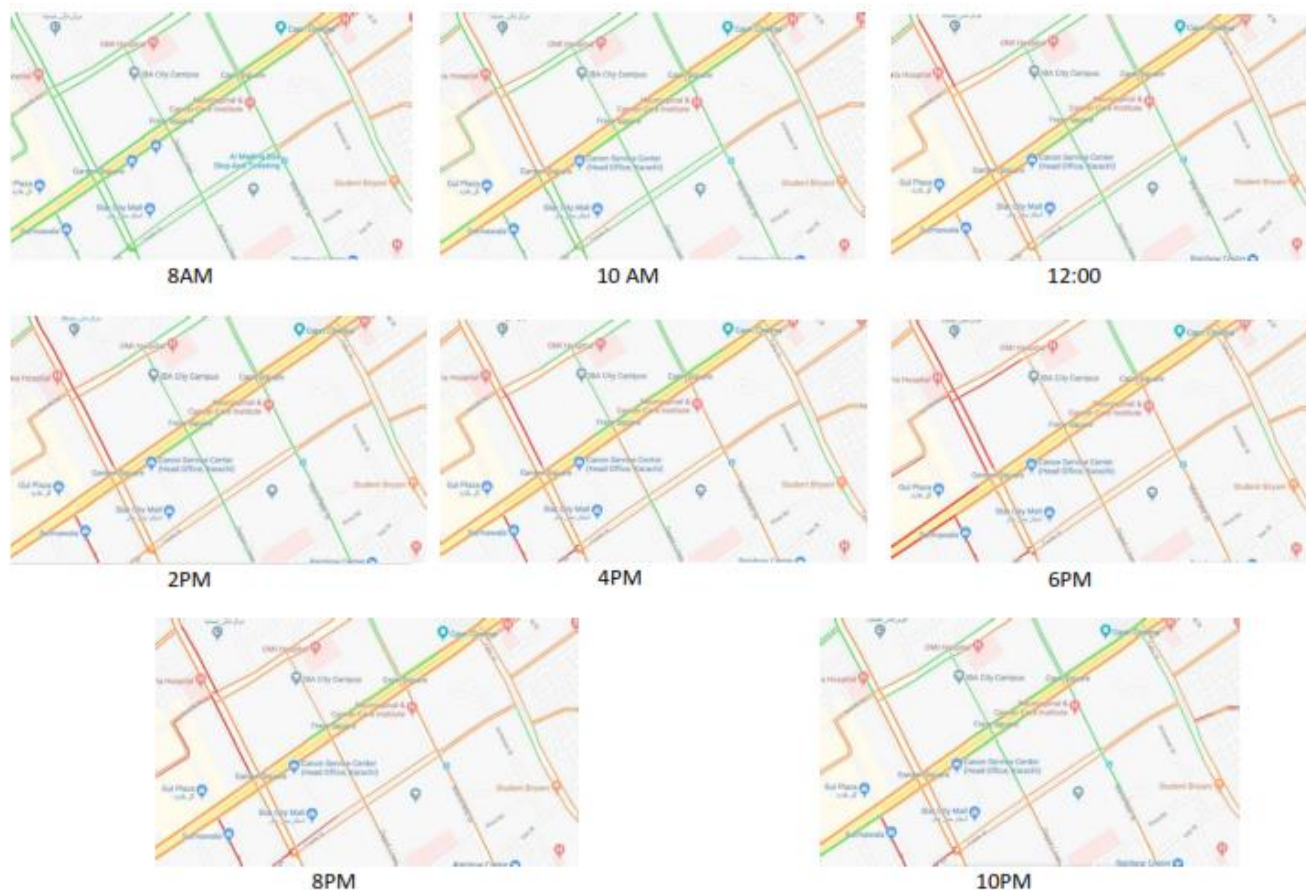


Figure 4.31: Map Representing the Traffic Variations along the Project Area during various time intervals



5. Public Consultation

Stakeholder consultation is a means of involving all primary and secondary stakeholders in the project's decision-making process in order to address their concerns, improve project design, and give the project legitimacy. Stakeholder consultation, if conducted in a participatory and objective manner, is a means of enhancing project sustainability. It is best to initiate the stakeholder consultation process at an early stage in a project cycle. This ensures that feedback from communities and other stakeholders directly or indirectly affected by the project can be used to adjust and improve the project's design, planning, and implementation, and help structure the project to be both environmentally and socially sound.

Sindh Environmental Protection 2014 mandates stakeholder consultation as an EIA tool to take onboard all primary & secondary stakeholders in the decision-making process. The objective is to address the concerns of the stakeholders as well as ecology. Stakeholder consultation, if conducted in a participatory and objective manner has been found to enhance the sustainability of the Project.

This EIA has conducted the stakeholder consultation meetings at the earliest stage of initiation of environmental assessment process. The stakeholder consultation has ensured feedback from communities and other stakeholders directly or indirectly affected by the project.

5.1 Objectives of Stakeholders Consultation

Objectives of the public consultation process adopted for this Project are as follows:

- To inform primary as well as secondary stakeholders about the Project and project activities;
- To obtain feedback from primary and secondary stakeholders on the Project and project activities;
- To set-out the boundaries of the assessment by collecting information on relevant potential environmental & social issues of the Project & project activities, and to propose mitigation measures.

5.2 Identification of Stakeholders

Stakeholders are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a proposed intervention. For the Prince ICON Project, the concerned stakeholders have been grouped into primary & secondary stakeholders as follows:





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- **Primary Stakeholders:** People, groups & institutions invited for consultation included the neighbors and proprietors of the activity centers in the immediate surroundings;
- **Secondary Stakeholders:** People, groups, or institutions that are important intermediaries in the project delivery process.

The main stakeholders for the Prince ICON Project have been identified in Figure 5.1.

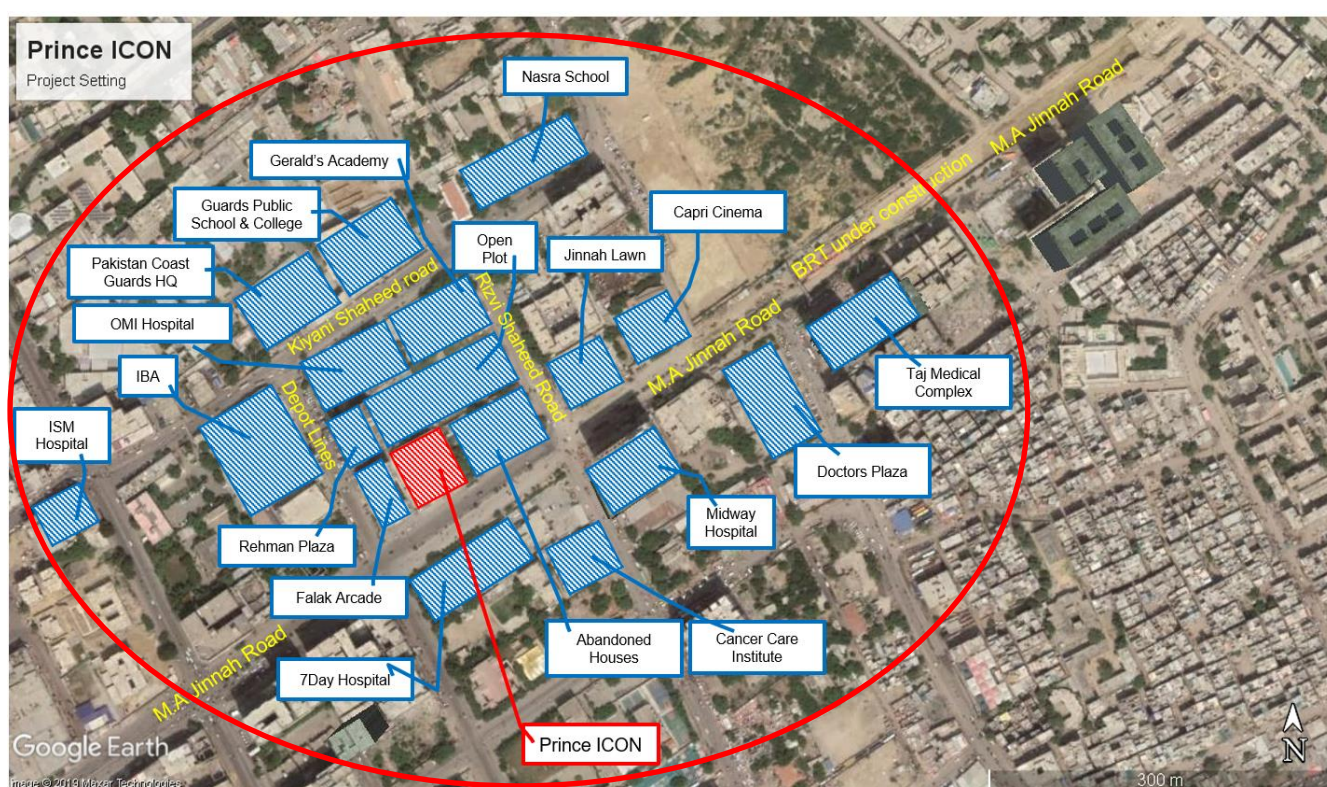


Figure 5.1: Primary stakeholders in the Project area

Other Important stakeholders include the following:

18. Sindh Environmental Protection Agency (SEPA)
19. Sindh Building & Control Authority (SBCA)
20. Karachi Cantonment Board
21. Culture, Tourism & Antiquities Department, GoS
22. Office of Commissioner District South
23. K-Electric
24. Sui Sothern Gas Company (SSGC)
25. Karachi Water & Sewerage Board (KW&SB)
26. Sindh Infrastructure Development Company Ltd (SIDCL)
27. SUPARCO



- 28. IUCN-Pakistan
- 29. WWF Pakistan
- 30. Shehri-CBE
- 31. National Forum for Environment & Health (NFEH)
- 32. Institute of Engineers, Pakistan (IEP)
- 33. Urban Resource Center
- 34. Academia

A variety of consultation tools were used to engage stakeholders and gather their feedback. A systematic approach was adopted, whereby stakeholders were initially contacted through official letters, followed-up through phone calls and emails and where possible, and meetings were held to solicit stakeholder concerns and recommendations. Consultation with the residents, businesses and public service institutions in the immediate vicinity of the project area was given priority to ensure they are informed regarding the project details and they have ample opportunity to share their concerns & comments. The methodology for stakeholder engagement and the tools used are detailed below.

5.3 Consultation Approach & Methodology

Consultation was conducted in two stages for the Prince ICON Project. During the EIA Scoping, a Background Information Document (BID) about the project design was shared with the most relevant stakeholders to get feedback on aspects related to design, construction & completion and during the project operations. The comments solicited from stakeholders were helpful in the screening of the potential environmental & social aspects of the project.

In the second stage, a 'Neighborhood Survey' was conducted to identify residential and commercial interests in the area that may face direct impacts from the proposed development. In preparation for the Neighborhood Survey, a 'Project Brief' was prepared highlighting the salient features of the project and the project location. The survey was conducted in two stages. The first stage comprised a reconnaissance survey whereby all stakeholders that either reside or work in the project vicinity were identified in reference to the proposed project location. Relevant public service institutions directly involved in service provision in the areas were also identified at this stage. During the second stage, a social survey field team engaged the area residents, commercial interests and public service institutions. Those stakeholders who were not available at the first attempt, were re-visited on the same day or followed-up for their comments during the next few days. During each meeting, the project team introduced the project to the stakeholders, recorded their concerns and suggestions and provided contact details to enable stakeholders to share further comments over email or in writing.

5.4 Consultation Feedback

The comments, concerns and suggestions received from stakeholders during the consultation meetings have been collated in this section. The concerns and suggestions of stakeholders have been segregated into two specific categories based on the responses during the consultation process: i) Residents & Business Operators, and ii) Professional Engineers & Experts from Institutions.

5.5 Observations/Views of the Residents & Business Operators

- All representatives of private schools were complaining about the miserable situation of solid waste management system in their respective areas; waste collection points have been created in front of schools which is not only creating health issues to the school children but affects the aesthetics of the surrounding of an school building which is considered a sensitive receptor.



Figure 5.2: Solid waste dumping sites in front of Private Schools

- The residents in general were very apprehensive of the sluggish progress of construction work along the green line corridor. According to them, green line project should have been completed 02 years ago because in view of the



traffic situation which has become worst due to lack of Public Transport infrastructure. Some of them very vehemently emphasized that the concept of densification of the roads has been grossly politicized since the roads have been allowed huge structures without considering the acute shortage of infrastructure facilities including burden on utility services.

- There was general agreement among the residents that the agony faced during the period of construction could be painful if suggested measures are not implemented with letter & spirit. Some business operators mentioned about the environmental & socioeconomic problems faced during the construction of green line project; businesses were lost, the school children & visitors to the hospitals were stressed, and the affectees were forced to migrate. The main reason is that the responsible authorities do not care to implement the management and monitoring plan and hence the contractors are left scot-free to degrade the social and physical environment.
- The residents & business operators appreciated that the Prince ICON project has more than the required provision for parking which takes care of the problems created by densification of the plot of such a large size. This arrangement appropriately responds with the parking facility for the residents and their visitors. According to businessmen of the area, parking issues and traffic management should not be viewed in isolation but being of comprehensive nature all densifiers should join hands and formulate a traffic management system unique to the process of densification.
- Densification and indiscriminate removal of vegetation/trespassing of open space have gone hand in hand. Most of open space has been lost during the construction of green line project. The parks have playgrounds have been forced to abandon land in the name of development. The private developers do promise provision of recreation facilities inside buildings as a compensatory measure to but that is not enough. They were of the opinion that the CSR plan should include supervision of the green spaces so that the objectives of promised recreation is available for the neighborhood.
- It was observed by the residents that it was unfair on the part of the land owing agencies to have received the development and service charges from the builders which is a public money and not spending any amount towards the betterment of the infrastructure or providing the amenities. The amount paid in the form of service charges are more than sufficient for construction of adequate services in the area but the amount seems to have been deposited in dead account.
- The stakeholders in the neighborhood including schools & hospitals management identified several precautionary measures that must be in place to ensure the peace of their area. Most importantly, the stakeholders



want to ensure that their security and privacy is not breached. Similarly, noise from the construction activities is bound to become a nuisance; construction should be carried out strictly in accordance to specific timings and there should be no construction activities at night. The residents should be taken into confidence regarding all developmental activities. Dust is another issue that usually results from construction activities and pollutes the surrounding areas. There was a suggestion that dust should be minimized as much as possible, at least the initial work with respect to site preparation should be covered to the maximum extent possible.

- Noise pollution especially during the initial construction activities and dust should be minimized. One of the stakeholders recommended construction vehicles to enter and exit the area only during the night-time when traffic volume is low.
- The stakeholders were pleased that the proposed building is an office set-up that has its own parking space. However, they also observed that the majority of the projects have been completed in violation of the approved plans because there is no provision for parking and the space for parking has been unauthorizedly allotted for more shops in the basements.
- Construction debris must be disposed of on continuous basis through proper waste contractor. Care must be taken to restore the construction site and the immediate surroundings to acceptable degrees of aesthetics.
- The sewerage system has been improved but the blockage of storm water drains is creating and submergence issues with every heavy rainfall. Authorities should see to it that all projects must have provision for sewerage treatment system with provision for recycling.
- The business operators observed that they had duly followed the building bye-laws by paying the betterment charges to the concerned agencies. However, the commercial activities carried out in the non-commercial area are responsible causing major damages to the infrastructure because the bye-laws are not being followed in total disregard of the mandatory requirement of obtaining permission for operating their business. The residential plots are housing illegal commercial activities which are adding to the burden of congestion on road and the amenity/utility services. This is unfair with regard to its unauthorized nature and causing losses to the government exchequer besides being cause for severe civic problems.
- The business operators also observed that the high-rise structures being constructed in the vicinity areas have kept provision for extra parking space which is much more than the requirement of Karachi Cantonment Board but it is also true that parking plazas are a necessary component of

commercialization and densification of roads all over the world. It is for the master plan department to conceive the necessity of parking plazas on densified roads of Karachi. There is still time for the planners to take necessary steps for mandatory provision of parking plazas on densified roads.

- The stakeholders appreciated that the Prince ICON project has several floors dedicated to parking of cars and motorcycles in view of the demand for parking stalls. The stakeholders preferred that the exit and entrance to the facility is properly planned to avoid disturbance to existing traffic. Entry & Exits should be properly designed to avoid any issue during peak-hours.
- The business community as well as residents welcomed the new development as they were of the view there is a need to have good office buildings and recreational areas because commercial activities will see a significant rise future as soon as the mass transit system will become operational. However, if mismanagement prevails as in other areas of Karachi, overcrowding and haphazard planning will actually deter the public from visiting due to parking ques and long waiting hours.



Figure 5.3: Consultation with project neighbor



Figure 5.4: Consultation with project neighbor – a Private School



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Figure 5.5: Consultation with project neighbor – a Private School



Figure 5.5: Consultation with representative of Private School Management



Figure 5.5: Consultation with representative of Private School Management



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Figure 5.6: Consultation with project neighbor – Rehman Plaza



Figure 5.7: Consultation with representative of Hospital



Figure 5.8: Consultation with representative of Fire Brigade Station



5.6 Observations/Views of the Institutional Stakeholders

Following are the observations of the stakeholders at the meetings arranged for consultations on the nature of the project & procedures followed for densification:

- According to the intuitional stakeholders; the trend of construction of high risers being in the already commercialized arterials all over Karachi without a cumulative assessment of the corridor is against sustainability principles and is likely to lead to socioeconomic problems. It was the general opinion of the institutional stakeholders that commercialization policy should have preceded by Strategic Environmental Assessment (SEA) which is a critical step since it concerns with the future development of Karachi.



Figure 5.9: Consultation with Professional Engineers & Experts

- Is there any master-plan being followed for the commercialization, densification and decongestion? the process of strip commercialization and

densification is an adhoc arrangement for solution of a complex problem of rapid urbanization. The need of the expanding city of Karachi is to expand the area to contain urban sprawl.

- The decision to densify the major roads without a masterplan has resulted in road congestion and parking issues. Parking issues have been aggravated due to the addition of the vehicles owned by the residents, their visitors, retailers, their visitors and will further add to the congestion of the already congested roads and all the intersections that are loaded with traffic jam at peak hours. Delay in completion of green line project has affected local businessmen who were forced to shut-down their businesses.



Figure 5.10: Consultation with Professional Engineers & Experts

- The addition of vehicles on the already congested roads is adding to the existing problem of smooth running and parking. The need of the hour is to have a realistic demand forecast and to have several parking plazas at critical



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sites on the commercial areas. The cost of implementation of traffic management plan should be shared among all the builders and developers.

- All the critical traffic intersection needs to be remodeled and the alternatives such as grade separation must be examined as soon as possible.
- Development activities in CBD are faced with the adverse impact arising from deficiencies in infrastructure and other facilities. The demand for utilities, such as water, sewage disposal, electricity and gas will be increased considerably for which there is no master-plan prepared by the agencies. The residents are already protesting against the shortage of water but the authorities are handicapped for inadequacies in the infrastructure of Karachi Water & Sewerage Board (KW&SB) who keeps on violating the instructions of judicial commission (water) like any other department.
- The betterment charges levied by the authorities should be specifically set-aside for improvement of the water supply, sewage disposal system, traffic intersections and provision of infrastructure facilities in the concerned areas. The residents are already raising their voice against non-supply of piped water to their houses but it appears that the Sindh Government is not ready to take any step for the provision of water to Karachiites. The infrastructure facilities are lacking in each sector: the roads are not vehicle worthy but are congested to the extent that the traffic volume is several folds in exceedance with its capacity.
- Under the circumstances the builders and developers are resorting to provision of facilities from ground water resources. The lack of water supply has given way to ground water extraction followed by rampant Reverse Osmosis (R.O) treatment without taking into consideration the likely subsidence of the soil which is already burdened by heavy mass shift. Water tankers have become the norm in the area.



Figure 5.11: Water tankers have become the norm in the area.



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- The greenery has been usurped and invasive species have been promoted which has added to the problems of health issues. Every builder & developer should be made to contribute to provision of greenery to offset the impact of urban heat island effect.
- The stakeholders were apprehensive of the inadequacies in the emergency evacuation and firefighting arrangements. In many cases the hydrants are simply not there and in others the access to the firefighting squad is denied. Since the number of incidents of fire breakout in the high risers is increasing each such unit should have adequate provision of firefighting & emergency evacuation plans.
- One of the major challenges for the proposed development and other such developments in the future is the deteriorating state of public utilities. Recent incidents of water lines bursting and consistent power outages in other parts of Karachi are examples that do not bode well for future projects.
- The proposed construction on the plot would increase the value of the property in the area that would be beneficial for owners of both residential and commercial property as well as the real estate businesses. Demand for Office buildings are also bound to increase with foreign investments in Pakistan including CPEC. Such developments would therefore also help meet the needs of foreigners who seek good quality housing that is safe, secure and hassle-free.
- The awareness on traffic laws is also severely lacking amongst the general public. Regardless of plans for mass-transit and other traffic management measures, without awareness of basic road laws and motivation to follow these, traffic congestion will continue and accidents will rise. Recent measures by the Traffic police of increasing fines and penalties are steps in the right direction but, positive incentives for drivers to follow the rules can also make a huge difference. Steps should be taken for area-wise education of traffic rules and benefits of following basic principles of road safety.
- Construction debris has of recent become a major constituent of the solid waste disposal system in Karachi. This is because the debris are left to the ill-equipped solid waste collection system to cater; the result is accumulation of piles of construction debris.
- The fire escape route and emergency exits must be provided as per international codes and standards. Recent episodes of fire incidents in Karachi has identified the need for each high riser to have its own firefighting system for each floor and fire alarm for each unit of the building.



6. Screening of Potential Environmental Impacts and Mitigation Measures

This section presents the screening process that identifies the environmental aspects and makes assessment of impact of different activities on the physical, biological and social environment. The screening process has through review of literature, screening of potential environmental and social aspects raised by the stakeholders, primary as well as secondary baseline data, and expert judgment, made assessment of the potential impacts of said activities on the physical, biological, and socioeconomic environment of the Project. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts and their adoption has been recommended. The report has taken cognizance of the construction activity which has intensified in the subject area during past few years.

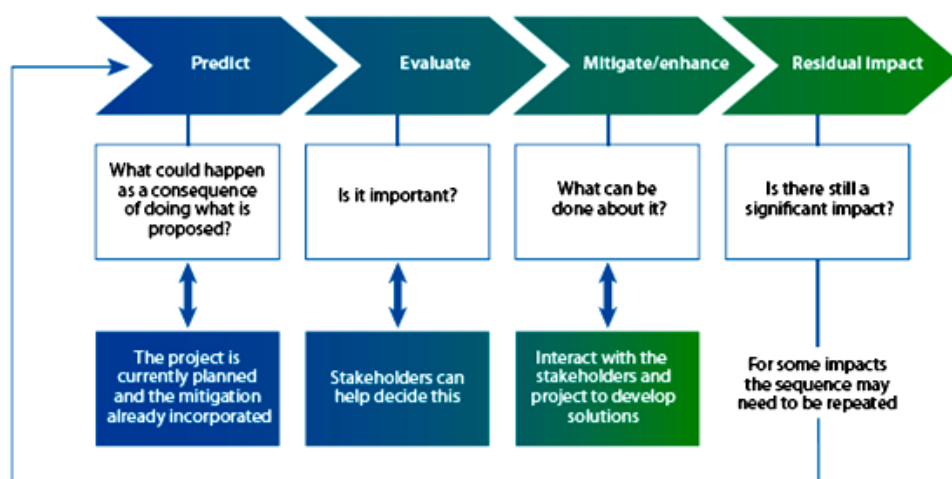


Figure 6.1: Impact Assessment Approach

6.1 Screening of Potential Environmental Impacts in Siting of Project

The project is proposed on a by-birth commercial plot. It was leased for building shops, showrooms, offices and cinema by the Karachi Cantonment. The lease of the plot is valid with provision of renewal. The proponent has obtained necessary no objection certificates or letters showing intention to provide amenities. The proponent has so far obtained NOC for electrical connection from KE vide letter No.S&BD/201910307 dated 02nd December 2019; SSGC vide letter No.Sales/NOC/MK-Sur90/12/19 dated 4th December 2019; KWSB vide letter No.Secy/NOC Committee/RRG/2019/478 dated 5th December 2019; CAA height clearance of 500 feet Above Ground Level (AGL) or 536 feet Above Mean Sea Level (AMSL) vide letter No.HQCAA /1117/003/ ARAS/KHI-895/750 dated 11th July 2019.



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The Project responds to the need of the segment of population that is seeking safety, security and improvement in quality of life. Advantage of this aspect has already been taken by other builders and developers who have gone ahead with the construction of residential and commercial ventures all along the major roads and strategic corridors of Karachi.

The microenvironment has no sensitive areas such as protected sites including wildlife sanctuaries, game reserves or national parks, or any archaeological, historical or cultural heritage in its immediate neighborhood; as such its siting would have no sensitivity in this regard. No significant flora and fauna will be disturbed, as the site is located in the commercial area, where no flora and fauna of significance exist.

The project when completed would require about 23, 520 gallons water per day and 900 KW of electricity. The proposed project is a self-contained building having its own back-up power generation, water supply supplemented by hyper filtration system and sewage treatment, grey water recycling and disposal system in addition to provision of more than required parking space. The concerned authorities have already received the due amount for provision of utility services and development of the area. They are expected to plan and implement augmentation of the facilities in advance, otherwise plan for densification would, instead of facilitating improvement in quality of life, be a burden on the environment.

With 24-hour security system all over the building the designers have ensured that the concerns on invasion of privacy are alleviated and eased. The Project would thus achieve its objective of providing a secure and safe residential cum commercial building at an attractive location. This being a positive impact would be an indicator of achievement of the objectives of the Project.

6.2 Assessment of Impacts at the Construction and Operation stages

6.2.1 Demolition of Structure(s)

The Prince ICON site is an open land with no permanent structure at the site or in the neighborhood. As such the construction activity will proceed straight away with land development and excavation. The SEPA and Karachi Cantonment Board will be kept informed of the proceedings during the construction stage.

6.2.2 Building Stability

The selection of foundation type depends upon the subsoil conditions, type of structure, and structural loads. According to the information furnished by client,





the proposed building will have basement whose base will be at about 10 – 12 feet below the existing ground level.

A study of boreholes show that top substrata consist of loose to medium dense, silty SAND / sandy silt and dense, sandy GRAVEL / gravelly SAND deposits up to 10 feet depth. This is underlain by stiff, clayey SILT and dense, sandy GRAVEL deposits in clayey matrix. This is followed by medium hard, SANDSTONE and hard, CONGLOMERATE deposits.

Taking into account the subsoil condition and anticipated structural loads, it is recommended that the proposed structure be supported on **raft foundation** placed as 14-15 feet depth below the existing ground level.

Allowable (gross) bearing capacity of raft foundation (with basement) placed at 14-15ft depth below the existing ground level must be adopted as 3.50 tons/ft².

Bearing capacities have been computed for the condition that about 14-15ft overburden soil will be permanently removed for the construction of basement.

Before placing foundation concrete the excavation should be carefully inspected to ensure that footings are being placed at in competent stratum. This precaution is necessary to guard against localized fills and inhomogeneities.

Modules of subgrade reaction at 14 – 15feet depth may be adopted as 140kef.

The site plan shows that on one side of the plot there is an empty plot whereas, on other side, there is (B+G+18 storeys) building which has an offset of 10feet from the property line. On the other two sides of the plot there exist roads. During basement excavation, special precautions must be taken to protect the slopes and foundation of adjacent structure. This may be done by proper shoring / bracing. It is essential to keep the excavation dry and excavation should be performed during dry season.

According to the uniform Building Code (1997), the soil profile falls in 'Sc' category corresponding to 'very dense, soil and soft rock'. Following table gives seismic zone, seismic zone factor, soil profile type and seismic coefficients.

Seismic Zone	Zone Factor z'	Soil profile type	Seismic coefficient 'Ca'	Seismic Coefficient 'CY'
2B	0.20	'Sc'	0.24	0.32

Sulphate content in subsoil has been found to be negligible. It is therefore recommended that Ordinary Portland Cement (OPC) be used in concrete in contact with soil.



6.2.3 Erosion of Soil

Generally, the exposed soil after excavation for foundations is vulnerable to erosions and runoffs by rains. Such a situation is of temporary nature and short duration. It lasts only during the landscaping and concreting phase of construction at the site. Standards operating procedures have to be adopted to minimize the impact.

Mitigation Measure

- Covering the open soil during the construction phase till such time that the foundation will adequately concreted.
- Intensification in fugitive dust emission caused by erosion of soil will be mitigated by appropriate measures to reduce the level of impact to minor significance.
- Control of air emission during construction will be ensured by adopting sound operating procedures such as:
 - Exposed surface will be regularly wetted to effectively keep airborne dust levels to minimum
 - Stockpiles of fine material will be wetted or covered with tarpaulin especially during windy weather conditions.
 - Site workers will be mandated to wear dust masks especially during dry & windy weather conditions.

6.2.4 Excavation

The provision of foundation will require excavation below ground level. Once removed, the void space is likely to impact the integrity of the soil in the surrounding. To maintain the stability of excavation and to protect foundations of adjacent structures, retention measures such as bracing or shoring can be used to retain the soil during the construction of basement. It is essential to keep the excavation dry and excavation should be performed during dry season. Due to the presence of ground water table at 70 feet, it is imperative that system should have adequate water proofing to make sure moisture doesn't ingress into the retention system and basement.

Mitigation Measure

- Engineering study of sub-soil structure and impact analysis of surrounding structures was carried out.



- Fencing and obscuring the construction site to reduce the perception impact was undertaken.
- During the construction of basement, it would be advisable to monitor the excavation cuts and if found necessary, shoring/bracing may be employed. It must be ensured that the excavation is done in dry season.
- The neighborhood will be notified with adequate signage at the very start of the project. Site will be appropriately covered all around to contain the fugitive dust emission within the microenvironment. The impact of the activity will be continuously monitored by IMC since it is apprehended that the residents in the immediate neighborhood are likely to be exposed to dust fall hazards.



Figure 6.2: Highrise basement water proofing with PVC geomembrane



6.2.5 Construction Waste

Typical solid waste generated during construction includes wasted concrete, steel and wooden scaffolding, cement bags, excavated soil, wood remains etc. It is envisaged that the quantum of earth fill material will be enormous since excavation will be deeper down. The waste generated has the potential to cause adverse impact on the surroundings if not properly managed and disposed to approved dumpsites by approved waste contractors. The excavated waste has the potential to block nearby drainage channels that could ultimately cause localized flooding, particularly during the monsoon season. Irregular storage of this waste may pose health hazards to the workers at site and more so to the school going children, residents and other sensitive receptors in the neighborhood. The following measures have been recommended for management of the excavation procedure and disposal of construction wastes:

Mitigation Measure

- Site will be properly cordoned off by placing curtains all around.
- Unusable wastes will be transported to approved dumpsites.
- Excavated soil will be disposed of through the regular channel of the approved disposal contractor.
- Proper solid waste containers of adequate capacity will be provided to cater to daily waste generation.

6.2.6 Topography and Geology

The siting of the project demands careful planning and evaluation of load bearing capacity of the soil to ensure the stability of the proposed structure which is localized to a small area and extends way upward to 21 storeys. In view of the anticipated structural loads and sub-soil condition, raft-foundation has been proposed. As such the stability of the project is ensured and is not likely to impose additional stress on the sub-soil structure and hence no significant impacts are envisaged.

6.2.7 Air Quality

The major source of air pollution during the construction phase will be dust emission due to earth works and gaseous emissions from construction equipment. The major source of air pollution during the operation phase when the Project is functional will be the pollutant emissions from the stand-by generator in case of power breakdown and vehicular emissions from the entry



and exit of owners and visitor's vehicles besides the emissions on and along M.A Jinnah road.

Impacts from each source and proposed mitigation measures are likely to be as follows:

Dust Emission: Particulate matter emitted during construction activities results in deterioration of ambient air quality in the vicinity of the source and is usually a nuisance to the neighborhood and the communities in the neighborhood besides the construction workers. Dust emission from construction site is a concern particularly if the site is near sensitive receptors (residential areas, schools & hospitals). The main health hazards emanate from particles smaller than 10 microns (PM₁₀) in particular PM_{2.5} as they are respirable. These particles are sufficiently charged to assume the properties of aerosols which on reaching the receptors have heavy impact on the respiratory system and on the surface of furnishings of the living environment. The impact on the environment would be considered significant if there is an increase in suspended particulate matter within and beyond the boundaries of the project site due to activities at the site, or if the dust affects local property or results in complaints from the community.

Potential sources of particulate matter emission during construction activities include earthworks (dirt or debris pushing and grading), exposed surfaces/storage piles, truck dumping, hauling, vehicle movement on unpaved roads, and concrete mixing and batching. The quantity of dust that is generated on a particular day depends on the magnitude and nature of activity and the atmospheric conditions prevailing on the day. Availability of ready-mix on commercial scale has considerably reduced the level of emission of fugitive and construction sites are no longer required to have a batching plant.

Mitigation Measure

The following mitigation measures have been recommended:

- Water sprinkling and monitoring to ensure adequate suppression of dust will be a regular activity as long as the excavation activity lasts.
- Dust emission from soil piles and aggregate storage stockpiles will have to be reduced by appropriate measures like keeping the material moist by sprinkling of water at appropriate frequency and regularly monitored by IMC. Availability & use of ready-mix on commercial scale will considerably reduce the level of emission of fugitive at the project site.
- Construction materials that are fragile and vulnerable to raising visible dust will be transported only in securely covered trucks to prevent dust emission during transportation.



- The exposure of construction workers to dust needs to be minimized by provision of dust masks and mandating the workers to wear them.

Vehicle & Equipment Exhaust: Combustion exhaust from vehicles & construction equipment can affect the ambient air quality of the site surroundings. The impact would be potentially significant when the ambient air quality deteriorates due to emissions from construction equipment and machinery or the construction generators etc. beyond the guidelines especially at the environmental receptors such as schools, hospitals and residential areas in the neighborhood. The exhaust emissions will include particulate matter (PM), hydrocarbons, oxides of nitrogen, sulphur, and carbon (NO_x, SO₂, CO_x).

Mitigation Measure

- All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants.
- The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level.
- The noise and air emission from site as a whole will be contained within its microenvironment by measures engrained in the design of the building. The mechanical area will be provided with noise abatement devices. Generators emissions will be controlled to acceptable levels by segregating their locations and timely maintenance.
- In order to compensate for the increase and footprint of carbon and water vapor it would be desirable for proponent to undertake plantation of large number of trees with dense canopy at the nearest public park/green belt in consultation with the Independent Monitoring Consultant (IMC).

6.2.8 Construction Noise

Depending on the construction equipment used and its distance from the receptors, the commuters travelling on connecting – surrounding roads : M.A Jinnah Road having connectivity with the green line bus rapid transit corridor on the immediate South, the plot is enclosed in a network of roads namely Rizvi Shaheed Road on the East, Depot Lines road on the West, Kiyani Shaheed road on the North and residents in the neighborhood may be exposed to intermittent and variable noise levels. During the day such noise results in general annoyance and can interfere with sleep during the night.

In general, human sound perception is such that a change in sound level of 3 dB is clearly noticeable, and a change of 10 dB is perceived as a doubling or halving



of sound level. The noise in the project area will increase during construction and completion of the G+21 storey Prince ICON project and may result in disturbance to the nearby receptors particularly school children, and visitors to the OMI Hospital unless it is contained within the appropriately fenced and covered site of the Project.

Baseline noise measurements were obtained through continuous monitoring for a 24-hour period at the project site. It was found from the noise monitoring that the typical average noise level in the project area was >70 dB (A). The Sindh Environmental Quality Standards for noise require that the sound level in residential and commercial areas should not exceed 55 dB(A) and 65 dB(A) respectively during day time and 45 dB(A) and 55 dB(A) respectively during the night time.

Mitigation Measures

- Restraining the use of noisy equipment to suit to the conditions of the living environment namely 65 dB(A) during the day and 55 dB(A) during the night.
- Reducing equipment noise at source by proper design, regular maintenance & repair of construction machinery and equipment.
- Minimizing noise from vehicles and back-up power generators by use of proper silencers and mufflers.
- Use noise-abating devices wherever needed and practicable.

6.2.9 Water Sourcing

Water required for numerous construction activities would not be of such order as to result in its reduced availability for other activities for the living environment. Conservation practices would nevertheless be adopted during the entire course of construction and operation.

Water in the initial stages will be obtained from tanker trucks, generally from the KWSB water supply system. The availability of ready-mix on commercial scale has greatly resolved the problem of availability of water in the initial stages. The drinking water need during the construction stage will be fulfilled through bottled from a bottled water supplier of repute.

Water requirement during the operation phase of Prince ICON Tower will be about ~23, 520 gallons per day for which the Proponent has obtained NOC from KW&SB for provision of water from K-IV project. Unnecessary delays in K-IV water supply project which is a three phase project; (i) Phase-I which is expected to add additional 260 MGD into the existing supply network has not yet been



completed, while on the other hand water demand and supply gap continues to stretch, (ii) Phase-2 which will add additional 260 MGD to the water supply network, (iii) Phase-3 which will add 130 MGD to the existing system are likely to be delayed. It is assumed that even after completion of K-IV the city is likely to experience water shortage, and the situation is likely to get worse if additional controls are not taken into consideration to address the current situation. K-IV project phase-I was supposed to be completed by 2018, however only 20 per cent of the work have been completed till date. Keeping in view the present situation the proponent has conducted ground water investigation survey at site through geo-professionals. This survey would also help in designing the tube well effectively and economically. In the present study resistivity survey was carried out by applying the vertical electrical sounding (VES) technique which measures the electrical resistivity variation with depth. These tests were performed at each proposed site locations using Schlumberger Electrode Configuration. The resistivity tests were under taken by increasing the distance between the electrodes for maximum depth of investigation of 180-200 m. All the electrical resistivity values show less considerable water presence in the area. However, the drilling location can be demarcated with 100ft radius of probe 3. Test borehole of 400ft-500ft deep is recommended to get average yield of brackish water from Manchar Formation. Test borehole of 800ft-1000ft deep is recommended to get maximum yield of saline water from Gaj Formation.

Option for recycling of the wastewater and regeneration of the potable water from groundwater resources by adequate treatment may have to be explored since adequate water supply to the Karachi residents the core areas is not assured despite the fact that the authorities are aware that the needs remain unfulfilled while the exorbitant taxes are unbearable.

Mitigation Measures

- A complete record of water consumption during the construction and operation phase will be maintained.
- Water conservation practices will be adopted to prevent wastage of water.
- The water supply lines will be checked and repaired for leaks, if any, in order to reduce wastage of water.
- Use of water efficient sanitary fittings such as low flush toilets, water efficient shower heads, and aerators on faucets will be ensured throughout the Project cycle.
- The RO reject will be passed through treatment system and will be managed through SEPA certified contractors.



Figure 6.3 Brine Treatment System

6.2.10 Soil Contamination

The contractor shall be mandated to follow the SOPs with regard to handling, storage, transfer, use and final disposal of contaminants, if any by the proponent. The following measures will be adopted during the construction stage to reduce the chances of soil contamination:

Mitigation Measure

- Fuel oils, lubricants, and chemicals will be stored in covered dyked areas, underlain with impervious lining. The construction site(s) will be provided with hard cover or tarpaulin lining to prevent contamination of soil.
- Washing and maintenance of vehicles and equipment will only be carried out at designated areas.
- Regular inspections will be carried out to detect leakages in construction vehicles and equipment.



- Appropriate implements such as shovels, plastic bags and absorbent materials will be made available near fuel and oil storage areas for removal of oil and contaminated soil.
- Contaminated soil will be removed and properly disposed after treatment such as by incineration by SEPA certified contractor.
- Hazardous Substances Rules 2014 will be adhered to for storage, transfer, subsequent handling and final disposal of any chemicals/substances during the operation stage.

6.2.11 Wastewater Generation & Disposal

Construction Phase: Disposal of domestic effluent from the construction site has to be adequately managed so that the wastewater flows into the regular channel and does not contaminate the soil and groundwater of the site or its surrounding.

Mitigation Measures

The following mitigation measures will be adopted:

- Wastewater generated will be routed to the nearest drain/sewerage system.
- Sewage will not be mixed with any other waste.

Operation Phase: The Prince ICON on becoming functional will generate around 19,000 gallons of wastewater per day that will be mainly sewage. Small quantities of hazardous wastewater will also be produced during the maintenance activities in the building (such as oily water etc.).

The source of wastewater will include toilets, washrooms, laundry and kitchen. This wastewater would comply with the SEQS values provided that other hazardous wastes (i.e. paints etc.) are not mixed with it. The discharges from kitchen, canteen and other sources will be provided grease traps to separate the oily waste that will be disposed of responsibly through SEPA approved contractor.

Waste water will be treated at source and the grey water will be separated from black and recycled into a separate channel for use in the washrooms. This is expected to substantially reduce the water footprint. The final discharge would be routed to the existing municipal drain/sewerage system.



Mitigation Measures

Following mitigation measures will be adopted for effective management of wastewater during the operation stage of project:

- Wastewater will be treated to comply SEQS.
- Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream.
- Water conservation strategies will be employed to avoid wastage of water.

6.2.12 Solid Waste Generation and Management

Construction Phase: The construction phase of the project is expected to generate wastes including; packing waste; scrap, excess construction materials and debris, domestic wastes from construction camp, empty containers and drums, used lubricating oils and chemicals etc.

The impact of solid waste disposal would be significant if the waste management is not carried out appropriately. This may adversely affect the health of workers, cause soil pollution, and deteriorate the quality of surface water and groundwater. Also, if excessive wastes are generated, recyclable wastes are not recycled, wastes are scattered, handling of wastes will result in contamination, and wastes are improperly disposed of, the result would be serious degradation of the environment.

Waste generated as a result of construction activity will be inherently less reactive and chemically inert under normal conditions however, its handling and storage may pose adverse impacts of minor nature which could be controlled by employing the recommended mitigation measures in the EMP.

Mitigation Measures

A waste management plan will be developed for the construction stage of the project. The following will be the key elements of the waste management system:

- Separate bins will be placed for different type of wastes - plastic, paper, metal, glass, wood, and cotton.
- Recyclable material will be separated at source. The recyclable waste will be sold to SEPA certified waste contractors for recycling.



- Non-hazardous non-recyclable wastes such as kitchen wastes will be disposed of in landfill site managed by municipal administration or approved waste manager/contractor.
- No wastes will be dumped at any location outside the site boundary.
- All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed of through approved waste contractor.
- Surplus construction materials including partially filled chemical and paint containers will be returned to suppliers. Inert construction wastes will be disposed of onsite as fill material or sold as scrap to contractors.
- Records of all waste generated during the construction period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register.
- Training will be provided to personnel for identification, segregation, and management of waste.

Operation Phase: Prince ICON will generate solid waste from Offices. waste will mainly include food waste, paper and packaging material, plastic bottles and glass. If not properly managed and disposed of this can pose serious environmental threat of pollution not only to the office-bearers and visitors to the complex but also to the surrounding receptors.

Solid waste management however remains an unresolved problem in Karachi. Several options have been proposed and also implemented but none of them could resolve the problem. The solution perhaps lies now in the attempts that the Sindh Solid Waste Management Board has launched on. The SSWMB has taken a holistic view of the situation and has integrated a number of options that may at least partly alleviate the heavy impact which Karachi is faced with.

Mitigation Measures

The following measures would reduce the negative impacts of solid waste disposal:

- Grease interceptors will be installed at all kitchen drains to trap oil & grease.
- The solid waste shall be collected through garbage chute at dedicated site.
- All solid waste shall be segregated into organic and recyclable waste at source and then collected, stored, & transported for ultimate safe disposal.



