SEPTEMBER - 2026

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

ROSHAN SAFA TOWER - 2

RESIDENTIAL BUILDING PROJECT







EMC Pakistan
Private Limited

ALTAF TAI
Builders & Developers

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ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

ROSHAN SAFA TOWER 2
RESIDENTIAL BUILDING PROJECT

PROPOSED BY ALTAF TAI BUILDERS & DEVELOPERS

SEPTEMBER 2026

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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 for its approval for construction of residential building project, namely "Roshan Safa Tower 2 2", consisting of 31 Storeys (3 Basements + Ground + 1-3 Floors of Parking + 4th to 31st Floor to Apartments) at Plot No. 125, Depot Lines, Karachi Cantonment Board, Karachi having total area of 557057.32 Sq. FT. 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, health and safety protection;
- 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.

M/s. Altaf Tai Builders & Developers have successfully executed numerous development projects of similar nature and scale, demonstrating a strong track record in delivering state-of-the-art buildings using modern construction technologies. The Proponent employs contemporary project management practices, advanced construction methodologies, and efficient work processes to ensure timely and effective project implementation. Supported by professionally qualified and experienced personnel, a competent workforce, a flexible organizational structure, and a comprehensive range of modern construction equipment and machinery, the Proponent possesses the capability and resources to successfully undertake mixed-use development projects.

The proposed project has been designed by a multidisciplinary team of qualified consultants, ensuring due consideration of building stability, energy requirements, efficient resource management, sustainability, health and safety, security, and compliance with applicable environmental standards and requirements.

Following are the salient features of the project;

Table Ex.1: Project Details	
Project Name	Roshan Safa Tower 2
3rd Basement Plan	75 Cars and 45 Motorcycles, underground water tank and underground firefighting water tank
2nd Basement Plan	70 Cars and 64 Motorcycles, Fan Room, Air Raid Shelter, Stair Case, Lifts, Flower Bed
1st Basement Plan	61 Cars and 53 Motorcycles, Fan Room, Air Raid Shelter, Stair Case, Lifts, Flower Bed
Ground Floor Plan	5 Cars and 36 Motorcycles, Reception Hall, Funeral Parlor, Waiting Area, Flower Bed, Entrance Lobby for Shops and Entrance lobby for apartments

1st Floor Plan: (Parking Floor)	39 Cars and 17 Motorcycles, K-electric substation, Electric Meter room & Flower Bed, Corpse Room, Garbage Collector & Washrooms
2nd Floor Plan (Parking Floor)	49 Cars and 17 Motorcycles, Electric Meter room
3rd Floor Plan (Parking Floor)	48 Cars and 37 Motorcycles
4th -11th Floor Plan (Residential Floor)	120 Apartments, (15 Apartments at each floor)
12th to 16th Floor Plan (Residential Floor)	65 Apartments (13 Apartments at each floor)
17th to 22nd Floor Plan (Residential Floor)	66 Apartments (11 Apartments at each floor)
23rd to 30th Floor Plan (Residential Floor)	56 Apartments (7 Apartments at each floor)
31st Floor	Recreational facilities
Note: Emergency Stair Case is designed to provide at each floor, Fire Fighting Water Provision provide separately	
Total Apartments:	307
Height of the Building	385'-0"
Roof	SKY Tower & Lift Machine, Overhead water tank, overhead firefighting water tank and Mechanical Room
Car Parking (total)	347
Motorcycle Parking (total)	269

The proposed project site is located at Plot No. 125, Depot Lines, Karachi Cantonment Board. The project site is served by Castle Street, Armenian Street & Talha Street. The microenvironment of the project comprises of residential Houses/Residential cum commercial building, school, mosques, restaurants, transport and health care facilities.

The proposed project site is located at Armaninan Street with Castle Street and Prince Road serves as a primary access towards the site. North of the project site lies 20'-0" wide Castle Street and Sawera Tower Residential and Commercial under construction Building, a 40'-00" wide Talha street runs North-East of project site, Mansfield Street in West and Empress View Apartments & Prince Road in South runs toward South-west to Bird Market Saddar and empress Market. Currently, the proposed site is a vacant plot free from encumbrances.