- Handling & disposal of solid waste shall be managed by a dedicated waste management contractor.
- The solid waste management plan developed will be implemented and facilities for collection, storage and transportation will be established and organized.

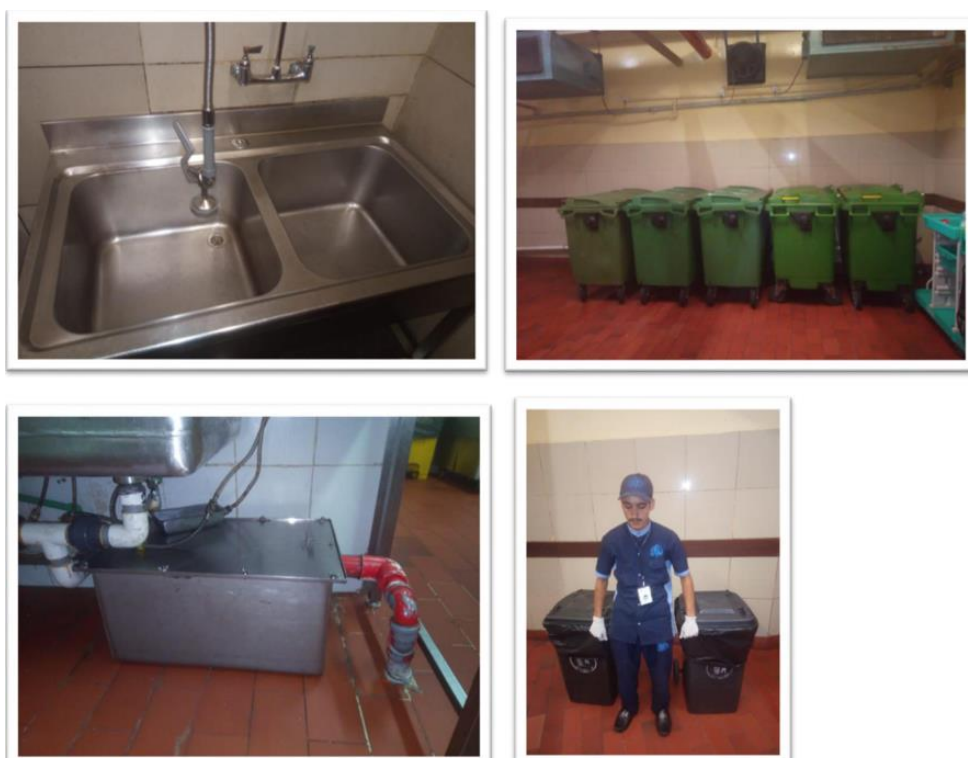


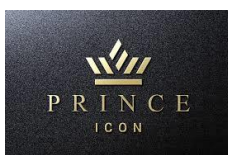
Figure 6.4: Waste Management System (Conceptual)

6.2.13 Operation of Vehicular Traffic

The proposed building is planned to be a commercial establishment with official units at 6th – 21st floor and cinemas on the 4th floor. The 4th floor also consists of recreational units such as gym, children's play area and community hall. Parking provisions are to be developed on 1st – 3rd floors. There are 06 shops on the ground as well as a very large driver's sitting area.

The floor description and details are presented as follows:

S.#	Floor	Description	Details
1	Basement	Service Area	UGWT, Lobby, Generator Area, etc.
2	Ground	Shops & Drivers Sitting Area	06 shops



Environmental Impact Assessment (EIA)

Survey 90, Depot Lines,
Karachi Cantt.

3	1 st – 3 rd	Parking Floors	Parking Slots for 189 bikes & 186 cars
4	4 th	Cinemas & Recreational Area	02 Cinema Halls, Children's Area, Gym & Community Hall
5	5 th	Service Area (Utilities Room)	Electrical & Plumbing Rooms
6	6 th – 21 st	Office Units	192 Office Units of Type A, B, C, D, E & F
7	Roof	Open Area	Open Area with Atrium

The conclusions developed through the analyses conducted are as follows:

Parking Analysis

Since the proposed building consists of cinemas and it also has a marginal impact on the parking demand, it is best suggested that shift management is applied for effective operations. All the shows for the cinema will start after 06:00 pm (except for Saturday and Sunday) which is also the departure time for office vehicles hence the demand for cinemas will be omitted from the actual demand, reducing the deficiency of vehicles at the project building.

Minimum Project Parking Demand				
S.#	Vehicle Type	Offices	Showrooms	Total
1	Car	340	8	348
2	Bike	716	16	732

Hence the project demand is summarized to 348 cars and 732 bikes according to which the supply and demand chart will be as follows:

Comparison Chart				
S.#	Vehicle Type	Parking Supply	Parking Demand	Deficiency
1	Car	189	348	159
2	Bike	186	732	546

Considering the mentioned fact to manage time slots for the cinema, the deficiency in the parking demand will be reduced up to 159 car parking slots and 546 bike parking spaces. This demand can further be managed through shift management of offices and also through careful assessment of the types of shopping facilitations provided.

Furthermore, as mentioned in the reports of BRT Blue Line and Green Line, the BRT Corridors will reduce vehicular demand of cars and motorcycles up to 10%. Therefore, we can fairly say that the deficiency of available parking slots, if mode of transportation is shifted to BRT as planned, will be further reduced to 144 cars and 492 motorcycles.



Access Gate Queue Length

Three different scenarios are calibrated through variation in the arrival period of cars and bikes. The results are presented in the table as follows:

Access Gate Queue Summary Chart						
Type of Vehicle	Scenario 1		Scenario 2		Scenario 3	
	Arrival Time: 30mins	Service time: 15 secs	Arrival Time: 30mins	Service time: 10 secs	Arrival Time: 45mins	Service time: 10 secs
Car	19		No Queue is Formed		Not Evaluated	
Bike	173		113		23	

The estimation predicts that for cars second scenario is most suitable whereas for bikes there is queue formation at the access gate of 23 bikes in a peak period. To resolve this effective management must be undertaken. Discussed in latter parts of the report.

volume-to-capacity ratio analysis

The calculations of the ratio are carried out such that different scenarios are established. The summary chart is presented as follows depicting that even after inclusion of project traffic and growth rate factor over the time span of two years the capacity of road at one section is about to reach its threshold value.

Volume-to-Capacity Ratio Analysis Summary Chart			
Direction	Existing Condition	No-Built Condition	Built Conditions
At M.A. Jinnah Road from Tower	0.645	0.724	0.751
At M.A. Jinnah Road towards Tower	0.927	1.042	1.068
At M.A. Jinnah Road from Tower with BRT Impact	0.604	0.679	0.703
At M.A. Jinnah Road towards Tower with BRT Impact	0.867	0.975	0.999

The analysis depicts that after a time period an additional lane will be required to cater for the increasing demand of M.A Jinnah Road.

The consolidated recommendations for the impact assessment of Prince ICON are presented as follows:

- The actual parking demand of the facility is of 472 cars and 792 bikes considering the parking demand for offices, showrooms and cinema. However, this demand is minimized providing that the show starting time of the cinemas will be at 06:00 pm and onwards for weekdays excluding Saturday and Sunday. This will reduce the maximum demand limit up to 347 cars and 732 bikes.



Environmental Impact Assessment (EIA)

Survey 90, Depot Lines,
Karachi Cantt.

- Considering the minimalized demand, the deficiency of parking spaces is of 158 cars and 546 bikes. To accommodate for this at least two basement parking maybe developed.
- Or in other case, rest of the deficiency may be catered into a separate parking lot in the surrounding area of project. This location must be identified and after its identification a plan has to be developed for better traffic management (both vehicular and pedestrian) to and from the parking lot.
- Furthermore, as mentioned in the reports of BRT Blue Line and Green Line, the BRT Corridors will reduce vehicular demand of cars and motorcycles up to 10%. Therefore, we can fairly say that the deficiency of available parking slots, if mode of transportation is shifted to BRT as planned, will be further reduced to 144 cars and 492 motorcycles.
- The showrooms provided in the building maybe used for clothing franchise. If such is the case then the demand maybe further managed as shopping areas usually carry out activities in the evening and night hours during the time when the office shifts are off. If the land-use strictly is identifying that the shopping area will only be used for clothing / brand stores then the demand will further be reduced to a great extent because when the parking will reach shopping peak limit, the office would have already emptied the parking slots. This phenomena in traffic engineering is called as demand management via shift management.
- It is best suggested that if night shifts are adapted for the offices in the proposed building, a minimal of 50% offices must only be allowed to operate during one-night shift.
- The project plot is situated on a road section which has comparatively less traffic in the morning peaks. During the morning Peak hour, the road section observes a total volume of 3,484 vehicles whereas the other direction of the road accommodates 12,010 vehicles. Hence the arrival queue formation of the bikes on access gate will have a negligible impact on the traffic flow.
- The access gate analysis is conducted separate for bikes and cars, therefore any mechanism adapted for entrance and exit must operate distinctively for each vehicle type. It is further suggested that a comprehensive RFID or similar system must be designed for the building offices and shop owner and employees parking.
- The access gate analysis depicts that in order to avoid queue formation at the entrance of project during morning peak both the gates must be utilized for vehicular entry at least from 8:00 am to 9:30 am.



- To further manage the traffic flow on the access gate both the ramps maybe utilized for entrance providing access to departing vehicles on amber signal only at least from 8:00 am to 9:30 am.
- There is a necessary requirement of proper bus stops in the project area vicinity considering the highly commercial land-use distribution.
- There are constructional activities going-on in the project area which are prosed for the Blue and Green BRT Line, it is suggested that a detailed study must be conducted after the constructional activities are complete.
- Proper traffic maneuvering plan after counts at at-least three intersections of M.A. Jinnah Road which are Depot Lines, Afridi Shahid Road and Rizvi Shaheed Road must be prepared after the construction of all the grade separations and BRT Corridors in the project vicinity.
- Since the influence area of the project is largely under construction therefore it is suggested that before the operations of the building a brief study must be done to fine tune the results highlighted in the report.

Recommendations Related to Parking Demand Management

- The writers and thinkers of ITDP (institute of transportation development and policy) and the people who first implemented BRT in the world also most of the modern-day traffic engineers are now of the opinion that increment in parking supply attracts more and more demand in the CBD area. They conclude that the increment in parking supply is not a decongestion contributor but instead it is a large contributor in congestion. Therefore, they now suggest that instead of increment in parking supply as per the demand, the policy has to be developed that more and more public transportation routes should be provided for CBD visitors so that they may shift from their private vehicles to the most optimized mode of transportation such as BRT, Large Buses etc.
- One of the major attractions of the business and work trips of Karachi is Saddar and nearby areas. Travel demand on the roads and streets of Saddar Area is growing day by day. Now the present situation is, that at most of the locations there is no room for additional lanes and grade separation structures. This situation has happened is metropolitans of many countries. To overcome the deficit of demand and supply travel demand management and demand control techniques are applied across the world. One of the best solutions is shift the mode of transport from private vehicles and two, three wheelers to an integrated bus network. This is the only possible and effective way for Saddar Region to manage the demand and supply gap.



- To manage demand and supply gap both micro level and macro level measures are required. Macro level measures include bus networks, mass transits and rail systems. And micro level systems include the facility demand management and control by restricting the facility users to use vans and public transport and discouraging them to use cars. If we restrict the offices that every office before commencement of its operations must provide a plan to accommodate 50% of their staff in vans then the demand supply gap will be minimized to a level that there will only be a deficiency of 109 motorcycles.
- This remaining deficiency can be adjusted using valet parking, re-design of parking floors or provision of one additional floor for the parking of vehicles.

Detailed report on Traffic Study is attached at Annex-III.

Mitigation Measures

The following measures would reduce the negative impacts of solid waste disposal:

- Heavy traffic during construction; phase will come to the project site during late night hours.
- Project vehicles shall not be fitted with pressure horns.
- Speed of vehicles will be regulated during construction phase.
- Designated parking areas will be provided for different type of project vehicles within and around the project site.
- Traffic management plan will be introduced to manage smooth flow of vehicular traffic and to avoid traffic jam and long queues.
- Traffic management plan will be implemented and monitored.
- Vehicles will be parked at designated parking areas during operational phase.
- Parking of vehicles alongside the road would be prohibited at all times.

6.2.14 Fire Hazards and Life Safety

Fire incidents in high-rise buildings have garnered significant attention in the fire safety over the years. The proponent has to take lessons from the ongoing fire episodes in buildings and take suitable measures with regard to provision of life safety systems. The design of life safety systems is a multidisciplinary solution



with the architect detailing the fire stairs, evacuation routes, areas of refuge as well as the fire rating of the shafts and internal fire separation within the building. The structural engineers will specify the fire-retardant materials that will protect the structure. MEP Consultants have designed the active systems in the building to provide a comprehensive fire detection and management system in line with the overall fire and life safety strategy.

Mitigation Measures

The following mitigation measures have been adopted:

- The active life safety systems comprise automatic sprinklers, standpipes, fire detection and alarm systems, fire suppression systems, stair and lobby pressurization systems.
- Fire control systems comprise of detection and alarm systems, fire suppression systems and fire management systems.
- Fire Detection and Alarm systems comprise of:
 - Smoke and heat detection in selected areas of the building
 - Sprinkler detection throughout the building with zoned flow switches
 - Manual call points
 - Voice Evacuation signals
- Fire suppression systems comprise of:
 - Automatic sprinkler systems
 - Fire standpipe and hose systems
- Fire management systems comprise of:
 - Smoke management systems
 - Pressurization systems
 - Emergency electric power systems
 - Automatic elevator recall systems
 - Communication and alarm notification systems
 - A central fire command center.
- Active smoke control measures:
 - Fire Control by Sprinklers
 - Pressurization of Designated Escape Stairways
 - Electromagnetic Door Closures
 - Depressurization of fire floor by extracting from fire floor only (12 air changes per hour)
 - Shut Down air handling plant on all other floors



- The emergency staircase will be provided with a system of pressurization air which is designed in accordance with United States National Fire Protection Association (NFPA) NFPA 92. The Stairwell pressurization and smoke control fans will be linked to the automatic fire alarm system.
- The fans for the pressurization will be located at the roof. Each pressurization system will be provided with run and standby fans. A system for modulating the air-flow will be provided to cater for the variations in the number of doors open onto the staircase. The flow rate of air into the lobbies will be varied by using variable speed fans. Smoke extract fans (duty/standby) will be located on the rooftops of building.
- Air will be supplied into the elevator lobbies in order to keep them slightly pressurized in normal operation and to provide the necessary ventilation and cooling. In an emergency situation, the air supply to the corridor lift lobbies will be increased to give the necessary degree of pressurization.
- The building will be served by an automatic sprinkler system fed by dedicated pumps.
- A combined system permitted under NFPA 14 is proposed where the sprinklers are fed from the same standpipe as the hose systems. Standpipes will be Class I-II standards. Outlet connections to Class III standpipes are provided at every floor level of every required stairway above or below grade.
- All areas of the building will have automatic sprinklers. The automatic sprinkler system is designed in accordance with United States National Fire Protection Association (NFPA) Automatic Sprinkler Code NFPA13 and local code requirements. A combined system is proposed in accordance with NFPA 14.
- The fire water tanks are combined with the domestic water storage to ensure that water does not stagnate in the tanks.
- The sprinkler detection system will be provided with zone valves connected to the analogue addressable fire alarm and detection system.

6.2.15 Energy use

Electricity during construction phase will be produced from diesel generators, whereas during operation phase, power supply from K-Electric shall be made available.

A back up diesel operated generator will also be installed in case of emergency or suspension of power supply from the mains. The power produced will be



significant in terms of costs both environmental and economic. Since energy produced from non-renewable resource results in CO_x, SO_x, and NO_x emissions, it is important to ensure that energy is used prudently and best management practices are adopted in building design.

Mitigation Measures

- Gensets will be installed with stand-alone or isolated foundation with proper anti-vibration packing/ pad, etc.;
- Smoke of a gensets will be channelized/emitted in a manner that it is not a nuisance in the neighborhood;
- Genset will be installed in the basement, roof top, ground floor, front/back offset of the premises/ building, in, in order of priority. However, due care will be taken so that it is not a nuisance in the neighborhood; and
- Proponent shall necessarily install a source of standby power back up for the building and installation of genset by individuals will be prohibited.
- Proper maintenance as per following can reduce the pollution level and increase the Genset life.

6.2.16 Materials Selection

General specification/details have been worked out in respect of type of structures, concrete, and all other materials required for the Construction of Prince ICON Project. The following measures will be adopted to ensure sustainable development of the Project:

Mitigation Measures

- The structures and materials will, in the construction stage, conform to recommended standards and follow standard practice of civil works.
- Materials including paving stones, crush, gravel and sand will be brought from commercial quarries located in Sindh province. Environmentally sound materials and goods will be selected, with priority being accorded to products meeting national and international standards.
- Traditionally well-trying materials and components will be selected and selection of construction materials would be based on sustainable source.
- The production, use and disposal of building materials during the construction stage of Prince ICON will utilize considerable amount of energy



and resources; all attempts will be made towards efficient consumption and minimization of wastage of water, energy and materials

- Best practice of energy efficiency will be adopted in the building design. The Project building would be constructed with high level of thermal insulation
- The environmental impacts arising from selection of building materials and components would take account of the environmental issues during the materials selection process, and introduce Recycling strategies such as Reuse and Reduction of Wastewater.

6.2.17 Disturbance to Wildlife

The project site does not have any wildlife habitat or endangered species. Therefore, no significant impacts are envisaged on the wildlife during the project construction and operation phase.

6.2.18 Potential Impacts on Socio-economic Environment

Health, Safety and Environment are major components of the Environmental Management Plan (EMP) of which monitoring of the environmental performance is an integral part. The proponent has to ensure strict adherence to the measures and guidelines stated in the EMP and the contractor must be made to follow the Standard Operating Procedures for construction activities.

It is not unusual to observe that construction workers are left on their own to protect themselves from imminent hazards. Accidents usually occur at unprotected sites and are incident on unprotected workers. HSE considerations require that precautions must be taken against even the most insignificant impacts. Major social concerns during the construction stage arise when: i) the stakeholders are not informed about the project or its schedule of operations; ii) the site is not appropriately cordoned off to restrain outsiders from entering the site; iii) construction crew invariably ignores or sidetracks the mandatory requirement of wearing PPEs; iv) construction crew is not pre-trained to be aware of the likely hazards during various stages of the project; v) even if they are trained on awareness and provided the PPEs the lukewarm attitude of the supervisors does not oversee the follow-up of HSE procedures/SOPs.

Safety risk assumes substantial proportion in densified areas of urban centers. Under the circumstances there is need for strict compliance with the HSE procedures and accidents incident on non-observation of HSE procedures must be keenly monitored and recorded to ensure the safety of both workers and citizens. For this purpose, the contractor will be required to maintain a record of procedures on Health, Safety and Environmental Management Plan and Standards Operating Procedures in addition to the following:





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- Provide alternative traffic arrangement/detours, if necessary, so that traffic can be distributed and move on different roads; and, ensure that public/residents association is informed about such traffic diversions;
- Provide information to the public through media – daily newspapers and local cable television (TV) services about the need and schedule of work, and alternative routes;
- Maintain transparency of the project, public information/caution boards must be provided at the work site – information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work; traffic diversion details, if any; entry restriction information; competent official's name and contact information for public complaints.
- Restraining access to the public from the site by enclosing/barricading the construction area; providing warning boards and sign boards and positioning security guards throughout the day and night, 07/24;
- Ensuring provision of PPEs (helmet, hand gloves, boots, masks, safety hoists when working at height, etc.) and making sure that all workers do wear them;
- List the code of conduct and standard operating procedures (SOPs) to be followed during different stages of construction;
- Employ an Environmental, Health and Safety (EHS) expert on site;
- Provide on-site Health and Safety Training for all site personnel;
- Report accidents to the authorities promptly, and maintain records on regular basis
- Temporary inconveniences due to construction works will be minimized through planning and coordination with community members and organizations e.g. Traffic Management Authorities.
- Maintain the service roads in good condition to allow smooth traffic movement; provide necessary personnel to guide and control the traffic.

The proposed project will create employment during its construction and operation phase. During construction, about 200 people are expected to be employed. The Project will create employment opportunities after completion. This also includes staff directly involved in the operation and management of the facilities that include the Prince ICON management, the staff engaged by the office owners, shop owners, servants, security personnel, and drivers.





Most of the workforce will consist of local people. The generation of employment is likely to be a major positive impact arising from the proposed development. Table- 6.1 presents an analysis of the socioeconomic impacts on the two domains of socioeconomic environment viz. macroenvironment and microenvironment. It may be seen from the Table that both domains have impact that are positive. The Project would promote economic uplift and raise the status of the commercial enterprises and social status as well as lifestyle of the community resident in the microenvironment of project area. Creation of jobs and promotion of business and commercial activities is an additional feature of the Prince ICON Project.

Table 6.1: Nature and Degree of Positive Socioeconomic Impacts		
Nature of positive impact	Degree of impact	Description
I. Construction Phase:		
Job opportunity	Positive Impact	Generate unskilled, semi-skilled and skilled jobs as construction laborers and other service providers.
Wider economic impact	Positive Impact	Economic impact in terms of generating opportunities for other business-like sourcing of man and material supplies for specialized jobs.
II. Operation Phase		
Job opportunity	Major Positive Impact	Generate large number of jobs in various positions both in managerial, supervisory and subordinate positions.
Improvement in quality of life	Major Positive Impact	Provide safe and secure environment for social, cultural, and commercial activity
Enhancement of quality of environment	Major Positive Impact	Benefit the macroenvironment by adopting Public park/greenbelt as a social responsibility

6.2.19 Cultural Resources

There are no protected or otherwise cultural or archaeological sites in the microenvironment of the project site and hence no impact of the project will occur on cultural or archaeological resources. However, close coordination will be maintained with all relevant stakeholders during the planning and construction phase of the project.

6.2.20 Land-use and Aesthetics

The Project falls in the category that permits the designated land-use viz. densification of M.A Jinnah road, Construction of multi-storey buildings is in line with the objectives of sustainable development that aims at improvement of quality of life with optimum utilization of resources, in this case densification of



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M.A Jinnah road by construction of multi-storied buildings that are self-contained in having their own back-up power generation, water supply and sewage disposal system in addition to provision of parking space. Each proponent is consequently required to ensure that the provisions by the MPGO are followed. The proponent of Prince ICON will accordingly be mandated by the SEPA to ensure sustainability by the procedure just suggested.

Accordingly, the development and launching of the Project will add the skillfully and sustainably designed 21-storey “Prince ICON” as a landmark to the skyline of Karachi & produce positive impact on the aesthetics of the urban environment.

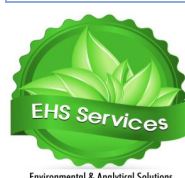
Prince ICON is designed as a self-contained building; having 24-hour security system all over the building the designers have ensured that the concerns on invasion of privacy are alleviated and eased. The Project would thus achieve its objective of providing a secure and safe Office building at an attractive location. This being a positive impact would be an indicator of achievement of the objectives of the Project.

- No mitigation measures will be required.

6.2.21 Impacts Rating

The following Checklist for the Prince ICON Project provides the screening of potential environmental impact on different components of ecosystem.

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area.....?			
Densely Populated?	✓		The project is following the plan of densification by KCB
Heavy with Development Activities?	✓		The densification has open doors for such development activities
Adjacent to or Within Any Environmentally Sensitive Areas?		✓	Outside the corridor of impact
Cultural Heritage Site		✓	Outside the corridor of impact
Protected Area		✓	Outside the corridor of impact
Wetland		✓	Outside the corridor of impact
Mangrove		✓	Outside the corridor of impact
Estuarine		✓	Outside the corridor of impact
Buffer Zone of Protected Area		✓	Outside the corridor of impact
Special Area For Protecting Biodiversity		✓	Outside the corridor of impact
Bay		✓	Outside the corridor of impact
B. Potential Environmental Impacts Will The Project Cause...?			
Impacts on the sustainability of associated sanitation and solid		✓	Taking cognizance of the situation, the proponent has



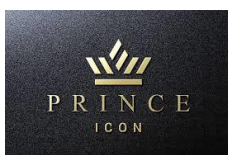


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waste disposal systems and their interactions with other urban services.			already paid heavy amount as its share for the augmentation of utility services of the area concerned
Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?	✓		Densification of the roads has taken no cognizance of the centripetal force mentioned above. This omission is likely to result in catastrophes on road. The issue must be resolved through a strategic solution to a cumulative problem.
Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	Not envisaged
Dislocation or involuntary resettlement of people		✓	Not envisaged
Dislocation of indigenous communities and Disadvantaged population		✓	Not envisaged
Degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	Not envisaged
Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to polluting industries?		✓	Not envisaged
Water resource problems (e.g. depletion/ degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		✓	Not envisaged, better management & conservation practices will be followed
Air pollution due to urban emissions?		✓	Minor
Social conflicts between construction workers from other areas and local workers?		✓	Not expected
Road blocking and temporary flooding due to land excavation during rainy season?		✓	Not envisaged but will be mitigated if some such situation emerges through better management practices
Noise and dust from construction activities?		✓	Minor but will be minimized and localized into the microenvironment through best management practices
Traffic disturbances due to		✓	The Project involves major





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construction material transport and wastes?			construction activity. State of the art technology will be used. Construction material transportation to the site will be managed through recognized access roads and adoption of good management practices
Temporary silt runoff due to construction?		✓	Not envisaged but will be mitigated if some such situation emerges through better management practices
Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not envisaged but will be mitigated if some such situation emerges through better management practices and implementation of Environmental Management Plan
Water depletion and/or quality degradation?		✓	Best management practices and conservation practices will be followed in view of constraints on availability
Overplaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	Conservation practices will be followed and excessive use will be avoided
Contamination of surface and ground waters due to improper waste disposal?		✓	Solid and Liquid waste Disposal system will be in place to prevent possible contamination of water resources
Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	Solid and Liquid waste Disposal system will be in place to prevent possible contamination of receiving waters.
Overall Rating		✓	No significant Impacts



7. Environmental Management Plan (EMP)

7.1 Introduction

The Environmental Impact Assessment (EIA) for the proposed development activities of Prince ICON Project has identified potential impacts that are likely to arise during the construction and operation phases. The EIA has examined in detail both negative and positive impacts of each stage of the operation. Where adverse impacts have been identified, the EIA has recommended mitigation measures; include management and monitoring practices, physical controls, or compensation in monetary terms. The mitigation measures proposed are based on a good understanding of the sensitivity and behavior of environmental receptors, past experience, case studies, legislative controls, guidelines, & expert advice.

For any residual impacts (impacts remaining after applying the recommended mitigation measures) or for impacts in which there has been a level of uncertainty in prediction, monitoring measures have been recommended. Advice on monitoring measures required was sought from experts involved in the EIA and case studies of similar development activities at international level.

For the effective implementation and management of the mitigation measures and monitoring requirements an Environmental Management Plan (EMP) has been prepared and presented in this section. The EMP satisfies the requirements of the Pakistan Initial Environmental Examination and Environmental Impacts Assessment Review Procedures, 2014.

7.2 Objectives

The EMP provides a delivery mechanism to address adverse impacts, to enhance project benefits and to introduce standards of good practice to be adopted for all project works. The primary objectives of the EMP are to:

- Outline mitigation measures recommended in the EIA and define the responsibility and timing for the implementation of these measures;
- Develop a monitoring mechanism and identify parameters that can confirm the implementation of the mitigation of these measures;
- Define roles and responsibilities of the project proponent for the implementation of EMP and identify areas where these roles and responsibilities can be shared with other stakeholders and
- Define the requirements necessary for documenting compliance with the EMP and communicating it to all concerned regulatory agencies.



For each impact, or activity, which could give rise to an impact, the following information is presented:

- Mitigation measure that will be implemented;
- The person(s) responsible for ensuring full implementation of the mitigation measure;
- The parameters that will be monitored to ensure effective implementation of the mitigation measure;
- The timing for the implementation of the action, to ensure that the objectives of the mitigation are fully met.

7.3 Structure of the EMP

The EMP consists of the following section.

- Legislation and guidelines.
- Organizational structure and roles and responsibilities;
- Mitigation management's matrix
- Environmental monitoring programme
- Change management plan
- Training Programme

7.4 Legislation and Guidelines

The EIA has discussed in detail all the legislation and guidelines (chapter 3) which has relevance to the project. Marvi Enterprises shall ensure that the construction and operation of project is conducted in conformance to relevant legislations and guidelines and guidance is sought as and when required. Marvi Enterprises shall also ensure that the key project management staff is aware of these legislations and guidelines. SEQs for municipal and industrial effluents, selected gaseous pollutants from industrial sources and motor vehicle exhaust and noise are provided in Chapter 2.

7.5 Organizational Structure and Roles and Responsibilities

7.5.1 Organizational Structure

The proposed project includes the following main organization:

- Marvi Enterprises as the project proponent and owners of the EMP.
- The construction contractor as well as contractor required during the operational phase (e.g. waste contractor) as the executors of the EMP.





These organizations will have the following roles and responsibilities during the project activities.

7.5.2 Roles and Responsibilities

7.5.2.1 General

Project Proponent: As project proponents, Marvi Enterprises will be responsible for ensuring the implementation of the EMP. A person holding a senior position will be responsible for the overall environmental performances during the proposed project. The person will be responsible for ensuring the implementation of the EMP by Marvi Enterprises and all project contractors. The proponent's Site Representative (SR) will be responsible of implementation of the EMP and liaison with project contractor and stakeholders at site regarding environmental issues during the construction phase. Further the person holding a senior position in Marvi Enterprises will also be responsible for monitoring EMP's compliance and provided technical support in environmental issues.

Project Contractors: For the proposed project, Marvi Enterprises will appoint construction contractor for different field operations. Various contractor will also be hired during the operation phase of the building (e.g. waste contractors) The contractors will be responsible for implementation of, or adherence to, all provisions of the EIA and the EMP and with any environmental and other codes of conduct required by Marvi Enterprises. Overall responsibility of the contractor's environmental performances will rest with the person holding the highest management position within the contractor's organization reporting to their management. The contractor's site managers will be responsible for the effective implementation of the EIA and the EMP. The contractor's HSE officers will have functional responsibilities to ensure implementation of or adherence to the EMP.

7.5.3 Planning and Design of the Operations

Details of project Activities: Details of the project activities are provided in section 2 of the EIA report. Following approval of the EIA, any changes to the proposed activities will be handled through the change Management Plan provided in this EMP.

Approvals: Obtaining Approval from SEPA will not relieve the proponent of other legal obligation and hence Marvi Enterprises and project contractors will obtain all other relevant clearance and necessary approvals required by the Government of Sindh and Relevant departments prior to commencing the respective operations.





Contractual Provision: Adherence to the requirements of the EIA and EMP in terms of environmental mitigation will be required from all project contractors and thus EMP will form part of their contractor with Marvi Enterprises.

7.5.4 Implementation of the Operation

Co-ordination with Stakeholders: Marvi Enterprises will ensure that co-ordination with the regulators and other stakeholders on environmental & social matters is maintained throughout construction & operation phase of the project.

Monitoring: Marvi Enterprises and the contractors will ensure that monitoring of the project activities is carried out throughout the project. The Marvi Enterprises' site representative will monitor all project activities during the construction and operation phase. He will keep a record of all non-conformances observed and report these along with actions to Marvi Enterprises management in Karachi for further action. The site representative will also report any impacts anticipated along with his recommendation for further action.

Emergency Procedures: Marvi Enterprises and the contractors will prepare contingency plans to deal with any emergency situation that may arise during the construction and operation e.g. major oil spills, medical evacuation & communicate these to the regulatory agencies if required by these agencies.

Approvals: The project contractor will be responsible for obtaining all relevant approvals such as approvals for waste contractors, water source & others as specified in Mitigation Management Matrix.

Trainings: The project contractors will be responsible for the selection and training of their staff capable of completing the project activities properly and efficiently. The contractors will be responsible for providing training to their staff members according to the training programme. The training programme is discussed briefly in section 7.7.3.

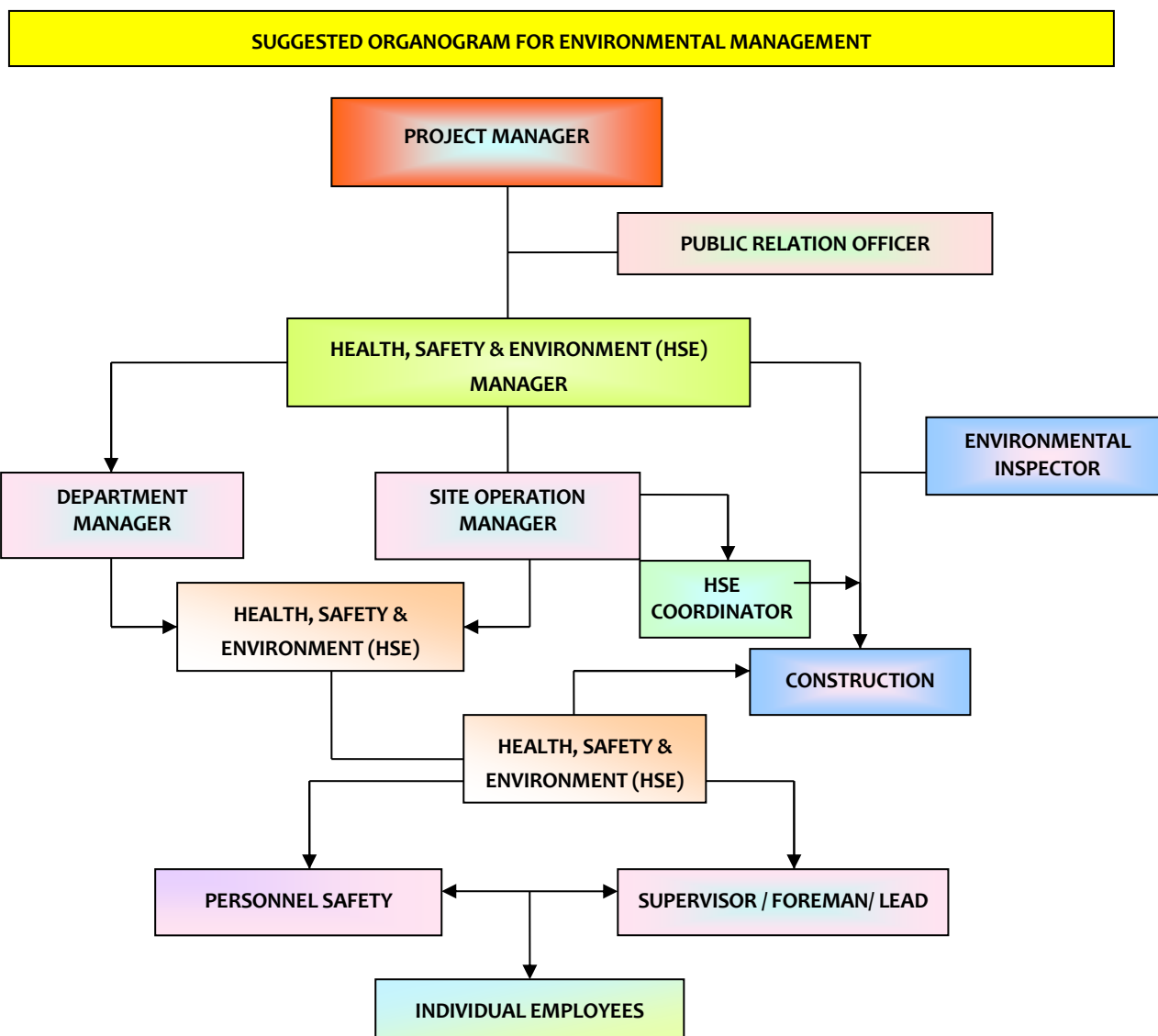
7.5.5 Communication and Documentation

Marvi Enterprises and the contractor will ensure that the communication and documentation requirements specified in the EMP are fulfilled during the construction and operation phase.

Change Management: The EIA for the proposed operation recognizes that changes in the operation or the EMP may be required during the project activities and therefore provides a Change Management Plan to manage such

changes. Overall responsibility for the preparation of change management statements will be with Proponent's site representative.

Restoration: Marvi Enterprises along with the construction contractor will be responsible for the final restoration of work areas.





7.5.6 Maintenance of the EMP

EMP needs to be revised on timely basis to keep up-to-date as per the requirements comes up regularly. Therefore, outlining the responsibilities and activities associated with the maintenance of the EMP is essential. The responsibilities of the Construction Contractor should be detailed and procedures for requesting EMP revisions should also be outlined. EMP revision procedures must include requirements for notification of the appropriate government and municipal agencies so that their role is also played in the overall management process.

7.5.7 Environmental Health and Safety Management System

Environmental, Health and Safety Management System is essential for the care of EHS issues which should outline mitigation measures and best management practices. This management system recommends carrying out a complete assessment, evaluating, monitoring, identifying and control all potential hazards and risks arise during the construction and operation phases of the proposed project. It needs to ensure that the Health and Safety Plan (HSP) along with the Health and Safety Rules is established and enforced. The Plan should outline roles, responsibilities and expected outcomes with respect to the environmental health and safety management of the construction & operation phase of the Project. These measures should be implemented to ensure that no significant adverse environmental, health and safety impacts are created by activities associated with the construction of the project.

Protection of the public and workforce health and safety during both construction and operations is the prime responsibility of proponent. Utilizing expert personnel and the Environment, Health and Safety Management System (EHSMS), the potential health and safety hazards and risks will be identified and assessed, then the subject of substantial planning, organization, procedures for various facility are developed.

7.5.8 Health and Safety during Construction Phase

Worker Health & Safety Management Plan will also be outlined to implement mitigation measures and best management practices. The plan should be implemented to ensure that no significant adverse worker's health and safety issues arise from activities associated with the construction of the project.

Potential hazards for workers in construction include:

- Falls (from heights);
- Trench collapse;





- Scaffold collapse;
- Electric shock and arc flash/arc blast;
- Failure to use proper personal protective equipment; and
- Repetitive motion injuries.

7.5.9 Health and Safety during Operation Phase

Prince ICON Tower is a high-rise development, occupational health & safety issues need to be addressed managed effectively to ensure safety of its occupants in particular and the neighborhood in general.

7.5.10 Emergency Response Plan

Emergency may be defined as a sudden event causing or has the potential to cause serious human injury and/or environmental degradation of large magnitude. The best “cure” for an emergency is, of course, “prevention”. The probable emergency situation can be:

- Serious fire or explosion
- Major gas leakage.
- Major Spillage
- Natural calamity such as heavy rain, flooding, dust storm or earthquake, cyclone, etc.
- Bomb threat or any sabotage/terrorist activity
- Any other incident involving all or large part of the premises and its workers.

Emergency Response Management is provided by a small team of senior managers (the “Control Committee”) who in turn will direct all response activities through the Emergency Response Unit.









7.5.10.1 Objectives

The main objective of this plan is to establish the general guidelines for the actions to be taken in the event of fires, explosion, emergencies, accidents, disasters and sabotage, aimed at minimizing their effects and consequences, in order to protect:

- The lives of own or third-party personnel present in the building’s facilities.
- The lives of the occupants of the Project
- The lives of the nearby residents & communities coming into the direct influence of the building’s area.
- The lives of the ecological systems located in the surroundings of the Project.

7.5.10.2 Emergency Response Manuals

Based on the Risk Assessment the proponent should prepare written emergency preparedness and response plans/procedures for the building to cover emergency situations that could occur. It may be required that Emergency Response Manuals will be developed for various situations arising.

Emergency Contact Numbers			
S. #	Description	Image	Contact #
01	Fire Brigade		16,
02	Ambulance		2022, 1015
03	Civil Hospital		
04	Police Station		15,
05	K Electric		
06	SSGC		1199
07	Air Port		114
08	Railway		117



7.5.11 Environmental Compliance Reporting, Documentation and Trainings

The management will be responsible for the regular audit and review of the environmental management and monitoring plan. This will include both on-site auditing and review of performance reports. Additional onsite inspections and investigations will be undertaken in the event of significant environmental incidents. These will be undertaken in conjunction with the IMC.

The management will participate in the audits & inspections and investigations. The management will also be responsible for regular review of the environmental performance of the site and site personnel, and for the reporting on the implementation of commitments made in the EMP.

In particular, there will be:

- Periodic audit reports.
- A review and improvement of the EMP.

Management recognizes that periodic external compliance audits and inspections will be made through a third-party consultant (IMC) to monitor, assess and validate the level of performance and compliance pursuant to the commitments made in the accepted Environmental Management Plan. The monitoring reports shall also be submitted to Sindh Environmental Protection Agency (SEPA) on regular intervals.

Training: It an important step for the implementation of the EMP. All the employees will require to be trained to work appropriately on EMP. EHS Manager will organize trainings in consultation with HSE Officer. It will make sure that employees understand the Environment, Health and Safety issues. Trainings should be arranged on regular basis with notification that it should be attended all respective employees.

HSE Officer will determine the training requirements during both phases. Induction will be the basis of all training courses for contractor & subcontractor during construction phase.

Trainings identified in EMP are given below:

- Site induction course
- Training for emergency response and preparedness
- Training for familiarization with site environmental controls

Specific environmental training for relevant employees e.g. daily checks to maintain controls, waste minimization, etc.





7.5.12 Mitigation Management Matrix

The Mitigation Management Matrix will be used as a management & monitoring tool for implementation of the mitigation measures required by the EIA. Mitigation management matrix for construction and operation is provided in the table 7.1. The matrix lists down the following:

- The mitigation measure recommended in the EIA.
- The person/organization directly responsible for adhering to or executing the required mitigation measures.
- The parameters which will be monitored to ensure compliance with the mitigation measures;
- The timing at which the mitigation or monitoring has to be carried out.

It is highlighted that although responsibilities for executing and monitoring mitigation measures have been delegated to different persons, Marvi Enterprises will hold the primary and overall responsibility for ensuring full implementation of the EMP.

7.5.13 Environmental Monitoring Programme

The objective of the environmental monitoring during the construction & operation phase will be as follows:

- To check compliance of the contractors with the EMP by monitoring activities of the project on a daily basis. This will be called compliance monitoring.
- To monitor impacts of the operation in which there has been a level of uncertainty in prediction such as impacts of noise, water abstraction etc. and to recommend mitigation measures if the impacts are assessed to be in excess of or different from those assessed in the EIA. The aim will be attained through effects monitoring.
- To achieve these objectives, the following monitoring programme will be implemented.

7.5.14 Compliance Monitoring

Compliance monitoring will be carried out to ensure compliance with the requirements of the EIA and to document and report all non-compliances. The mitigation management matrix provided in the EMP will be used as a management and monitoring tool. The contractor's HSE Officer will be responsible for monitoring the compliance of their organization with the relevant EMP requirements. Proponent's site representative will monitor the contractor's compliance and will also ensure that during construction each activity system and plan is in place for effective compliance monitoring. The site





representative will make regular checks on the contractor's works; keep records of all non-compliances observed during the execution of the project activities; & the details of all remedial actions taken to mitigate the project impacts.

7.5.15 Effects Monitoring

The effects monitoring requirements have been detailed in Table 7.2. An independent monitoring consultant (IMC) will be responsible to carry out the required effects monitoring during the construction and operation phase.

7.5.16 Environmental Reporting

7.5.16.1 Final Monitoring Report (Construction Phase)

After completion of construction phase, a final monitoring report will be prepared by site representative. The report will include the following:

- Introduction.
- Details of the Project Activities.
- Natural Resource used during the Project.
- List of Non-compliances recorded.
- Effects of the Project on Communities and Physical Resources.
- Photographic Records
- Approvals provided during the project
- Change managements statements
- Trainings
- Conclusions

7.5.16.2 Annual Environmental Monitoring Reports (Operation Phase)

The project proponent shall prepare annual environmental monitoring reports describing the conduct of the operation phase for project along with details of the effects monitoring conducted annually during the operation phase of the project. The report shall be submitted to the SEPA.