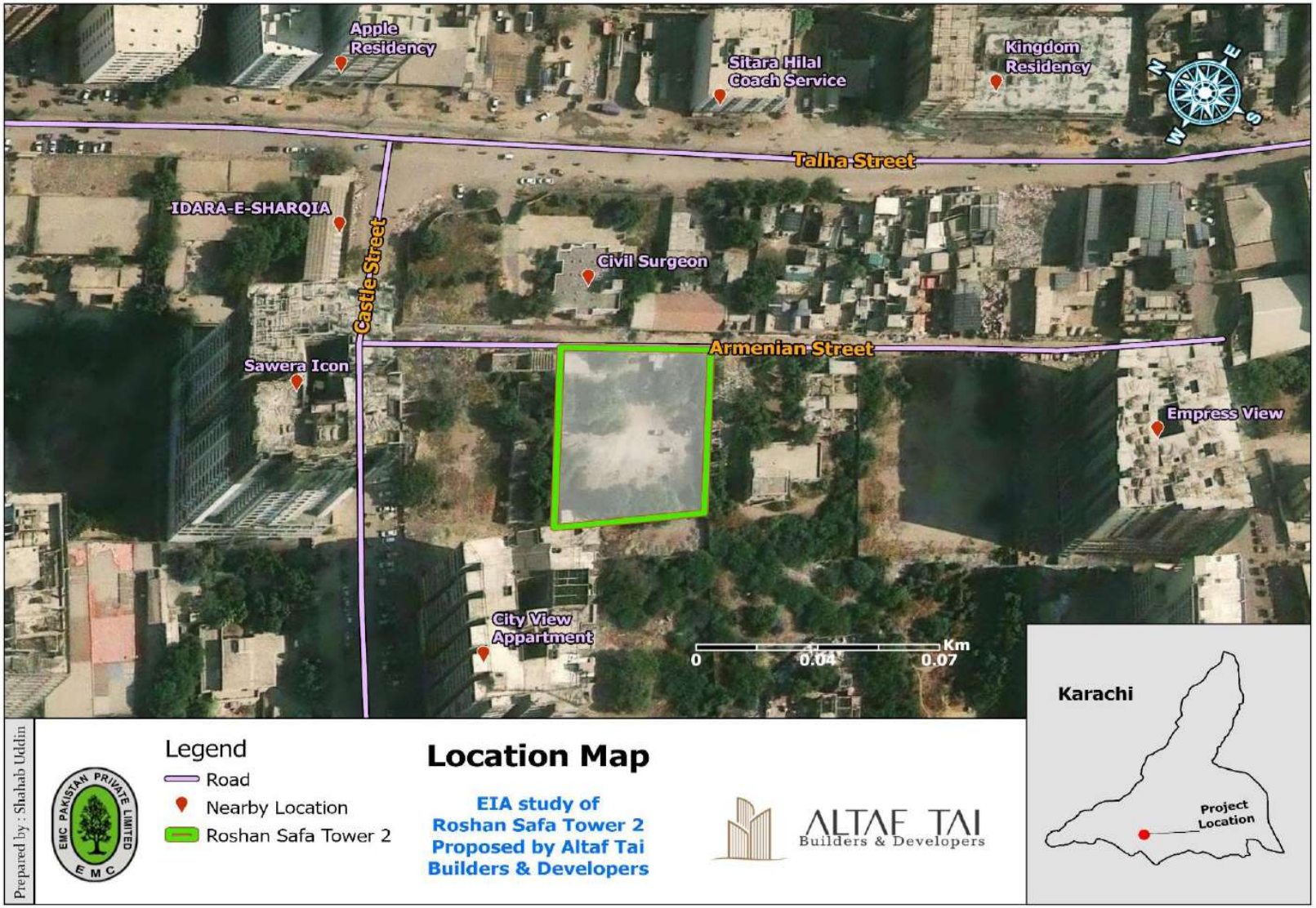


Fig Ex-1: Project Location Map

- The Project will be sited at Plot No. 125, Depot Lines, Karachi Cantonment Board; the Project site falls in the appropriate category that permits the designated land-use by the relevant authority i.e. Karachi Cantonment Board. The site is thus the only and hence the preferred alternative for siting the Project.
- The ownership of the plot lies with the M/s Altaf Tai Builders & Developers. Since the proponent is the rightful owner of the project's plot. there is no dispute with regard to siting of the project. To validate their claims on the site and on its being the only and hence the preferred alternative for establishment of their residential building project, the proponent has obtained NOCs from KCB and utility agencies.
- Being the integral part of the EIA study, detailed consultations were carried out with the stakeholders of the Project. In this regard, a Neighborhood Survey was conducted to identify residential and commercial interests in the area that may face direct impacts from the proposed development. Main concerns were related to high-rise buildings in the area potentially blocking the ambient air flow & causing wide-spread dust during construction phase, traffic congestion and parking issues and overburdened utilities in the area, particular water supply. EIA study has addressed the concerns specific to the project and has proposed proportionate mitigation measures. Following are some pictures of consultation:

	
Mr. Aamir, Store Incharge of Sawera Tower	Mr. Rizwan, Resident
	
Govt. Girl Secondary School, Lines Area	Mr. Shehbaz Ahmed, Civil Surgeon,

	
Consultation with Food Cart Owner	Consultation with Manager, Student Biryani

- The site is free from encumbrances and therefore would least likely cause displacement of population, loss of business and annoyance to the living environment and disturbance to the area.
- The macroenvironment 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 commercialized area, where no flora and fauna of significance exist.
- The project when completed would require an estimated 16,960 US gallons per day. Total electrical load is about 694 kW. Water supply will be obtained through KW&SB system and additionally through city water tankers if required. The proposed project has its own back-up power generation, sewage treatment and disposal with Septic tank and grey water recycling, in addition to provision of parking space. The relevant 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.
- 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 to be paid.
- Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters travelling on the roads surrounding the project.
- 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) standard NFPA 92. The stairwell pressurization and smoke control fans will be linked to the automatic fire alarm system.

- 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.
- With 24-hour security system all over the building, the designers have ensured that the concerns on safety are alleviated and eased. The Project would thus achieve its objective of providing a secure and safe building project 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 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.
- Based on the findings of the environmental impact assessment it is concluded that the environmental impacts of the construction and operation of the project are manageable and can be mitigated by implementing the Environmental Management and Monitoring Plan which forms an integral part of EIA document. The screening process has, through review of literature, 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 study, therefore, 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.

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Chapter 1 INTRODUCTION

1.1 General

This Environmental Impact Assessment (EIA) report presents the assessment of environmental impacts that may arise due to the development of proposed Residential building in Depot Lines, Karachi Cantonment Board, Karachi which will be developed by M/s Altaf Tai Builders and Developers. This document has been prepared in compliance with the mandatory requirement of the Section 17 of Sindh Environmental Protection Act (SEPA) 2014. Compliance with provisions of SEPA 1997, Section 17 requires that

"No proponent of a project will commence construction or operation unless he has filed with the Agency an environmental impact assessment, and has obtained from the Agency approval in respect thereof".

M/s EMC Pakistan Private Limited has been commissioned by M/s Altaf Tai Builder and Developers to assess the project's environmental and social viability through various environmental components like air, water, noise, including land, biological along with the parameters of human interest and to prepare Environmental Management Plan (EMP) for mitigation of adverse impacts along with chalking out of post project environmental monitoring program.

1.2 Overview of Proponent

M/s Altaf Tai Builders and Developers have successfully executed development projects of similar nature and magnitude with a strong track record of putting together a state-of-the-art building and construction technologies. They have, in their business of construction, employed modern management tools and work methodology to implement the project on a fast and right track. With professionally qualified and competent staff, efficient work force, flexible organization and a large pool of modern construction equipment & machinery.

1.3 Project Proponent & Consultant – Contact details

Name of the Project:	Roshan Safa Tower 2
Location of the Project:	Plot No. 125, Depot Lines, Karachi Cantonment,
Name of the Proponent:	Altaf Tai Builders & developers
Name of Environmental: Consultant Contact:	Syed Nadeem Arif, Managing Director, EMC Pakistan Pvt Ltd, Office # 503, Anum Estate Building, Main Shahrah-e-Faisal, Opp. Duty Free Shop, Karachi Tel: (+92-21) 34311466; Fax: (+92-21) 34311467 Email: nadeem@emc.com.pk

Presented in this report are the findings of the Environmental Impact Assessment (EIA) study submitted to the Sindh Environmental Protection Agency for its approval for construction of "Roshan Safa Tower 2" Residential Building, consisting of 31 Storeys (3 Basements + Ground + 1-3 Floors of Parking + 4th to 31st Floor to Apartments) at Plot No. 125, Depot Lines, Karachi Cantonment Board, Karachi having total area of 557057.32 Sq. FT.