7.5.17 Change Management Plan

The EIA for the proposed project recognizes that changes in the operation or the EMP may be required during the construction and operation and therefore provides a Change Management Plan to manage such changes. The management of changes is discussed under two separate headings, Additions to the EMP and Changes to the Operation and the EMP.



7.5.17.1 Changes to the EMP

The EIA and the EMP have been developed based on the best possible information available at the time of the EIA study. However, it is possible that during the conduct of the proposed operation additional mitigation measures based on the findings of environmental monitoring during the operation may have to be included in the EMP. In such cases following actions will be taken:

- A meeting will be held between Marvi Enterprises and the concerned project contractors. During the meeting, the proposed addition to the EMP will be discussed and agreed upon by all parties.
- Based on the discussion during the meeting, a change report will be produced collectively, which will include the additional EMP clause and the reasons for the addition.
- The report will be signed by all parties and will be filled at the site office: A copy of the report will be sent to Marvi Enterprises and contractor head offices.
- All relevant project personnel will be informed of the addition.

7.5.17.2 Changes to the Operation

The change management system recognizes three orders of changes:

First Order: A first order change is one that leads to a significant departure from the project described or the impacts assessed in the EIA and consequently require a reassessment of the environmental impacts associated with the change. Example of first order change includes change in location of proposed project. Action required in this case will be that the environmental impacts of the proposed change will be reassessed by Marvi Enterprises and sent to the SEPA for approval.

Second Order: A second order change is one that does not result in the change in project description or impacts that are significantly different from those detailed in the EIA. Example of second order changes includes extension in the site area. Action required for such changes will be that Marvi Enterprises will reassess the impact of the activity on the environment & specify additional mitigation measures if required and report the changes to SEPA.

Third Order: A third order change is one that does not result in impacts above those already assessed in the EIA, rather these may be made site to minimize the impact of an activity such as:

- Increase in project workforce;
- Change in layout plan.





The only action required for such changes will be to record the change in the Change Record Register.

7.5.18 Training Programme

Environmental training will form part of the environmental management system. The training will be directed towards all personnel for general environmental awareness.

7.5.18.1 Objectives

The key objective of training programme is to ensure that the requirements of the EMP are clearly understood and followed throughout the project. The trainings to the staff will help in communicating environmental related restrictions specified in the EIA and EMP.

7.5.18.2 Roles and Responsibilities

The contractors will be primarily responsible for providing environmental training to all project personnel on potential environmental issues of the project. The contractors will be responsible to arrange trainings and ensure the presence of targeted staff.

7.5.18.3 Training Programme

The environmental awareness, EIA and EMP training will be carried out during the project activities.

Training log: A training log will be maintained by the contractors. The training log will include:

- Topic
- Date, time and location
- Trainer
- Participants

Training Needs Assessment: In addition to the training specified in the training log special/additional trainings will be provided during the project activity. The criteria to assess the need of training will be based on the following:

- When a specified percentage of staff is newly inducted in the project
- When any non-compliance is repeatedly reported refresher training will be provided regarding that issue.



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- When any incident/accident of minor or major nature occurs. Arrival of new contractor/sub-contractor.
- Start of any new process/activity.

Training Material: The contractors will develop & prepare training material regarding environmental awareness, sensitivity of the area, EIA, EMP and restrictions to be followed during the project. Separate training material will be prepared for each targeted staff.

Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
1	Land Use and Soils			
1.1	The construction activities will be planned to minimize disturbance to soil	Marvi Enterprises, CC	Monitoring compliance	During construction phase
1.2	To the extent possible, equipment and materials would be staged in areas that have already been disturbed	Marvi Enterprises, CC	Monitoring compliance	During construction phase
1.3	Movement of construction equipment will be restricted to work areas only to avoid unnecessary disturbance to soil	CC	Monitoring compliance	During construction phase
1.4	Routes of water tankers, dumper trucks and other project vehicles will be monitored for any signs of soil disturbance & road damage	CC	Monitoring compliance	During construction phase
1.5	Area showing signs of unstabilised soil conditions will be compacted and watered	Marvi Enterprises, CC	Monitoring compliance	During construction phase
1.6	The assessment of settlement within affected zone due to dewatering will be conducted prior to dewatering	CC	Monitoring compliance	During construction phase
1.7	The affected zone of settlement, if identified will be monitored regularly during dewatering activity	Marvi Enterprises, CC	Monitoring compliance	During construction phase
1.8	Proper drainage will be provided to construction camp, construction site,	CC	Monitoring compliance	During construction phase





Environmental Impact Assessment (EIA)

Survey 90, Depot Lines,
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Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
	especially near excavations and around proposed facility			
1.9	Vehicle speed will be regulated and monitored to avoid excessive dust emissions	CC	Monitoring compliance	During construction phase
1.10	Total land uptake by the project and associated facilities will be kept to the minimum	Marvi Enterprises, CC	Monitoring compliance	During construction phase
1.11	Periodic trainings will be provided to drivers on mitigation measures related to off-road travel and speed limits	Marvi Enterprises, CC	Check training records	During construction phase
1.12	The Project will have a storm water collection system so that the storm water effluent has minimal sediment load	Marvi Enterprises, CC	Monitoring compliance	During design and construction phase
2	Air Quality			
2.1	Dust Emissions			
2.1.1	Water will be sprinkled daily or when there is an obvious dust problem on all exposed surfaces to suppress emission of dust. Frequency of Sprinklings will be kept such that the dust remains under control, particularly when wind is blowing towards the receptors	CC	Monitoring compliance	During construction phase
2.1.2	Dust emissions from soil piles and aggregate storage stockpiles will be reduced by appropriate measures. These may include: → Keeping the material moist by sprinkling of water at appropriate frequency → Erecting windshield walls on three sides of the piles such that the	CC	Monitoring compliance	During construction phase





Environmental Impact Assessment (EIA)

Survey 90, Depot Lines,
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Table 7.1: Environmental Management Plan (EMP)

S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
	wall project 0.5m above the pile, or → Covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emissions. → Locating stock piles out of the wind direction			
2.1.3	All roads within the proposed Project will be paved as early as possible after the commencement of construction work. Until the roads are paved, they will be sprinkled regularly to prevent dust emission. Other temporary tracks within the site boundary will be compacted and sprinkled with water during the construction works.	Marvi Enterprises, CC	Monitoring compliance	During construction phase
2.1.4	Project traffic will maintain a maximum speed limit of 20km/hr on all unpaved roads within the proposed site area.	Marvi Enterprises, CC	Check speed of vehicles	During construction phase
2.1.5	Construction materials that are susceptible to dust formation will be transported only in securely covered trucks to prevent dust emission during transportation.	CC	Monitoring compliance	During construction phase
2.1.6	The exposure of construction workers to dust will be minimized by provision of dust masks.	CC	Check for dust masks	During construction phase
2.2	Vehicle Equipment and Exhaust.			
2.2.1	All vehicles, generators and other equipments used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants.	Marvi Enterprises, CC	Maintenance records of vehicles and equipments	During construction phase



Environmental Impact Assessment (EIA)

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Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
2.2.2	The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level	CC	Monitor compliance	During construction phase
2.3	Generator Emissions			
2.3.1	The option of using natural gas as fuel in the back-up generators should be explored.	Marvi Enterprises, Generator Vendor	Monitor compliance	During design phase
2.3.2	The generator will be properly tuned and maintained in good working condition in order to minimize exhaust emissions	Marvi Enterprises	Check maintenance records	During operation phase
2.3.3	The diesel generator should be used for a very short duration with the power switched back to the main power supply as quickly as possible.	Marvi Enterprises	Monitoring compliance	During operation phase
2.3.4	NOx emission reduction techniques should be employed on a regular basis	Marvi Enterprises	Monitor NOx emissions	During operation phase
3	Construction Noise			
3.1	Reduce equipment noise at source by proper design, maintenance and repair of construction machinery and equipment	Marvi Enterprises, CC	Check maintenance records	During construction phase
3.2	Minimize noise from vehicles and power generators by use of proper silencers and mufflers.	Marvi Enterprises, CC	Monitor compliance	During construction phase
3.3	Use noise-abating devices wherever needed and practicable.	Marvi Enterprises, CC	Monitor compliance	During construction phase
4	Water Sourcing			
4.1	A complete record of water consumption during construction and operation phase will be maintained	Marvi Enterprises, CC	Check water consumption records	During construction and operation phase



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Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
4.2	If a new water well is to be installed, it will be designed to abstract water preferably from deep aquifer not being used by local communities	Marvi Enterprises, CC	Monitor compliance	During construction phase
4.3	Water conservation program will be initiated to prevent wastage of water.	Marvi Enterprises, CC	Monitor compliance	During construction and operation phase
4.4	The water supply lines will be checked and repaired for leaks in order to reduce wastage of water.	Marvi Enterprises, Maintenance Contractor	Check maintenance records	During operation phase
4.5	Recycle grey water for use for toilet flushing	Marvi Enterprises	Monitor compliance	During operation phase
4.6	Ensure that water efficient sanitary fittings are used throughout the development e.g. low flush toilets, water efficient shower heads, and aerators on faucets	Marvi Enterprises, CC	Monitor compliance	During construction and operation phase
5	Soil Contamination			
5.1	Fuels, lubricants, and chemical will be stored in covered bounded areas, underlain with impervious lining	Marvi Enterprises, CC	Monitor compliance	During construction phase
5.2	Maintenance of vehicles and equipment will only be carried out designated areas. The area will be provided with hard surface or tarpaulin will be spread on the ground to prevent contamination of soil	Marvi Enterprises, CC	Monitor compliance	During construction phase
5.3	Vehicles will only be washed at designated areas.	CC	Vehicle Inspection record	During construction phase
5.4	Regular inspections will be carried out to detect leakage in construction vehicles and equipment	Marvi Enterprises, CC	Check inspection / maintenance records	During construction phase





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Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
5.5	Appropriate arrangements, including shovels, plastic bags and absorbent materials, will be available near fuel and oil storage areas	CC	Monitor compliance	During construction phase
5.6	Contaminated soil will be removed and properly disposed after treatment such as incineration etc.	Marvi Enterprises, CC	Monitor compliance	During construction phase
6	Traffic			
6.1	Heavy traffic during construction phase will come to the project site during late night hours.	Marvi Enterprises, CC	Traffic record	During construction phase
6.2	Project vehicles shall not be fitted with pressure horns	CC	Monitor compliance	During construction phase
6.3	During construction, regulate speed of vehicles	Marvi Enterprises, CC	Monitor compliance	During construction phase
6.4	Designated parking areas will be provided for different type of project vehicles within and around the project site	Marvi Enterprises, CC	Monitor compliance	During construction phase
6.5	Manage vehicle movement to avoid traffic jam and long queues	Marvi Enterprises, CC	Monitor compliance	During construction and operation phase
6.6	Prepare, implement and monitor the traffic management plan	Marvi Enterprises	Monitor compliance	During construction and operation phase
6.7	Vehicles to use designated parking areas during operational phase.	Marvi Enterprises	Monitor compliance	During operation phase
6.8	Parking of vehicles alongside the road should be prohibited at all time.	Marvi Enterprises	Monitor compliance	During construction and operation phase
7	Wastewater Generation			
7.1	Wastewater Generation During Construction			



Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
7.1.1	Wastewater generated at the campsites will be stored temporarily in septic systems comprising of septic tanks from where it will be routed to a nearest drain/sewerage system.	Marvi Enterprises, CC	Monitor compliance	During construction phase
7.1.2	At the time of restoration, septic tanks will be dismantled in place and backfilled with at least 1m of soil cover above the surrounding natural surface level	CC	Monitor compliance	After the completion of construction phase
7.2	Wastewater Generation During Operation			
7.2.1	The grey water will be recycled to be re-used again in toilets and kitchens etc.	Marvi Enterprises	Monitor compliance	During operation phase
7.2.2	Black water will be temporary stored in septic tanks and will be discharged into a nearby out fall sewer via trunk sewer	Marvi Enterprises, CC	Monitor compliance	During design, construction & operation phase
7.2.3	Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream	Marvi Enterprises	Monitor compliance	During operation phase
7.2.4	Water conservation strategies will be employed to avoid wastage of water	Marvi Enterprises	Monitor compliance	During operation phase
8	Solid Waste Generation and Management			
8.1	Solid Waste Generation and Management During Construction			
8.1.1	Separate bins will be placed for different types of wastes- plastics, paper, metal, glass, wood, and cotton.	Marvi Enterprises, CC	Monitor compliance	During construction phase
8.1.2	Recyclable material will be separated at source. The recyclable waste will be sold to waste contractors for recycling	Marvi Enterprises, CC	Monitor compliance	During construction phase



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Table 7.1: Environmental Management Plan (EMP)

S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
8.1.3	Non-hazardous non-recyclable wastes such as construction camp kitchen wastes will be disposed off in landfill site through municipal administration or approved waste contractor.	Marvi Enterprises, CC	Monitor compliance	During construction phase
8.1.4	No waste will be dumped at any location outside the proposed site boundary.	Marvi Enterprises, CC	Monitor compliance	During construction phase
8.1.5	All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed of through approved waste contractors.	Marvi Enterprises, CC	Check hazardous waste disposal records	During construction phase
8.1.6	Surplus construction materials including partially filled chemical and paint containers will be returned to suppliers. Inert construction wastes will be disposed of onsite as fill material or sold as scrap to contractors.	Marvi Enterprises, CC	Check waste records	During construction phase
8.1.7	Records of all waste generated during the construction period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register	Marvi Enterprises, CC	Check waste record register	During construction phase
8.1.8	Training will be provided to personnel for identification, segregation, and management of waste	Marvi Enterprises, CC	Check training records	During construction phase
8.2	Solid Waste Generation and Management During Operation			
8.2.1	Waste generation will be minimized by adopting waste management	Marvi Enterprises	Monitor compliance	During operation phase



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Table 7.1: Environmental Management Plan (EMP)				
S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
	strategy of reduce, reuse and recycle			
8.2.2	A waste management plan will be prepared, implemented and monitored for the safe collection, storage and treatment/disposal of the building waste	Marvi Enterprises	Monitor compliance	During operation phase
8.2.3	Records of all waste generated will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register	Marvi Enterprises	Check waste tracking register	During operation phase
8.2.4	Training will be provided to personnel for identification, segregation, and management of waste	Marvi Enterprises	Check training records	During operation phase
8.2.5	All inert and non-hazardous construction wastes will be disposed to the existing tipping sites within or outside of the city limits	Marvi Enterprises, Waste Contractor	Monitor compliance	During operation phase
8.2.6	Hazardous wastes will be disposed through waste management contractors who will identify suitable disposal options for these wastes such as recycling, metal recovery, incineration or bioremediation etc.	Marvi Enterprises, Waste Contractor	Monitor compliance	During operation phase
8.2.7	Various waste containers for waste collection should be placed at appropriate locations in the building	Marvi Enterprises	Monitor compliance	During operation phase
8.2.8	Waste storage areas should be located within the facility and sized to the quantities of waste generated, with the following design considerations: Hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply,	Marvi Enterprises, CC	Monitor compliance	During operation phase





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Table 7.1: Environmental Management Plan (EMP)

S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
	Secured by locks with restricted access designed for access and regular cleaning by authorized cleaning staff and vehicles Protected from sun, and inaccessible to animals/Rodents Equipped with appropriate lighting and ventilation Segregated from food supplies and preparation areas Equipped with supplies of protected clothing, and spare bags/containers			
9	Seismicity			
9.1	No specific mitigation measures other than to construct the facility in accordance with UBC Zone 2B	Marvi Enterprises, Structure Design Consultant, CC	Monitor compliance	During project design phase
10	Sustainability			
10.1	Best practice of energy efficiency will be incorporated in the building design	Marvi Enterprises, CC	Monitor compliance	During project design phase
10.2	Buildings to be constructed with high levels of thermal insulation	Marvi Enterprises, CC	Monitor compliance	During project design phase
10.3	Ensure that HVAC system, refrigeration equipment and fire suppression equipment do not contain HCFC's or Halons	Marvi Enterprises, CC	Monitor compliance	During project design phase
11	Socio-Economic Impacts			
11.1	Deliveries should be programmed to arrive and routed to minimize disturbance to sensitive receptors	Marvi Enterprises, CC	Monitor compliance	During construction phase
11.2	Designated parking areas will be provided for different type of project vehicles within and around project site	Marvi Enterprises, CC	Monitor compliance	During construction & operation phase





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Table 7.1: Environmental Management Plan (EMP)

S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
11.3	Areas earmarked for amenity and commercial infrastructure will not be used for other purposes after construction	Marvi Enterprises	Monitor compliance	During construction & operation phase
11.4	Employment preference will be given to residents of the project area	Marvi Enterprises, CC	Monitor compliance	During construction & operation phase
11.5	Local contractors will be given preference for hiring equipment and machinery during operation	Marvi Enterprises, CC	Monitor compliance	During construction & operation phase
11.6	Ensure maximum quantity of water to be treated and reused in order to lessen its burden on the existing sewerage system.	Marvi Enterprises	Monitor compliance	During design, construction & operation phase
11.7	Locals, surrounding business and city government are kept on the same page during all stages of the development of the project.	Marvi Enterprises	Monitor compliance	During construction phase
11.8	A complaint register will be maintained on site during construction to record complaints of the nearby residents.	Marvi Enterprises	Provision of complaint register	During construction phase

Table 7.2: Environmental Monitoring Plan

Ambient Air Quality Sampling Plan

Phase	Parameters	Locations	Frequency	Duration	Standards
Construction	SO _x , NO _x , CO, O ₃ , Smoke, PM ₁₀	At the interface of project site and receptors	Twice Monthly	Continuous for 8 hours* in a full working day	NAAQS (USEPA)
Operation	SO _x , NO _x , CO, O ₃ , Smoke, PM ₁₀	At the interface of project site and receptors	Quarterly	Continuous for 8 hours* in a full working day	SEQS (Pak EPA)

Drinking Water Quality Sampling Plan

Stages	Parameters	Locations	Frequency	Duration	Standards
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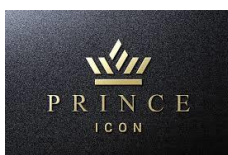
Environmental Impact Assessment (EIA)

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Table 7.2: Environmental Monitoring Plan

Construction	Heavy metals, TDS, TSS, pH, Total Coliform, Faecal Coliform	Ground water source and other sources	Monthly	Grab sampling	WHO drinking water quality guidelines
Operation	Heavy metals, TDS, TSS, pH, Total Coliform, Faecal Coliform	Drinking water sources	Quarterly	Grab sampling	WHO drinking water quality guidelines
Wastewater Quality Sampling Plan					
Stages	Parameters	Locations	Frequency	Duration	Standards
Construction	BOD, COD, DO, TSS, TDS, pH, NO ₃ , SO ₄ , Oil & Grease)	Camp site discharge points into drains	Twice Monthly	Grab sampling	SEQS (Pak EPA)
Operation	BOD, COD, DO, TSS, TDS, pH, NO ₃ , SO ₄ , Oil & Grease)	Effluent from wastewater treatment plant	Twice Monthly	Composite sampling / Grab sampling	SEQS (Pak EPA)
Noise Level Sampling Plan					
Stages	Parameters	Locations	Frequency	Duration	Standards
Construction		At the interface of project site & receptors	Twice Monthly	Continuous for 8 hours in a full working day	WHO Noise Guidelines
		7 m from the equipment at construction site			
Operation	Decibels [dB(A)Scale]	At the interface of project site & facing road	Quarterly		SEQS for Noise (Pak EPA)
		7 m from the equipment at construction site			
Solid Waste					
Stages	Parameters	Locations	Frequency	Duration	Standards
Construction	Waste generation rate, waste composition:	At main solid waste collection point from	Monthly	24-hour sample collected	EPA





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Table 7.2: Environmental Monitoring Plan

	recyclables and non-recyclables, hazardous waste	where the waste is transported from site		during week days	
Operation	Waste generation rate, waste composition; recyclables and non-recyclables, hazardous waste	At waste transfer facility of the project site prior to off-site disposal	Quarterly	24-hour sample collected during week days and holidays	EPA

Table 7.3: Sample Forms for Ambient Air Quality Monitoring Record

Items		Measured Value (Mean.)	Measured Value (Max.)	SEQS	Remarks (Measurement Point, Frequency, Method, etc.)	Comments*
SO ₂	Annual Average			80 µg/m ³		
	24 hours			120 µg/m ³		
NO ₂	Annual Average			40 µg/m ³		
	24 hours			80 µg/m ³		
NO	Annual Average			40 µg/m ³		
	24 hours			40 µg/m ³		
CO	8 hours			5.0 mg/m ³		
	1 hour			10 mg/m ³		
Lead Pb	Annual Average			1.0 µg/m ³		
	24 hours			1.5 µg/m ³		
O ₃	1 hour			130 µg/m ³		
Suspended	Annual Average			360 µg/m ³		
SPM	Annual Average			360 µg/m ³		
	24 hours			500 µg/m ³		
Respirable particulate matter PM ₁₀	Annual Average			120 µg/m ³		
	24 hours			150 µg/m ³		
Respirable particulate matter PM _{2.5}	Annual Average			40 µg/m ³		
	24 hours			75 µg/m ³		

* (H=High, L=Low)





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Table 7.4: Stack Emissions

CO, SO _x , NO _x , Smoke						
Location	S.#	Parameters	Date	Time (Hrs: Min)	Result (mg/Nm ³)	SEQS (mg/Nm ³)
	1	CO				800
	2	SO _x				1700
	3	NO _x				600
	4	Smoke				40% or 2 Ringlemann Scale or equivalent smoke number
	5	PM ₁₀				500

* (H=High, L=Low)

Table 7.5: Sample Forms for Waste Water Quality Monitoring Record

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	SEQS	Remarks (Measurement Point, Frequency, Method, etc)
pH	pH			6-10	
TSS (Total Suspended Solids)	mg/L			150	
TDS (Total Dissolved Solids)	mg/L			3500	
BOD ₅	mg/L			80	
COD	mg/L			150	
Oil and Grease	mg/L			10	
Phenols	mg/L			0.1	
Chloride	mg/L			1000	
Cyanide	mg/L			2	
Sulphate	mg/L			600	
Sulphide	mg/L			1.0	
Ammonia	mg/L			40	
Fluoride	mg/L			10	
Pesticides	mg/L			0.15	
Cadmium	mg/L			0.1	
Chromium	mg/L			1.0	
Copper	mg/L			1.0	
Lead	mg/L			0.5	
Mercury	mg/L			0.01	
Selenium	mg/L			0.5	
Nickel	mg/L			1.0	
Total Toxic metals	mg/L			2.0	
Zinc	mg/L			5.0	



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Arsenic	mg/L			1.0	
Barium	mg/L			1.5	
Iron	mg/L			8.0	
Silver	mg/L			1.0	
Manganese	mg/L			1.5	
Boron	mg/L			6.0	
Chlorine	mg/L			1.0	
An-ionic detergents	mg/L			20	
Temperature	°C			40° ≤ 3°	

Table 7.6: Sample Form for Noise Quality Monitoring Record

Location	S. #	Date	Time (Hrs: Min)	Analysis Result [dB(A)Scale]	SEQS [dB(A)Scale]*	Comments**
	1				55 (Day) / 45 (Night)	
	2				55 (Day) / 45 (Night)	
	3				55 (Day) / 45 (Night)	
	4				55 (Day) / 45 (Night)	
	5				55 (Day) / 45 (Night)	
	6				55 (Day) / 45 (Night)	
	7				55 (Day) / 45 (Night)	
	8				55 (Day) / 45 (Night)	

** (H=High, L=Low)

Table 6.7: Sample Form for Drinking Water Quality Monitoring Record

Location	Date	Parameters	Sindh Environmental Quality Standards (mg/l)	Analysis Result (mg/l)	Comments*
		Color	< 15 TCU		
		Taste	Non-objectionable/ Acceptable		
		Odor	Non-objectionable /Acceptable		
		Turbidity	< 5 NTU		
		Total Hardness as CaCO ₃	< 500 mg/l		
		TDS	<1000		
		pH	6.5-8.5		
		Aluminum (Al) mg/l	≤ 0.2		
		Antimony (Sb)	≤ 0.005		
		Arsenic (As)	≤ 0.05		
		Barium (Ba)	0.7		
		Boron (B)	0.3		
		Cadmium (Cd)	0.01		
		Chloride (Cl ⁻)	< 250		





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Table 6.7: Sample Form for Drinking Water Quality Monitoring Record

	Chromium (Cr)	≤ 0.05		
	Copper (Cu)	2		
	Phenolic compounds	<0.0002		
	Cyanide (CN) ⁻	≤ 0.05		
	Fluoride (F)	≤ 1.5		
	Lead (Pb)	≤ 0.05		
	Manganese (Mn)	≤ 0.5		
	Mercury (Hg)	≤ 0.001		
	Nickel (Ni)	≤ 0.02		
	Nitrate (NO ₃) ⁻	≤ 50		
	Nitrite (NO ₂) ⁻	≤ 3		
	Selenium (Se)	≤ 0.01		
	Residual Chlorine	0.2-0.5 At consumer end 0.5-1.5 at source		
	Zinc (Zn)	5.0		
	All water intended for drinking (E.Coli or Thermo tolerant Coliform bacteria)	0.0 cfu/ 100 ml		
	Treated water entering the distribution system (Ecoli or thermo tolerant coliform and total coliform bacteria)	0.0 cfu/ 100 ml		
	Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform bacteria)	0.0 cfu/ 100 ml		

(cfu=Coliform Unit), * (H=High, L=Low)



**Table 6.8: Sample Form for Solid Waste Monitoring Record
(Domestic/residential/commercial solid wastes)**

Location: _____, Date: _____, Source: _____ (domestic/commercial)

Total Quantity (kg)	Components	Weight (as discarded)	% by weight (as discarded)	Recyclables	Non-recyclables	Organic waste
	Food/kitchen waste					
	Plastics					
	Metals					
	Paper					
	Textile/Rugs					
	Cardboard					
	Glass					
	Rubber					
	Other					
Total						

Generation Rate:

For domestic or residential units Total waste generated = _____ kg/capita/day
No of persons in units

For commercial units Total waste generated = _____ kg per unit area
Total floor area of unit

Summary:

- Total Waste Generated (as collected) = _____ kg
- Recyclable waste quantity = _____ kg
- Non-Recyclable waste quantity = _____ kg
- Organic waste quantity = _____ kg
- %age of Recyclables = _____ %
- %age of Non-recyclables = _____ %
- %age of Organic waste = _____ %
- Total waste sent for recycling = _____ kg
- Total waste sent for landfill = _____ kg

Comments:

Table 6.9: Sample Form for Solid Waste Monitoring Record (Hazardous solid wastes)

Location: _____, Date: _____, Source: _____ (domestic/commercial)

Total Quantity (kg)	Hazardous waste Components	Weight (as discarded)	% by weight (as discarded)	Characteristics (corrosive, toxic, explosive, etc.)	Non-recyclables (requiring disposal)	Recyclables
Total						

Generation Rate:

Whichever of the following applies:

For domestic or residential units Total waste generated = _____ kg/capita/day

No of persons in units

For commercial units Total waste generated = kg per unit area

Total floor area of unit

Summary:

- Total Waste Generated (as collected) = _____ kg
- Recyclable waste quantity = _____ kg
- Non-Recyclable waste quantity = _____ kg
- %age of Recyclables = _____ %
- %age of Non-recyclables = _____ %
- Total waste sent for recycling = _____ kg
- Total waste sent for disposal = _____ kg

Comments:

7.6 Standard Operating Procedures (During Construction phase)

7.6.1 Wastewater/ Storm water management

(1) Purpose of Wastewater/storm water Management

The purpose of the adopted procedure is to provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of wastewater wherever and whenever arising during the project's construction phase.



Wastewater management is a critical component of operating policies. Wastewater management includes the proper disposal / recycling and reuse of the wastewater generated during construction and operation phase.

(2) Scope

Wastewater as part of construction operation will be managed as per this procedure. An integrated wastewater management system for Prince ICON project is essential to reduce wastewater.

Substitute techniques must be investigated, including source reduction, recycling and reuse wherever possible with a view towards maximizing the benefits and minimizing the cost of each method of wastewater management.

(3) Procedure

Main concern to manage the wastewater is listed below:

- Eliminate wastewater production wherever possible.
 - Minimize wastewater production.
 - Recycle or Reuse
 - Wastewater disposal in an environmentally safe manner through adequately designed facility
 - Proper drainage of Storm water
- a) **Wastewater Minimization:** Generation of wastewater will be minimized through the following steps taken by working personnel at the facility:
- Through efficient use of raw water (minimizing the wastewater).
 - Reuse of wastewater after treatment.
- b) **Storage and Handling:** Wastewater shall be stored/retained in specifically designed facility or storage tanks till proper treatment at sewage treatment plant is sought and subsequently disposed of.
- c) **Segregation:** Wastewater used in construction will be segregated from wastewater originating from latrines used by construction staff.
- d) **Recycling:** Reuse of wastewater is a best way to reduce the quantity of the wastewater that requires subsequent treatment and disposal. Construction



wastewater may be reused in construction activity because it is generally Non-hazardous.

- e) **Treatment:** Wastewater originates from latrines used by construction staff requires treatment through retention in septic tanks and through primary and secondary treatment processes.
- f) **Disposal:** Proper disposal should be done following the treatment through discharge into water bodies or sewerage system where available.

(4) Wastewater Management Options

- All storm water run-off from construction sites will be inspected for the sediment load and may be directed to sedimentation basins to remove suspended solids (e.g., silt);
- Sewage may be collected and temporarily stored in tank(s) until it is transported to a designated wastewater treatment facility;
- Standard mobile sewage tankers may be engaged to collect and transport sewage from portable latrines and temporary storage tanks;
- Direct discharge will only be considered as a contingency option.

7.6.2 Solid Waste Management Plan

(1) Purpose

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, managing and disposing of solid wastes. Waste management includes the proper handling, collection, storage, manifesting, transportation, and disposal/recycling of the solid waste generated. The procedure is designed to assist in the management's wide effort to provide protection to the environment and to comply with environmental laws and regulations regarding proper waste management.

(2) Scope

The waste management plan has been developed to ensure that the Management of solid waste generated as a result of the construction is consistent, efficient, and in conformance with the laws and regulations.

With respect to monitoring, the waste management sets out the following objective:





- To monitor and inspect waste management-related facilities and activities directly resulting from executing the scope of the contract in order to ensure compliance with the WMP. Guidelines for proper handling, categorization, recording, minimization, recycling and disposal of all types of waste associated with company operations and projects are part of this procedure.

(3) Definitions

- a) **Waste:** Any material, for which no further use is intended, is considered a waste. It can be solid, semi-solid or liquid. Additionally, abandoned materials and materials intended to be recycled are considered wastes. It is very important to understand this concept, because even though something is going to be recycled, it must be managed as a waste until it is actually recycled.
- b) **Hazardous Waste:** Waste is categorized as a hazardous waste if it has one or more of the following properties:
- Ignitability (flash point less than 60°C);
 - Corrosivity (pH less than or equal to 2.0, or greater than or equal to 12.5);
 - Reactivity (inherently unstable under ordinary conditions or when exposed to water);
 - Irritability (when in contact with body causes inflammation)
 - Toxicity (may cause risk of injury to health of organisms or the environment.)
- c) **Non-hazardous Waste:** The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous characteristics as defined above. However, non-hazardous waste may still present hazards to employees who handle them. All recommended safety and handling practices must be followed.

(4) Procedure

Priorities to manage the waste are listed below:

- Eliminate waste production whenever and wherever possible. Use the material only for its intended purpose on site
- Minimize waste production
- Reuse
- Dispose of waste through properly designed waste disposal facility.





- a) **Waste Minimization:** To minimize waste, the following steps shall be taken by all personnel working on sites (during construction phase):
- Only the needed amount of materials shall be ordered. Before purchasing hazardous material, all alternatives for non-hazardous material should be explored.
 - Prior consideration shall be given to the sizes of containers available when ordering products that could potentially generate waste. The intent is to avoid unused products and/or their containers from becoming wastes that require special handling.
- b) **Waste Categorization:** All wastes generated at facilities shall be categorized in two major categories (i.e. Hazardous wastes and Non-hazardous wastes) as per the definitions in section above. Each category has different types of requirement for handling, storage and disposal.
- c) **Labelling**
- Name of the waste (e.g., waste oil, solvents, paints).
 - Waste category (e.g., toxic, ignitable).
 - Facility name and address (disposal site, etc.).
 - Date of waste accumulation: (date when waste was placed in drum).
 - Wastes are segregated and located in designated areas to optimize control; storage areas.
- d) **Segregation:** The scheme of segregation is as follow:
- All hazardous waste if found shall be segregated from other types of hazardous wastes as well as non-hazardous wastes at the point of generation of waste.
 - Food waste shall be collected in separate containers.
 - All containers must be clearly labeled. The label must clearly mention the name or type of waste. Also, if the waste is hazardous, it should be clearly labeled on the container along with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). This is important to workers and to emergency response teams, who need to know what they are dealing with. Missing or unreadable labels must be replaced.



e) Storage and Handling

- Waste shall be temporarily stored at waste storage facility that will be sent for recycling or off-site disposal shall be temporarily stored at designated site(s) within the building premises.
- The oily sludge, contaminated soil shall be stored in containers
- All other wastes awaiting disposal shall be kept in closed containers/boxes separately. Care must be taken to prevent wastes giving rise to secondary environmental problems, such as odors or soil and groundwater contamination through rainwater leaching.
- All stored wastes must be clearly labeled with type of waste and warning signs.
- Daily estimates of hazardous and non-hazardous waste and volumes generated on site.
- Waste segregation, waste storage containers, general housekeeping and the provision of adequate resources will be monitored.
- All workers handling wastes shall use proper PPE.

f) Reuse

Construction waste can be reused in other construction projects & excavated material can be reused in backfilling.

g) Disposal

Disposal becomes the only available alternatives, if reuse and recycling options are exhausted. A material should be classified as a waste for disposal only if no other useful purpose can be identified and if the material cannot be beneficially reused or recycled. The choice of a suitable disposal option for any waste depends on both environmental and economic considerations. The final disposal can only be off-site disposal facilities due to limited space available.

It requires properly designed and well-operated commercial waste disposal facilities such as sanitary landfill. All such facilities should be explored and evaluated for possible future use.

(5) Recording & Reporting

The management has to record the information about source, composition, quantity, and final disposal of the waste. This information is needed for regulatory compliance, risk assessment and setting reduction targets and



objectives as well as corporate statistics. The routine track of waste shall be recorded.

7.6.3 Air and Noise Emissions

(1) Purpose

The purpose of this guideline is:

- To monitor contents of polluting substances in the atmospheric air;
- To control observance of approved limiting permissible emissions at man-made sources;
- To monitor natural sources and a number of man-made sources of emission at work sites at the construction phase;
- To identify sources of noise emissions and control noise pollution;
- To monitor noise emissions.

(2) Scope

Scope of work includes:

- Evaluation of present ambient air quality and noise level at existing area.
- Evaluation of impact of traffic movement at the proposed site and noise level.
- Evaluation of impacts on roads and in the adjacent area due to construction.
- Evaluation of impacts of air emissions and noise from various stationary sources.
- Recommendations for mitigation techniques to redress the expected impacts both for design phase.

(3) Definitions

Air pollution may be referred to as contamination of pollutants dispersed in air affecting ambient air quality that may be deleterious to life and property.

In common use the word noise means unwanted sound or noise pollution. Excessive noise permanently damages hearing, but a continuous low-level sound can be dangerous too.



(4) Procedure

Air emissions (continuous or non-continuous) from facilities such as power generators are comprising of principal gases (greenhouse gases) which typically include carbon monoxide (CO), carbon dioxide (CO₂), water vapors and other gases such as nitrogen oxides (NO_x), and, in case of sour gases, sulphur dioxide (SO₂). Air quality impacts should be estimated by the use of baseline air quality assessments and atmospheric dispersion models to establish potential ground level ambient air concentrations during facility design and operations planning. These studies should ensure that no adverse impacts to human health and the environment result. All reasonable attempts should be made to maximize energy efficiency and design facilities to minimize energy use. The overall objective should be to reduce air emissions and evaluate cost-effective options for reducing emissions that are technically feasible.

Also, vehicular emissions and noise due to traffic movement in and around the complex facility may of concern to be mitigated and monitored. Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Vegetation, such as trees, and walls can reduce noise levels. Installation of acoustic insulating barriers can be implemented, where necessary.

(5) Noise and Air Emissions Management Options

Noise and air emissions monitoring includes;

- Monitoring of air and noise emissions.
- Pollution control technology assessment,
- Emission inventory development,
- Development of parametric monitoring, periodic monitoring, and compliance assurance monitoring.

(6) Air and Noise Quality Monitoring

Refer attached Environmental Monitoring Plan for details of air and noise quality monitoring at the Prince ICON project site during construction phase.

- a) **Performance Indicator:** Monitoring results of ambient air shall show the concentration of pollutant in ambient air.
- b) **Record and Comments:** Record would be kept with the laboratory report attached.



7.7 Standard Operating Procedures (During Operational Phase)

7.7.1 Wastewater Management

(1) Purpose of Wastewater Management

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, managing, and disposing of wastewater wherever and whenever arising during the project's operational phase. Wastewater management includes the proper disposal/recycling & reuse of the wastewater generated during operation phase.

(2) Scope

Wastewater generation as part of operational activity will be managed as per this procedure. An effective wastewater management system for Prince ICON building is essential to reduce wastewater. Substitute techniques must be investigated, including source reduction, recycling and reuse wherever possible with a view towards maximizing the benefits and minimizing the cost of each method of wastewater management.

(3) Definitions

- a) **Wastewater:** All water arising after use/consumption from the Project which can encompass a wide range of potential contaminants and concentrations.
- b) **Hazardous Wastewater:**
- All wastewater comes in the category of hazardous wastewater. If it has one or more of the following properties:
 - Oily water
 - Toxicity (wastewater containing laboratory testing chemicals, antibiotics etc.)
 - Concentration of contaminants too high above safe acceptable limits
- c) **Non-hazardous Wastewater:** All wastewaters are categorized as non-hazardous wastes, if they do not possess any of the hazardous contaminant mainly comprising of consumed water arising from washing area and sanitary wastewater.

(4) Procedure

Main concern to manage the wastewater is listed below:

- Eliminate wastewater production wherever possible.





- Minimize wastewater production.
 - Recycle or Reuse
 - Wastewater disposal in an environmentally safe manner through adequately designed facility
- a) **Wastewater Minimization:** Generation of wastewater will be minimized through the following steps taken by working personnel at the facility:
- Through efficient use of raw water (minimizing the wastewater).
- b) **Storage and Handling:** Wastewater shall be stored/retained in specifically designed facility or storage tanks till appropriate treatment is sought and subsequently disposed of.
- c) **Segregation:** Hazardous wastewater shall be segregated from Non-hazardous wastewater.
- d) **Recycling:** Recycling of Non-hazardous wastewater is a best way to reduce the quantity of the total wastewater that requires subsequent treatment and disposal. Non-hazardous wastewater may be used in the cooling plants and for horticulture purposes.
- e) **Treatment**
- Treatment of wastewater through retention in septic tanks and through primary and/or secondary treatment processes.
 - Some of the wastewater may be reused as mentioned in recycling of wastewater. The treated water should comply with Sindh Environmental Quality Standards (SEQS).
- f) **Disposal**
- Proper disposal should be done following the treatment through discharge into water bodies or sewerage system where available.

(5) Drinking Water Quality and Wastewater Monitoring Plan

Refer attached Environmental Monitoring Plan for details of drinking water quality and wastewater monitoring plan.



a) Performance Indicator

Monitoring results of water quality shall show the extent of contamination in the drinking water and shall regulate and maintain the quality of potable water for establishing its suitability for human consumption as per WHO guidelines for drinking water quality.

Monitoring results of wastewater quality shall show the concentration of pollutants in the sewage water and potential for contamination of ground water if not disposed of properly.

b) Record and Comments

Record of analysis reports shall be maintained.

7.7.2 Solid Waste Management Plan

(1) Purpose

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, managing, and disposing of solid wastes. Waste management is a critical component of management's operating policies. Waste management includes the proper handling, collection, storage, manifesting, transportation, and disposal / recycling of the solid waste generated.

(2) Scope

The waste management plan has been developed to ensure that the Management of solid waste generated as a result of operation is consistent, efficient, and in conformance with the laws and regulations.

(3) Definitions

a) Waste: Any material, for which no further use is intended, is considered a waste. It can be solid, semi-solid or liquid. Additionally, abandoned materials and materials intended to be recycled are considered wastes. It is very important to understand this concept, because even though something is going to be recycled, it must be managed as a waste until it is actually recycled.

b) Hazardous Waste: Waste is categorized as a hazardous waste if it has one or more of the following properties:



- Ignitability (flash point less than 60°C);
- Corrosivity (pH less than or equal to 2.0, or greater than or equal to 12.5);
- Reactivity (inherently unstable under ordinary conditions or when exposed to water);
- Irritability (when in contact with body causes inflammation)
- Toxicity (may cause risk of injury to health of organisms or the environment.)

c) **Non-hazardous Waste:** The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous characteristics as defined above. However, non-hazardous waste may still present hazards to employees who handle them. All recommended safety & handling practices must be followed.

(4) Procedure

Priorities to manage the waste are listed below:

- Eliminate waste production whenever and wherever possible.
- Minimize waste production
- Reuse
- Dispose of waste through properly designed waste disposal facility.

a) **Waste Minimization:** To minimize waste, the following steps shall be taken by all personnel working on sites:

- Only the needed amount of materials shall be ordered. Before purchasing hazardous material, all alternatives for non-hazardous material should be explored.
- Prior consideration shall be given to the sizes of containers available when ordering products that could potentially generate waste. The intent is to avoid unused products and/or their containers from becoming wastes that require special handling.

b) **Waste Categorization:** All wastes generated at facilities shall be categorized in two major categories (i.e. Hazardous wastes and Non-hazardous wastes) as per the definitions in section above. Each category has different types of requirement for handling, storage and disposal.

c) **Labelling**

- Name of the waste (e.g., chemical waste, solvents, paints, biomedical etc.).





- Waste category (e.g., toxic, ignitable).
- Facility name and address (disposal site, etc.).
- Date of waste accumulation: (date when waste was placed in drum).
- Wastes are segregated and located in designated areas to optimize control; storage areas.

d) Segregation: As there are no hazardous wastes envisaged in the project therefore segregation among the waste will be done as per their matter.

The scheme of segregation is as follow:

- All hazardous waste if found shall be segregated from other types of hazardous wastes as well as non-hazardous wastes at the point of generation of waste.
- Laboratory chemical waste is also to be segregated into chlorinated and non-chlorinated solvents.
- Non-hazardous waste consists of containers, shipping cartons, bags, reject, broken bottles, rejected cartons, labels, strips, corrugated boxes, paper etc.

e) Storage and Handling

- All waste from floor and equipment is to be collected using vacuum cleaners.
- All containers must be properly and clearly labeled. The label must clearly mention the name or type of waste. Also, if the waste is hazardous, it should be clearly labeled on the container along with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). This is important to workers and to emergency response teams, who need to know what they are dealing with. Missing or unreadable labels must be replaced.
- Non-hazardous waste shall be temporarily stored at waste storage facility that will be sent for recycling or off-site disposal shall be temporarily stored at waste storage facilities available at different sites such as junkyard, scrap yard, pits, etc.
- All other wastes awaiting disposal shall be kept in closed containers/boxes separately. Care must be taken to prevent wastes giving rise to secondary environmental problems, such as odors or soil and groundwater contamination through rainwater leaching.
- Daily estimates of hazardous and non-hazardous waste and volumes generated on site.
- Waste segregation, waste storage containers, general housekeeping and the provision of adequate resources will be monitored.