1.4 Project Overview

The proposed project is a Ground plus 31 floors residential building with the following facilities:

Table.1.1: Project Details	
Project Name	Roshan Safa Tower 2
3rd Basement Plan	75 Cars and 45 Motorcycles, underground water tank and underground firefighting water tank
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The proposed project site is located at Plot No. 125, Depot Lines, Karachi Cantonment Board. The project site is served by Castle Street, Armenian Street & Talha Street. The microenvironment of the project comprises of residential Houses/Residential cum

commercial building, school, mosques, restaurants, transport and health care facilities.

The proposed project site is located at Armaninan Street with Castle Street and Prince Road serves as a primary access towards the site. North of the project site lies 20'-0'' wide Castle Street and Sawera Tower Residential and Commercial under construction Building, a 40'-00'' wide Talha street runs North-East of project site, Mansfield Street in West and Empress View Apartments & Prince Road in South runs toward South-west to Bird Market Saddar and empress Market. Currently, the proposed site is a vacant plot free from encumbrances.

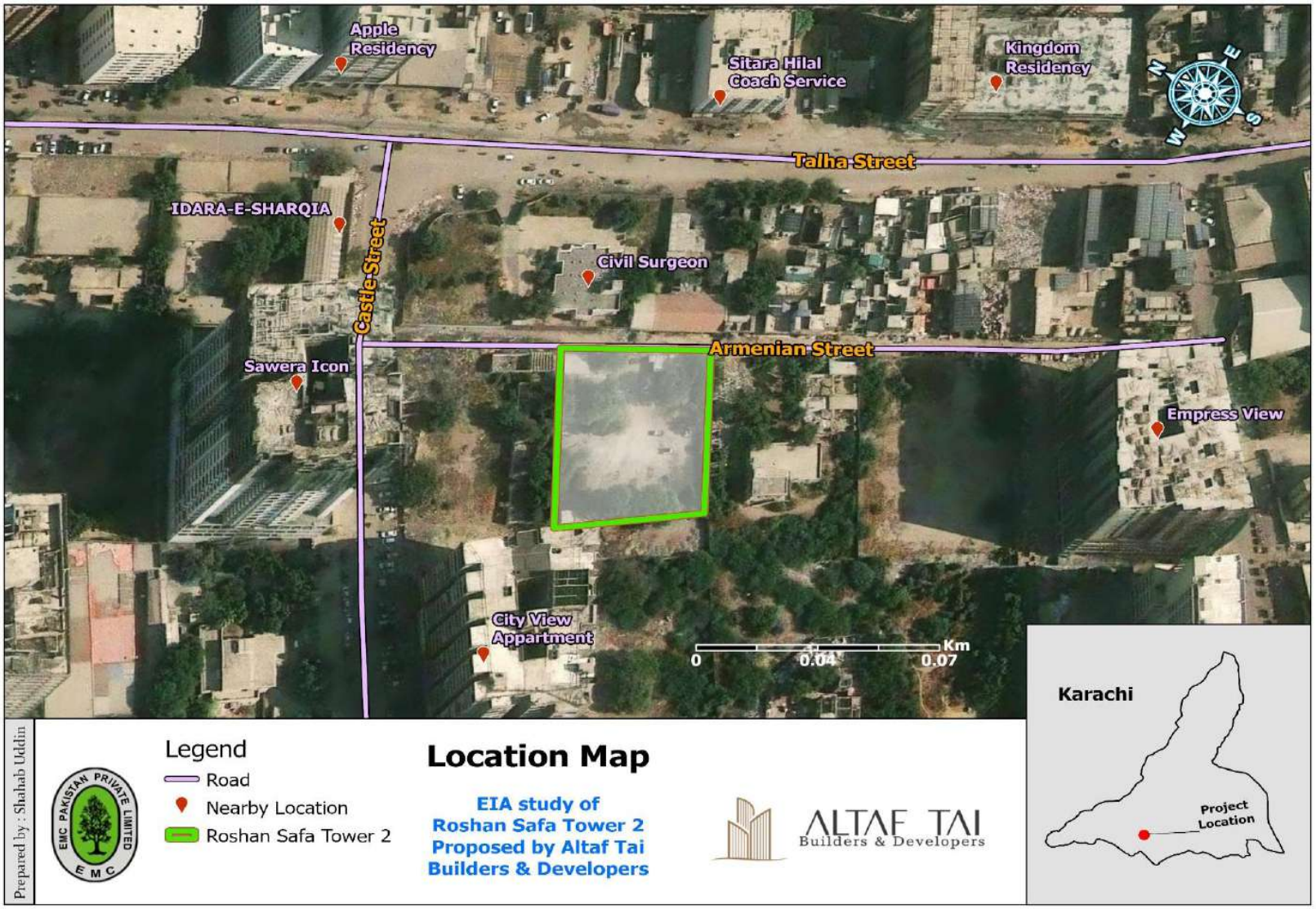


Figure 1.1: Location of Project site

1.5 Objectives of Project

In launching the Project, the proponent aims to achieve the following objectives:

- To provide an organized residential structure conducive to the current demand of fast degrading environment;
- To promote development in the Housing Sector which at present is among the worthwhile contributors to the growth of GDP;
- Respond to the need of integrating commercial units in this part of Karachi which has of recent attracted the population from other towns of the city in response to commercial needs.

1.6 Need for EIA

The EIA study is a mandatory requirement under the provisions of Sindh Environmental Protection Act 2014, Sindh Environmental Protection Agency (Environmental Assessment) Regulation 2021 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 reference:

"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."

Project under Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021 have been classified as

Schedule III, List of Projects requiring an EIA,
Clause I. Urban development and tourism
Sub Clause 2: Residential, Commercial High-rise buildings subject to compliance of building bylaws of relevant organizations more than 500,000 sq. feet

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. The project falls in the EIA category in the regulations as it is spread over an area of 557557057.32 Sq. FT which is greater than the 500,000 Sq. Ft area.

This assessment focuses on various parameters covering all environmental & social issues including water & waste water management, sewage treatment plant, source of water, ground water utilization, 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 simultaneously with other technical and economic criteria, it may be possible to develop the housing projects with the safeguard of environmental & socioeconomic resources 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 and 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.

1.7 Need for the Development of the Project

Karachi is among the five mega cities of South Asia performing a vital function with regard to investment trade, growth and innovation while simultaneously bearing the cost of this function. There is a huge and growing demand for housing schemes and residential projects in Karachi since population has seen an upward growth spiral bringing with it a huge demand for housing. The city is growing at the northern peripheries with a number of new developments constantly being added the inventory. Surjani has been identified as a high growth area with potential reinforced by modern infrastructure and public transportation links, sustained by employment generators in the form of industrial areas supported by various residential and retail formats.[1].

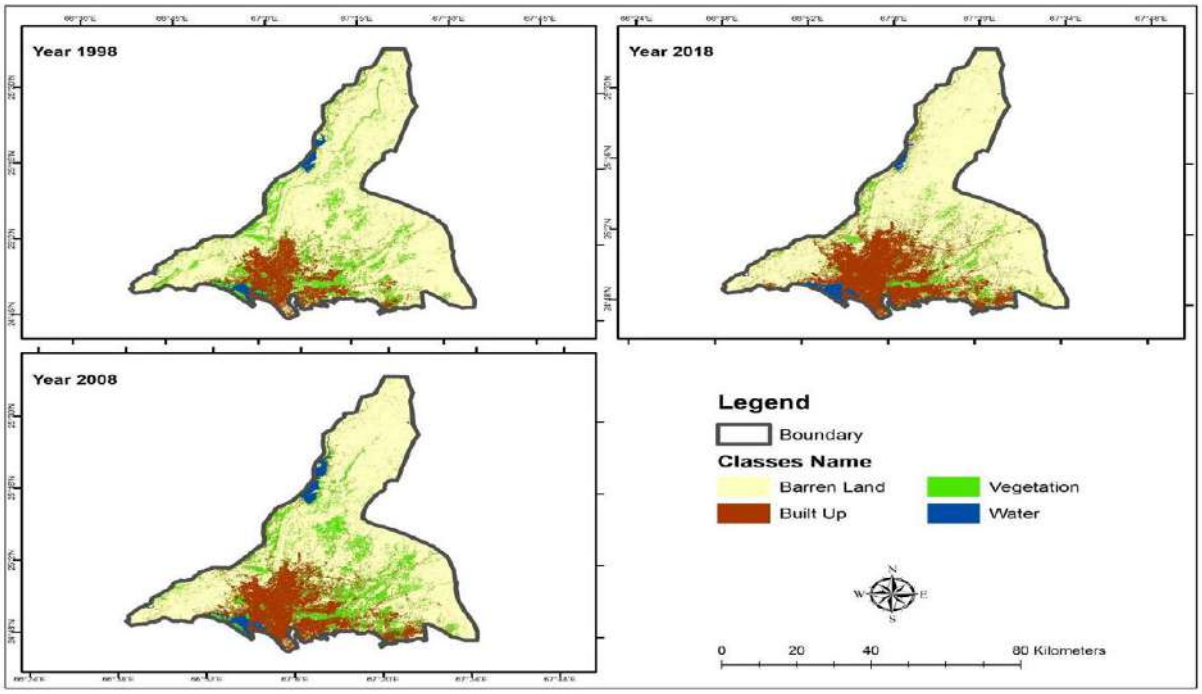


Figure 0.1: Urban expansion in Karachi[2]

[1] Master Plan for Design Brief, Housing Scheme in Surjani, Karachi.
[2] LULC map of Karachi Division with respect to rapid change in urbanization for the years 1998, 2008 and 2018. Adapted from "Raza, D., Karim, R. B., Nasir, A., Khan, S. U., & Zubair, M. H. (2019). Satellite Based Surveillance of LULC

1.8 Methodology for Environmental Assessment

This environmental assessment (examination and evaluation) is based on comparative evaluation of the environmental quality before and after establishment of the project. For this purpose, the baseline of the profile project area was developed by collecting data, records and information on physical, ecological as well as socioeconomic environment, in particular the surrounding areas in its neighborhood. An assessment of impact at the different phases of the project, i.e. pre-construction, construction and operation stages. The changes anticipated in the critical environmental aspects e.g. in the ambient environmental parameters that may be significant have been identified. This leads to identification of significant impact, for which necessary mitigation measures have been proposed. Figure below shows the step-by-step process for the completion of an EIA study.