- All workers handling wastes shall use proper PPE.
- f) **Recycling:** Non-hazardous waste can be recycled and reuse to minimize the quantity of waste requiring disposal. Some of the wastes (like one side printed paper) can be reused within the facilities while others can only be recycled at off-site recycling centres.
- g) **Disposal:** Disposal becomes the only available alternatives, if reuse and recycling options are exhausted. Onsite burning or dumping of waste is strictly prohibited.

A material should be classified as a waste for disposal only if no other useful purpose can be identified and if the material cannot be beneficially reused or recycled. The choice of a suitable disposal option for any waste depends on both environmental and economic considerations. The final disposal can only be off-site disposal facilities due to limited space available.

The waste shall be disposed of through a contractor.

(5) Recording & Reporting

The management has to record the information about source, composition, quantity, and final disposal of the waste. This information is needed for regulatory compliance, risk assessment and setting reduction targets and objectives as well as corporate statistics.

The routine track of waste shall be recorded. It is the responsibility of the proponent to assign a suitable person to sign off the record of waste tracking before the waste is dispatched outside.

7.7.3 Air and Noise Emissions

(1) Purpose

The purpose of this guideline is:

- To monitor contents of polluting substances in the atmospheric air;
- To control observance of approved limiting permissible emissions at man-made sources;
- To monitor natural sources and a number of man-made sources of emission at work sites during operational phase;
- To identify sources of noise emissions and control noise pollution;





- To monitor noise emissions.
- The air emissions from backup generators should comply with the SEQS for air emissions and reported as per SEPA reporting requirements.

(2) Scope

Scope of work include

- Evaluation of present ambient air quality and noise level at existing area.
- Evaluation of impact of traffic movement at the proposed site and noise level.
- Evaluation of impacts on roads and in the adjacent area during operational phase.
- Evaluation of impacts of air emissions and noise from various stationary sources.
- Recommendations for mitigation techniques to redress the expected impacts both for design phase and operational phase.

(3) Definitions

Air pollution may be referred to as contamination of pollutants dispersed in air affecting ambient air quality that may be deleterious to life and property.

In common use the word noise means unwanted sound or noise pollution. Excessive noise permanently damages hearing, but a continuous low-level sound can be dangerous too.

(4) Procedure

Air emissions (continuous or non-continuous) from facilities such as power generators, etc. are comprising of principal gases (greenhouse gases) which typically include carbon monoxide (CO), carbon dioxide (CO₂), water vapors and other gases such as nitrogen oxides (NO_x), and, in case of sour gases, sulphur dioxide (SO₂). Air quality impacts should be estimated by the use of baseline air quality assessments and atmospheric dispersion models to establish potential ground level ambient air concentrations during facility design and operations planning. These studies should ensure that no adverse impacts to human health and the environment result. All reasonable attempts should be made to maximize energy efficiency and design facilities to minimize energy use. The overall objective should be to reduce air emissions and evaluate cost-effective options for reducing emissions that are technically feasible. Also, vehicular



emissions and noise due to traffic movement in and around the plant is to be mitigated and monitored.

Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Vegetation, such as trees, and walls can reduce noise levels. Installation of acoustic insulating barriers can be implemented, where necessary.

(5) Noise and Air Emissions Management Options

Noise and air emissions monitoring includes;

- Air dispersion modeling and monitoring of air and noise emissions.
- Indoor air quality management
- Pollution control technology assessment,
- Emission inventory development,
- Development of parametric monitoring, periodic monitoring, & compliance assurance monitoring.

(6) Air and Noise Quality Monitoring

Refer attached Environmental Monitoring Plan for details of air and noise quality monitoring at the Prince ICON project site during operation phase.

- a) **Performance Indicator:** Monitoring results of ambient air shall show the concentration of pollutant in ambient air.
- b) **Records & Comments:** Records of monitoring reports shall be maintained



8. Conclusion

Based on the findings of the environmental impact assessment it is concluded that the environmental impacts of the construction and operation of Prince ICON project are manageable and can be mitigated by implementing the Environmental Management and Monitoring Plan which forms an integral part of EIA document. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts and their adoption has been recommended. The proposed project is a self-contained building having its own back-up power generation, water supply supplemented by R.O treatment system and sewage treatment, recycling and disposal system in addition to provision of more than required parking space. This being a positive impact would be an indicator of achievement of the objectives of the Project.

Realizing that the city has overgrown its sustainability limits, it is imperative that the Builders and Developers take cognizance of the cumulative effect of the current pace of rapid development. Consequently, each project is required to keep the sustainability principles in view and go an extra mile beyond the present approach which is confined to bare survival. Their projects have so far been profit oriented, now they will have to share the profit with net zero energy and net zero discharge approach in the project design.

The study recommends that the Environmental Impact Assessment (EIA) report should be approved with the provision that the suggested mitigation measures will be adopted and the Environmental Management & Monitoring Plan will be followed in letter and spirit.

Environmental Impact Assessment (EIA)

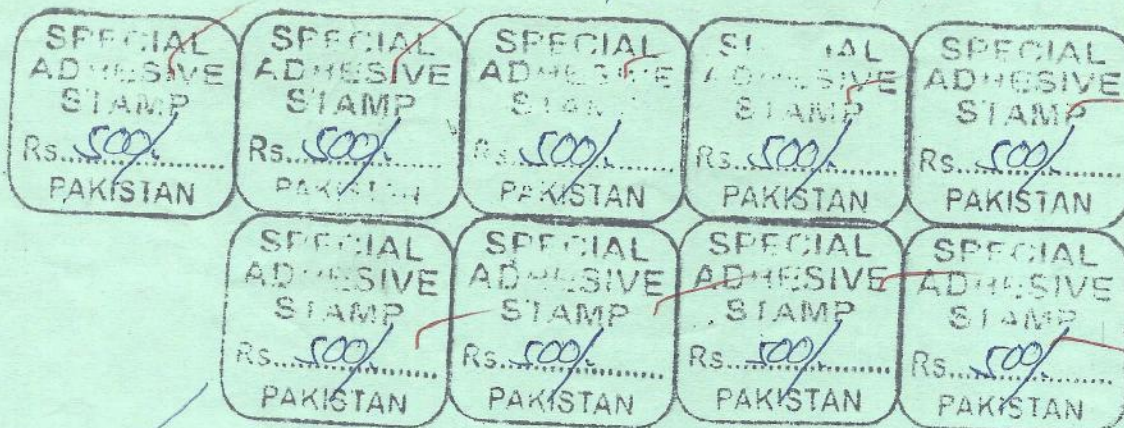
Survey 90, Depot Lines,
Karachi Cantt.

Annexures

-  **Statutory Approvals**
-  **Soil Investigation Report of the Project Site**
-  **Detailed Report on Traffic Study**

challan no. 60 dt 14/7/96
Rs. 4500/-
stamp issued to A. Malik

TRUE COPY



S. Burhain
14/7
Assistant Superintendent of
stamp office city court
Karachi (Pakistan)
16 Jul 1996

SCHEDULE VIII OF THE
CANTONMENT LAND ADMINISTRATION RULES, 1937

BUILDING LEASE FOR A TERM OF YEARS ENDING THE EIGHTEENTH
DAY OF JULY ONE THOUSAND NINE HUNDRED NINETY-EIGHT
(18-7-1998) RENEWABLE AT OPTION OF LESSEES FOR TWO TERMS
EACH FOR THIRTY YEARS.



THIS INDENTURE made the 14th day of July
One Thousand Nine hundred Ninety-six (1996) BETWEEN THE
President of Islamic Republic of Pakistan through the
Military Estates Officer, Karachi Circle, Karachi Cantonment
(hereinafter called the "LESSOR") of the ONE PART and M/s.
PanAsian Industries (pvt) Ltd. incorporated at Karachi
having its registered office at Prince Cinema, M.A. Jinnah
Road, Karachi represented by its Managing Director Mr. Abdul
Malik Rahmatalla son of Mr. Rahmatalla Kassim through their
Attorney Mr. Abdul Karim son of Mr. Kanji Kara, C/o. Prince
Cinema Building, M.A. Jinnah Road, Karachi (hereinafter
called the "LESSEES") OF THE OTHER PART.

WHEREAS by virtue of rules made under Section 280 of
the Cantonments Act, 1924, the Military Estates Officer,
Karachi Circle, Karachi (hereinafter called the Military
Estates Officer) has agreed on behalf of the Lessor with the
confirmation of the Government of Pakistan, Ministry of
Defence, Rawalpindi letter No.

S. Jamel Uddin Ansari
military Estate officer
Karachi circle Karachi

S. Abdul Karim
(Cont'd.....Pg/2)

17/11/98
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-(2) -

to demise the plot of land hereinafter described to the Lessees in manner hereinafter appearing.

18/2/98
NOW THIS INDENTURE WITNESSETH in consideration of the rent hereinafter reserved and of the covenants on the part of the Lessees hereinafter contained the Lessor doth hereby demised unto the Lessees ALL THAT plot of land containing by admeasurement 3740 square yards situated at Survey No.90 in the Karachi Cantonment which said plot of land is more particularly described in the Schedule hereunder written and with the boundaries thereof is delineated on the plan annexed to these presents and thereon coloured in RED together with all rights easements and appurtenances whatsoever to the said plot of land belonging or in any wise appertaining EXCEPTING AND RESERVING unto the Lessor all mines minerals mineral substances of every description, sand and clay in or under the premises hereby demised with full right and liberty at all times to do all acts and things which may be necessary or expedient for the purpose of searching or digging working obtaining removing and enjoying and the same making the Lessees reasonable compensation for all damages done and also all timber fruit trees and other trees (but not the fruit or leaves or all the branches of trees cut down with the written consent of the Military Estates Officer) with right of entry to mark fall cut and carry away the same TO HOLD the premises hereby demised unto the Lessees for the term ending on eighteenth day of July One thousand nine hundred ninety-eight (18-7-1998) rendering therefore during the said term the yearly rent of Rs.10,227/- on the eighteenth day of July in each year at the office of the Military Estates Officer or such other place as the Military Estates Officer shall from time to time appoint in this behalf.

I. AND THE LESSEES DO hereby covenant with the Lessor:

to pay unto the Lessor during the term hereby granted the yearly rent hereby reserved on the terms and in the manner hereinbefore appointed.

(2) From time to time and at all times during the said term to pay and discharge all rates taxes and assessments of every description which are now or may at any time hereafter during the

18/2/98
Sd. J. Uddi Bhatti
Military Estates Officer,
Karachi Circle Karachi

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Sd. Abdul Karim

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said term be imposed charged or assessed upon the premises hereby demised or the buildings to be erected thereupon or the landlord or tenant in respect thereof.

- (3) Not to cut down any of the timber fruit trees or other trees now or at any time hereafter growing on the premises hereby demised without the previous consent in writing of the Military Estates Officer but to preserve the same in good order.
- (4) Not to make any excavations in the land hereby demised or remove any minerals mineral substances or any description sand or clay from the said land without the consent in writing of and in accordance with the terms and conditions prescribed by the Military Estates Officer.
- (5) Within thirty-six calendar months next after the date of these presents at their own cost to erect and finish fit for use on the premises hereby demised shops, show rooms, offices and cinema together with all necessary outhouses sewers drains and other appurtenances in accordance with a plan or plans to be approved in writing by the Cantonment Board under the provisions of the Cantonments Act, 1924 and not to erect or suffer to be erected on any part of the premises hereby demised any building other than and except the shops, show rooms, offices and Cinema hereby covenanted to be erected without the previous consent in writing of the Govt. of Pakistan.
- (6) Not to make any alterations in the plan or elevation of the ~~shops~~ show-rooms, offices and cinema without such ~~consent~~ as aforesaid nor to use the ~~same~~ ~~same~~ the same to be used for any purpose other than that, or shops, show-rooms, offices and cinema.
- (7) At all times during the said term to keep the said shops, show-rooms, offices and cinema and the premises in good and substantial repair and on the expiration

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Sd. J. A. Ansari
Military Estates Officer,
Karachi Circle Karachi

Sd. Abdul Karim



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or sooner determination of the said term peaceably to yield up the same in such good and substantial repair unto the Lessor.

(8) Upon every assignment transfer or sub-lease of the premises hereby demised or any part thereof within one calendar month thereafter to deliver a notice of such assignment transfer or sub-lease to Military Estates Officer setting forth the names and description of the parties to every such assignment transfer or sub-lease and the particulars and effect thereof.

II. PROVIDED ALWAYS that if any part of the rent hereby reserved shall be in arrear or unpaid for one calendar month next after any of the days thereon the same shall become due whether the same shall have been demanded or not or if there shall have been in the opinion of the Military Estates Officer any breach by the Lessees or by the Lessees or by any persons claiming through or under them of any of the covenants or conditions hereinbefore contained then and in such case the Lessor may not withstanding the waiver of any previous cause or right of re-entry enter upon any part of the premises hereby demised or of the building thereon in the name of the whole and thereupon the said premises and building shall remain to the use of and be vested in the Lessor and this demise shall absolutely determine and the Lessees shall be entitled to any compensation whatsoever.

III. PROVIDED ALSO that the Lessor will at the request and cost of the Lessees at the end of the term of years hereby granted and so on from time to time thereafter at the end of each such successive further term of years as shall be granted execute to the Lessees a new lease of the premises hereby demised by way of renewal for the term of thirty years but ~~shall~~ renewed term of years as shall be granted shall ~~not~~ with the original term of years exceed in the aggregate ~~the~~ period ending the eighteenth day of July two ~~thousand~~ fifty eight (18-7-2058) and such renewal leases shall be granted only at such rents within a percentage of enhancement of fifty per cent of the rent which shall have been reserved by any lease (either original or renewed immediately preceding the renewal lease) to be

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Sd. J. A. Ansari
Military Estates Officer,
Karachi Circle Karachi

Sd. Abdul Kadir

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or the time being granted as the Lessor shall determine and save as to the amount of the rent to be thereby reserved and as to the term to be thereby granted every renewed lease of the said premises hereby demised shall contain such of the covenants provisions and conditions in these presents contained as shall be applicable.

IV. PROVIDED ALSO that the expressions "LESSOR" and the "LESSEE" hereinbefore used shall unless such an interpretation be inconsistent with the context include in the case of the former his successors and assigns and in the case of the latter their heirs executors, administrators, representatives and assigns.

THE SCHEDULE above referred to -

ALL THAT piece and parcel of land situated at Karachi Cantonment recorded in the General Land Register of the Cantonment as Survey No.90 within the territory of Preedy Police Station, registration, District and Sub-District of Karachi and bounded on the -

NORTH BY	10' WIDE ROAD.
SOUTH BY	M.A. JINNAH ROAD.
EAST BY	SURVEY NO.102.
WEST BY	SURVEY NO.90/I.

IN WITNESS whereof the parties have hereto set their respective hands the day, month and year first written above.

Signed, sealed and delivered on behalf of the Lessor in the presence of :

[Signature]
.....
(WITNESS)
[Signature]

Sd. J. U. Ansari
Military Estates Officer
Karachi Circle Karachi
.....
MILITARY ESTATES OFFICER,
KARACHI CIRCLE, KARACHI.

Signed by the above-named Lessee through their Attorney in the presence of :

[Signature]
.....
(WITNESS)
[Signature]

Sd. Abdul Karim
.....
(LESSEE)

TRUE COPY

sd. Abdul Karim

App. Copping fees
Rs. 14/- Received
vide receipt no. 29
date 17-7-86

2658
Accounted of the Office of the
Sub-Registrar of Karachi
to Court of 12 and 1
on 14-7-86
sd. Abdul Karim
T.D.W. - J(A)

ACTING FEES as follows
Registration Fee 140-00
Copying Fee () 30-00
Postage charges 5-00
Admission fee 175-00
sd. Abdul Karim
T.D.W. - J(A)

① Mr. Jamal Uddin Ansari
Military Estate officer
Karachi
In his official capacity, except from
Personal appearance Under Section 88 of
the Registration Act, 1908, his signature is known
to the Under signed Sub. Registrar.

② Mr. Abdul Karim Kara
S/o. Kanji Kara
Occupier, aged 54 years, Carpenter Business
R/o. 1st Floor Aziz Manzil 165/166 Kanji
Street Saldar Bazar Karachi executing party
The above admit the execution before the
Under signed Sub. Registrar

(L.T.1)

sd. Abdul Karim

Mr. S. A. Siddiqui Advocate
Karachi

sd. S. A. Siddiqui



sd. Abdul Karim
T.D.W. - J(A)

3831311



MOHAMMAD UMER STAMP VENDOR
Lic # 14, Shop # 114, New Ruby Centre,
Talpur Road, Boulton S.No.....38399
Market Karachi Date.....
Issue to with Address.....
Through with Address.....
Purpose.....
Value Rs.....
Stamp Vendor's Signature.....
(NOT USE FOR FREE WILL & DIVORCE PURPOSE)
Vendor Not Responsible for Fake Documents

07 MAY 2019

(RUPEES FIFTY ONLY)



1711
Page 191 of 196
12 of Book 121
Sd. Adil M. A.
Sub Registrar, Talpur Rd. - T (A)
14-7-196



True Copy

TRUE COPY

Adil M. A.
Talpur Rd.
Karachi

Mohd
TRUE COPY

This Certified True Copy has been prepared
as per Available Record / Volume which
was maintained by the Sub Registrar
concerned at Talpur Road
Karachi. This Certified True Copy
has been granted to Mr. Adil M. A.
Vide his Application No. 846
Dated 24-5-2019
issued for the Purpose of Record / AR + N.P.



SUB-REGISTRAR
CENTRAL RECORD
KARACHI

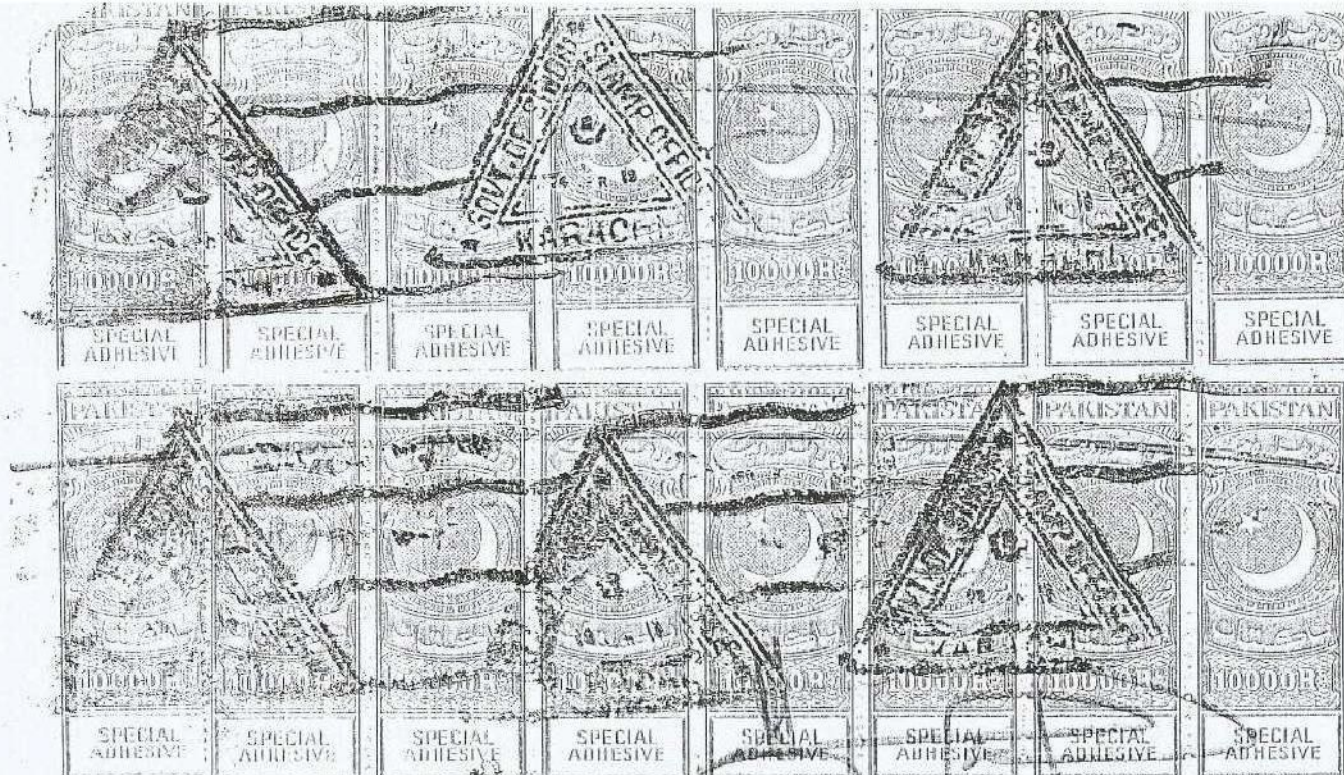
24-5-2019
225

2.10 125
26/11/11

78
2 14 13

RENEWAL
OF
LEASE

Plot no. 90 Depot line
Kandi



SCHEDULE IV

(See Rule 16 (3).)

**FORM FOR RENEWAL OF LEASE
IN SCHEDULE VIII OF THE CLA RULES, 1937.**



THIS INDENTURE made the 25th day of April 2019

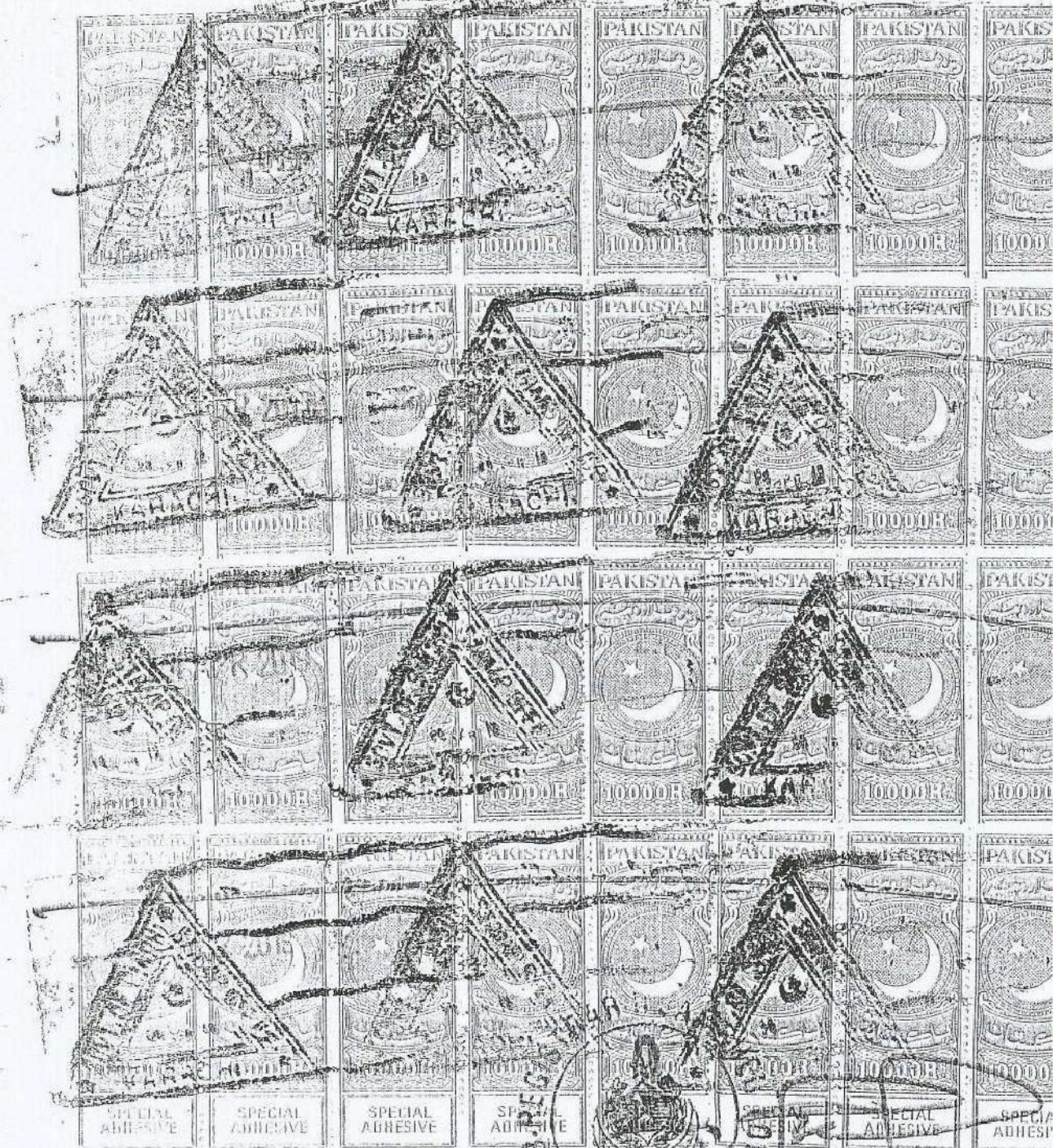
BETWEEN THE PRESIDENT OF Islamic Republic of Pakistan through the Military Estates Officer, Karachi Circle, Karachi Cantonment (hereinafter called "the Lessor") of the **ONE PART** and **M/s Panasian Industries (Pvt) Ltd.** through its authorized Director **Ms. Sakar Khan Moloo**, holding CNIC No.42000-0457765-2 D/o **Mr. Ismail**, R/o House No.C-43, Darakhshan Villa, DHA, Karachi (hereinafter called the Lessee) of the **OTHER PART.**

WHEREAS the lessees were solely entitled to the benefit of the within written lease in Schedule-VIII of the Cantonments Land Administration Rules, 1937 executed on 14/07/1996, Registered as No.1711 at Pages 191 to 196 in Volume 12 of Book No.I-Addl, dated 14/07/1996 by the Sub-Registrar, T-Div-I(A), Karachi, in respect of Survey No.90, measuring 3740 Sq. Yards, Depot Lines, Karachi Cantonment on the day of its expiry and requested the Lessor to renew same vide its application dated 15/03/2019 in accordance with clause III thereof which the Lessor (who is now entitled to the reversion immediately expectant on the said lease) has agreed to do on the terms hereinafter mentioned.

Continued on Page No.2.

Sakar Moloo

[Signature]
Military Estates Officer
Karachi Circle Karachi



Page No. 3

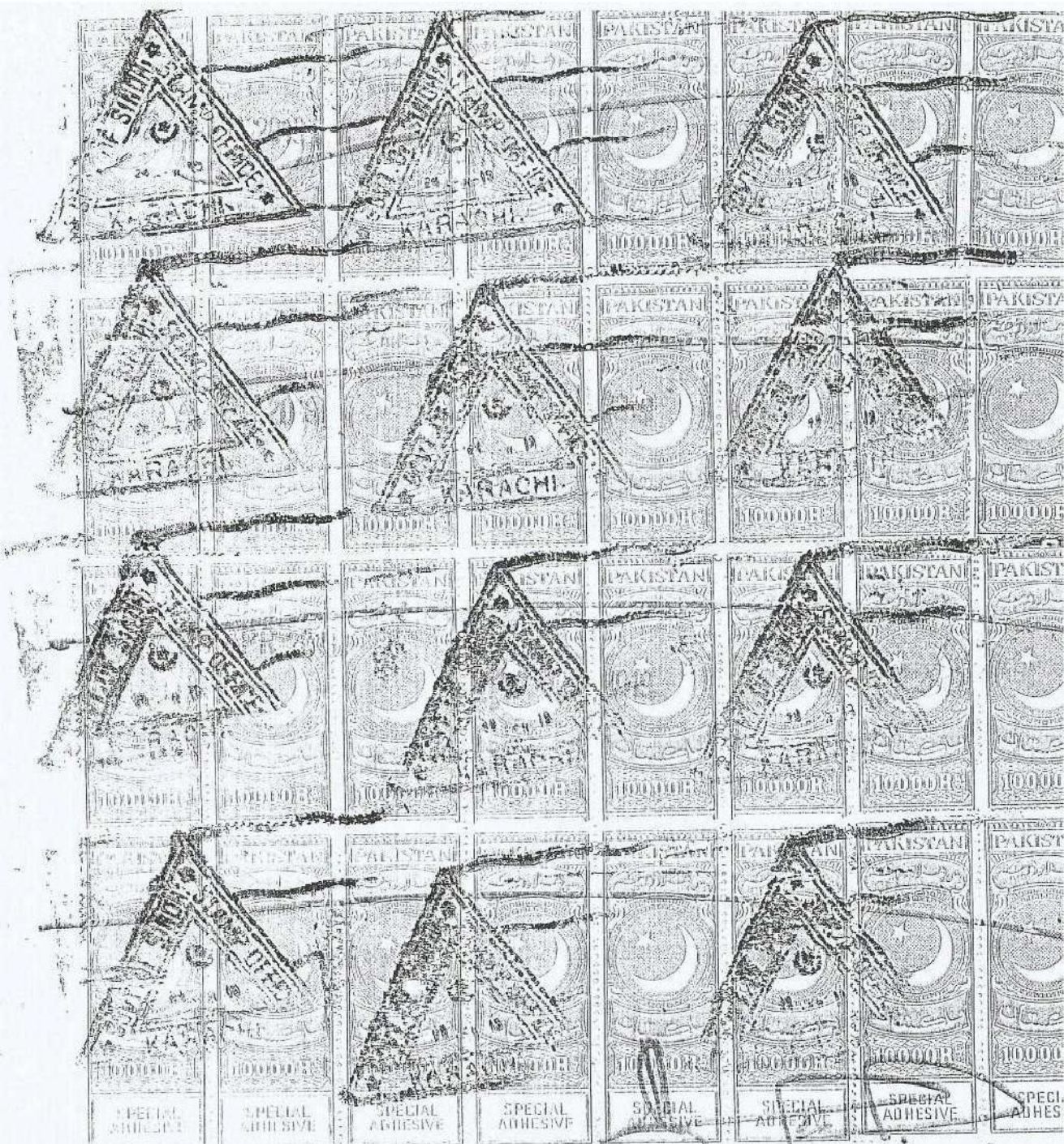
NOW THIS INDENTURE WITNESSETH as follows: -

(1) In pursuance of the premises the Lessor, hereby demises unto the Lessee **ALL AND SINGULAR** the here determents and premises comprised in and demised by the within written lease including the buildings etc., now standing thereon with the same exceptions and reservations as are therein expressed **TO HOLD** unto the Lessee from the **19th day of July, 1998** for the **2nd** term of thirty years subject to the payment on the same days and in the like manner of yearly rent of **Rs.15,341/-** (first payment has been made on **17/04/2019**) and subject to and with the benefit of such and the like Lessee's and Lessor's covenants respectively and such and the like provisos and conditions in all respects (including the proviso for re-entry) as are contained in the within written lease.

Sakir

Continued on Page No. 3.

Military Estates Office
Karachi Circle Karachi



Page No---3---

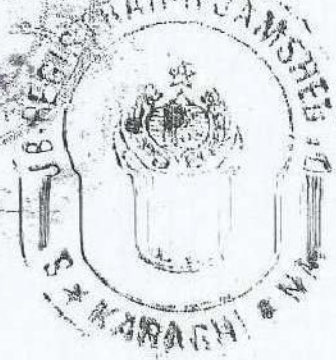
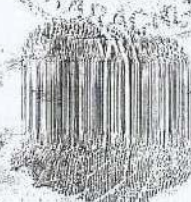
48
32
80

(2) It is hereby mutually covenanted and agreed by and between the Lesser and Lessees so that the obligations hereunder shall continue throughout the term hereby created and shall be binding on their respective successors in interest in the demised premises that they will perform and observe the several covenants provisos and stipulations in the within written lease expressed as fully as if the same covenants provisos and stipulations had been herein repeated in full with such modifications only as are necessary to make them applicable to this demise and as if the names of the parties hereto had been substituted for those in the within written lease.

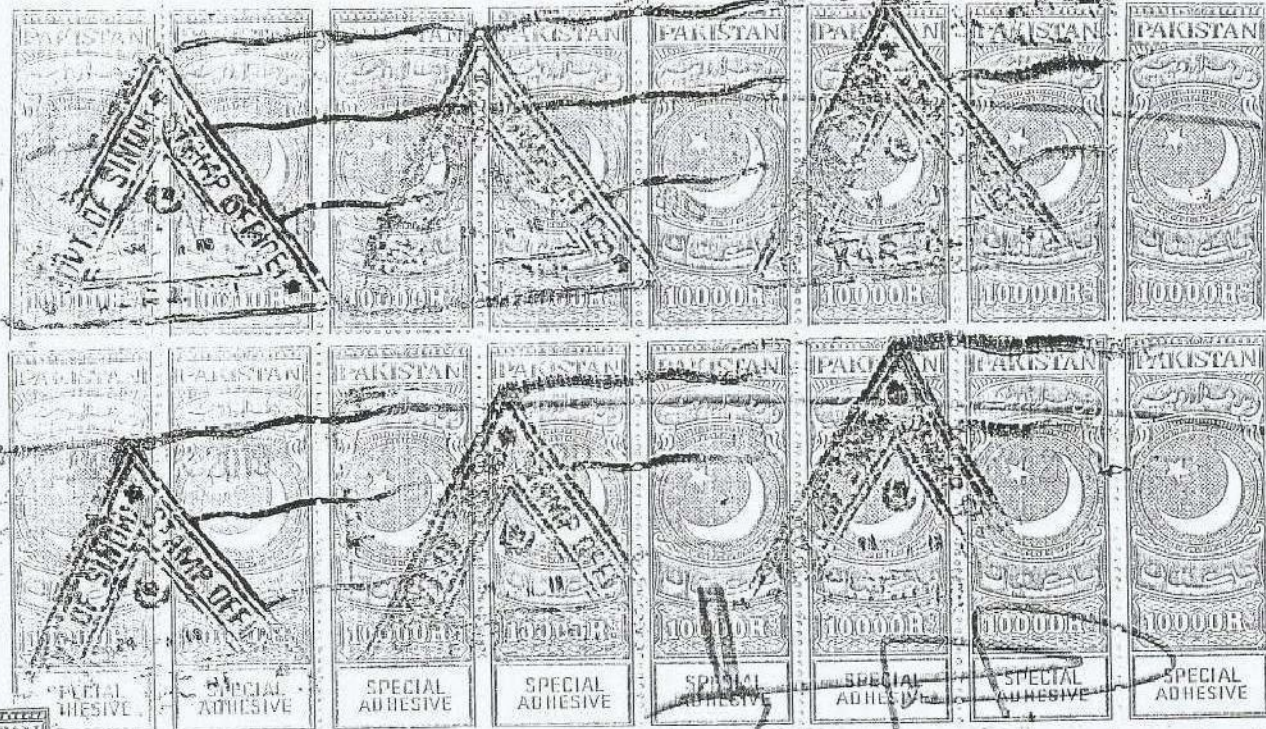
78

Continued on Page No.4

Sub. mto



Karachi Circle Karachi



80/16/26 PROVIDED ALWAYS that the Survey No.90, measuring 3740 Sq. Yards, Depot Lines, Karachi Cantonment referred to in clause I (5) of the within written lease having been erected the Lessee / Lessees shall not be under any obligation to erect another.

IN WITNESS whereof, the parties hereto have set their hands, the day and year first above written.

Signed by:
Military Estates Officer,
Karachi Circle, Karachi
On behalf of the President of
Islamic Republic of Pakistan

788
Military Estates Officer
Karachi Circle Karachi

In the presence of:
[Signature]
MEO Office, Karachi Circle, Karachi.

Signed by M/s Panasian Industries (Pvt) Ltd.
through its authorized Director
Ms. Sakar Khanu Moloo D/o Mr. Ismail

In the presence of:
WITNESS
[Signature]

LESSOR
42000-0457265-2
0300 2075154



S.No. 1256
26/4/19

Adt. Rental of pay order and
C/T deed order for registration on
29-4-2019



Govt. K.H.
Sindh

13-May-2019

RD:789/SRO:42/
DocType:18



SUB-REGISTRAR-II
JAMSHED TOWN
KARACHI

Registered No: 789
Book No: 29-4-2019
Date: 29-4-2019

Sub-Registrar
Jamshed Town-II Karachi



Tele No: 021-99202220,
Fax No: 021-99201941.

Government of Pakistan
Ministry of Defence
ML&C Department
Military Estates Office
Karachi Circle, Karachi - 74200,
No.K-7/90/150
Dated the 25th Apr, 2019.

To

The Sub-Registrar-I,
Saddar Town,
KARACHI.

Subject: - **REGISTRATION OF RENEWAL LEASE IN SCHEDULE-IV OF
THE CANTONMENTS LAND ADMINISTRATION RULES, 1937
IN RESPECT OF SITE COMPRISING SURVEY NO.90, DEPOT
LINES, KARACHI CANTT.**

Renewal Lease Deed as per the following particulars has been executed by
the undersigned in his official capacity as the Military Estates officer, Karachi Circle,
Karachi Cantonment on Behalf of the President of Islamic Republic of Pakistan:-

- 26 APR 2019
- Date of execution 25th Apr, 2019.
 - Area 3740 Sq. Yards.
 - Annual Ground Rent Rs.15,341/-
 - Purpose Commercial
 - Period ending on 18/07/2028.

2. It is requested that the above mentioned lease may be admitted to
registration on its being presented by M/s Panasian Industries (Pvt) Ltd. through its
authorized Director Ms. Sakar Khanu Moloo, holding CNIC No.42000-0457765-2 D/o
Mr. Ismail.



(Adn Rafi Siddiqui)
Military Estates Officer
Karachi Circle, Karachi

Copy to:

1. M/s Panasian Industries (Pvt) Ltd. through its authorized Director Ms. Sakar Khanu Moloo D/o Mr. Ismail, R/o House No.C-43, Darakhshan Villa, DHA, Karachi.

Please approach Sub-Registrar concern, for registration of renewal lease deed within four (04) months and after registration, a photocopy of registered renewal lease deed duly attested by an Oath Commissioner may please be sent to this office for record purpose.

2. Master File (Land Branch).



Board of Revenue, Sindh Face Sheet

SR Office: Jamshed Town-II **Deed Type:** Conveyance Deed **Doc ID:** 493311
Property Type: Open Plot Commercial Property **Area:** 3740 SQR YD
District: Karachi East **Taluka/Town:** Jamshed Town II **Deh/Area:** DEPOT LINE
Complete Address: COMMERCIAL OPEN PLOT BEARING SURVEY NO.90 **Computer Number:** BOR - 2019 - 45 - 2229

Property Details

1st Party Detail:

SYED AFTAB HUSSAIN

42201-1925456-9 03008221501

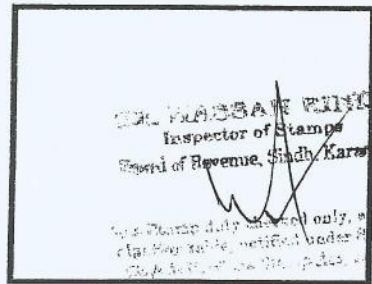
No More Members

2nd Party Detail:

MAHESH KUMAR

45101-5655232-9 NULL

No More Members



For Office Use Only:

RD No#: 2261 **RD Date:** 08-Aug-2019

<input type="checkbox"/> Registration Fee: 1250000	<input type="checkbox"/> Advance Tax: 2500000
<input type="checkbox"/> CVT: 3750000	<input type="checkbox"/> Municipal Tax: _____
<input type="checkbox"/> Gain Tax: _____	
<input type="checkbox"/> Stamp Duty: 2500000	

Signature (Sub Registration)

Audit Observation (if any):

Signature (Audit Officer)

This Registration Fee & CVT R. 3750000 is checked & confirmed by the Audit Officer, Sindh, Karachi.

2890

06 AUG 2019

2561
8/8/19

Bank AL Habib
Chartered Avenue Clifton branch
Cheque No 11170945

Challan Validity : 15 days for Payment
Challan Submission : 15 days after Payment in Bank
before Stamp Office /
Board of Revenue, Sindh

Sr. No. 060818

Challan of Cash / Cheque paid in the
National Bank of Pakistan
Passport Office / City Court Branch, Karachi.

ORIGINAL

ORIGINAL

Challan No. 10

To be filled by the remitter		To be filled by the Department Office of the Treasury	
By whom tendered (Name)	<i>M. M. M. M.</i>	Head of Account	
Signature	<i>[Signature]</i>	Non-Food	
CNIC No.	<i>5701565235</i>	Account No. 1	
Mobile No.	<i>0200210823</i>	D.D.O. Code	
Name (or designation) and address of the persons on whose behalf money is paid	<i>Assistant Superintendent of Stamps, Karachi</i>		
Full particulars of the remittance and the authority (if any)		Order to the Bank	
Stamp Duty Paid on	Rs. <i>25000</i>	Correct - Received and receipt	
<i>Spec. Challan</i>		Date	
<i>602707</i>		Signature and full designation of the Officer ordering the money to be paid in	
<i>Two million Five hundred</i>			
<i>thousand</i>			
National Bank of Pakistan City Courts Br. Khl. (0289)	Total	Rs.	<i>25000</i>
(In words) Rupees			
<i>Five thousand</i>			
TRANSFER RECEIVED			
Treasurer.	Accountant.	Date	
	<i>250000</i>	<i>23/11/2019</i>	
		Treasury Officer/ Agent	
		Stamps Office	

Q 280009

CH-10

20/07/18



CONVEYANCE DEED OF IMMOVABLE PROPERTY

Valued at Rs. 250,000,000/-

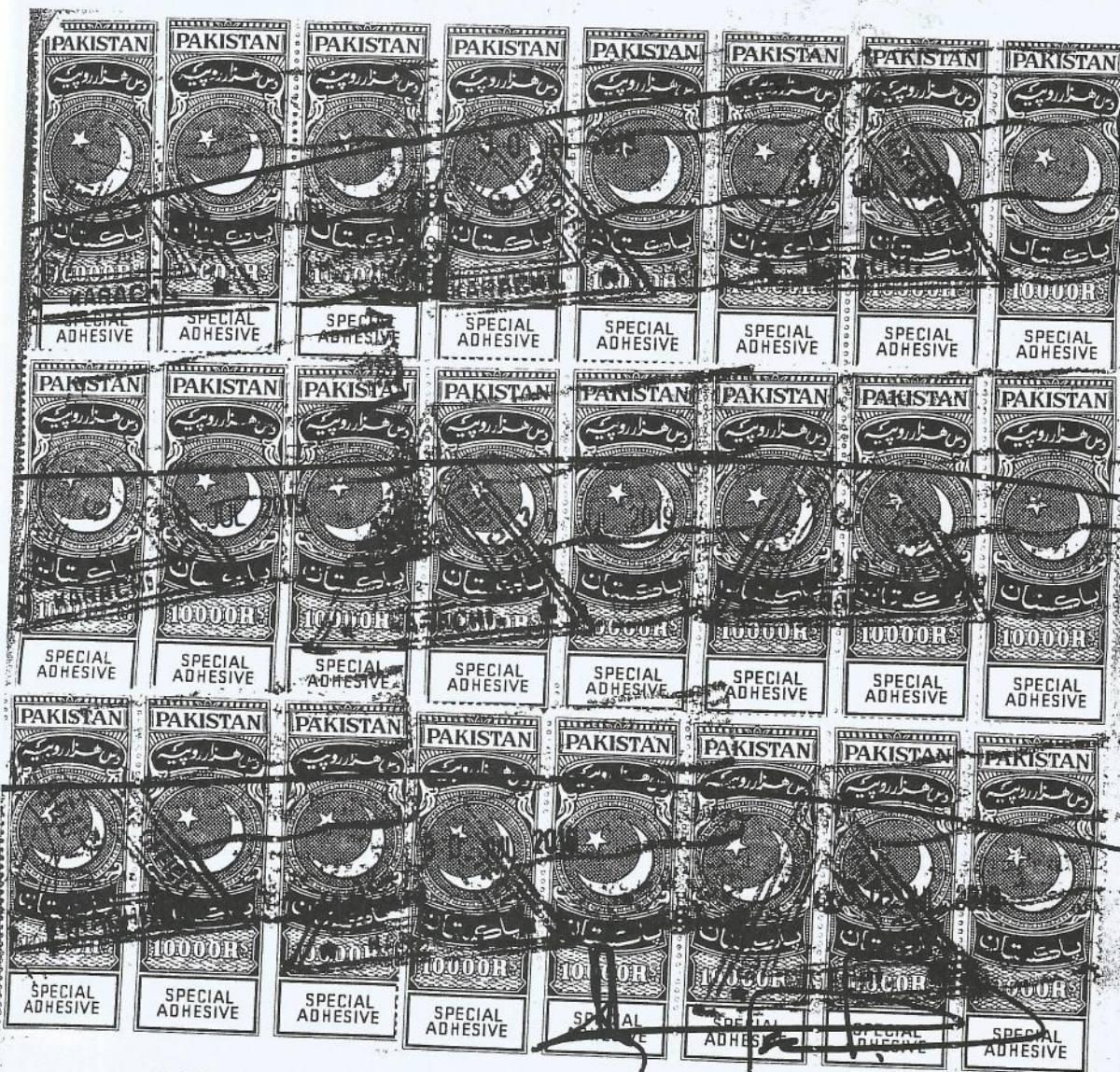
THIS CONVEYANCE DEED is made at Karachi on this ____ day of ____ 2019.