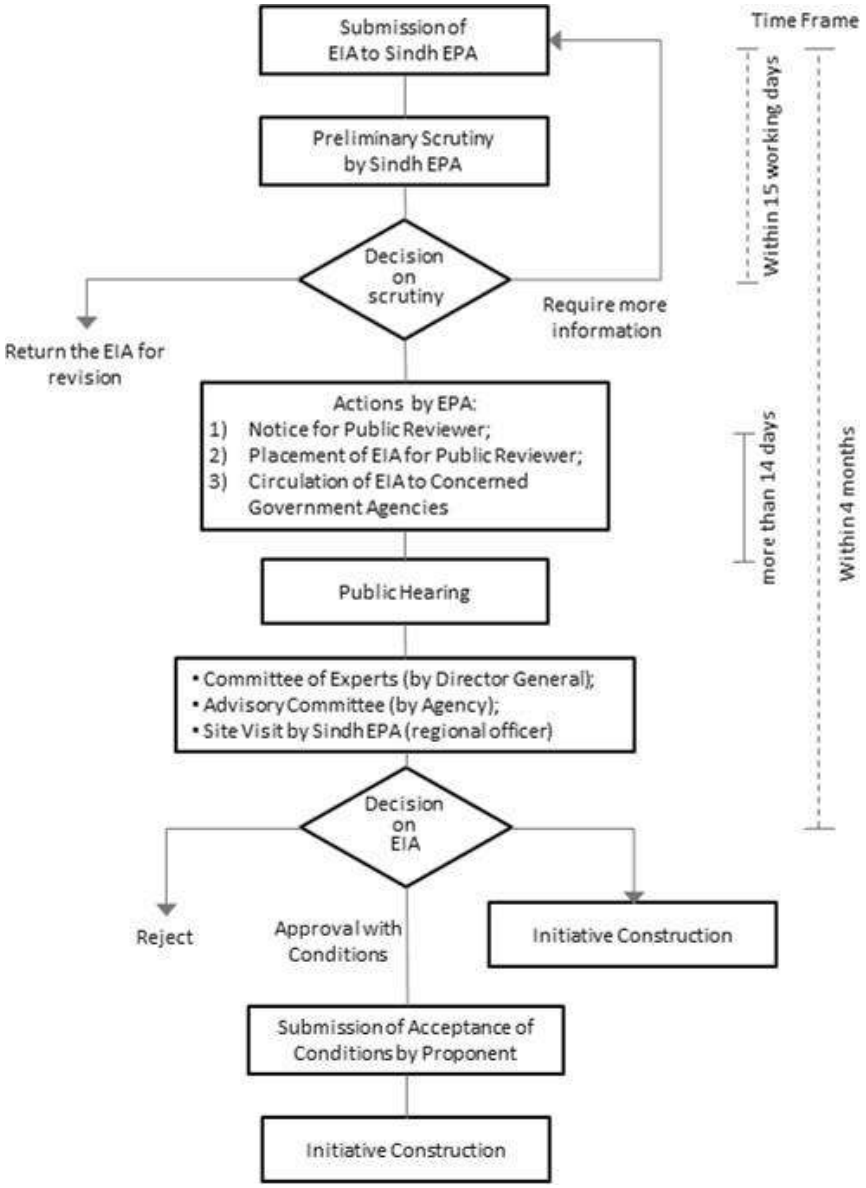


Figure 0.2: Steps of EIA
(Source: EIA Study Team)

with Deliberation on Urban Land Surface Temperature and Precipitation Pattern Changes of Karachi. *Pakistan. J Geogr Nat Disast*, *9*(237), 2167-0587".

1.9 Scoping

A scoping exercise was undertaken to identify the potential issues that are to be considered in the environmental impact assessment. The scoping exercise included the following tasks:

Data Compilation: A generic description of the proposed activities relevant to this environmental assessment was compiled with the help of the Project Proponent.

- **Review of Published literature:** All available published and unpublished information pertaining to the micro & macro environment of the study area was obtained and reviewed. It included the earlier studies conducted in the study area, environmental & social baseline and impact assessment studies conducted by different consultants in past. Secondary data was very helpful in understanding the issues that were identified by other consultants.
- **Review of applicable Legislation**: Information on relevant legislation, regulations, guidelines, and standards was reviewed and compiled.
- **Identification of potential impacts:** The information collected in the above procedures was reviewed and potential environmental issues identified.
- **Initial site visit:** An initial site visit was conducted to get an overview of site conditions and the surrounding areas.

1.10 Acquiring Project Specific Data

This was the very first step to embark on the study initiated through meetings held with the officials of the proponent. In the meetings, discussions were made to clarify the nature and location of project in environmental perspectives. Basic information on the form of raw input received from the proponent was analyzed by the experts to comprehend the project and to assess its influence on the environment.

1.11 Literature Review

While the project details were being acquired, desktop study was also initiated simultaneously to draft environmental baseline information of the project area. The desktop study comprised of literature review, collection of updated authenticated published/printed data on the physical and social environment related to the focused area. The same was also used to delineate the scope of surveys which would then form the basis of environmental assessment.

1.12 Stakeholder Consultation