BETWEEN

PANASIAN INDUSTRIES (PRIVATE) LIMITED a company incorporated under the corporate law of Pakistan having its registered at Plot No.90, M.A Jinnah Road, Karachi through its authorized persons (1). Ms. Saker Khanu Moloo daughter of Ismail, Muslim, Adult, holding CNIC No.42000-0457765-2 and (2). Syed Aftab Hussain son of Syed Waris Hussain, holding CNIC No.42201-1925456-9, (hereinafter referred to as the "Vendor", which expression shall, unless repugnant to or excluded by the context mean and include its directors, executors, representatives, attorneys, successors-in-interest and assigns) **OF THE FIRST PART;**

Saker Khanu Moloo
[Signature]

[Signature]



24
26
48

LD

2261
Sub-Registrar
Muzaffargarh District

30.7.19



AND

M/S. MARVI ENERPRISES a partnership concern having its registered office at Anaj Mandi, Daharki, District Ghotki, Ghotki, Daharki through its partner Mr. Mahesh Kumar son of Ram Chand, Hindu, Adult, holding CNIC No.45101-5655232-9, resident of House 612, Old Anaj Mandi, Daharki (hereinafter referred to as the "Vendee", which expression shall, unless repugnant to or excluded by the context mean and include their legal heirs, executors and permitted assigns), **OF THE SECOND PART;**



Sabir 2020

[Signature]



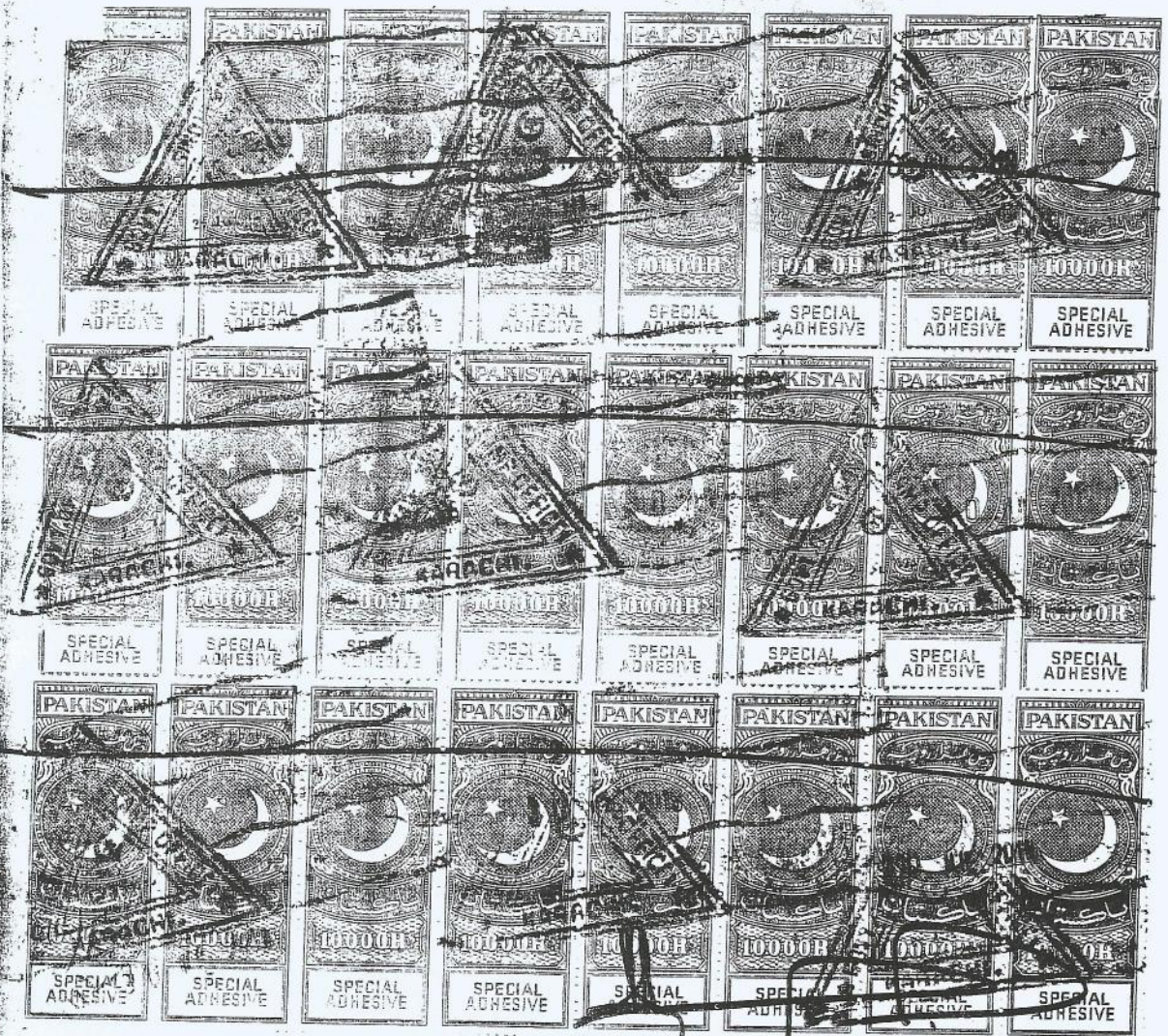
20.2.19



WHEREAS the Seller above-named on the date of these presents is seized and possessed of all that amalgamated (commercial) plot of land bearing Survey No. 90, measuring 3740 square yards, situated at Depot Lines, Karachi Cantonment, Karachi along with single story building constructed thereon with authorized (hereinafter referred to as the "Said Property").



Sahar mudo



2261
24/06/1996

10

2261
Sub-Registrar II
Jamshed Town, Karachi

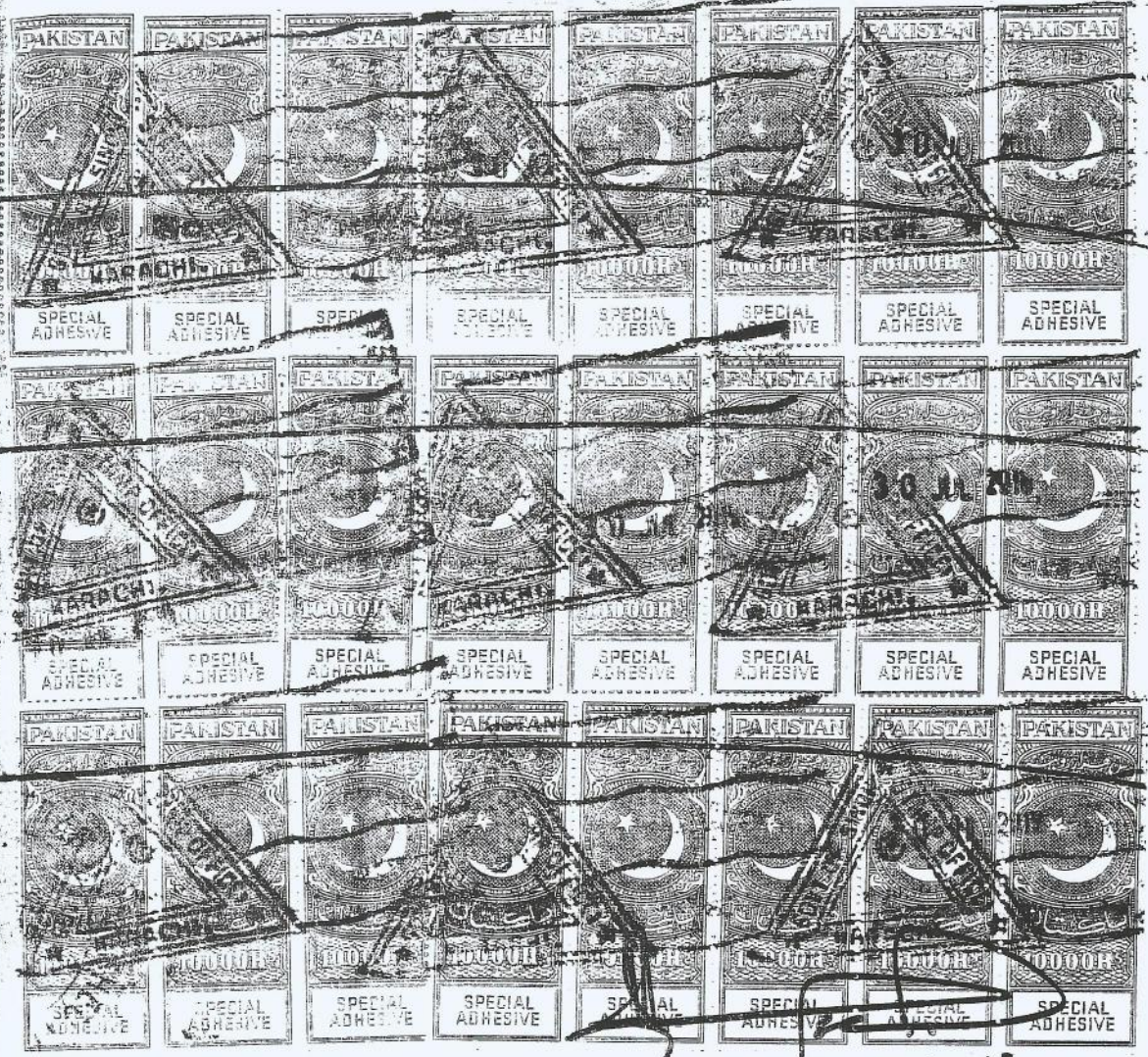


AND WHEREAS the Seller acquired leasehold rights ending on 18.07.1998 in the Said Property with authorized

vide Schedule-VIII of the Cantonment Land Administration Rules 1937 duly registered in the office of the Sub-Registrar T. Division I (A), Karachi at No.

1711, pasted at pages No. 19 and 196 in volume No. 12 of Book No. I Addle, dated 14.07.1996.

Sub-Registrar II
Jamshed Town, Karachi



24/20/2007

110

2261
Jamshed Town, Karachi

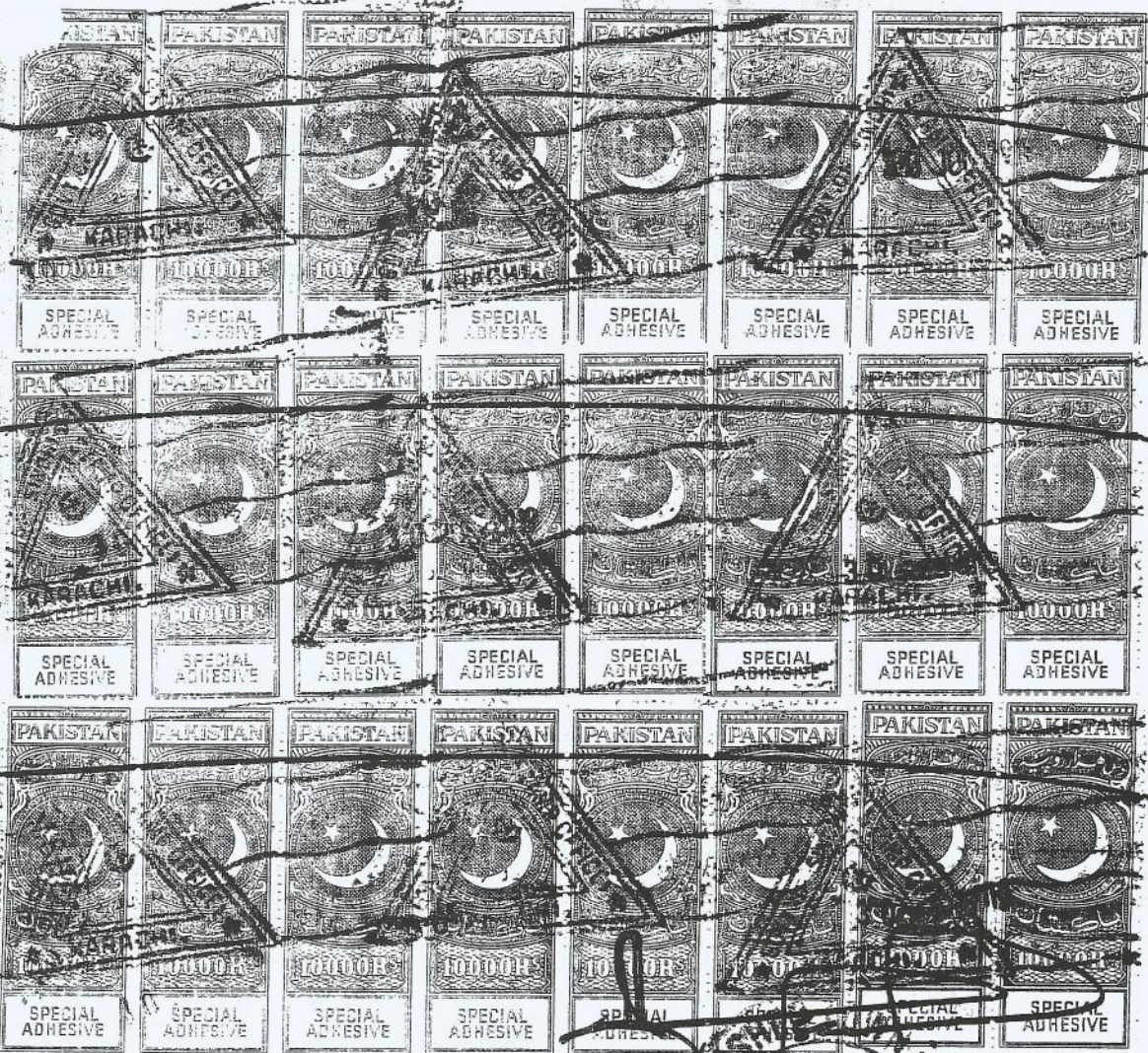
31.3.15



AND WHEREAS due to expiration of first term of lease, the Seller has got lease period renewed for further 30 years with commencing from 19.07.1998 and ending on 18.07.2028 vide Schedule-IV under rule 16 (3) of the Cantonment Land Administration Rules 1937 duly registered in the office of the Sub-Registrar, Jamshed Town, Karachi at No. 789, Book No. I, dated 29.04.2019.

[Handwritten signature]
Sd/- *[Signature]*

[Handwritten signature]



10000/- 120
24
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100

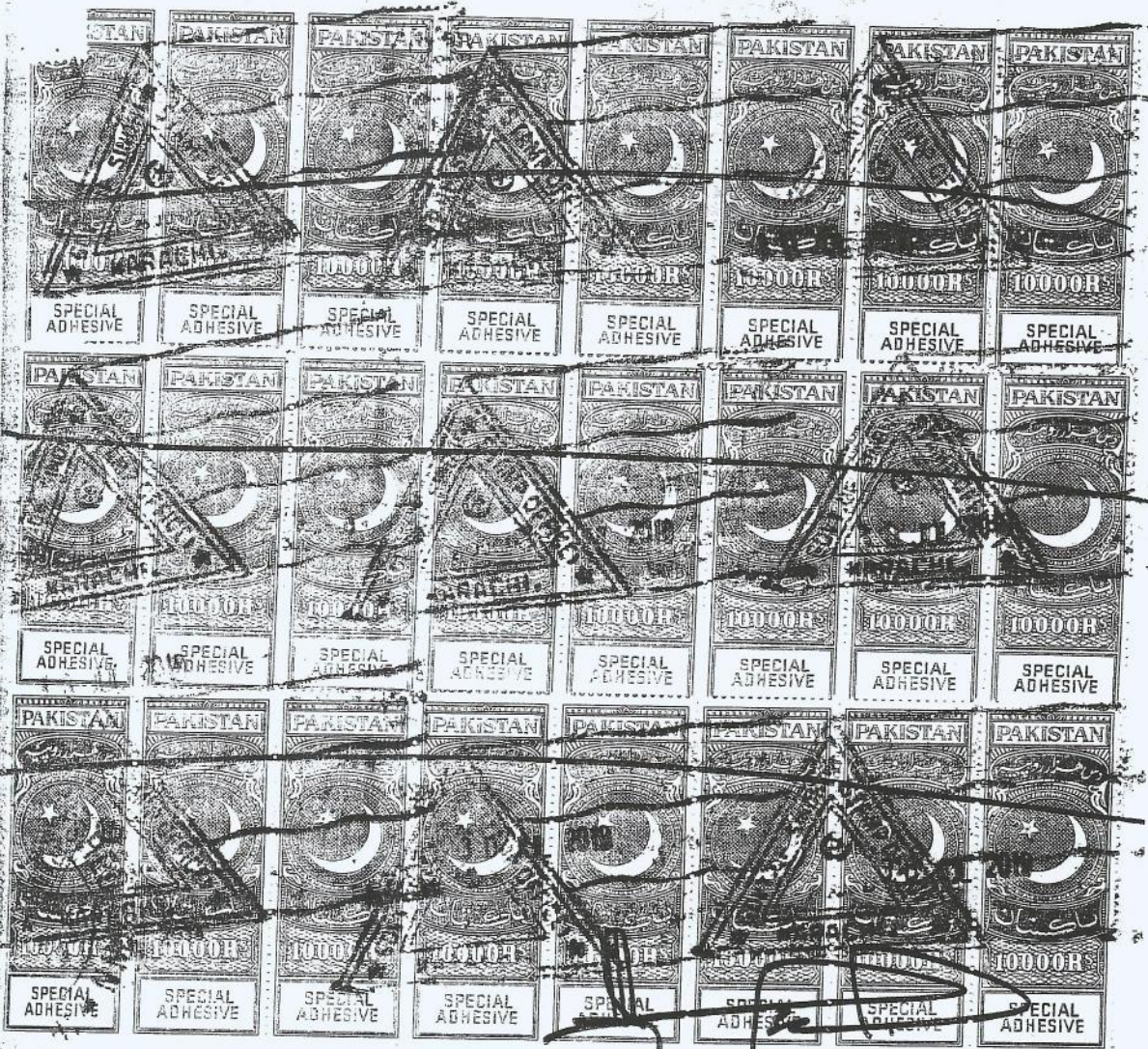
2261
Registration No. _____
Sub-Registrar's Office
Municipal Town Karachi



AND WHEREAS the Vendor has agreed to sell, transfer, assign and convey the Said Property to the Vendee and the Vendee has agreed to purchase the Said Property from the Vendor free from all charges, claims, encumbrances, mortgages, liens, rights, obligations, objections of any nature whatsoever and together with valid, marketable and transferable commercial leasehold rights free from any restrictions or objections from any department, authority or person whatsoever for an aggregate sale consideration of **Rs. 250,000,000/-** (Rupees Two Hundred Fifty Million Only) on the terms and conditions set-forth in this Conveyance Deed.

PAKISTAN
MUNICIPAL TOWN KARACHI
Sub-Registrar's Office
Sahar mutor

[Handwritten signature]



REGISTRAR
KARACHI

144
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168

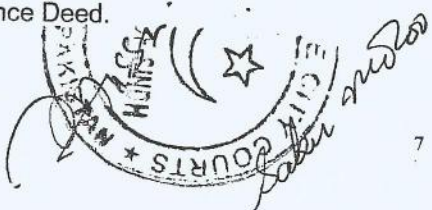
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Sub-Registrar
Karachi

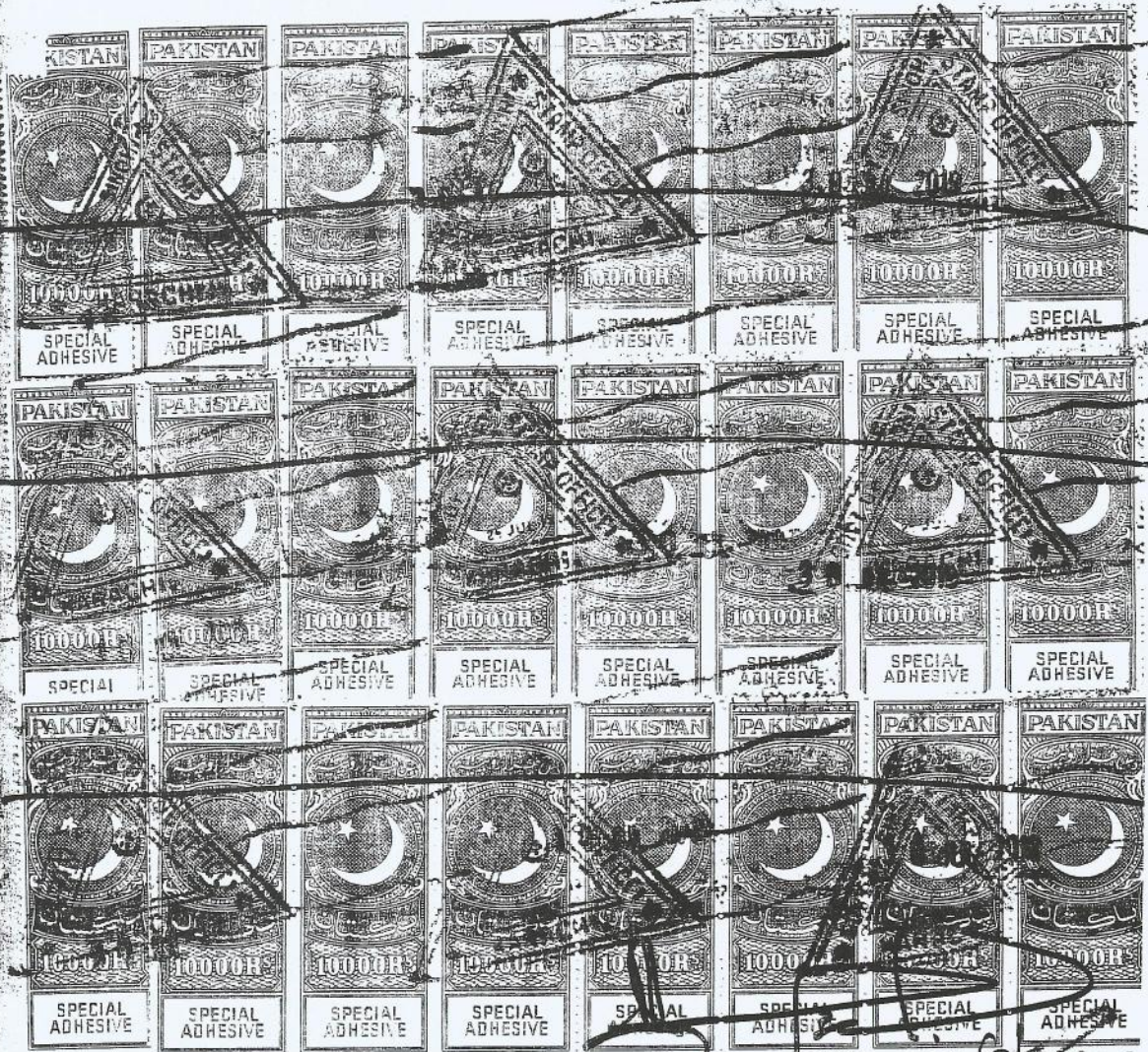


AND WHEREAS the Vendee has paid the aggregate sale consideration of Rs. 250,000,000/- (Rupees Two Hundred Fifty Million Only) to the Vendor before the execution and registration of this Conveyance Deed vide

(1). Cheque/Pay Order [BCDHA 00011304] dated [01-08-2019] for Rs. [250,000,000]
]/- drawn on Bank [Bank Alfalah Defence Branch] Branch Karachi in favour
 of [Panasonic Industries (Private) Limited] , receipt whereof the Vendor
 doth hereby admits and acknowledges, on the terms and conditions set-forth in this
 Conveyance Deed.

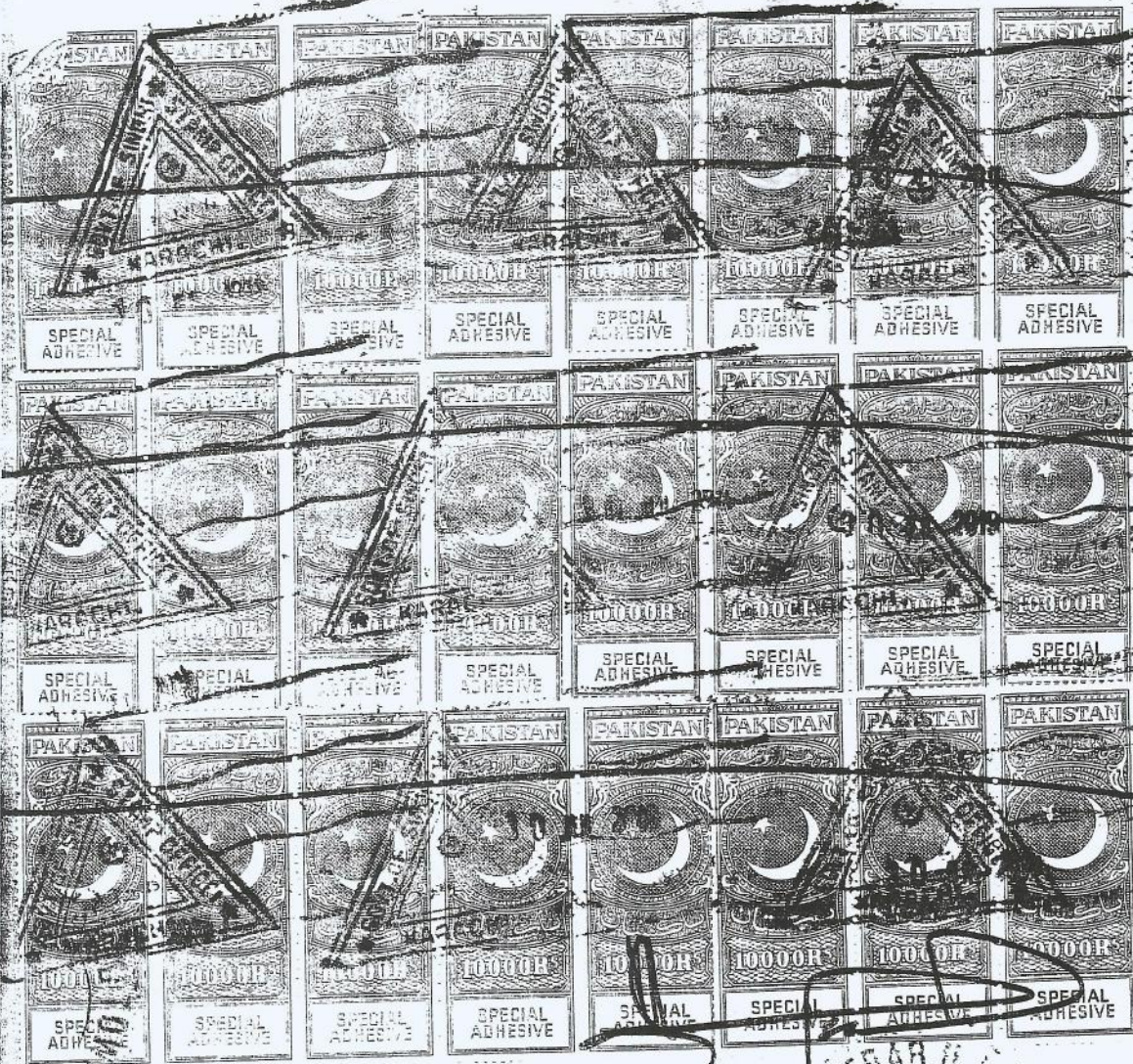


[Handwritten signature]



NOW, THEREFORE, THIS CONVEYANCE DEED WITNESSETH AS UNDER:

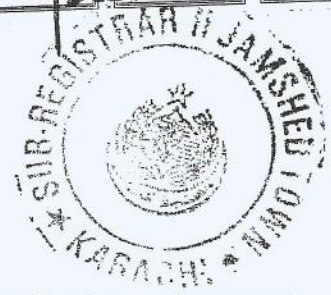
1. In consideration of the full and final sale consideration of **Rs. 250,000,000/-** (Rupees Two Hundred Fifty Million Only) for the sale of the Said Property, paid by the Vendee to the Vendor prior to execution of this Conveyance Deed, receipt whereof the Vendor hereby admit and acknowledge, and of and from the same and every part thereof the Vendor hereby acquits, discharges and exonerates the Vendee and the Vendor as the exclusive, legal and beneficial owner of the Said Property hereby sells, transfers, assigns and conveys absolutely unto the Vendee the Said Property **TOGETHER WITH** marketable and transferable title thereto and the existing privileges, rights, title, commercial leasehold interest, easements, passages and all advantages whatsoever belonging thereto or in any way appertaining therewith or any part thereof now or at any time hereto - before usually held, occupied or enjoyed by the Vendor **TO HAVE AND TO HOLD THE SAME** unto and to the use and benefit of the Vendee as absolute owner thereof, free from all lets, hindrances, claims, demands, suits, disputes, denials, interruptions, litigations, previous commitments, sureties, mortgages, charges and for ejection whatsoever **AND** together with the absolute right to further sell, transfer, convey, mortgage, gift, and assign the Said Property.



192
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216

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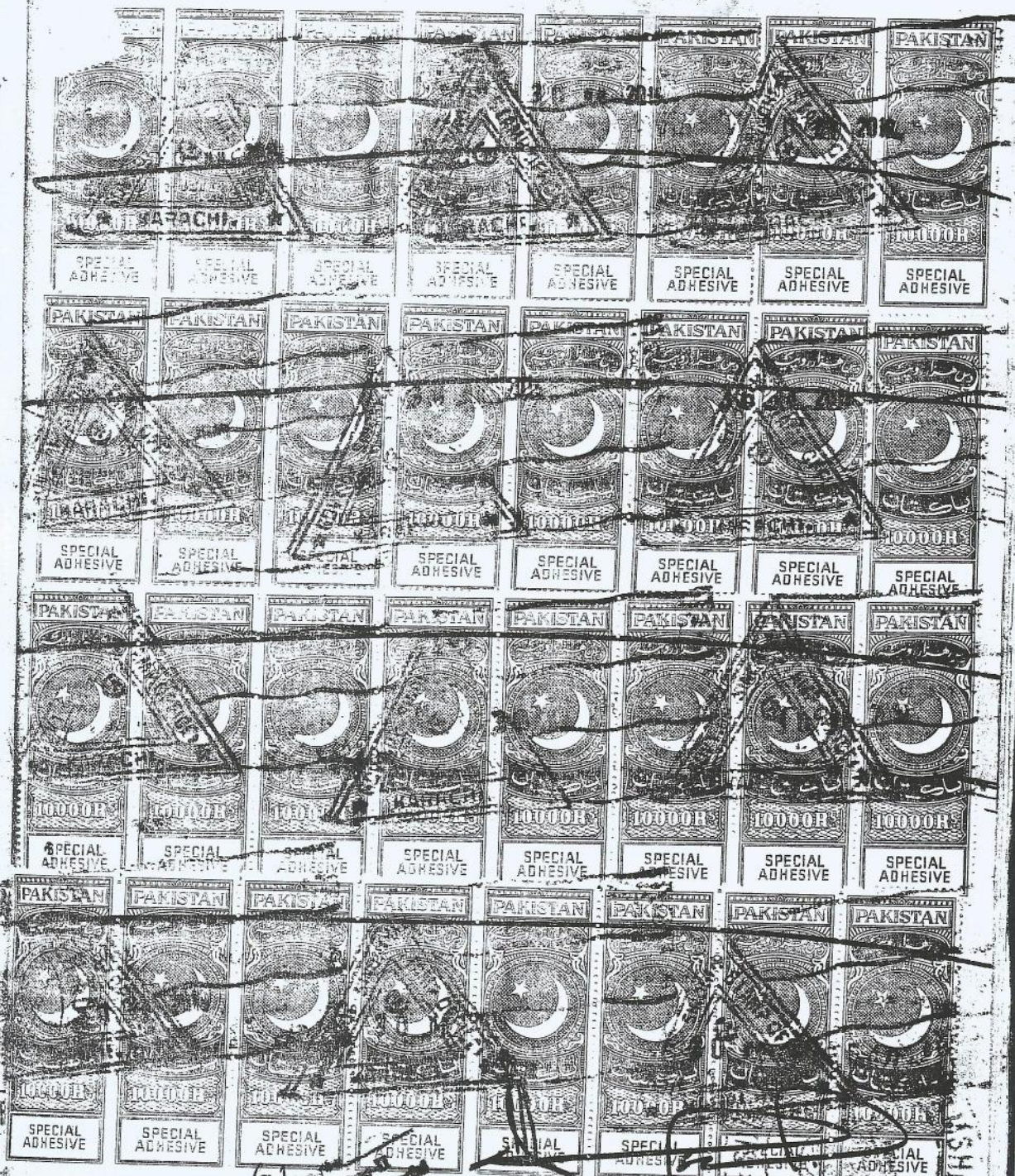
2267



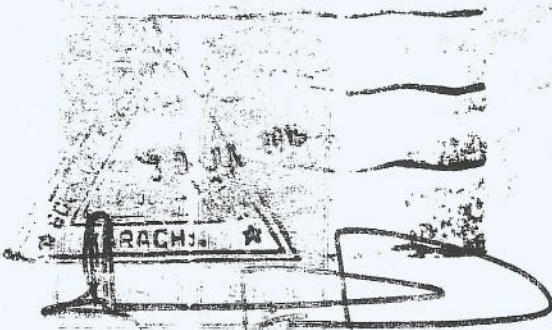
2. That the Vendor doth hereby covenants with the Vendee and represents that the Vendee shall be absolutely entitled to peacefully and quietly own, possess, occupy and enjoy the Said Property free from all claims, demands, charges, lets, hindrances, interruptions and disputes, litigations, and eviction whatsoever from any persons claiming through, under or in trust from the Vendor.
3. That the Vendor doth hereby covenants with the Vendee and represents that the Vendor have not done, made, committed, permitted or caused suffer to be done or neglected from doing anything whereby the Vendor's right to grant, sell, assign, convey or transfer any of estate, rights, titles and interest in respect of the Said Property and/or right of possession and enjoyment have been or may be impaired.

Sabir
COURTS

[Signature]



4. That the Vendor further doth hereby covenants with the Vendee that the Vendor has valid marketable leasehold title to the Said Property and the Said Property is free from all claims, disputes, mortgages, charges, liens, demands and encumbrances whatsoever and that the Vendor shall keep and hold the Vendee secured, harmless and indemnified against any losses, damages or costs suffered or incurred by the Vendee on account of any defect in the title of the Vendor to the Said Property or on account of any lawful claims, liens, mortgages, charges, evictions, lets, hindrances and encumbrances in respect of the Said Property created prior to the date hereof.



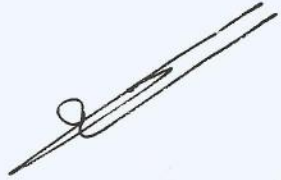
OFFICE OF THE
Stamp Office

30 JUL 2019

30-7-19

1/2

5. That the Vendor doth hereby declares that the peaceful complete physical vacant possession of the Said Property has been handed over to the Vendee and the Vendor has also delivered to the Vendee all the original deeds and documents of title pertaining to the Said Property in the possession of the Vendor and relating to the Said Property and that henceforth the Vendor has ceased to have any right, title, interest or claim in the Said Property or any part thereof and the Vendee shall be the exclusive, absolute and rightful owner of the Said Property, and Vendee acknowledges receipt of peaceful complete physical possession of the Said Property and of the said original deeds and documents.
6. The Vendor further covenants with the Vendee and represents that all dues, outgoings, taxes, levies, charges in respect of the Said Property and bills for utilities (telephone, electricity gas, water and conservancy) availed or connected at the Said Property for the period up to the date of presentment for registration of this Conveyance Deed (including but not limited to property tax and ground rent and dues of Military Estate Office, Karachi Cantonment Board) have been paid and cleared by the Vendor, however, if any, claims and /or bills in respect of the same are received by the Vendee pertaining to the period up to the date of registration of this Conveyance Deed, the same shall be borne by the Vendor and the amount thereof immediately paid to the Vendee on demand.
7. The Vendor undertakes to execute or sign such other documents, applications, declarations, and forms and provide all necessary co-operation as may be necessary or required for more fully perfecting the conveyance and transfer of the Said Property to the Vendee and to procure the Said Property to be transferred / mutated in the records of Military Estate Office, Karachi Cantonment Board and other departments, all at the entire cost and expense of the Vendee.



SCHEDULE OF THE PROPERTY

ALL THAT piece and parcel of amalgamated (commercial) plot of land bearing Survey No.90, measuring 3740 square yards, situated at Depot Lines, Karachi Cantonment, Karachi along with single story building constructed thereon together with all Fittings and fixtures installed therein within the territorial jurisdiction of _____ P.S. and registration District, Sub-District and City of Karachi, bounded as follows:-

On the North by : 10'-00" Wide Road
On the South by : M.A. Jinnah Road
On the East by : Survey No.102
On the West by : Survey No.90/I

2261
Sub-District
Limited Terms

IN WITNESS WHEREOF the parties hereto have executed and delivered this Deed on the day month and year first above mentioned.

WITNESSES:

Sunny Kumar
45101-16914681

VENDOR

PANASIAN INDUSTRIES (PVT.) LIMITED
Through its authorised persons



(1) Syed Aftab Hussain
S/o Syed Waris Hussain
CNIC 42201-1925456-9

2. *[Signature]*
Ch. Abid ulah Khan
34601-0812254-3

[Signature]

(2) Ms. Saker Khanu Moloo
Daughter of Haji Ismail
CNIC 42000-0457765-2



Vendee

M/S. MARVI ENTERPRISES
Through its partner
Mr. Mahesh Kumar S/o
of Ramchand
CNIC No.45101-5655232-9



S. No: 2610

Presented in the office of

Sub-Registrar-II,

Jamshed Town on:

Between: Hrs. _____ to: _____

06 AUG 2019

Shahin J. Chaudhary
Sub-Registrar-II

Jamshed Town, Karachi

Received Registration Fee as follows:

Registration fee: 12.50,000/-

Micro Filing Fee: _____

Endorsement Fee: _____

Search Fee: _____

Penalties a/s 25/34: _____

Income Charges: 12.50,000/-

Shahin J. Chaudhary
Sub-Registrar-II

Jamshed Town, Karachi

Mr./Mrs./Miss: Syed Ahab Hussain

S/o D/o W/o Syed Inam Hussain

Executing Party Business/Service: _____

Muslim Adult Age: 48

R/o Gulshan-e-Jahangir

Admits execution of this deed.

NIC NO. 422014925456-9

In the Capacity as: _____ in the deed.

Mr./Mrs./Miss: Sakher Khanum Nisoor

S/o D/o W/o Haji Ismail

Executing Party Business/Service: _____

Muslim Adult Age: 81

R/o DHA Karachi

Admits execution of this deed.

NIC NO. 42000-0457765-12

In the Capacity as Show in the deed.

Mr./Mrs./Miss: Mahesh Kumar

S/o D/o W/o Rame Khan

Executing Party Business/Service: _____

Muslim Adult Age: 52

R/o Anaj Market Karachi

Admits execution of this deed.

NIC NO. 45101-5655232-9

05761733
24-08-19
C/1301 R2

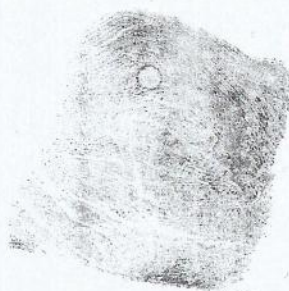
H. Nisoor

①

Mahesh

②

Sakher Nisoor



3

~~2~~



M. Amin Khan
HK-3058

States that he personally
knows the above executant
and identifies.

Date: 06 AUG 2019

Shahur gh Chaudhary
Sub-Registrar-II
Jamshed Town, Karachi

NOTE: Officer to check 8 pages only

Shahur gh Chaudhary

SUB-REGISTRAR
JAMSHED TOWN-II
KARACHI

NOTE: Please check 8 pages and send
over to Registrar on 8.8.2019



28-890-2019

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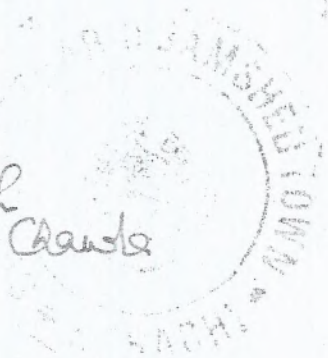


Shahur gh Chaudhary

SUB-REGISTRAR-II
JAMSHED TOWN
KARACHI

Registered No: 2261
Book No: 8
Date: 8.8.2019

Sub-Registrar
Jamshed Town-II Karachi
Shahur gh Chaudhary




PANASIAN INDUSTRIES (PRIVATE) LIMITED


BOARD RESOLUTION PASSED BY THE DIRECTORS OF PANASIAN INDUSTRIES (PRIVATE) LIMITED IN THE MEETING HELD ON JUNE 24, 2019

RESOLVED that Panasian Industries (Private) Limited ("Company") intends to sell its immovable property Survey No. 90, measuring 3740 square yards, situated at Depot Lines, Karachi Cantonment, Karachi (hereinafter referred to as the "Said Property").

FURTHER RESOLVED that (1). Ms. Saker Khanu Moloo daughter of Ismail and (2) Syed Aftab Hussain son of Syed Waris Hussain, holding CNIC No.42201-1925456-9, be and are hereby authorised to enter into the sale agreement and to execute Sale/Conveyance Deed on behalf of the Company in respect of the Said Property in favour of the proposed purchaser and appear before the concerned Sub-Registrar and present the same for registration and complete all registration formalities and admit execution thereof.

FURTHER RESOLVED that (1). Ms. Saker Khanu Moloo daughter of Ismail and (2) Syed Aftab Hussain son of Syed Waris Hussain be and are hereby authorized to deliver the possession as well as the relevant original title deeds and documents in respect of the Said Property to the proposed purchaser on behalf of the Company and sign on the Handing/Taking Over Possession Letter and take any other steps for selling and/or transferring the Said Property in favour of the proposed purchaser on behalf of the Company in respect of the Said Property.


Abdul Karim K. Kara
(Chief Executive)


Ms. Saker Khanu Moloo
(Director)


(Ms. Sultana Mangalji)

Shareholder



Prince Cinema Building M. A Jinnah Road Karachi. P.O.Box 7706, Karachi



GOVERNMENT OF PAKISTAN
Ministry of Defence
Survey of Pakistan
Directorate of Map Publication
Tele: 051-9290207

No. 937c /42-A-3/Sec,(DSCO).

Dated: 20 - 06 -2019.

To,

Mr. Saker Khanu Moloo,
PANASIAN INDUSTRIES (PVT) LIMITED,
Address. Survey 90, Depot Line, **KARACHI.**
Contact No. 021-35306079, Cell No. 0301-8311522.