A stakeholder consultation was undertaken to document the concerns of the local community and other stakeholders, and to identify issues that may require additional assessment in order to address these concerns. Stakeholder consultation was conducted during the survey with following objectives:

- To inform the Stakeholders, Communities about the project
- To gather feedback from primary and secondary stakeholders of project

- To identify relevant potential issues, including the socioeconomic impact of the project, and corresponding mitigation measures.

During the stakeholder consultation process for the project, following key considerations were focused:

- Identification of sensitive receptors in the area
- Concerns of the nearby villages about the project

1.12.1 Reconnaissance and Detailed Surveys

Preliminary surveys of project location were organized by EMC in which experts visited the area and assessed the physical scenario for the EIA stage. The relevant surveys were carried out under the supervision of environmental experts. Preliminary socio-economic evaluation was also undertaken.

Detailed and comprehensive surveys will be conducted in detailed EIA study stage to investigate various domains of environment and socio-economic sector to highlight various issues, and concerns that may lead to the identification of aspects and subsequent assessment of impacts.

For having an over view of the project area and to assess the existing infrastructure and socio-economic activities, a detailed groundwork investigation was carried out around the microenvironment of project area.

1.12.2 Aspects Identification

The EIA process requires development of an inventory of all possible environmental and socio-economic aspects of the project, which provide the basis of categorization and evaluation of impacts and their likelihood to occur due to the materialization of the project. Aspects are those which are the causes of positive or negative impacts.

Those aspects are primarily associated with activities performed during construction and operation phases of the Project.

1.12.3 Impact Assessment and Mitigation Measures

Based on the developed aspects inventory, experts analyzed the aspects for their logical outcome as potential impacts on the physical and social environment. These impacts have been identified, assessed and weighed for different activities during construction, commissioning and operational phases of the Project.