Sub: **PROVISION OF SITE CO-ORDINATES IN WGS-84:**

Ref: Your office letter No. Nil, dated. 27-05-2019,

It is intimated that site co-ordinates and height AMSL of your site location, **Plot No. Survey 90, Depot Line Karachi Cantt,** have been issued vide this office letter No. 936c /42-A-3/Sec,(DSCO), dated. 20 -06 -2019, to concerned authorities as detailed below:-

- i) **Additional Director, Aerodrome Standards Branch,
Headquarters Pakistan Civil Aviation Authority,
Inspectorate Building,
Jinnah International Airport, KARACHI:**
- ii) **The Assistant Director, Navigation,
Directorate of ATS, Air Headquarters, ISLAMABAD:**

You are requested to contact with the above offices for further proceeding please.


(MUHAMMAD QASIM)
ASSISTANT DIRECTOR
MAP PUBLICATION OFFICE
SURVEY OF PAKISTAN
RAWALPINDI

Copy to:-

The Director Southern Circle, Survey of Pakistan Karachi, for information with reference to **DSCO letter No. 546-T/42-A-2, dated. 30-05-2019, and 6 Party letter No. 2538/42-A-3/Verify, dated. 18-06-2019,** please.

INFORMATION TO INDENTERS

No. 942-C/42-A-3/Sec

Dated 20 - 06 -2019.

ACKNOWLEDGMENTS

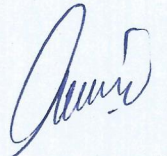
- i. Additional Director, Aerodrome Standards Branch,
Headquarters Pakistan Civil Aviation Authority,
Inspectorate Building,
Jinnah International Airport,
KARACHI.
- ii. The Assistant Director Navigation,
Director of ATS , Air Headquarters
ISLAMABAD.

SL No.	Letter No.	Dated	SL No.	Letter No.	Dated
1	880-C/42-A-3/Sec(DSCO)	20-06-2019	16	910-C/42-A-3/Sec(DSCO)	20-06-2019
2	882-C/42-A-3/Sec(DSCO)	20-06-2019	17	912-C/42-A-3/Sec(DSCO)	20-06-2019
3	884-C/42-A-3/Sec(DSCO)	20-06-2019	18	914-C/42-A-3/Sec(DSCO)	20-06-2019
4	886-C/42-A-3/Sec(DSCO)	20-06-2019	19	916-C/42-A-3/Sec(DSCO)	20-06-2019
5	888-C/42-A-3/Sec(DSCO)	20-06-2019	20	918-C/42-A-3/Sec(DSCO)	20-06-2019
6	890-C/42-A-3/Sec(DSCO)	20-06-2019	21	920-C/42-A-3/Sec(DSCO)	20-06-2019
7	892-C/42-A-3/Sec(DSCO)	20-06-2019	22	924-C/42-A-3/Sec(DSCO)	20-06-2019
8	894-C/42-A-3/Sec(DSCO)	20-06-2019	23	926-C/42-A-3/Sec(DSCO)	20-06-2019
9	896-C/42-A-3/Sec(DSCO)	20-06-2019	24	930-C/42-A-3/Sec(DSCO)	20-06-2019
10	898-C/42-A-3/Sec(DSCO)	20-06-2019	25	932-C/42-A-3/Sec(DSCO)	20-06-2019
11	900-C/42-A-3/Sec(6-Party)	20-06-2019	26	934-C/42-A-3/Sec(DSCO)	20-06-2019
12	902-C/42-A-3/Sec(DSCO)	20-06-2019	27	936-C/42-A-3/Sec(DSCO)	20-06-2019
13	904-C/42-A-3/Sec(DSCO)	20-06-2019	28	938-C/42-A-3/Sec(DSCO)	20-06-2019
14	906-C/42-A-3/Sec(DSCO)	20-06-2019	29	940-C/42-A-3/Sec(DWCO)	20-06-2019
15	908-C/42-A-3/Sec(DSCO)	20-06-2019			

SURVEY OF PAKISTAN
DIRECTORATE OF SOUTHERN CIRCLE
KARACHI

Sub: **PROVISION OF SITE CO-ORDINATES IN SIX DIGITS AND HEIGHT A.M.S.L:**

Forwarded duly recommended to the Director Map Publication, Survey of Pakistan, Rawalpindi with the remarks the Govt. fee: amounting co-ordinate and height fee 41600/- (Copy attached) has been received vide CR No. 689/164 dated 29/5/19 (Copy attached) or cheque / Bank Draft No — dated — (Copy attached) documents submitted by the indenter are enclosed, please.


(KHALID TUFAIL)
Assistant Director
T.O to DSC
Survey of Pakistan Karachi

No. 546-T/42-A-2

Dated: 30 05 – 2019

Copy to,

Mr. Saker Khanu Moloo, Panasian Industries (Pvt.) Ltd. Survey No. 90, Depot Line, Karachi Cantt for information with the request to collect the map duly marked for coordinates from this office, please



HEADQUARTERS
PAKISTAN CIVIL AVIATION AUTHORITY
JINNAH INTERNATIONAL AIRPORT
INSPECTORATE BUILDING
KARACHI-75200, PAKISTAN
Tel: (92-21) 99242741
Fax: (92-21) 99242676
e-mail: daar@caapakistan.com.pk

Ref (HQCAA/1117/003/ARAS/KHI-895) /750

Date: 11 July, 2019

Dear Sir,

HEIGHT CLEARANCE AS PER RULE-68 AND AVIATION SAFETY STANDARDS
(CONSTRUCTION SUBJECT TO NOC FROM RESPECTIVE BUILDING CONTROL AUTHORITY)

Kindly refer to your Application dated 2nd July 2019 regarding the NOC for height clearance.

2. Pakistan Civil Aviation Authority is pleased to inform availability of height of **500 feet (Five hundred feet) Above Ground Level (AGL) or 536 feet Above Mean Sea Level (AMSL)** high building including over head water tank, antenna, Neon Sign board etc, on roof top at (245201.30797N 670135.71675E, 245159.77279N 670136.69478E, 245200.37577N 670137.68403E & 245201.78685N 670137.25718E) at Plot Survey No.90, Depot Lines, Karachi with the following terms and conditions:-

- Construction will begin after NOC from respective building control authority and lifting of ban from courts.**
- Height of the building should not be more than **500 feet (Five hundred feet) Above Ground Level (AGL) or 536 feet Above Mean Sea Level (AMSL)** including over head water tank, antenna, Neon sign board etc. on roof top.
- Obstruction light must be provided on top of the building in accordance with the specification contained in Para 6.2 of chapter 6 of Aerodrome Standard Manual of Pakistan (ASMP) (copy enclosed).
- The refuse shall not be kept open but always be stored in covered containers to ensure that birds are not attracted.
- Civil Aviation Authority shall not accept liability for any loss(s)/damage(s) /inconvenience suffered due to noise or other aviation related activities or any other claim by other Organizations/person(s).
- Civil Aviation Authority reserves the right to cancel the said clearance if the terms & conditions are not complied.
- This NOC is only valid **FOR HEIGHT CLEARANCE FOR FLIGHT SAFETY PURPOSES** and **does not cover the NOCs** for construction and other purposes required from **Building Control Authorities, organizations, agencies etc.**
- Clearance from Director Air Traffic Services, Air Headquarters PAF, Islamabad must also be obtained before the start of work. Height cleared by CAA or PAF whichever is lower will be considered as final permissible height.**
- Completion of work is also required to be notified to HQCAA for the issuance of notices to the Aviators.

3. This Clearance is only related to the permissible height at proposed location and does not absolve the holder for fulfilling requirement of other concerned departments. Moreover, any omission due to submission of incorrect data or marginal error **shall not entitle** the holder for any claim whatsoever in future. **In addition at any stage if, any dispute of land on the said survey numbers arises with CAA, this clearance shall stand canceled immediately.**

Encl: As stated in Para 2(c)

(JAVED AZIZ FAROOQI)

Director

Airspace & Aerodrome Regulations

To,
✓ Mr. Sakar Khanu Moloo,
Pan Asian Industries Pvt Ltd,
Survey 90, Depot Lines,
Karachi Cantt.

Copy to:-

- DG SBICA, Karachi.
- Director ATS, Air Headquarters, Islamabad.
- Airport Manager JIAP, Karachi
- AdID AIM HQCAA.
- A/AdID Procedure Design, HQCAA.

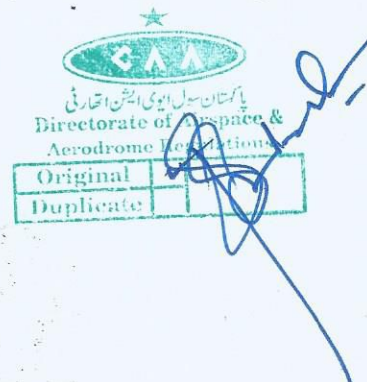


Table 6-3 Light distribution for medium and high intensity obstacle lights according to benchmark intensities of table 6-1

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)			Vertical		Vertical elevation angle (b)			Vertical beam	
	0°		-1°	beam spread (c)		0°	-1°	-10°	spread (c)	
	Minimum average intensity (a)	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensit y (a)	Maximu m intensity (a)	Maximu m intensity (a)	Maximu m intensity (a)	Maximum beam spread	Intensit y (a)
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75 000
100 000	100 000	75 000	37 500	3°	37 500	125 000	56 250	3 750	7°	37 500
20 000	20 000	15 000	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2000	2000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

Note.— This table does not include recommended horizontal beam spreads. 6.2.1.3 requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

- (a) 360° horizontal. All intensities are expressed in Candela. For flashing lights, the intensity is read into effective intensity, as determined in accordance with the Aerodrome Design Manual, Part 4.
(b) Elevation vertical angles are referenced to the horizontal when the light unit is leveled.
(c) Beam spread is defined as the angle between the horizontal plan and the directions for which the intensity exceeds that mentioned in the "intensity" column.

Note.— an extended beam spread may be necessary under specific configuration and justified by an aeronautical study.

- 6.2.2.6 Low intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security shall be flashing-blue and those displayed on other vehicles shall be flashing-yellow.
6.2.2.7 Low intensity obstacle lights, type D, shall be displayed on follow-me vehicles.
6.2.2.8 Low intensity obstacle lights on objects with limited mobility such as aerobridges shall be fixed-red, and as a minimum be in accordance with the specifications for low-intensity obstacle lights, type A, in table 6-1. The intensity of the lights shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

6.2.3 Fixed objects

Note.— The fixed objects of wind turbines are addressed separately in 6.2.4 and the fixed objects of overhead wires, cables, etc. and supporting towers are addressed separately in 6.2.5.

Marking

- 6.2.3.1 All fixed objects to be marked shall, whenever practicable, be coloured, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need to be otherwise marked.

Marking by colour

- 6.2.3.2 Recommendation — An object should be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red

and white should be used, except where such colours merge with the background. (see figure 6-1).

6.2.3.3 Recommendation – An object should be coloured to show alternating contrasting bands if:

- it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or
- it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.

The bands should be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less. The colours of the bands should contrast with the background against which they will be seen. Orange and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour. (see figure 6-1 and 6-2).

Note – Table 6-4 shows a formula for determining band widths and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour.

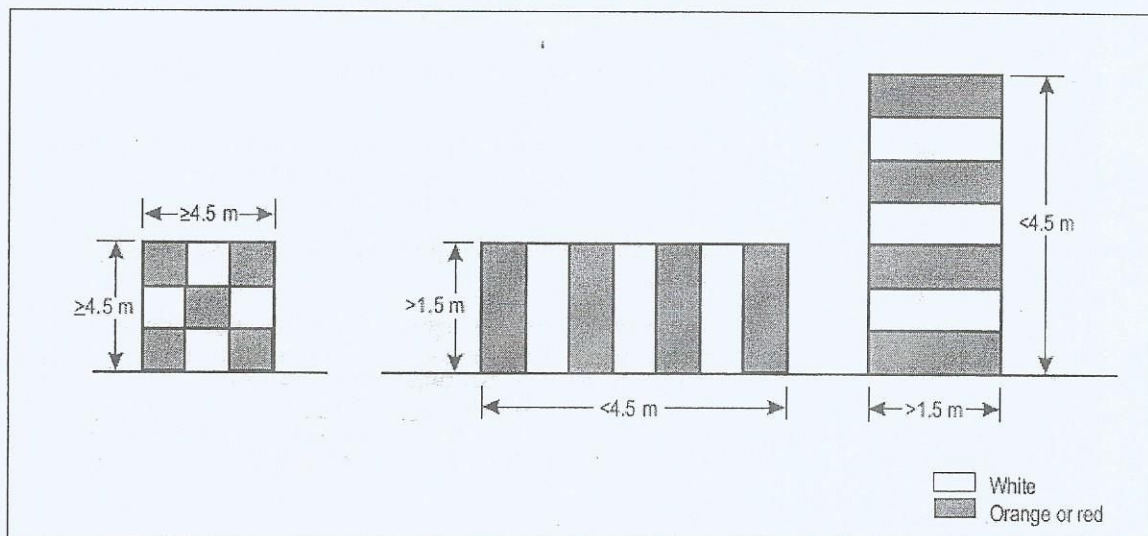


Figure 6-1. Basic marking patterns

Table 6-4. Marking band widths

Longest dimension		Band width
Greater than	Not exceeding	
1.5 m	210 m	1/7 of longest dimension
210 m	270 m	1/9 " " "
270 m	330 m	1/11 " " "
330 m	390 m	1/13 " " "
390 m	450 m	1/15 " " "
450 m	510 m	1/17 " " "
510 m	570 m	1/19 " " "
570 m	630 m	1/21 " " "

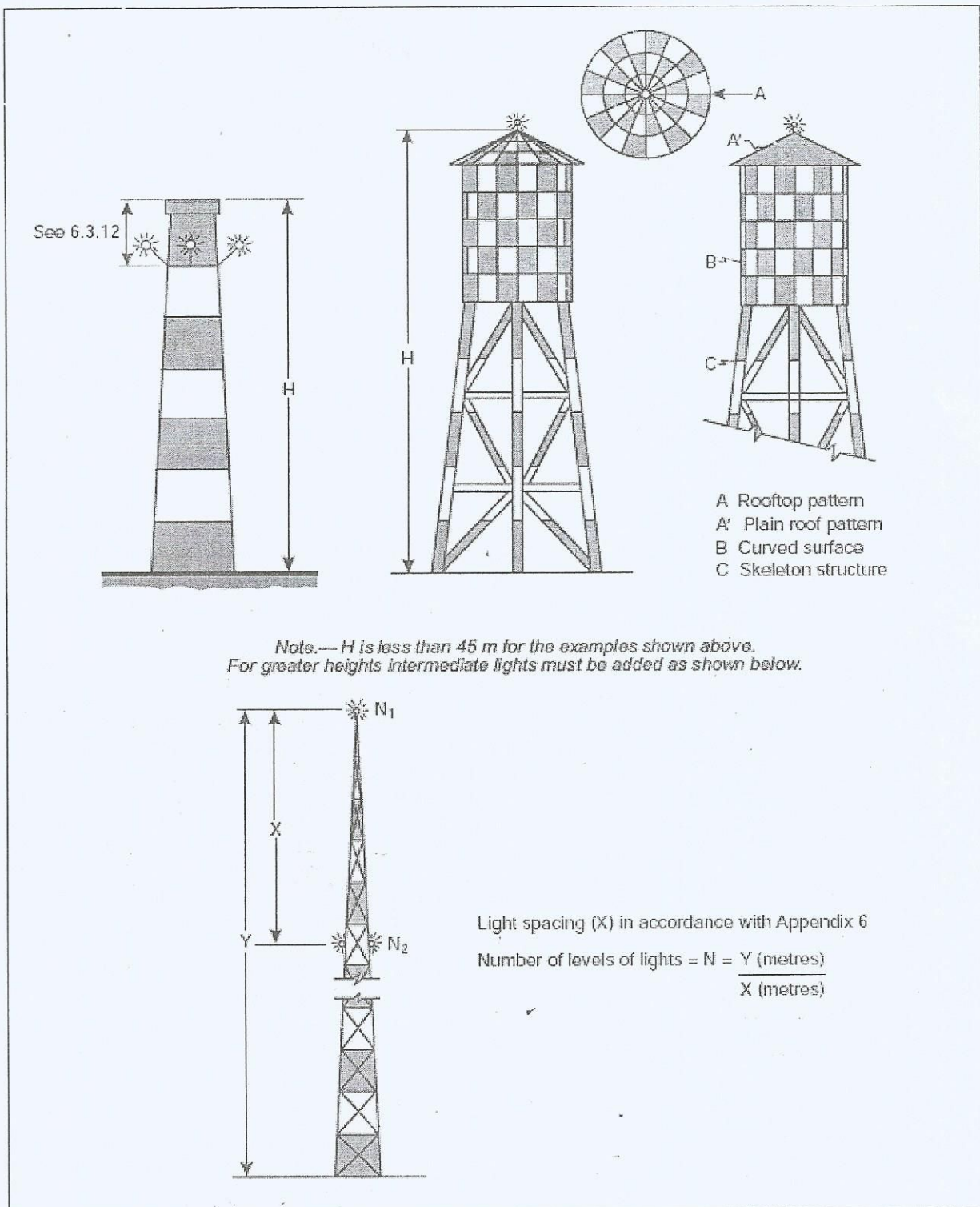


Figure 6-2. Examples of marking and lighting of tall structures

- 6.2.3.12 In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance, such as a rod or an antenna, greater than 12 m where it is not practicable to locate a high intensity obstacle light on top of the appurtenance, such a light shall be located at the highest practicable point and, if practicable, a medium-intensity obstacle light, type A, mounted on the top.
- 6.2.3.13 In case of an extensive object or a group of closely spaced objects to be lighted that are:
- penetrating a horizontal OLS or located outside an OLS, the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface or above the ground, and so as to indicate the general definition and the extent of the objects; and
 - penetrating a sloping OLS the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface, and so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked.
- 6.2.3.14 **Recommendation** - When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights should be placed on the highest point of the object.
- 6.2.3.15 Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and
- low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m.
 - medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.
- 6.2.3.16 High-intensity obstacle lights, Type A, medium-intensity obstacle lights, Types A and B, located on an object shall flash simultaneously.
- 6.2.3.17 **Recommendation** - The installation setting angles for high-intensity obstacle lights, Type A, should be in accordance with Table 6-5

Note - High intensity obstacle lights are intended for day use as well as night use. Care is needed to ensure that these lights do not create disconcerting dazzle. Guidance on the design, operation and the location of high-intensity obstacle lights is given in the Aerodrome Design Manual, Part 4.

- 6.2.3.18 **Recommendation** - Where, in the opinion of the appropriate authority, the use of high-intensity obstacle lights, type A, or medium-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns, a dual obstacle lighting system should be provided. This system should be composed of high intensity obstacle lights, Type A or medium intensity obstacle lights, Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle light, Type B or C, for night-time use.

Lighting of objects with a height less than 45 m above ground level

- 6.2.3.19 **Recommendation** - Low-intensity obstacle lights, Type A or B, should be used where the object is a less extensive one and its height above the surrounding ground is less than 45 m.

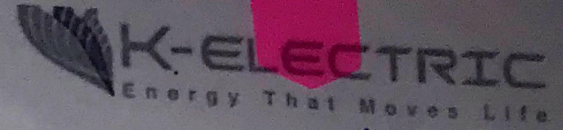
- 6.2.3.20 **Recommendation** – Where the use of low-intensity obstacle lights, Type A or B, would be inadequate or an early special warning is required, then medium- or high-intensity obstacle lights should be used.
- 6.2.3.21 **Recommendation** – Low-intensity obstacle lights, Type B, should be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with 6.2.3.22.
- 6.2.3.22 **Recommendation** – Medium-intensity obstacle lights, Type A, B or C, should be used where the object is an extensive one. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.

Note – A group of buildings is regarded as an extensive object.

Lighting of objects with a height 45 m to a height less than 150 m above ground level

- 6.2.3.23 **Recommendation** – Medium-intensity obstacle lights, Type A, B or C, should be used. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.
- 6.2.3.24 Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.
- 6.2.3.25 Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.
- 6.2.3.26 Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.
- 6.2.3.27 Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in 6.2.3.10 except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

ACTION BY	A.CE regd
C.E.O.	✓
Addi. C.E.O.	
A. S.	



Our Ref. No. S&BD/2019/ 10307
Dated: 02nd Dec, 2019

(18)

To,
The Cantonment Executive Officer
Karachi Cantonment
259, Sarwar Shaheed Road, Karachi Cantonment.
Tel: 021-99204311

Your Ref No. KCB/90/D.L./MA JINNAH ROAD/2019/2229

Date: 04-11-2019

Subject: REQUEST FOR NO OBJECTION CERTIFICATE FOR ELECTRICAL CONNECTION AT PROPOSED BUILDING PLAN ON PLOT NO. 90, SITUATED AT DEPOT LINES, MA JINNAH ROAD, KARACHI.

This refers to the request for No Objection from SBCA received in new connection department of KE Vide our inward No: 9544 on 06-11-2019, we would like to inform you that KE has exclusivity for the supply of Electricity in its distribution territory that covers the entire city of Karachi and some parts of Baluchistan as per the Distribution License issued by NEPRA dated July 21, 2003.

KE has the obligation to provide electricity Connection to any and all Applicant that meets the criteria as spelled out in the NEPRA Eligibility Criteria for consumer of Distribution Companies Regulations, 2003. Consequently, the supply of electricity connection for the premise mentioned above would be subject to availability of KE 132/11 kV and LT Network in the area, the loading condition of Grid and Feeder and the fulfilment of all new connection formalities and procedures of KE by the applicant.

The obligations on the part of applicant in addition to cost and documentary requirements include the following;

- Make available sub-station space to KE where the covered area of premise (industry, commercial, residential) exceeds 25,000 sq. feet (2323 Sq. m) and/or the Assessed load exceeds 400 kW as per the dimensions specified in KE Letter Ref No: M/S&BD/9824-A dated 12th November 2019 communicated to SBCA.
- Make available appropriate size of land facing 60 feet on roadside for the construction of the Dedicated Grid Station as per KE's Standard Specifications and policies, where the Assessed load exceeds 5 MW.

In view of the above, K-Electric has "**NO OBJECTION**" for providing Electricity Connection to the Applicant at the subject Premise if he fulfils all the above requirements

K-Electric assures the best services at all the times.

Regards,

[Signature]
02/12/2019

Sabir Ali Alarakhya
Manager Level-2
New Connections

S.NO. 11814 IN.W.NO.
DATE 04/12/19 DATE
KARACHI CANTONMENT BOARD

Mobile: +92 346 8203873
021-38701932 (Ext: 9353)

cc:

- Head of Commercial & Growth Planning – New Connections
- MARVI ENTERPRISES
Anaj Mandi Dahorki District Khotki
Cell No. 0300-8310924 , 0301-8311522

Sales/NOC/MK-Sur90/12/19
4th December, 2019

Anaj Mandi Daharki
District Ghotki.

Attn: Mr. Mahesh Kumar
(M/S Marvi Enterprises)

Subject: **NO OBJECTION CERTIFICATE**

Dear Sir,

This refers to your letter No. Nil dated 18-10-2019 for issuance of No Objection Certificate (NOC) in respect of proposed (Basement + Ground + 21st floors) Project at Plot Survey No. 90, Depot Lines, Karachi Cantt.

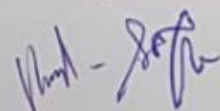
We are pleased to issue our NOC subject to following conditions:

- The NOC is being issued at your request and not a commitment on SSGC part for supply of gas to the project in future.
- Gas supply to above project will be subject to prevailing GoP Policy / Company policy and the availability of gas.
- On the basis of NOC, customer, authorized representative / residents will not be entitled to claim gas connection from SSGC.
- Gas connections to the above project for domestic use only will be subject to meeting building safety criteria by the builder/owner. In no case this connection would be used for power generation or HVAC system.
- You will clear all outstanding dues / claims related to the premise, if any.
- You will provide all required documents, approved proposed construction plan and / or completion plan duly approved by the competent authority (SBCA / Cantonment Board or any Authority / Civic Agency), whichever authority has the jurisdiction. NOC from KBCA / SBCA in accordance with SSGC requirement for gas connection.
- You will undertake to provide required NOC, Road cutting permissions from relevant Authorities to SSGC at your cost.
- Customer will complete all formalities and technical requirements.
- Customer will be required to clear right of way for SSGC Gas Mains and to arrange open and free passage for SSGC work. You will also maintain safety distance applicable to gas main existing or near the premises.
- Customer will provide safe and separate space for installation of meters as per SSGC requirement.
- The above conditions may be reviewed, modified by SSGC in future. SSGC reserves the right to withdraw NOC at any stage.

Kindly confirm for our record that above conditions are acceptable to you.

Yours truly,


Afeef Ahmed
General Manager (Sales)







Karachi Water & Sewerage Board

*** DIRECTOR BULK / GP ***

RRG DEPARTMENT

9th Mile, Karsaz, Shabrae Faisal, Karachi

Phone: 99245159/99245152 Web: www.kwsb.gos.pk Email: md@kwsb.gos.pk

No. Secy/NOC Committee/RRG/2019/ 478

Dated: 5/12/2019

The Cantonment Executive Officer
Karachi Cantonment Board,
Karachi.

Subject: NO OBJECTION CERTIFICATE.

Ref: NO.KCB/90/D.L./MA Jinnah Road/2019/2228 Dated: 04th November, 2019
M/S. MARVI ENTERPRISES PLOT NO. 90 SITUATED AT DEPOT LINES, M.A.
JINNAH ROAD, KARACHI.

Whereas with reference to the above letter NO.KCB/90/D.L./MA Jinnah Road/2019/2228 Dated: 04th November, 2019, received from KCB along with copy of concept plan and title documents for issuance of NOC for the water and sewerage services by KW&SB.

Now therefore in the current circumstances of severe water shortage and inadequate sewerage services in Karachi, this NOC is being issued with the following conditions.

- This No Objection Certificate (NOC) is being issued at the request of CBM, with reference to the above cited letter subject to the payment of advance 25% of water and sewerage connection charges.
- Separate application for water connection will only be considered until full operational capacity (260 MGD) of Phase-I K-IV Project is obtained at the end terminals of distribution system, and the remaining 75% of the water connection charges prevailing at that time, is adjusted / paid by the applicant along-with other applicable charges if any.
- Use of any alternate source of water i.e. sub-soil water etc. for any purpose will also be subject to approval from KW&SB under sub-soil water regulations for which separate application is required which will be examined & processed accordingly.
- The NOC issued to the construction site where the change of land use is permitted / allowed by CBM in conformity with the approved Master Plan and in line with Supreme Court orders.
- The CBM, shall not issue completion plan / occupancy certificate to the project until the water / sewerage connections are provided by KW&SB to the said premises.
- The Builder / Developer shall not let the premises occupy in case the utility connections are not provided.
- KW&SB reserves the right to with draw this NOC at any stage.


**Secretary,
NOC Committee, KW&SB**

Copy to:

1. Managing Director, KW&SB.
2. Dy. Managing Director (TS) / Convener.
3. Dy. Managing Director (RRG), KW&SB.
4. Builder / Owner / Builder.

M/S MARVI ENTERPRISES

**REPORT
ON
GEOTECHNICAL INVESTIGATION
FOR
'PRINCE ICON'
ON SURVEY NO. 90
DEPOT LINES, KARACHI CANTONMENT
MAIN M.A. JINNAH ROAD, KARACHI**

NOVEMBER, 2019

***GEOTECHNICAL
SERVICES***

**Civil & Geotechnical Engineers
Testing Laboratory**

**52/3, Darul Aman Society, Haider Ali Road,
Off Shaheed-e-Millat Road, Karachi.**

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**REPORT
ON
GEOTECHNICAL INVESTIGATION
FOR BUILDING 'PRINCE ICON'
ON SURVEY NO. 90, DEPOT LINES
KARACHI CANTONMENT, MAIN M.A JINNAH ROAD
KARACHI**



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**REPORT
ON
GEOTECHNICAL INVESTIGATION
FOR BUILDING 'PRINCE ICON'
ON SURVEY NO. 90, DEPOT LINES
KARACHI CANTONMENT, MAIN M.A JINNAH ROAD
KARACHI**



1. INTRODUCTION:

M/s Marvi Enterprises have planned to construct a building 'Prince Icon' on Survey No. 90, Depot Lines, Karachi Cantonment, Main M.A Jinnah Road, Karachi. The project shall comprise of basement plus ground plus 21 storeys.

In order to obtain geotechnical information for the design of foundations, it was considered necessary to carry out subsoil investigation at the project site. 'Geotechnical Services' were assigned the job of subsoil investigation. The report was prepared in November, 2019.

The program of investigation comprised of drilling six boreholes, varying in depth from 75 to 100 feet.

In order to ascertain the degree of compactness / consistency of substrata, standard penetration tests (SPTs) were performed at various depth horizons. Moreover core samples were extracted using double tube core barrel.

Selected soil and water samples were sent to the laboratory of 'Geotechnical Services' Karachi, for the evaluation of geo-engineering characteristics.

This report presents a review of subsoil investigation performed at the project site. The field and laboratory test data has been analyzed for the evaluation of allowable bearing pressure. The recommendations regarding the type and bearing capacity of foundations are incorporated in the report.

The report also incorporates borehole location plan, borelogs, field/laboratory test results and photographs.



Saif Ahmed Saeed
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PEC Regn: Civ/2917 Consult/882



2. PROGRAM OF INVESTIGATION:

Field Investigation:

The program of subsurface investigation at the project site consisted of drilling six boreholes. The boring was accomplished by rotary method.

Following is the break-up of borehole depths:

Boring No.	Investigated Depth (feet)
BH-1	75
BH-2	100
BH-3	75
BH-4	100
BH-5	75
BH-6	75

The locations of these boreholes are shown on borehole location plan appended to this report.

Standard penetration tests (SPTs) were performed at various depth horizons wherever found feasible. These tests were performed in accordance with ASTM Designation D-1586. This test gives indication of degree of compactness/consistency of granular/cohesive substrata. The 'N'-values are shown on borelogs appended to this report.

Disturbed samples were obtained through split spoon sampler used in the standard penetration tests. These samples were carefully examined to identify the soil types at various depths. The samples were placed in plastic containers, marked with borehole number, depth and subsequently, dispatched to the laboratory

Core samples were extracted by means of double tube core barrel. After each run of the core barrel, percent core recovery and rock quality designation (RQD) were determined. The cores were stored in wooden core boxes. Wooden markers indicating depth and run numbers were inserted between each core run. The core boxes were, then, transported to the laboratory for testing. Some of the cores were sealed with molten wax and treated as undisturbed sample.



Laboratory Testing:

In order to arrive at a rational evaluation of the geotechnical properties of the substrata, a program of laboratory testing was undertaken in the laboratory of Geotechnical Services.

Following physical and chemical tests were performed on representative soil and water samples:

- Grain size analysis
- Atterberg Limits
- Moisture Content
- Unconfined Compression
- Bulk Density
- Total Salts
- Sulphate content
- Chloride content
- pH value

The results of laboratory tests are appended to this report.

Observations were regularly made in boreholes to determine the position of ground water table. The position of water table is indicated on the borelogs.



3. SUBSURFACE CHARACTERISTICS:

Subsoil investigation has revealed that top substrata consist of loose to medium dense, silty SAND / sandy SILT and dense, sandy GRAVEL / gravelly SAND deposits upto 10 feet depth. This is underlain by stiff to very stiff, clayey SILT and dense, sandy GRAVEL deposits in clayey matrix. This is followed by medium hard, SANDSTONE, hard, CONGLOMERATE and medium hard, SILTSTONE deposits that continue upto the investigated depth of 100 feet.

It must be noted that in BH-1, top 3 feet consist of fill material.

Major subsurface deposits can be described as follows:

- Brown, loose, sandy SILT
- Grayish brown, medium dense, fine to coarse SAND
- Brown, dense, gravelly, fine to coarse SAND
- Brown, dense, sandy GRAVEL in clayey matrix
- Brown, medium hard, SANDSTONE
- Grayish brown, hard, CONGLOMERATE
- Brown, medium hard, SILTSTONE

The exact sequence of occurrence of these deposits is shown on boreholes appended to this report.

Ground water table was encountered at a depth of about 70 feet below existing ground level.



4. FOUNDATION RECOMMENDATIONS:

4.1 General:

Foundation is a structural member that supports the loads of a structure and distributes them over the substrata on which it rests. In order to be satisfactory, the foundation should satisfy the following requirements:

- a) The foundation must be safe against the possibility of shear failure
- b) The foundation must not undergo excessive differential settlement

Calculations have been made to check allowable soil pressure for both the shear and settlement criteria.

Keeping in view the stratigraphy of the area and field and laboratory test results, the allowable pressures have been computed.

4.2 Foundation Type:

The selection of foundation type depends upon the subsoil conditions, type of structure, and structural loads.

According to the information furnished by the Client, the proposed building will have basement whose base will be at about 10-12 feet below the existing ground level.

A study of boreholes show that top substrata consist of loose to medium dense, silty SAND / sandy SILT and dense, sandy GRAVEL / gravelly SAND deposits upto 10 feet depth. This is underlain by stiff to very stiff, clayey SILT and dense, sandy GRAVEL deposits in clayey matrix. This is followed by medium hard, SANDSTONE and hard, CONGLOMERATE deposits.

Taking into account the subsoil condition and anticipated structural loads, it is recommended that the proposed structure be supported on **raft foundation** placed at 14-15 feet depth below the existing ground level.



4.3 Allowable Bearing Capacity

Field and laboratory data have been analyzed for the estimation of allowable bearing pressure.

Allowable (gross) bearing capacity of **raft foundation** (with basement) placed at 14-15 ft depth below the existing ground level must be adopted as **3.50 tons/ft²**.

These bearing capacity have been computed for the condition that about 14-15 ft overburden soil will be permanently removed for the construction of basement.

Before placing foundation concrete the excavations should be carefully inspected to ensure that footings are being placed in competent stratum. This precaution is necessary to guard against localized fills and inhomogenities.

4.4 Modulus of Subgrade Reaction:

Modulus of subgrade reaction at 14-15 feet depth may be adopted as 140 kcf.

4.5 Stability of Excavations:

As already discussed, construction of basement would entail excavation of 14-15 feet below the existing ground level.

The site plan shows that on one side of the plot there is an empty plot whereas on the other side, there is (B+G+18 storeys) building which has an offset of 10 feet from the property line. On the other two sides of the plot there exist roads.

During basement excavation, special precautions must be taken to protect the slopes and foundation of adjacent structure. This may be done by proper shoring / bracing.

It is essential to keep the excavation dry and excavation should be performed during dry season.



4.6 Seismic Coefficients:

According to the Uniform Building Code (1997), the soil profile falls in 'S_C' category corresponding to 'very dense, soil & soft rock'.

Following table gives seismic zone, seismic zone factor, soil profile type and seismic coefficients.

Seismic zone	Zone factor 'z'	Soil profile Type	Seismic Coefficient 'Ca'	Seismic Coefficient 'Cv'
2B	0.20	'S _C '	0.24	0.32

4.7 Cement Type:

American Concrete Institute (ACI) gives the requirements for concrete exposed to sulphate (SO₄) containing solutions. The ACI standards are given below:

Sulphate Exposure	Water Soluble Sulphate in Soil (%)	Sulphate in Water (mg/lit)	Cement Type
Negligible	0.00-0.10	0-150	OPC
Moderate	0.10-0.20	150-1500	Type II
Severe	0.20-2.00	1500-10000	Type V
Very Severe	Over 2.00	Over 10000	Type V plus pozzolan

Sulphate content in subsoil has been found to be negligible. It is therefore recommended that Ordinary Portland Cement (OPC) be used in concrete in contact with soil.

.....
For GEOTECHNICAL SERVICES

Saif Ahmed Saeed

SAIF AHMED SAEED, P.E.
B.E. (Civil), M. Engg. (AIT)
AMASCE, MIE (Pak), Consult 882

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CERTIFICATE



This is to certify that I, Saif Ahmed Saeed, am submitting the soil investigation report for building on Survey No. 90, Depot Lines, Karachi Cantonment, Main M.A. Jinnah Road, Karachi, which has been carried out under my guidance and supervision. The recommended bearing capacity is given on page 6 and summarized below:

- Allowable (gross) bearing capacity of **raft foundation** (with basement) placed at 14-15 ft depth below the existing ground level must be adopted as **3.50 tons/ft²**.

I certify that following conditions have been observed while performing the entire soil investigation:

1. I was present at site from 13.10.19 to 02.11.19 when field work of the subsoil investigation was in progress on above site.
2. The representative of subsoil testing laboratory Mr. Munir Beg was present at site to obtain the soil samples for laboratory testing purposes.
3. Books and references considered while giving the final recommendations are listed in the appendix of the report.
4. The borelog results are in conformity with and correlated to laboratory results.



Saif Ahmed Saeed

SAIF AHMED SAEED
GEOTECHNICAL ENGINEER
PEC REGN No. CIV/2917

Saif Ahmed Saeed
B.E. (Civill), M. Engg. ATT. Bangkok
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LIST OF REFERENCES



1. FOUNDATION ANALYSIS & DESIGN

BY J.E. BOWLES

2. FOUNDATION DESIGN & CONSTRUCTION

BY M.J. TOMLINSON

APPENDIX

3. SOIL MECHANICS & FOUNDATIONS

BY PUNMIA

4. SOIL MECHANICS

BY LAMB & WHITMAN

5. FOUNDATION ENGINEERING

BY PECK, HANSON & THORNBURN

.....



APPENDIX



BRATTI

A-11

10.0 WIDE ROAD

115-6

204-0

18'

BH-4

20'

35'

15'

BH-6

SY NO-90

AREA = 3740.57 YDS

SY. No - 90/1

120'

BH-3

190'

200'-7

BH-5

80'

30'

BH-1

65'

BH-2

32'

25'

158-6

SY. No - 102

Abdus Kader

Military Estates Officer
Karachi Circle Karachi

M A JINNAH ROAD

Shafiq Ahmed Javed
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SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A. JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 13.10.19 to 16.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (Feet)
3.0	DS DPT-1		Fill material comprising of concrete pieces						
	DS DPT-2	GP	Brown, dense, sandy GRAVEL		40				
7.0	DS DPT-3				40				05
					45				
10	CORE	ML	Brown, hard, clayey SILT with interlayers of sand			72	42	2.86	Waxed Core 7.86-8.17
									10
	DS DPT-4	GP	Brown, dense, sandy GRAVEL in clayey matrix		40				15
20	DS DPT-5								
					50				20
25	CORE		Brown, SANDSTONE, fractured			30	Nil		
									25
	CORE					33	Nil		
									30
	CORE					40	08	203.21	Waxed Core 30.84-31.25
									35
	CORE		Grayish brown, hard, CONGLOMERATE			28	Nil		
									40
	CORE					36	Nil		
									45
50	CORE					40	Nil		50

Aail
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GEOTECHNICAL SERVICES

SUBSURFACE EXPLORATION LOG

Bore Hole No BH-1

Sheet 2 of 2

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 13.10.19 to 16.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/cm ²)	REMARKS (Feet)
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			46	11	9.37	Waxed Core 50.00-50.58
	CORE					40	28		55 Waxed Core 55.42-55.92
	CORE					43	15		60
	CORE					43	18	8.67	65 Waxed Core 66.00-66.50
70								15.80	70 Waxed Core 70.00-70.50
	CORE		Grayish brown, friable to medium hard, SANDSTONE			45	10		
75			BOTTOM OF BOREHOLE						75

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SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 16.10.19 to 21.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq cm)	REMARKS (Feet)
6.5	SPT-1	ML	Brown, loose, sandy SILT, trace gravel		05				05
	SPT-2				07				
	DS DPT-1				35				
10	SPT-3	GP	Grayish brown, dense, sandy GRAVEL		20				10
11.5		ML	Brown, very stiff, clayey SILT						
	DS	SP	Brown, dense, gravelly, fine to coarse SAND in clayey matrix		40				15
	DPT-2								
	DS								
20	DPT-3			50				269.51	20
	CORE		Grayish brown, hard, CONGLOMERATE		20	06			Waxed Core 20.25-20.58
	CORE				23	Nil			25
	CORE				40	Nil			30
	CORE				36	Nil			35
	CORE				48	13		291.02	40
	CORE								Waxed Core 40.58-40.92
45			Brown, medium hard, SILTSTONE		51	40			45
50	CORE								Waxed Core 45.00-45.58
									50

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SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 16.10.19 to 21.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/cm ²)	REMARKS (Feet)
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			50	26	16.63	Waxed Core 50.33-50.84
	CORE					38	Nil		55
	CORE					45	20		60 Waxed Core 60.00-60.58
	CORE					45	28		65 Waxed Core 65.00-65.42
	CORE					41	26		70 Waxed Core 70.84-71.42
75	CORE		Grayish brown, friable to medium hard, SANDSTONE			40	16	6.18	75 Waxed Core 75.66-76.17
	CORE					46	35	80 Waxed Core 80.66-81.42	
85	CORE		Grayish brown, medium hard, SILTSTONE			45	38	15.03	85 Waxed Core 85.66-86.33
90	CORE		Grayish brown, friable to medium hard, SANDSTONE			51	08		90 Waxed Core 90.33-90.84
	CORE					46	07	95 Waxed Core 95.50-96.00	
100			BOTTOM OF BOREHOLE						100

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SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 22.10.19 to 25.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq cm)	REMARKS (Feet)
7.0	DS SPT-1 SPT-2 SPT-3	SM	Grayish brown, medium dense, fine to coarse SAND, some clay, trace gravel		16 11 16				05
10	SPT-4	SP	Grayish brown, medium dense, gravelly SAND, trace clay		11				10
11.5		ML	Brown, stiff, clayey SILT, trace sand						
20	DS DPT-1 DS DPT-2	SP	Brown, dense, sandy GRAVEL, little clay		45 40				15 20
25	DS DPT-3		Brown, fragmented SANDSTONE		50			90.96	25
35	CORE CORE		Brown, medium hard, SANDSTONE		31 46	10 21			Waxed Core 25.00-25.50 30 Waxed Core 31.00-31.42
50	CORE CORE CORE		Grayish brown, hard, CONGLOMERATE		33 43 41	Nil 06 06		255.35	35 40 Waxed Core 41.25-41.58 45 Waxed Core 45.25-45.58

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GEOTECHNICAL SERVICES

SUBSURFACE EXPLORATION LOG

Bore Hole No BH-3

Sheet 2 of 2

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A. JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 22.10.19 to 25.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sqcm)	REMARKS (Feet)
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			56	51	19.12	Waxed Core 51.25-52.17
	CORE					56	51		55 Waxed Core 57.84-58.17
	CORE					56	48		60 Waxed Core 61.58-62.17
	CORE					53	38	8.12	65 Waxed Core 65.84-66.50
	CORE					55	51		70 Waxed Core 70.00-70.50
75			BOTTOM OF BOREHOLE						75

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GEOTECHNICAL SERVICES

Bore Hole No BH-4

Sheet 1 of 2

SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN MA JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 25.10.19 to 27.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq cm)	REMARKS (Feet)	
	SPT-1	SM	Brown, medium dense, fine to coarse SAND, little clay, little gravel		12				05	
	SPT-2				12					10
	SPT-3				13					
10	SPT-4	SM-SC	Brown, medium dense, clayey SAND / sandy CLAY with gravel		17				15	
15	DPT-1			45						
	DS	CL	Brown, hard, sandy CLAY with fragmented sandstone		40				20	
	DPT-2									
	DS									
25	DPT-3		Brown, medium hard, SANDSTONE		50	40	16	88.08	25 Waxed Core 25.66-26.08	
	CORE				30 Waxed Core 30.58-31.00					
	CORE								40	20
35			Grayish brown, hard, CONGLOMERATE					156.67	35 Waxed Core 35.00-35.50	
	CORE								40 Waxed Core 40.33-40.75	
	CORE									38
	CORE				56	23			45	
	CORE				40					Nil
50									50	

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SUBSURFACE EXPLORATION LOG

Bore Hole No BH-4

Sheet 2 of 2

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 25.10.19 to 27.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/cm ²)	REMARKS (Feet)
55	CORE		Brown, medium hard, SANDSTONE			40	06		Waxed Core 50.84-51.17
	CORE					31	13	15.73	55 Waxed Core 55.25-55.92
	CORE					41	06		60 Waxed Core 60.33-60.66
	CORE					40	08		65 Waxed Core 65.25-65.66
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			45	30	16.07	70 Waxed Core 70.00-70.58
	CORE					30	13		75 Waxed Core 75.33-75.66
	CORE					43	20		80 Waxed Core 80.00-80.50
	CORE					55	53		85 Waxed Core 85.84-86.33
	CORE					45	23	10.05	90 Waxed Core 90.50-91.00
100	CORE					48	20		95 Waxed Core 95.00-95.66
BOTTOM OF BOREHOLE									

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SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN MA JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 31.10.19 to 02.11.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq cm)	REMARKS (Feet)
5.0	DS DPT-1	GP	Grayish brown, dense, sandy GRAVEL with stone fragments		35				
7.0	SPT-1	SC	Brown, medium dense, clayey SAND, trace gravel		13				05
10	SPT-2	SP	Brown, medium dense, gravelly SAND		27				
15	SPT-3	CL	Brown, medium dense, silty CLAY		13				10
15	DPT-2	CL	Brown, stiff, silty CLAY, some sand, little gravel		40				15
20	DS DPT-3	GP	Grayish brown, dense, sandy GRAVEL, trace clay		50			269.25	20
25	CORE		Brown, hard, CONGLOMERATE			40	16		Waxed Core 20.00-20.50
30	CORE		Brown, medium hard, SANDSTONE			38	06		25 Waxed Core 25.66-26.00
35	CORE		Grayish brown, hard, CONGLOMERATE			30	Nil		30
40	CORE					33	Nil		35
45	CORE					40	05	252.07	40 Waxed Core 40.00-40.25
50	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			45	30		45 Waxed Core 45.00-45.50
									50

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SUBSURFACE EXPLORATION LOG

Bore Hole No BH-5

Sheet 2 of 2

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 31.10.19 to 02.11.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sqcm)	REMARKS (Feet)
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			40	10	7.20	Waxed Core 50.25-50.75
	CORE					40	16		55 Waxed Core 55.84-56.33
	CORE					38	13		60 Waxed Core 60.00-60.33
	CORE					40	06	10.02	65 Waxed Core 66.66-67.00
70	CORE		Brown, friable to medium hard, SANDSTONE			40	08		70 Waxed Core 70.84-71.25
75			BOTTOM OF BOREHOLE						75

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SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN MA JINNAH ROAD, SADDAR, KARACHI

Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 28.10.19 to 31.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq cm)	REMARKS (Feet)
	DS								
	DPT-1				30				
	DPT-2	GP-SP	Brown, dense, sandy GRAVEL / gravelly SAND in clayey matrix		40				05
	DPT-3				50				
10	SPT-1				16				10
	CORE	ML	Brown, very stiff, clayey SILT with interlayers of sand			47	26	4.72	Waxed Core 11.50-11.92
15									15
	CORE					38	13		Waxed Core 16.33-16.66
								111.80	20
	CORE					33	06		Waxed Core 20.00-20.33
									25
	CORE					31	05		Waxed Core 25.00-25.25
			Grayish brown, hard, CONGLOMERATE						30
	CORE					33	10		Waxed Core 30.66-31.17
									35
	CORE					40	23		
								165.46	40
	CORE					70	13		Waxed Core 40.25-40.58
									45
	CORE					40	05		Waxed Core 45.00-45.25
50									50

SUBSURFACE EXPLORATION LOG

Project SURVEY NO. 90, DEPOT LINES, KARACHI CANTONMENT,
MAIN M.A. JINNAH ROAD, SADDAR, KARACHI


Ground Water Depth 70.0 feet



Type of Boring ROTARY

Date 28.10.19 to 31.10.19

Depth (Feet)	Sample No.	Classification	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N' Count	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sqcm)	REMARKS (Feet)
	CORE		Brown, friable to medium hard, SANDSTONE			55	48	14.11	Waxed Core 51.08-51.66
	CORE					40	18		55 Waxed Core 55.00-55.50
60	CORE		Brown, medium hard, SILTSTONE			50	16	15.99	60 Waxed Core 60.00-60.50
	CORE					46	36		65 Waxed Core 65.50-66.00
	CORE					53	43		70 Waxed Core 70.00-70.58
75			BOTTOM OF BOREHOLE						



Sail
Sail Waxed Sored

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PROJECT : SURVEY #90, DEPOT LINES, KARACHI CANTT, M.A. JINNAH ROAD, KARACHI

DATE: Nov. 15, 2019
L.R. No.: 706/19

GRAIN SIZE ANALYSIS (PER CENT FINER BY WEIGHT) **SIEVE SIZES IN mm**

HYDROMETER **(DIA IN mm)**

S No	BH NO.	SAMPLE	DEPTH (ft)	75.0	37.5	19.0	9.50	4.75	2.36	1.18	0.600	0.300	0.150	0.075	.05	.01	.002	.001
1.	BH-1	DS	5.00	100	69	40	24	18	07	06	05	04	03	02	-	-	-	-
2.	BH-2	SPT-2	5.00	-	-	-	100	97	94	91	89	84	76	57	45	26	11	03
3.	BH-2	DS	11.50-10.00	-	100	78	69	66	57	49	44	37	33	29	-	-	-	-
4.	BH-3	SPT-2	5.00	-	-	100	98	92	78	62	55	44	39	31	-	-	-	-
5.	BH-3	DS	11.50-15.00	100	57	38	37	32	29	25	24	23	22	19	-	-	-	-
6.	BH-4	SPT-2	5.00	-	-	100	88	83	61	40	33	25	22	20	-	-	-	-
7.	BH-4	SPT-4	10.00	-	100	92	68	65	61	59	58	57	56	50	44	32	24	13
8.	BH-5	SPT-1	5.00	-	-	-	100	97	88	75	69	56	51	42	35	24	18	10
9.	BH-5	SPT-3	10.00	-	-	100	96	89	83	81	80	79	77	75	65	48	26	13
10.	BH-6	DS	3.00-5.00	-	100	69	53	48	37	29	27	20	18	15	-	-	-	-



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ATTERBERG LIMITS / MOISTURE CONTENT

S. NO.	BORING NO.	SAMPLE	DEPTH (ft)	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT, %
1.	BH-1	Waxed Core	7.76-8.17	34	11	15.07
2.	BH-1	Waxed Core	50.00-50.58	40	14	9.043
3.	BH-1	Waxed Core	66.00-66.50	34	11	7.92
4.	BH-2	DS	11.50-15.00	20	06	16.28
5.	BH-2	Waxed Core	60.00-60.58	34	10	11.11
6.	BH-2	Waxed Core	85.66-86.33	40	13	7.95
7.	BH-3	SPT-2	5.00	19	04	10.46
8.	BH-3	DS	11.50-15.00	27	08	4.83
9.	BH-3	Waxed Core	51.25-52.17	40	15	9.30
10.	BH-3	Waxed Core	65.84-66.50	32	12	10.03
11.	BH-4	SPT-2	5.00	18	04	7.15
12.	BH-4	SPT-4	10.00	30	09	17.66
13.	BH-4	Waxed Core	55.25-55.92	34	12	20.19
14.	BH-4	Waxed Core	70.00-70.58	28	08	7.50
15.	BH-4	Waxed Core	90.50-91.00	32	09	9.58
16.	BH-5	SPT-1	5.00	20	05	8.52
17.	BH-5	SPT-3	10.00	29	09	20.75
18.	BH-5	Waxed Core	50.25-50.75	33	10	8.65
19.	BH-5	Waxed Core	66.66-67.00	36	12	9.87
20.	BH-6	DS	3.00-5.00	24	06	3.78
21.	BH-6	Waxed Core	11.50-11.92	30	09	12.95
22.	BH-6	Waxed Core	70.00-70.58	40	15	9.70



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: SURVEY #90, DEPOT LINES, KARACHI CANTT, M.A. JINNAH ROAD, KARACHI

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UNCONFINED COMPRESSION / BULK DENSITY

S. NO.	BORING NO.	SAMPLE	DEPTH (ft)	UNCONFINED COMPRESSION		BULK DENSITY (gm/cc)
				qu (kg/cm ²)	STRAIN (%)	
1.	BH-1	Waxed Core	7.86-8.17	2.86	12.66	2.058
2.	BH-1	Waxed Core	30.84-31.25	203.21	2.57	2.365
3.	BH-1	Waxed Core	50.00-50.58	9.37	3.65	2.168
4.	BH-1	Waxed Core	66.00-66.50	8.67	4.04	2.165
5.	BH-1	Waxed Core	70.00-70.50	15.80	1.23	2.193
6.	BH-2	Waxed Core	20.25-20.58	269.51	2.85	2.414
7.	BH-2	Waxed Core	40.58-40.92	291.02	2.72	2.438
8.	BH-2	Waxed Core	60.00-60.58	16.63	7.34	2.182
9.	BH-2	Waxed Core	75.66-76.17	6.18	1.64	2.134
10.	BH-2	Waxed Core	85.66-86.33	15.03	5.06	2.179
11.	BH-3	Waxed Core	25.00-25.50	90.96	2.76	2.296
12.	BH-3	Waxed Core	41.25-41.58	255.35	2.37	2.414
13.	BH-3	Waxed Core	51.25-52.17	19.12	1.16	2.217
14.	BH-3	Waxed Core	65.84-66.50	8.12	1.47	2.168

.....cont'd



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SHEET 2 OF 2

UNCONFINED COMPRESSION / BULK DENSITY

S. NO.	BORING NO.	SAMPLE	DEPTH (ft)	UNCONFINED COMPRESSION		BULK DENSITY (gm/cc)
				qu (kg/cm ²)	STRAIN (%)	
15.	BH-4	Waxed Core	25.66-26.08	88.08	2.59	2.290
16.	BH-4	Waxed Core	35.00-35.50	156.67	2.50	2.337
17.	BH-4	Waxed Core	55.25-55.92	15.73	3.84	2.191
18.	BH-4	Waxed Core	70.00-70.58	16.07	1.26	2.199
19.	BH-4	Waxed Core	90.50-91.00	10.05	2.37	2.170
20.	BH-5	Waxed Core	20.00-20.50	269.25	2.44	2.367
21.	BH-5	Waxed Core	40.00-40.25	252.07	2.39	2.418
22.	BH-5	Waxed Core	50.25-50.75	7.20	1.37	2.151
23.	BH-5	Waxed Core	66.66-67.00	10.02	7.03	2.170
24.	BH-6	Waxed Core	11.50-11.92	4.72	9.54	2.123
25.	BH-6	Waxed Core	20.00-20.33	111.80	2.53	2.322
26.	BH-6	Waxed Core	40.25-40.58	165.46	2.55	2.347
27.	BH-6	Waxed Core	55.00-55.50	14.11	1.25	2.118
28.	BH-6	Waxed Core	70.00-70.58	15.99	1.54	2.197



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PROJECT

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DATE: Nov. 15, 2019
L.R. No.: 706/19

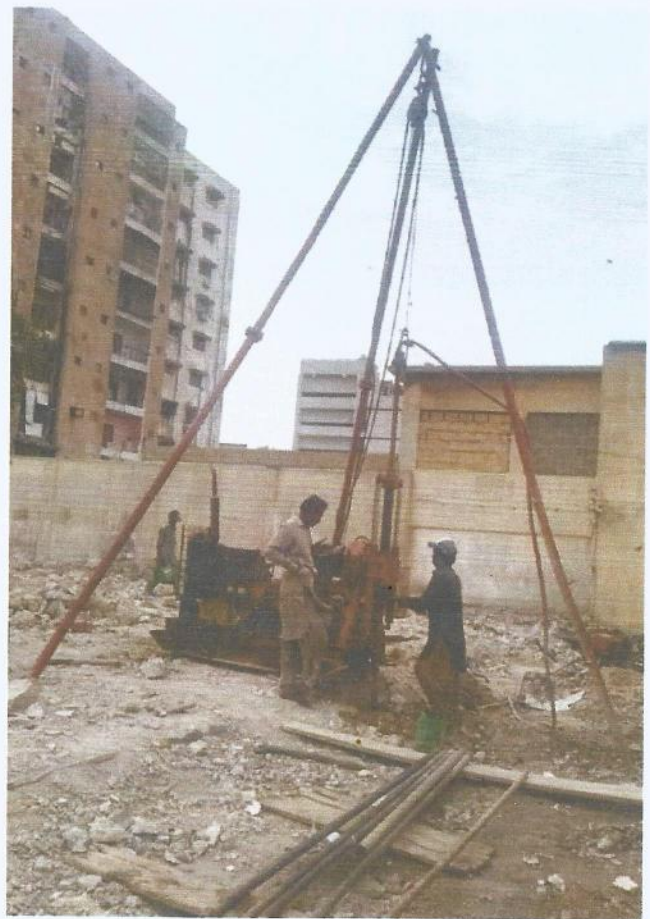
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CHEMICAL TESTS

S. NO.	BORING NO.	SAMPLE	DEPTH (ft)	TOTAL DISSOLVED SALTS	SULPHATE CONTENT	CHLORIDE CONTENT	pH VALUE
1.	BH-2	SPT-1	3.00	-	0.078 %	-	-
2.	BH-4	SPT-1	3.00	-	0.085	-	-
3.	BH-2	WATER	-	25600 mg/lit	329 mg/lit	10000 mg/lit	7.75
4.	BH-5	WATER	-	25800 mg/lit	347 mg/lit	10100 mg/lit	7.75







TRAFFIC IMPACT ASSESSMENT



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Executive Summary

Traffic Impact Studies (TIS) are assessed to foresee impacts of demand on the transportation network and its traffic, in existing as well as in future condition. They also determine transportation improvements that may be necessary to accommodate new development. TIS generally underline the appropriate facilitation of traffic and transportation related activities such as Parking Assessment, Access Gate Performance, LOS Evaluation, Trip Generation and relevant Recommendations to manage and minimize the impact on traffic caused due to any re-development or new project.

1 Project Brief

The proposed project entitled under the name 'Prince Icon' is planned to be constructed at Plot No. Survey No. 90, Depot Lines, Karachi Cantonment. The total area of the plot is 33,600 sq. ft. The proposed building is planned to be a commercial establishment with official units at 6th – 21st floor and cinemas on the 4th floor. The 4th floor also consists of recreational units such as gym, children's play area and community hall. Parking provisions are to be developed on 1st – 3rd floors. There are 06 shops on the ground as well as a very large driver's sitting area.

The floor description and details are presented as follows:

Table 1: Project Description

S.#	Floor	Description	Details
1	Basement	Service Area	UGWT, Lobby, Generator Area, etc.
2	Ground	Shops & Drivers Sitting Area	06 shops
3	1 st – 3 rd	Parking Floors	Parking Slots for 189 bikes & 186 cars
4	4 th	Cinemas & Recreational Area	02 Cinema Halls, Children's Area, Gym & Community Hall
5	5 th	Service Area (Utilities Room)	Electrical & Plumbing Rooms
6	6 th – 21 st	Office Units	192 Office Units of Type A, B, C, D, E & F
7	Roof	Open Area	Open Area with Atrium

2 Traffic Impact Assessment Outcomes

The conclusions developed through the analyses conducted are as follows:

2.1 Parking Analysis

2.1.1 Minimum Project Demand

Since the proposed building consists of cinemas and it also has a marginal impact on the parking demand, it is best suggested that shift management is applied for effective operations. All the shows for the cinema will start after 06:00 pm (except for Saturday and Sunday) which is also the departure time for office vehicles hence the demand for cinemas will be omitted from the actual demand, reducing the deficiency of vehicles at the project building.

Table 2: Minimum Project Parking Evaluation

Minimum Project Parking Demand				
S. No.	Vehicle Type	Offices	Showrooms	Total
1	Car	340	8	348
2	Bike	716	16	732

Hence the project demand is summarized to 348 cars and 732 bikes according to which the supply and demand chart will be as follows:

Table 3: Minimized Project Demand Summary Chart

Comparison Chart				
S. No.	Vehicle Type	Parking Supply	Parking Demand	Deficiency
1	Car	189	348	159
2	Bike	186	732	546

Considering the mentioned fact to manage time slots for the cinema, the deficiency in the parking demand will be reduced up to 159 car parking slots and 546 bike parking spaces. This demand can further be managed through shift management of offices and also through careful assessment of the types of shopping facilitations provided.

Furthermore, as mentioned in the reports of BRT Blue Line and Green Line, the BRT Corridors will reduce vehicular demand of cars and motorcycles up to 10%. Therefore, we can fairly say that the deficiency of available parking slots, if mode of transportation is shifted to BRT as planned, will be further reduced to **144 cars and 492 motorcycles**.

2.2 Access Gate Queue Length

Three different scenarios are calibrated through variation in the arrival period of cars and bikes. The results are presented in the table as follows:

Table 4: Access Gate Queue Length Analysis Summary Chart

Access Gate Queue Summary Chart						
Type of Vehicle	Scenario 1		Scenario 2		Scenario 3	
	Arrival Time: 30mins	Service time: 15 secs	Arrival Time: 30mins	Service time: 10 secs	Arrival Time: 45mins	Service time: 10 secs
Car	19		No Queue is Formed		Not Evaluated	
Bike	173		113		23	

The estimation predicts that for cars second scenario is most suitable whereas for bikes there is queue formation at the access gate of 23 bikes in a peak period. To resolve this effective management must be undertaken. Discussed in latter parts of the report.

3 Volume-To-Capacity Ratio Analysis

The calculations of the ratio are carried out such that different scenarios are established. The summary chart is presented as follows depicting that even after inclusion of project traffic and growth rate factor over the time span of two years the capacity of road at one section is about to reach it's threshold value.

Table 5: Volume-to-Capacity Ratio Analysis Summary Chart

Direction	Existing Condition	No-Built Condition	Built Conditions
At M.A. Jinnah Road from Tower	0.645	0.724	0.751
At M.A. Jinnah Road towards Tower	0.927	1.042	1.068
At M.A. Jinnah Road from Tower with BRT Impact	0.604	0.679	0.703
At M.A. Jinnah Road towards Tower with BRT Impact	0.867	0.975	0.999

The analysis depicts that after a time period an additional lane will be required to cater for the increasing demand of MA Jinnah Road.

4 Consolidated Recommendations

The consolidated recommendations for the impact assessment of Prince Icon are presented as follows:

4.1 General Recommendations

- The actual parking demand of the facility is of 472 cars and 792 bikes considering the parking demand for offices, showrooms and cinema. However, this demand is minimalized providing that the show starting time of the cinemas will be at 06:00 pm and onwards for weekdays excluding Saturday and Sunday. This will reduce the maximum demand limit up to 347 cars and 732 bikes.
- Considering the minimalized demand, the deficiency of parking spaces is of 158 cars and 546 bikes. To accommodate for this at least two basement parking maybe developed.
- Or in other case, rest of the deficiency may be catered into a separate parking lot in the surrounding area of project. This location must be identified and after its identification a plan has to be developed for better traffic management (both vehicular and pedestrian) to and from the parking lot.
- Furthermore, as mentioned in the reports of BRT Blue Line and Green Line, the BRT Corridors will reduce vehicular demand of cars and motorcycles up to 10%. Therefore, we can fairly say that the deficiency of available parking slots, if mode of transportation is shifted to BRT as planned, will be further reduced to 144 cars and 492 motorcycles.
- The showrooms provided in the building maybe used for clothing franchise. If such is the case then the demand maybe further managed as shopping areas usually carry out activities in the evening and night hours during the time when the office shifts are off. If the land-use strictly is identifies that the shopping area will only be used for clothing / brand stores then the demand will further be reduced to a great extent because when the parking will reach shopping peak limit, the office would have already emptied the parking slots. This phenomena in traffic engineering is called as demand management via shift management.
- It is best suggested that if night shifts are adapted for the offices in the proposed building, a minimal of 50% offices must only be allowed to operate during one night shift.
- The project plot is situated on a road section which has comparatively less traffic in the morning peaks. During the morning Peak hour the road section observes a total volume of 3,484 vehicles whereas the other direction of the road accommodates 12,010 vehicles. Hence the arrival queue formation of the bikes on access gate will have a negligible impact on the traffic flow.
- The access gate analysis is conducted separate for bikes and cars, therefore any mechanism adapted for entrance and exit must operate distinctively for each vehicle type. It is further suggested that a comprehensive RFID or similar system must be designed for the building offices and shop owner and employees parking.
- The access gate analysis depicts that in order to avoid queue formation at the entrance of project during morning peak both the gates must be utilized for vehicular entry at least from 8:00 am to 9:30 am.
- To further manage the traffic flow on the access gate both the ramps maybe utilized for entrance providing access to departing vehicles on amber signal only at least from 8:00 am to 9:30 am.
- There is a necessary requirement of proper bus stops in the project area vicinity considering the highly commercial land-use distribution.
- There are constructional activities going-on in the project area which are prosed for the Blue and Green BRT Line, it is suggested that a detailed study must be conducted after the constructional activities are complete.
- Proper traffic maneuvering plan after counts at at-least three intersections of M.A. Jinnah Road which are Depot Lines, Afridi Shahid Road and Rizvi Shaheed Road must be prepared after the construction of all the grade separations and BRT Corridors in the project vicinity.

- Since the influence area of the project is largely under construction therefore it is suggested that before the operations of the building a brief study must be done to fine tune the results highlighted in the report.
- The writers and thinkers of ITDP (institute of transportation development and policy) and the people who first implemented BRT in the world also most of the modern-day traffic engineers are now of the opinion that increment in parking supply attracts more and more demand in the CBD area. They conclude that the increment in parking supply is not a decongestion contributor but instead it is a large contributor in congestion. Therefore, they now suggest that instead of increment in parking supply as per the demand, the policy has to be developed that more and more public transportation routes should be provided for CBD visitors so that they may shift from their private vehicles to the most optimized mode of transportation such as BRT, Large Buses etc.

4.2 Recommendations Related to Parking Demand Management

- The writers and thinkers of ITDP (institute of transportation development and policy) and the people who first implemented BRT in the world also most of the modern-day traffic engineers are now of the opinion that increment in parking supply attracts more and more demand in the CBD area. They conclude that the increment in parking supply is not a decongestion contributor but instead it is a large contributor in congestion. Therefore, they now suggest that instead of increment in parking supply as per the demand, the policy has to be developed that more and more public transportation routes should be provided for CBD visitors so that they may shift from their private vehicles to the most optimized mode of transportation such as BRT, Large Buses etc.
- One of the major attractions of the business and work trips of Karachi is Saddar and nearby areas. Travel demand on the roads and streets of Saddar Area is growing day by day. Now the present situation is, that at most of the locations there is no room for additional lanes and grade separation structures. This situation has happened in metropolitans of many countries. To overcome the deficit of demand and supply travel demand management and demand control techniques are applied across the world. One of the best solutions is shift the mode of transport from private vehicles and two, three wheelers to an integrated bus network. This is the only possible and effective way for Saddar Region to manage the demand and supply gap.
- To manage demand and supply gap both micro level and macro level measures are required. Macro level measures include bus networks, mass transits and rail systems. And micro level systems include the facility demand management and control by restricting the facility users to use vans and public transport and discouraging them to use cars. If we restrict the offices that every office before commencement of its operations must provide a plan to accommodate 50% of their staff in vans then the demand supply gap will be minimized to a level that there will only be a deficiency of 109 motorcycles.
- This remaining deficiency can be adjusted using valet parking, re-design of parking floors or provision of one additional floor for the parking of vehicles.

Chapter 1: The Project

The framework of this chapter encompasses the introduction, site, and study area of the project with detailed focus on the need of study, objectives, and scope of work which is necessary for understanding the project.

1 Project Overview

The proposed project entitled under the name 'Prince Icon' is planned to be constructed at Plot No. Survey No. 90, Depot Lines, Karachi Cantonment. The total area of the plot is 33,600 sq. ft. The proposed building is planned to be a commercial establishment with official units at 6th – 21st floor and cinemas on the 4th floor. The 4th floor also consists of recreational units such as gym, children's play area and community hall. Parking provisions are to be developed on 1st – 3rd floors. There are 06 shops on the ground as well as a very large driver's sitting area. The details of each floor are given below:

Table 6: Project Description

S. No.	Floor	Description
1	Basement	Service Area (UGWT, Lobby, Generator Area, etc)
2	Ground	Shops & Drivers Sitting Area
3	1 st – 3 rd	Parking Floors
4	4 th	Cinemas & Recreational Area
5	5 th	Service Area (Utilities Room)
6	6 th – 21 st	Office Units
7	Roof	Open Area

The building consists of a total of 192 office units with six varying types of offices. Parking for cars and bikes are provided at three floors of the building accommodating 189 cars and 186 bikes.

2 Project Study Area

The proposed project will be constructed at main M.A. Jinnah Road. The plot is situated between Capri Square and Frere Square Junctions. The surrounding area of the plot has multiple commercial units and minimal residential units are also present. The commercial distribution of the area is increased in terms of offices, warehouses and factories.

There are several hospitals, educational institutions, banks and large- and small-scale commercial facilities. The existing situation of the road network associated with the proposed project is largely under construction. Due to recent construction activities the area is affected and certain traffic flow congestion occurs. From Nursery towards Tower at several sections of the M.A. Jinnah Road, there are constructional activities going on to establish a passageway for the Blue and Green Line BRT and hence due to activity serious choking is observed along the entire route.

The following map shows the project location and nearby commercial units.



Figure 1: Project Location Map

2.1 Project Influence Area

Since the area is a significant commercial hub and also situated on the mid-block of a main road, it is evident that large numbers of traffic volumes on daily basis are facilitated in the influential contour of the building. The project influence is capturing the varying traffic conditions is marked in red in the figure as follows.



Figure 2: Project Influence Area

3 Objectives of The Study

The objectives of the traffic impact study are as follows:

- Carry out baseline traffic counts, parking counts and roadway inventory
- To estimate the site generated traffic and to identify its effects on the nearby road network

- To conduct parking demand analysis and suggest solution which can fulfill increased parking demand
- To quantify the travel demand to and from the site and/or the adequacy of the parking terminal capacity
- To identify any proposed modifications to the existing roadway system that may be necessary.
- To recommend road improvements that are likely to be required in the immediate vicinity of the site

4 Scope of Work

The Scope of Work includes the following:

- Data Collection from the Client
- Traffic surveys at nearby locations of the building
- Similar Area Parking Survey
- Calculation of Peak Hour and Peak Hour Factor
- Recommendations on proposed alternatives

5 Report Content

As per the codes and standards, the Traffic Impact Study (TIS) will include at a minimum:

- Purpose and Objectives of the respective traffic impact study
- A brief description of the site location and study area
- Existing conditions of the subjected area
- Parking and Queue Length Analysis
- Traffic condition resulting from the development
- Projected future traffic volumes
- An assessment of the change in roadway operating conditions resulting from the development traffic
- Recommendations for site access and transportation improvements needed to maintain traffic flow to, from, within, and pass the site at an acceptable and safe level of service.

Chapter 2: Methodology

Traffic Impact Studies interpret a major part in the planning phase of the project hence careful assessment is necessary as the outcomes will affect the operational phase. The methodological framework adapted for the particular project is devised as follows and relative tasks are carried to conclude respective solutions and recommendations if any major impact is analyzed.

1 Methodological Framework

The project is kicked off with detailed external and internal meetings through which the workforce and relevant task schedules are finalized on the basis of overall characteristics of the project. The general methodology of a typical Traffic Impact Study is categorized into five stages for a systematical approach towards the designed scope of works. These are as follows:

2 Reconnaissance Study

Reconnaissance Study are carried out through a series of preliminary inspection surveys of the nearby vicinity of the project area. The data gained through these surveys consists of information regarding the existing land-use, traffic and road conditions. The road geometry and pavement situations affecting the traffic flows are identified. During reconnaissance the vintage points for mounting cameras in order to conduct other extensive traffic surveys are finalized. All the gathered data is recorded through notes and photographs.

3 Stage I: Data Collection

Data collection exercise for the particular project is carried out through two major categories. The data gathered is recorded and further processed to achieve required products.

3.1 Building Specific Data

Data collection from Client consists of architectural drawings showing the characteristics of the project building. These include land-use distribution (residential, commercial or both), amenity facilitation, parking supply, internal circulation, access points as well as the roads connected with the access points. An overall inventory as proposed in the design is evaluated through this data which further assists in estimation of trip rates and land-use specific trends of the particular project.

3.2 Data from Field Surveys

Traffic Surveys highlight the specific numbers of traffic and their movement pattern through which the impact generated may be assessed. Based on the area critical features, the number and types of surveys required are finalized and conducted.

3.2.1 Traffic Count Surveys

Traffic Count Surveys are constructed to determine the traffic volume which emphasize on the movements and numbers of roadway vehicles along with their classifications. Such a data is preliminary recorded to attain the feasibility of a particular road network. However, extended evaluation of Traffic count Data is useful to deduce critical flows, peak time periods and traffic volume trends.

Video cameras are used for recording traffic movement, which are mounted on a vintage point from where a clear scene can be captured. The video is then rendered and processed for counting traffic movement in each direction. The outcomes are then recorded in excel spreadsheets with respect to each direction.

3.2.2 Similar Area Parking Survey

Similar area parking survey is conducted in order to generate the parking factor for the proposed development. One or more buildings with similar characteristics as of the proposed development are selected and parking survey is carried out. Parking Factors are derived from this survey and applied to the proposed building to evaluate the parking demand.

3.2.3 road inventory survey

Road Inventory Surveys help in assessment of Road geometry and provides with the data that describes the physical elements of the road system. These also includes inspection of existing road assets. The details acquired through road inventory are further incorporated in evaluation of Volume-to-Capacity Ratio.

3.2.4 land-use density survey

For density survey regarding the land-use distribution, on-site visits are carried out. It is conducted in order to assess the existing land-use pattern and its characteristics. This evaluation is significant to attain the trip generation factor and further assists in the assessment of impact generated through the particular proposed project while also keeping focus on the existing impact generated through buildings nearby.

4 Stage II: Data Processing

Data provided by the client and surveys which are conducted during the traffic impact study lead to the essential statistics for examining the traffic impacts of the proposed project. Mentioned below is the list of immediate outcomes of collected data:

Traffic Volume:

The number of vehicles on the specific road network is used as an input for LOS Analysis, Capacity Analysis, Assessment of varying traffic management measures and Parking management.

Modal Split:

The designation of classified vehicles percentages in the total volumes is required to estimate trip generation and plan various traffic operations.

Densification and Mix of Project Area Vicinity:

These are obtained through Land-use Densification Survey and assist in precise and detailed impact evaluation of the influential area of project so as to suggest the best applicable recommendations.

Available Road Capacity:

The encroachment surveys are conducted to analyze the difference in the lane capacity and the actual operational capacity of the particular road.

Parking Supply Inventory:

Information of available parking capacity is obtained from the proposed drawings and available documents, to aid the estimation of deficiency or efficiency in parking supply.

Detailed Road Inventory:

Information about the typical road geometrical features is obtained through inventory survey.

5 Stage III: Data Analyses

It is essential to put forward reliable information through collected data and hence relevant data analyses are carried out. The following analysis further leads into development of suitable recommendations for the proposed project.

5.1.1 Estimation of Parking Demand

Parking is considered as an important yet critical factor of any particular construction. Hence parking demand is estimated through area of each floor of the building for commercial land-use implied through an appropriate parking factor.

5.1.2 Comparison of Parking Supply and Demand

A comparison between the supply and demand is led to assess the traffic impact of the proposed project on the surrounding land use. If the parking stalls are coming out to be additional then it can be catered for guest or disabled parking, while the deficiency in comparison must be reduced by some additional modifications for parking.

5.1.3 Access Gate Queue Length Analysis

For the purpose of a careful and accurate forecast of traffic operations at the approach road of the facility following steps are followed.

- *Queue Capacity* - refers to the availability of space at the access lane for the vehicles arriving or departing the facility
- *Readjustment of the capacity* - Involves the geometrical considerations which will lead to the recommendations for the improvement of queue capacity
- *Peak Hour at Access Gate* - will be evaluated to encounter the requirements of ultimate traffic.

5.1.4 Volume-To-Capacity Ratio Analysis

The volume-to-capacity (v/c) ratio is an indication of how well traffic flow is being accommodated by the road network. This ratio is a principle influencing factor to evaluate the Level of Service of a particular junction and eventually in evaluation of the impact upon the influential area road network.

V/C ratios are estimated through scenario development on the;

- *Existing Condition*
- *No Built Condition – Growth Rate*
- *Built Condition – Growth Rate*

6 Stage IV: Major Outcomes

The results of each individual analyses and their aftermaths are observed in this stage. Any requirement of further analysis is highlighted and worked upon. Suggestions with respect to the analysis carried out are foretold concluding the impact generated by the proposed building.

7 Stage V: Recommendations

After data processing and analyses, the estimation for the traffic impact of proposed development and the impact of overall traffic on the project vicinity, alternatives will be suggested. These alternatives can be traffic management alternatives, traffic control changes, stretching peak hour using time shifts, and minor to major geometric changes, parking adjustments etc. Along with applicable alternatives, the significance of any further studies is also added as a prominent part of Traffic Impact Study Recommendations.

8 Consolidated Final Report

The complete procedure to plan, execute and analyze the project essentials will be accorded systematically in the report. The content of the report initiates with overview of the existing conditions then concentrates on the factors that implicate assessment and finally evaluates these factors to be further used in implementation of relevant task.

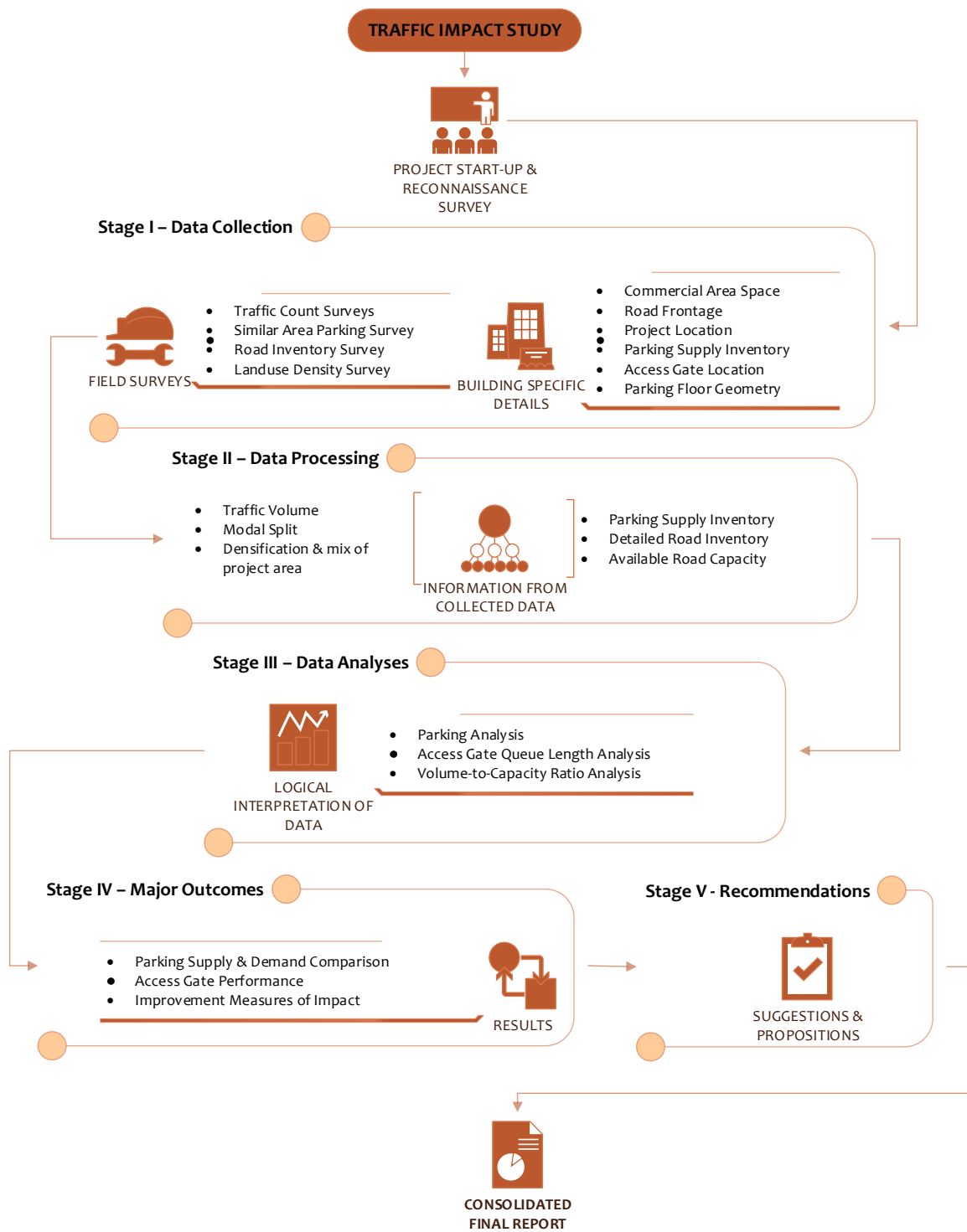


Figure 3: Methodological Flowchart

Chapter 3: Data Collection

This chapter encompasses the outcomes of all tasks performed in order to collect on-field data for comprehensive, precise and detailed analysis. Following surveys are performed during the course of study. Details of each survey is described in the subsequent sections.

1 Types of Data Collection

Data collection for traffic impact studies is broadly divided into two types i.e. Data collected through field surveys and the data collected via client. The data collected via client includes the building related information, which is collected from the architectural plans and sections of the building, expected operational year of the building, nature and land-use etc. The data collected via field surveys mainly consist of following surveys and the information collected for this study during the data collection exercise is mentioned below:

1.1 Reconnaissance Survey

The project is located at main M.A. Jinnah Road adjacent to Falak Arcade. At present the surrounding area of the project consists of several commercial facilitations and some residential buildings as well. M.A. Jinnah road is a 5+5 lane carriageway separated by a median of minimal width and currently there is a road constructional activity going on in the area which effects the traffic flow up to a very high level. The precisely congested land-use distribution of the area attracts high volumes of traffic on daily basis. The road condition of the area is adequate with provision of footpaths to ensure pedestrian maneuvering however the condition of the footpaths is distorted.

During recon it is observed that at M.A. Jinnah Road there is minimal encroachment but considering the present situations there are on-road parking which are covering some part of the carriageway as well as the footpath. This encroachment seems to be temporary as after the constructional activity is complete, they will be removed.



Figure 4: Project Site Picture taken during Reconnaissance



Figure 5: Project Road Condition

1.2 Traffic Count Survey

Traffic count surveys are conducted to determine the number, movements, and classifications of roadway vehicles at a specific location. This data can help to identify critical flow, time periods, and determine the influence of large vehicles or pedestrians on vehicular traffic flow, or evaluate traffic volume trends. The length of the sampling period depends on the type of count and the intended use of the data recorded. For the particular project traffic count numbers for the year 2018 has been used considering the present condition of the area due to which current volumes will not be suitable for the precise assessment. Traffic volume details obtained through the surveys are shown in the tables provided below:

1.2.1 Traffic Count at M.A. Jinnah Road from Tower

The traffic count conducted at the mid-block of M.A Jinnah Road directed from Tower captured the following volumes as presented in the chart. It can clearly be shown that the peak hour of this direction is at 04:00 – 05:00pm.

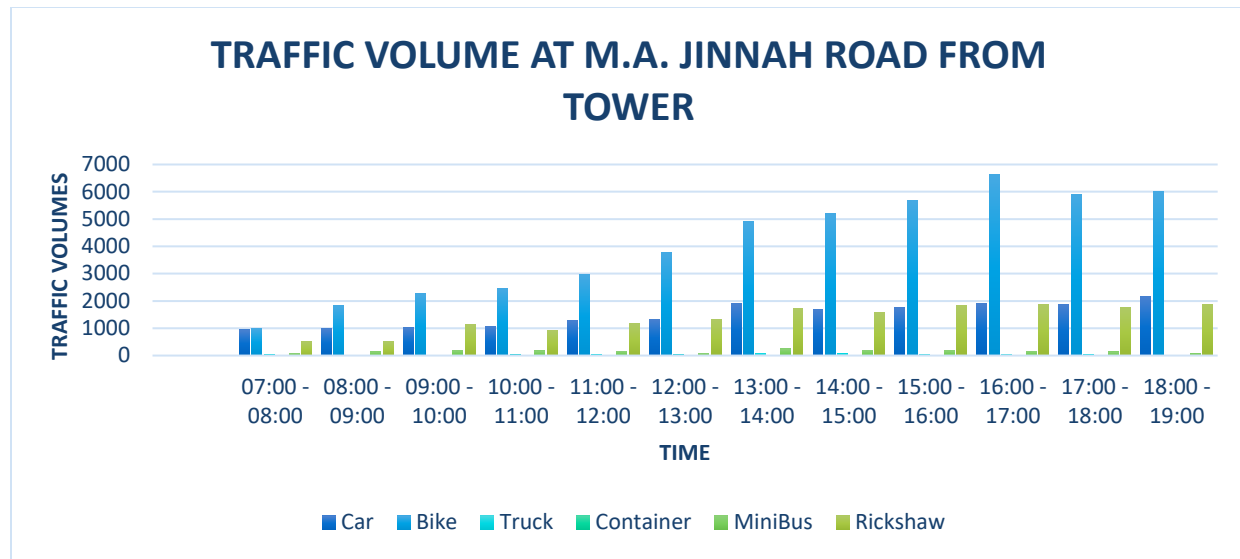


Figure 6: Traffic Volume at M.A. Jinnah Road from Tower

1.2.2 Traffic Count at M.A. Jinnah Road Towards Tower

The traffic count conducted at the mid-block of M.A Jinnah Road directed towards Tower captured the following volumes as presented in the chart. It can clearly be shown that the peak hour of this direction is at 11:00am – 12:00pm.

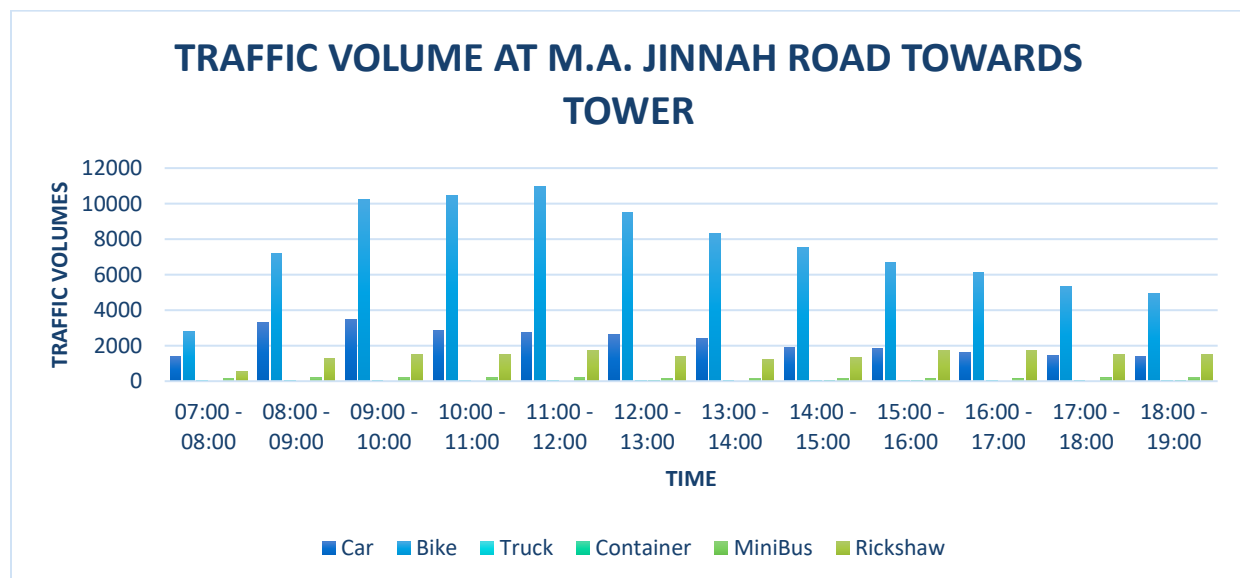


Figure 7: Traffic Volume at M.A. Jinnah Road towards Tower

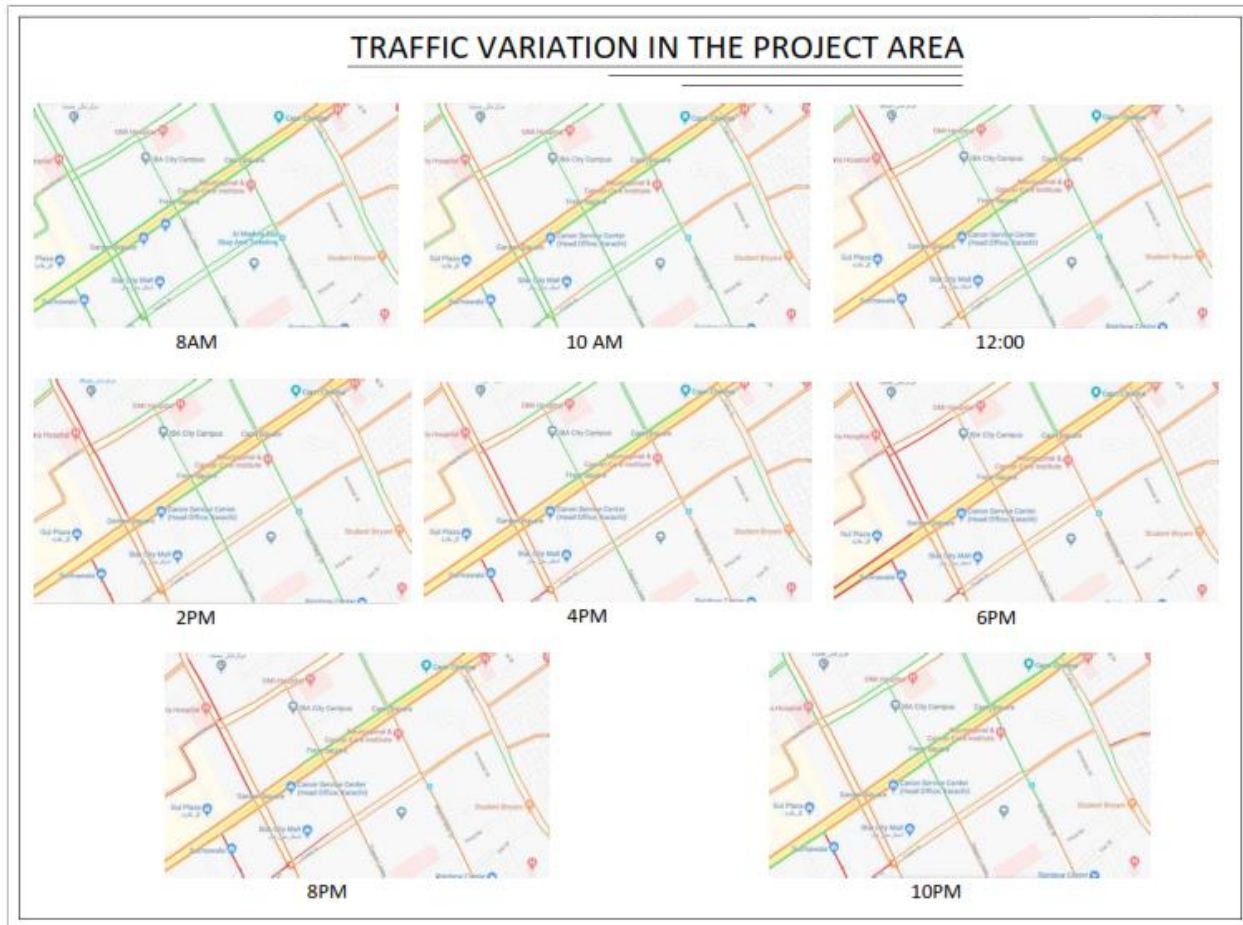


Figure 8: Map Representing the Traffic Variations along the Project Area during various time intervals

1.3 Similar Area Parking Survey

In order to obtain the information about the parking factor of office buildings various offices are surveyed. The questions asked included; type of office, square foot area, number of staff, vehicle ownership, arrival and departure flow etc. It is observed that working hours of most offices are from 9 am to 5 pm. During these hours, except for the lunch breaks, almost all the stalls are occupied. Following graphs show this routine.

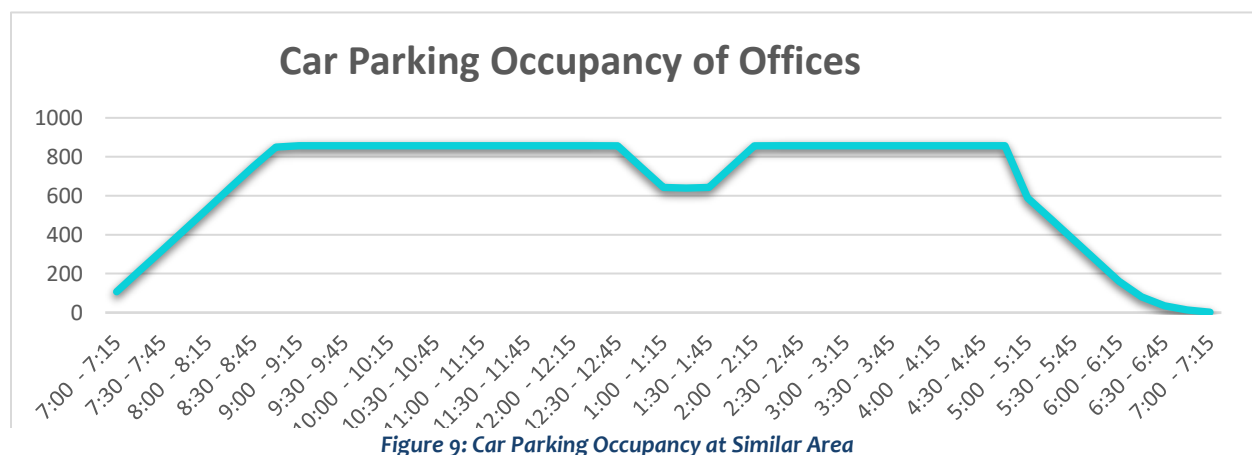


Figure 9: Car Parking Occupancy at Similar Area

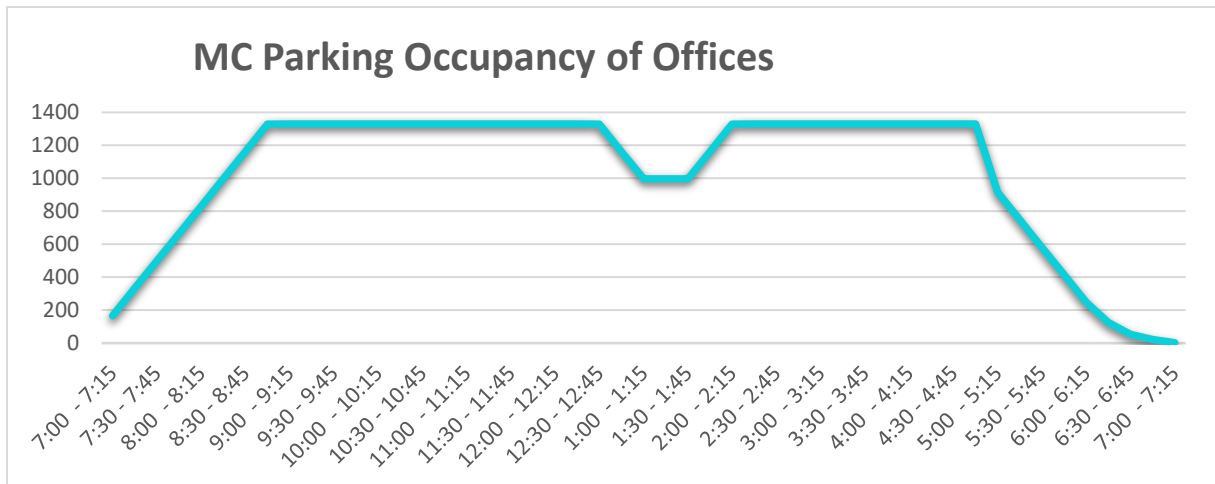


Figure 10: Bike Parking Occupancy at Similar Area

It is however pertinent to mention that this graph and the parking generation factors obtained from this survey may vary as per the type of office, nature of work and various other factors. Therefore, it is recommended that before starting the operational phase of building an exclusive study must be done to finalize the traffic operational plan.

For parking estimation of showrooms, a similar area survey is conducted at Dolmen Mall, Hyderi and a parking factor is derived through which demand estimation of the particular project is carried out.

For evaluation of parking demand at Cinemas, a similar area is surveyed to attain a parking factor through which the demand is calculated.

1.4 Road Inventory Survey

Road Inventory Survey is carried out to know the physical elements of the road geometry. The survey findings are later employed for geometric improvement recommendations and capacity analysis of the network. The following drawing is developed using the road inventory survey data. The wide carriageway of the project road is adequate to support large volumes of traffic and currently provides a route for almost all types of modes of transport.

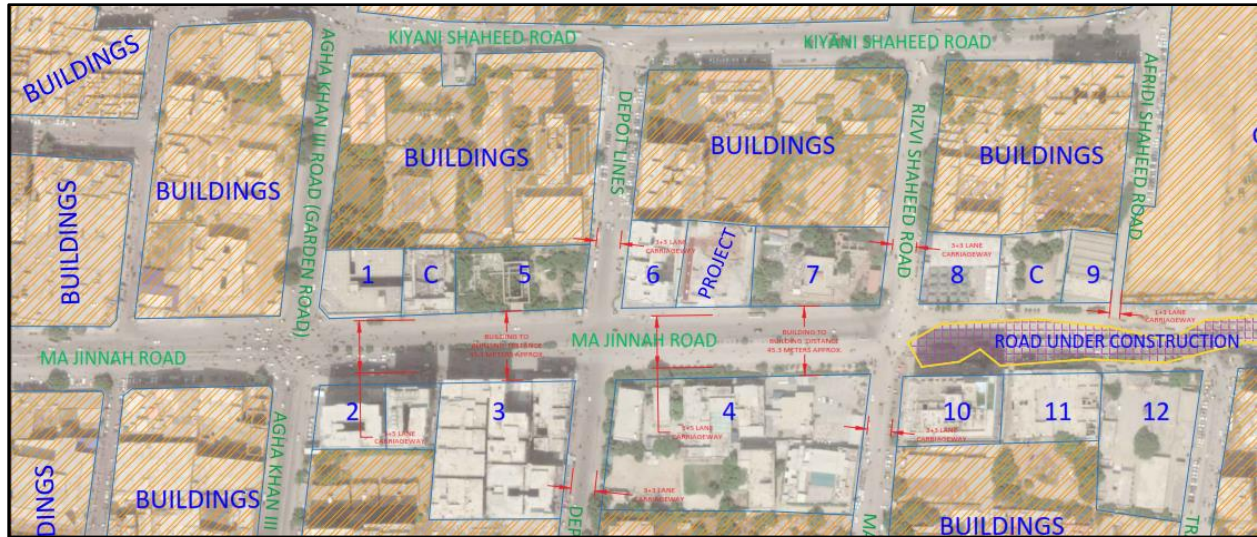


Figure 11: Project Area Road Inventory Map

1.5 Land-Use Density Survey

The Densification and Mix of the land-use distribution is identified through this type of survey. The significance of the data collected is such that the nature of project area i.e. the surrounding buildings of the proposed project highly cause an impact on the traffic generation. The actual difference between the delay created by the surrounding and the project can be reviewed separately. The map attached below signifies the various land-uses on the connecting mid-block.



Figure 12: Map of Land-use Distribution in the Project Area

The density levels are given in the chart attached below followed by the land-use densification map.

Table 7: Land-use Density Levels Chart

Density	Number of Floors
Low Density	1 to 2 floors
Medium	4 to 8 floors
High	9 plus floors

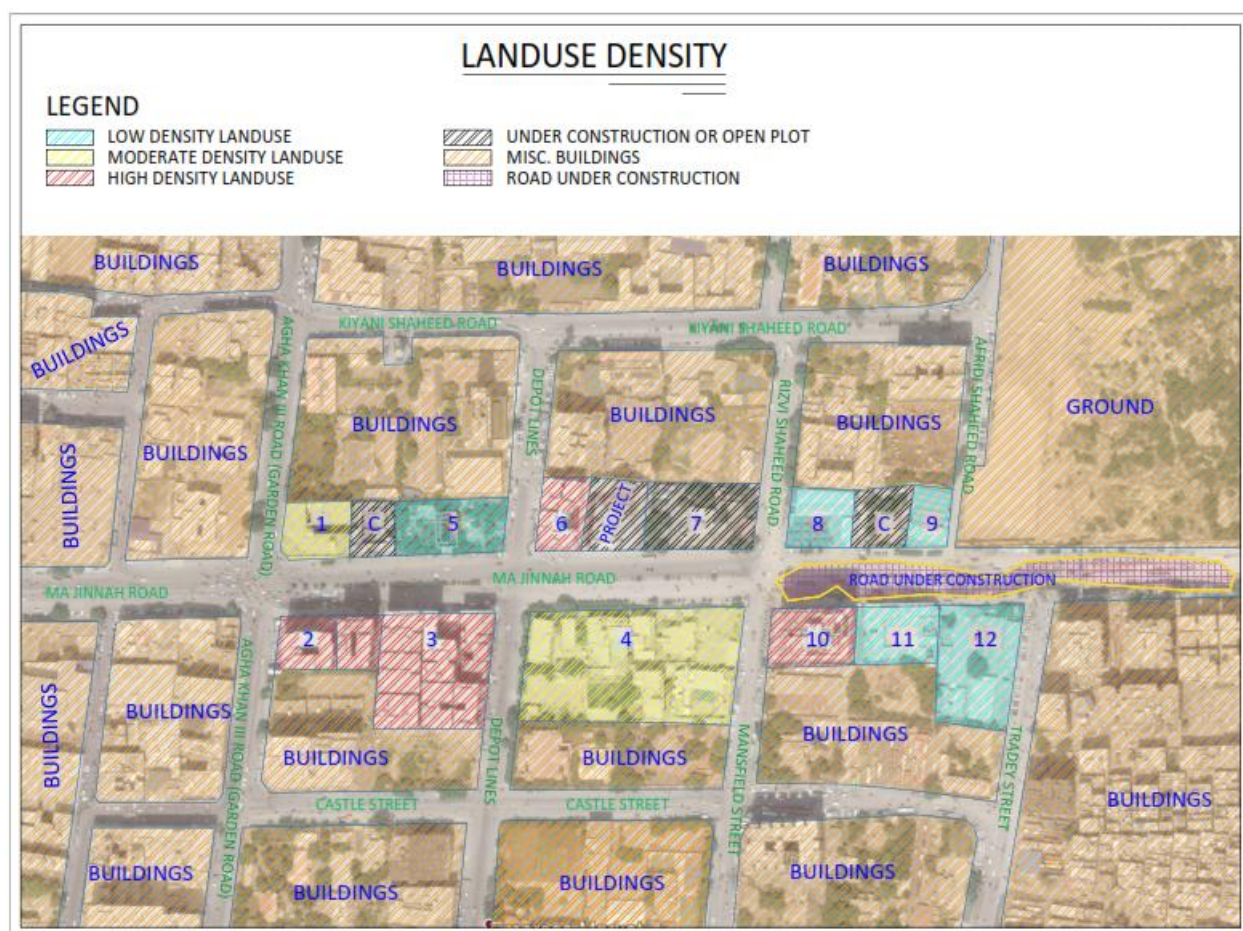


Figure 13: Land-use Densification Map

1.6 Data Collected from Client

The data collected via client includes the building related information, which is collected from the architectural plans and sections of the building. Expected operational year of the building, nature and land-use etc. are also extracted through project drawings and other data provided by the client. Primarily, data is provided by the client to kick off the project.

SCHEDULE OF PARKING				REQUIRED CAR PARKING			
AREA OF SHOP				CAR PARKING			
			(COMMERCIAL)	TOTAL NO OF CAR	=	192.93 - 5.24	
GROUND FLOOR AREA	5248.46	-	5248.46 SQ.FT.			187.98 CARS	
CAR PARKING AREA		-	5248.46 SQ.FT.	say	=	188 CARS	
FOR SHOPS			1000				
		=	5.24 = 6	M.C / CAR PARKING	=	6X30.88= 185.28	
AREA OF OFFICE		say	6	TOTAL NO OF M.C	=	186 M.C	
			(COMMERCIAL)				
TYPICAL FLOOR AREA	12058.88 * 16	-	192943.68 SQ.FT.	PROVIDED CAR PARKING			
			TOTAL AREA	1ST	=	61 CARS	
		=	192943.68 SQ.FT.	2ND	=	63 CARS	
CAR PARKING AREA		=	192943.68 SQ.FT.	3RD	=	65 CARS	
FOR OFFICE		=	1000				
		=	192.94 = 193	TOTAL NO OF CAR	=	189 CARS	
TOTAL NO OF CAR		say	193	PROVIDED M.C PARKING			
				1ST	=	62 M.C	
16 % PARKING REQUIRED OF M.CYCLE		=	16% OFF 193 = 30.88	2ND	=	62 M.C	
FOR BIKES AREA		=	31	3RD	=	62 M.C	
NO OF BIKES		=	89 Bikes	TOTAL NO OF M.C	=	186 M.C	

Figure 14: Project Parking Information as stated in the drawing provided by the Client

The collection of data from the client is significant in the approach to establish a precise analysis. This data can be effectively used to verify certain observations of traffic surveys. It is evident that some data is collected through practical surveys providing a more accurate number to carry out the analysis. The data collection exercise is followed by Parking Analysis, estimation of Access Gate Queue Length and V/C Ratio Analysis.

Chapter 4: Data Analyses

The series of data collection exercise is followed by relevant analyses through which outcomes are drawn relating to various traffic activities. Based upon these outcomes significant and appropriate recommendations are advocated.

1 Project Information

The proposed project entitled under the name ‘Prince Icon’ is planned to be constructed at Plot No. Survey No. 90, Depot Lines, Karachi Cantonment. The total area of the plot is 33,600 sq. ft. The proposed building is planned to be a commercial establishment with official units at 6th – 21st floor and cinemas on the 4th floor. The 4th floor also consists of recreational units such as gym, children’s play area and community hall. Parking provisions are to be developed on 1st – 3rd floors. There are 06 shops on the ground as well as a very large driver’s sitting area.

The building consists of a total of 192 office units with six varying types of offices. Parking for cars and bikes are provided at three floors of the building. The floors description and details are presented in the following chart:

Table 8: Detailed Project Description

S.#	Floor	Description	Details
1	Basement	Service Area	UGWT, Lobby, Generator Area, etc.
2	Ground	Shops & Drivers Sitting Area	06 shops
3	1 st – 3 rd	Parking Floors	Parking Slots for 189 bikes & 186 cars
4	4 th	Cinemas & Recreational Area	02 Cinema Halls, Children’s Area, Gym & Community Hall
5	5 th	Service Area (Utilities Room)	Electrical & Plumbing Rooms
6	6 th – 21 st	Office Units	192 Office Units of Type A, B, C, D, E & F
7	Roof	Open Area	Open Area with Atrium

2 Parking Analysis

Parking is one of the major concerns in the planning as well as operational phase of a project. The availability of less space in urban areas has increased the demand for parking space especially in an amply crowded area. Being commercial building, the project site is expected to generate a considerable amount of traffic.

It is necessary to conduct Parking analysis in order to evaluate the required parking demand of the building. This evaluation will further involve the comparison of parking supply with the demand and in case of deficiency a strategy will be developed to manage the deficiency within the facility.

2.1 Project Parking Supply

The drawings of the plot conclude that parking facilitation for the project traffic provided from floors 1st – 3rd. The total supply inventory at the proposed building is:

Table 9: Project Parking Supply Chart

Vehicle Type	Parking Supply
Car	189
Bike	186

2.2 Parking Demand Estimation for Offices

Factors derived from the similar area parking surveys are employed afterwards for the estimation of required parking. The parking factor for offices is such that for 702sq.ft. 01 car parking is required and for 333sq.ft. 01 motorcycle is required. Calculations for the estimation of parking demand is presented in the chart below:

Table 10: Demand Evaluation for Offices Chart

Estimation of Parking Demand for Office Units								
Sr. No.	Floors	Description			Parking Factor		Required Parking	
		Type of Office Units	Area	No. of Units	Cars	Bikes	Cars	Bikes
1	6th - 21st	Type A	1380.25	32	702	333	63	133
2		Type B	1483.06	32			68	143
3		Type C	1262.36	32			58	121
4		Type D	1254.03	32			57	121
5		Type E	1004.08	32			46	96
6		Type F	1069.14	32			49	103
Total Required Parking							340	716

It is evaluated that the demand which is to be generated through offices in the building will consist of 340 cars and 716 bikes.

2.3 Parking Demand Estimation for Showrooms

The parking factor for showrooms according the area is such that for 702sq.ft. 01 car parking is required and for 333sq.ft. 01 motorcycle is required. Calculations for the estimation of parking demand is presented in the chart below:

Table 11: Demand Evaluation for Showrooms Chart

Estimation of Parking Demand for Showrooms								
Sr. No.	Floor	Description			Parking Factor		Required Parking	
		Type	Area	No. of Units	Cars	Bikes	Cars	Bikes
1	Ground	Showroom Type 1	892.5	1	702	333	1	3
2		Showroom Type 2	885.89	5			6	13
Total Required Parking							8	16

It is evaluated that the demand which is to be generated through showrooms in the building will consist of 08 cars and 16 bikes.

2.4 Parking Demand Estimation for Cinemas

A cinema facilitation building is surveyed and a vehicle occupancy factor from the similar area is extracted. This factor is evaluated for one cinema hall of similar characteristics as of the proposed building. It is seen that there are recreational facilitations also provided on this floor but for the demand estimation it is considered that the no separate demand will be catered for these but it will only be utilized by the existing demand of offices, showrooms and cinema. The demand calculated through is presented as follows:

Table 12: Demand Evaluation for Cinemas Chart

Estimation of Parking Demand for Cinemas							
S. No.	Floor	Description		Vehicle Occupancy per Cinema		Required Parking	
		Type	No. of Units	Cars	Bikes	Cars	Bikes
1	4th	Cinema 1	1	62	30	62	30

2		Cinema 2	1			62	30
Total Required Parking						124	60

It is evaluated that the demand which is to be generated through showrooms in the building will consist of 124 cars and 60 bikes.

2.5 Project Parking Demand

The total number of parking stalls as calculated according to the parking factors of various types of facilitation in the building are:

Table 13: Total Project Parking Demand

Project Parking Demand					
Sr. No.	Vehicle Type	Offices	Showrooms	Cinema	Total
1	Car	340	8	124	472
2	Bike	716	16	60	792

The project parking demand estimation is for 472 cars and 792 bikes.

2.6 Comparison of Supply and Demand

Parking Analysis is conducted to assess the provision of parking at the facility such that in case of any deficiency suitable adjustments may be carried out before the operational phase. The calculations are presented in the table below:

Table 14: Project Supply and Demand Comparison Chart

Supply & Demand Comparison Chart				
Sr. No.	Vehicle Type	Parking Supply	Parking Demand	Deficiency
1	Car	189	472	283
2	Bike	186	792	606

The above analysis represents that the available parking space is of 189 cars, and 186 bikes, whereas the estimated parking deficiency is of 283 cars and 606 bikes. Concluding that the available in-house parking space in the building is inadequate for cars while for bikes provided parking stalls may not be severely insufficient to cater for the demand generated by the project.

2.7 Minimum Project Demand

Since the proposed building consists of cinemas and it also has a marginal impact on the parking demand, it is best suggested that shift management is applied for effective operations. All the shows for the cinema will start after 06:00 pm (except for Saturday and Sunday) which is also the departure time for office vehicles hence the demand for cinemas will be omitted from the actual demand, reducing the deficiency of vehicles at the project building.

Table 15: Minimum Project Demand Evaluation Chart

Minimum Project Parking Demand				
S. No.	Vehicle Type	Offices	Showrooms	Total
1	Car	340	8	348
2	Bike	716	16	732

Hence the project demand is summarized to 348 cars and 732 bikes according to which the supply and demand chart will be as follows:

Table 16: Project Supply and Minimized Demand Comparison Chart

Comparison Chart				
S. No.	Vehicle Type	Parking Supply	Parking Demand	Deficiency
1	Car	189	348	159
2	Bike	186	732	546

Considering the mentioned fact to manage time slots for the cinema, the deficiency in the parking demand will be reduced up to 159 car parking slots and 546 bike parking spaces. This demand can further be managed through shift management of offices and also through careful assessment of the types of shopping facilitations provided.

3 Access Gate Queue Length Analysis

Considerable trip rates are expected to be generated by the building due its commercial and residential nature. As the project site is in the close vicinity of the intersection, it is obligatory to assess the impact of queue length that is expected to be generated by the project traffic at the access gate of the project and on the existing inventory of the study area.

Scenarios based on the expected consequences are developed and conclusions drawn from the study of existing site geometry are assessed collectively for the final evaluation of the expected Queue Length at the access gate. For the analysis we have considered 40% of the minimum project demand. Details and outcomes obtained from the examination of the scenarios is discussed below.

3.1 Scenario 1

Different scenarios are considered to evaluate the performance and level of effectiveness of access gate under various arrival times. The best suited scenario is then recommended for operations at the project building.

In the first scenario we are assuming 40% of minimum demand generation of the building approaching at the access gate, in the peak period of 30mins. Service time for bikes and cars is 15 secs.

Table 17: Access Gate Queue Length Scenario 1 - Cars

Arrival Scenario: 1		(Subject Vehicle: Car)		
Arrival period =30 mins, Service Time= 15 sec/veh				
S. No.	Description	Inputs	Statistics	Units
1	Time Period (min)	30	1800	sec
2	40% of Minimum Project Demand (i.e. 348 cars)	348	139	# of cars
3	Service Time Required for vehicle	1	15	sec
4	Service Time Required for Generated Cars	139	2088	secs
5	Expected Queue for Cars		19	# of cars

The scenario depicts that at this particular arrival rate 19 cars will be queued at the access gate.

Table 18: Access Gate Queue Length Scenario 1 - Bikes

Arrival Scenario: 1		(Subject Vehicle: Bike)		
Arrival period =30 mins, Service Time= 15 sec/veh				
S. No.	Description	Inputs	Statistics	Units
1	Time Period (min)	30	1800	sec
2	40% of Minimum Project Demand (i.e. 732 bikes)	732	293	# of bikes
3	Service Time Required for vehicle	1	15	sec
4	Service Time Required for Generated Bikes	293	4392	secs
5	Expected Queue for Bikes		173	# of bikes

In this scenario, the queue obtained consists of 173 bikes.

3.2 Scenario 2

In the second scenario we are assuming 40% of minimum demand generation of the building approaching at the access gate, in the peak period of 30mins. Service time for bikes and cars is 10 secs.

Table 19: Access Gate Queue Length Scenario 2 - Cars

Arrival Scenario: 2		(Subject Vehicle: Car)		
Arrival period =30 mins, Service Time= 10 sec/veh				
S. No.	Description	Inputs	Statistics	Units
1	Time Period (min)	30	1800	sec
2	40% of Minimum Project Demand (i.e. 348 cars)	348	139	# of cars
3	Service Time Required for vehicle	1	10	sec
4	Service Time Required for Generated Cars	139	1392	secs
5	Expected Queue for Cars	No Queue is Formed		

The analysis highlights that no queue formation of cars is observed at the access gate

Table 20: Access Gate Queue Length Scenario 2 - Bikes

Arrival Scenario: 2		(Subject Vehicle: Bike)		
Arrival period =30 mins, Service Time= 10 sec/veh				
S. No.	Description	Inputs	Statistics	Units
1	Time Period (min)	30	1800	sec
2	40% of Minimum Project Demand (i.e. 732 bikes)	732	293	# of bikes
3	Service Time Required for vehicle	1	10	sec
4	Service Time Required for Generated Bikes	293	2928	secs
5	Expected Queue for Bikes		113	# of bikes

In this scenario, the queue obtained consists of 113 bikes.

3.3 Scenario 3

This scenario is considered for bikes only. In the third scenario we are assuming 40% of minimum demand generation of the building approaching at the access gate, in the peak period of 45 mins. Service time for bikes is of 10 secs.

Table 21: Access Gate Queue Length Scenario 3 - Bikes

Arrival Scenario: 3		(Subject Vehicle: Bike)		
Arrival period = 45 mins, Service Time= 10 sec/veh				
S. No.	Description	Inputs	Statistics	Units
1	Time Period (min)	45	2700	sec
2	40% of Minimum Project Demand (i.e. 732 bikes)	732	293	# of bikes
3	Service Time Required for vehicle	1	10	sec
4	Service Time Required for Generated Bikes	293	2928	secs
5	Expected Queue for Bikes		23	# of bikes

In this scenario, the queue obtained consists of 23 bikes depicting that effective measures must be taken to reduce this impact.

3.4 Access Gate Queue Length Summary

Three different scenarios are calibrated through variation in the arrival period of cars and bikes. According to the project specifications and surrounding area, 40% of demand generation is taken into consideration. The results are presented in the table as follows:

Table 22: Access Gate Queue Length Analysis Summary Chart

Access Gate Queue Summary Chart						
Type of Vehicle	Scenario 1		Scenario 2		Scenario 3	
	Arrival Time: 30mins	Service time: 15 secs	Arrival Time: 30mins	Service time: 10 secs	Arrival Time: 45mins	Service time: 10 secs
Car	19		No Queue is Formed		Not Evaluated	
Bike	173		113		23	

The estimation predicts that for cars second scenario is most suitable whereas for bikes there is queue formation at the access gate of 23 bikes in a peak period. To resolve this effective management must be undertaken.

4 Volume-To-Capacity Ratio Analysis

The V/C ratio indicates the proportion of the facility's capacity being utilized by current or projected traffic. Here V/C is calculated with the help of number of lanes, lane capacity, existing traffic and projected traffic volume of proposed site. V/C ratio is less than 1 which means that current design is sufficient.

The volume-to-capacity ratio is evaluated on both directions from which project is expected to attract traffic. Both directions are calculated on three scenarios; Existing Condition, No-built condition (2-year span) and Built Condition (2-year span) along with application of growth rate factor.

4.1 At M.A. Jinnah Road from Tower

At this section the traffic volumes arriving from Tower are used to evaluate V/C Ratio. The results obtained are as follows:

Table 23: V/C Ratio at M.A. Jinnah Road from Tower

AT M.A. JINNAH ROAD FROM TOWER			
No. of Lanes	Capacity	Volume	V/C
Existing Condition			
5	11000	7092	0.645
No-Built Condition (2-year Growth)			
5	11000	7969	0.724
Built Condition (2-year Growth)			
5	11000	8256	0.751

Volume-to-Capacity Ratio indicates that there are adequate vehicle volumes on the road as per the capacity. The introduction of project traffic has a minimal of increase of 0.027 in the existing V/C Ratio.

4.2 At M.A. Jinnah Road Towards Tower

At this section the traffic volumes arriving towards Tower are used to evaluate V/C Ratio. The results obtained are as follows:

Table 24: V/C Ratio at M.A. Jinnah Road towards Tower

At M.A. Jinnah Road Towards Tower			
No. of Lanes	Capacity	Volume	V/C
Existing Condition			
5	11000	10201	0.927
No-Built Condition (2 year Growth)			
5	11000	11462	1.042
Built Condition (2 year Growth)			
5	11000	11749	1.068

Volume-to-Capacity Ratio indicates that in the existing condition the road capacity is about to reach the threshold value of 1. This means that the road will be operational at its complete capacity and within the time span of two years an additional lane must be required to fulfil the increasing demand. The introduction of project traffic has an increase of 0.026 in the V/C Ratio.

4.3 At M.A. Jinnah Road from Tower with BRT Impact

The Volume Capacity Ratio is also analyzed considering the impact of BRT on the road section. The results obtained are as follows:

Table 25: V/C Ratio at M.A. Jinnah Road from Tower with impact of BRT

At M.A. Jinnah Road from Tower with BRT Impact			
No. of Lanes	Capacity	Volume	V/C
Existing Condition			
5	11000	6644	0.604
No-Built Condition (2-year Growth)			
5	11000	7465	0.679
Built Condition (2-year Growth)			
5	11000	7733	0.703

The proposed BRT Blue and Green Lines which will pass through M.A. Jinnah Road are expected to reduce the modal percentage of cars by 6%, of bikes by 8% and of buses by 10% providing the suitable routes and quality of transport to people. Hence the V/C Ratio of the road is maintained at 0.7 even after introduction of project traffic.

4.4 At M.A. Jinnah Road Towards Tower with BRT Impact

The Volume Capacity Ratio is also analyzed considering the impact of BRT on the road section. The results obtained are as follows:

Table 26: V/C Ratio at M.A. Jinnah Road towards Tower with impact of BRT

At M.A. Jinnah Road Towards Tower with BRT Impact			
No. of Lanes	Capacity	Volume	V/C
Existing Condition			
5	11000	9541	0.867
No-Built Condition (2-year Growth)			
5	11000	10720	0.975
Built Condition (2-year Growth)			
5	11000	10988	0.999

The proposed BRT Blue and Green Lines which will pass through M.A. Jinnah Road are expected to reduce the modal percentage of cars by 6%, of bikes by 8% and of buses by 10% providing the suitable routes and quality of transport to people.

Hence the V/C Ratio is evaluated considering the mentioned facts, however the capacity of the road is still likely to reach its threshold value.

The writers and thinkers of ITDP (institute of transportation development and policy) and the people who first implemented BRT in the world also most of the modern-day traffic engineers are now of the opinion that increment in parking supply attracts more and more demand in the CBD area.

They conclude that the increment in parking supply is not a decongestion contributor but instead it is a large contributor in congestion.

Therefore, they now suggest that instead of increment in parking supply as per the demand, the policy has to be developed that more and more public transportation routes should be provided for CBD visitors so that they may shift from their private vehicles to the most optimized mode of transportation such as BRT, Large Buses etc.

4.5 Volume-To-Capacity Ratio Analysis Summary

The calculations of the ratio are carried out such that different scenarios are established. The summary chart is presented as follows depicting that even after inclusion of project traffic and growth rate factor over the time span of two years the capacity of road at one section is about to reach its threshold value.

Table 27: Volume-to-Capacity Ratio Analysis Summary Chart

Direction	Existing Condition	No-Built Condition	Built Conditions
At M.A. Jinnah Road from Tower	0.645	0.724	0.751
At M.A. Jinnah Road towards Tower	0.927	1.042	1.068
At M.A. Jinnah Road from Tower with BRT Impact	0.604	0.679	0.703
At M.A. Jinnah Road towards Tower with BRT Impact	0.867	0.975	0.999

Chapter 5: Conclusions

The proposed project entitled under the name 'Prince Icon' is planned to be constructed at Plot No. Survey No. 90, Depot Lines, Karachi Cantonment. The total area of the plot is 33,600 sq. ft. The proposed building is planned to be a commercial establishment with official units at 6th – 21st floor and cinemas on the 4th floor. The 4th floor also consists of recreational units such as gym, children's play area and community hall. Parking provisions are to be developed on 1st – 3rd floors.

There are 06 showrooms on the ground as well as a very large driver's sitting area. The building consists of a total of 192 office units with six varying types of offices. Parking for cars and bikes are provided at three floors of the building.

The conclusions developed through the analyses conducted are as follows:

1 Parking Analysis

1.1 Minimum Project Demand

Since the proposed building consists of cinemas and it also has a marginal impact on the parking demand, it is best suggested that shift management is applied for effective operations.

All the shows for the cinema will start after 06:00 pm (except for Saturday and Sunday) which is also the departure time for office vehicles hence the demand for cinemas will be omitted from the actual demand, reducing the deficiency of vehicles at the project building.

Table 28: Minimum Project Demand Evaluation Chart

Minimum Project Parking Demand				
S. No.	Vehicle Type	Offices	Showrooms	Total
1	Car	340	8	348
2	Bike	716	16	732

Hence the project demand is summarized to 348 cars and 732 bikes according to which the supply and demand chart will be as follows:

Table 29: Project Supply and Minimized Demand Comparison Chart

Comparison Chart				
S. No.	Vehicle Type	Parking Supply	Parking Demand	Deficiency
1	Car	189	348	159
2	Bike	186	732	546

Considering the mentioned fact to manage time slots for the cinema, the deficiency in the parking demand will be reduced up to 159 car parking slots and 546 bike parking spaces. This demand can further be managed through shift management of offices and also through careful assessment of the types of shopping facilitations provided.

2 Access Gate Queue Length

Three different scenarios are calibrated through variation in the arrival period of cars and bikes. According to the project specifications and surrounding area, 40% of demand generation is taken into consideration. The results are presented in the table as follows:

Table 30: Access Gate Queue Length Analysis Summary Chart

Access Gate Queue Summary Chart						
Type of Vehicle	Scenario 1		Scenario 2		Scenario 3	
	Arrival Time: 30mins	Service time: 15 secs	Arrival Time: 30mins	Service time: 10 secs	Arrival Time: 45mins	Service time: 10 secs
Car	19		No Queue is Formed		Not Evaluated	
Bike	173		113		23	

The estimation predicts that for cars second scenario is most suitable whereas for bikes there is queue formation at the access gate of 23 bikes in a peak period. To resolve this effective management must be undertaken.

3 Volume-To-Capacity Ratio Analysis

The calculations of the ratio are carried out such that different scenarios are established. The summary chart is presented as follows depicting that even after inclusion of project traffic and growth rate factor over the time span of two years the capacity of road at one section is about to reach its threshold value.

Table 31: Volume-to-Capacity Ratio Analysis Summary Chart

Direction	Existing Condition	No-Built Condition	Built Conditions
At M.A. Jinnah Road from Tower	0.645	0.724	0.751
At M.A. Jinnah Road towards Tower	0.927	1.042	1.068
At M.A. Jinnah Road from Tower with BRT Impact	0.604	0.679	0.703
At M.A. Jinnah Road towards Tower with BRT Impact	0.867	0.975	0.999

The analysis depicts that after a time period an additional lane will be required to cater for the increasing demand of the area.

Chapter 6: Recommendations

The consolidated recommendations for the impact assessment of Prince Icon are presented as follows:

1 General Recommendations

- The actual parking demand of the facility is of 472 cars and 792 bikes considering the parking demand for offices, showrooms and cinema. However, this demand is minimalized providing that the show starting time of the cinemas will be at 06:00 pm and onwards for weekdays excluding Saturday and Sunday. This will reduce the maximum demand limit up to 347 cars and 732 bikes.
- Considering the minimalized demand, the deficiency of parking spaces is of 158 cars and 546 bikes. To accommodate for this at least two basement parking maybe developed.
- Or in other case, rest of the deficiency may be catered into a separate parking lot in the surrounding area of project. This location must be identified and after its identification a plan has to be developed for better traffic management (both vehicular and pedestrian) to and from the parking lot.
- Furthermore, as mentioned in the reports of BRT Blue Line and Green Line, the BRT Corridors will reduce vehicular demand of cars and motorcycles up to 10%. Therefore, we can fairly say that the deficiency of available parking slots, if mode of transportation is shifted to BRT as planned, will be further reduced to 144 cars and 492 motorcycles.
- The showrooms provided in the building maybe used for clothing franchise. If such is the case then the demand maybe further managed as shopping areas usually carry out activities in the evening and night hours during the time when the office shifts are off. If the land-use strictly is identifying that the shopping area will only be used for clothing / brand stores then the demand will further be reduced to a great extent because when the parking will reach shopping peak limit, the office would have already emptied the parking slots. This phenomena in traffic engineering is called as demand management via shift management.
- It is best suggested that if night shifts are adapted for the offices in the proposed building, a minimal of 50% offices must only be allowed to operate during one-night shift.
- The project plot is situated on a road section which has comparatively less traffic in the morning peaks. During the morning Peak hour, the road section observes a total volume of 3,484 vehicles whereas the other direction of the road accommodates 12,010 vehicles. Hence the arrival queue formation of the bikes on access gate will have a negligible impact on the traffic flow.
- The access gate analysis is conducted separate for bikes and cars, therefore any mechanism adapted for entrance and exit must operate distinctively for each vehicle type. It is further suggested that a comprehensive RFID or similar system must be designed for the building offices and shop owner and employees parking.
- The access gate analysis depicts that in order to avoid queue formation at the entrance of project during morning peak both the gates must be utilized for vehicular entry at least from 8:00 am to 9:30 am.
- To further manage the traffic flow on the access gate both the ramps maybe utilized for entrance providing access to departing vehicles on amber signal only at least from 8:00 am to 9:30 am.
- There is a necessary requirement of proper bus stops in the project area vicinity considering the highly commercial land-use distribution.
- There are constructional activities going-on in the project area which are prosed for the Blue and Green BRT Line, it is suggested that a detailed study must be conducted after the constructional activities are complete.

- Proper traffic maneuvering plan after counts at at-least three intersections of M.A. Jinnah Road which are Depot Lines, Afridi Shahid Road and Rizvi Shaheed Road must be prepared after the construction of all the grade separations and BRT Corridors in the project vicinity.
- Since the influence area of the project is largely under construction therefore it is suggested that before the operations of the building a brief study must be done to fine tune the results highlighted in the report.
- The writers and thinkers of ITDP (institute of transportation development and policy) and the people who first implemented BRT in the world also most of the modern-day traffic engineers are now of the opinion that increment in parking supply attracts more and more demand in the CBD area. They conclude that the increment in parking supply is not a decongestion contributor but instead it is a large contributor in congestion. Therefore, they now suggest that instead of increment in parking supply as per the demand, the policy has to be developed that more and more public transportation routes should be provided for CBD visitors so that they may shift from their private vehicles to the most optimized mode of transportation such as BRT, Large Buses etc.

2 Recommendations Related to Parking Demand Management

- The writers and thinkers of ITDP (institute of transportation development and policy) and the people who first implemented BRT in the world also most of the modern-day traffic engineers are now of the opinion that increment in parking supply attracts more and more demand in the CBD area. They conclude that the increment in parking supply is not a decongestion contributor but instead it is a large contributor in congestion. Therefore, they now suggest that instead of increment in parking supply as per the demand, the policy has to be developed that more and more public transportation routes should be provided for CBD visitors so that they may shift from their private vehicles to the most optimized mode of transportation such as BRT, Large Buses etc.
- One of the major attractions of the business and work trips of Karachi is Saddar and nearby areas. Travel demand on the roads and streets of Saddar Area is growing day by day. Now the present situation is, that at most of the locations there is no room for additional lanes and grade separation structures. This situation has happened in metropolitans of many countries. To overcome the deficit of demand and supply travel demand management and demand control techniques are applied across the world. One of the best solutions is shift the mode of transport from private vehicles and two, three wheelers to an integrated bus network. This is the only possible and effective way for Saddar Region to manage the demand and supply gap.
- To manage demand and supply gap both micro level and macro level measures are required. Macro level measures include bus networks, mass transits and rail systems. And micro level systems include the facility demand management and control by restricting the facility users to use vans and public transport and discouraging them to use cars. If we restrict the offices that every office before commencement of its operations must provide a plan to accommodate 50% of their staff in vans then the demand supply gap will be minimized to a level that there will only be a deficiency of 109 motorcycles.
- This remaining deficiency can be adjusted using valet parking, re-design of parking floors or provision of one additional floor for the parking of vehicles.