Mitigation and control measures were also proposed for various activities of Project in order to minimize the potential impacts during the life span of the Project.

1.13 Environmental Management and Monitoring Plan

In the light of impacts identified and mitigations proposed an Environmental Management Plan (EMP) has been developed which has a pivotal role in assigning tasks to personnel for the

environmental management and implementation of mitigation measures as well as to monitor its effectiveness throughout the life cycle of the project. It also provided monitoring plans/procedures to be followed for checking and compliance maintenance of environmental quality and legal requirements through suggested mitigation measures.

1.14 Documentation Review and Conclusion

This is the final step to complete the environmental assessment and compile all the work done in shape of an EIA report. Report writing started just after the initiation of environmental assessment.
The report has been written by experts of EMC and compiled by the office staff in coordination with the experts. At the end of the study, the entire report is reviewed by the team leader followed by recommendations and conclusion in the light of the assessment.

1.15 Structure of EIA Report

The EIA report has been structured on the standard format, prescribed by the EPA. The Report has been presented in the following sections:

- **Chapter 1:** Provides an introduction and overview of the project
- **Chapter 2:** Gives an overview of policy and legislation along with international guidelines relevant to the project
- **Chapter 3:** Includes the project description, its objective, location of the project area and construction /operation related details
- **Chapter 4:** Provides description of the microenvironment and macro environment of the project area. This chapter contains description of the Physical, Biological and built environment of the Site.
- **Chapter 5:** Describes the public consultations and its outcomes.
- **Chapter 6:** Describes screening of environmental and social impacts and appropriate mitigation measures.
- **Chapter 7:** Presents the Environmental Management Plan and Monitoring Program for the project
- **Chapter 8:** Summarizes the report and presents its conclusions.

The main text of the report is supported by a series of Annexures which provide auxiliary information including: Respective sections of prominent Provincial Environmental Laws and Guidelines which form part of the environmental study are provided in the Annexures.

1.16 EIA Study Team

This EIA report has been prepared by EMC Pakistan organized and coordinated with the team of experts mentioned in Table 1.2 for the purpose of conducting environmental assessment and preparation of the report:

Table 0.1: List of EIA Team Members

S#	Name	Position in EIA Study Team
1.	Mr. Syed Nadeem Arif	Project Manager / Team Leader
2.	Mr. Syed Omer Arif	Director
3.	Mr. Muhammad Haseeb Zaman	Director
4.	Mr. Imran Khan Yusufzai	Senior Environmentalist
5.	Mr. Muhammad Fahad Afzal	Environmentalist
6.	Mr. Shehryar Naseer	Sociologist
7.	Ms. Iman Shiraz	Sociologist
8.	Mr. Shahabuddin	GIS Expert
9.	Environmental Expert, Social Team & Environmental Field & Laboratory Analyst	-

CHAPTER 2 REGULATORY FRAMEWORK

The Constitution of Pakistan contains provisions for environmental protection & resource conservation. There are two fundamental rights that are directly relevant for environmental issues.
The first is Article 9 of the Constitution, which provides:

"No person shall be deprived of life or liberty save in accordance with law".

The second is Article 14, which makes the dignity of a man a fundamental right.

The Supreme Court in landmark judgment in the case of *Shehla Zia and others vs WAPDA (1994)* referred to both these Articles and laid down the foundation of modern environmental law in Pakistan in the following terms:

"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 our 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 below bare necessity is like without proper food, clothing, shelter, education, health care, clean atmosphere and unpolluted environment."

This Chapter provides synopsis of policies, legislation, and guidelines that may have relevance to the proposed project & administrative framework as well as institutional set-up relevant to the environmental assessment of the proposed project.

After the Eighteenth amendment in the constitution of Pakistan, 1973 many federal subjects devolved to provincial legislation. The Concurrent List in fourth schedule of the constitution containing entries of subjects wherein federal and provincial legislation could legislate has been abolished. The subject of "Environmental Pollution and Ecology" the entry No.24 of the concurrent legislative list has also devolved to provincial legislations. Since project is in province of Sindh; therefore, only those national laws, rules and regulations are discussed here which have application in the project. Between 1993 and 2010, the Pak-EPA promulgated several rules, regulations, standards, and guidelines to implement the provisions of the PEPA 1997. The provincial government has yet to draft its own complete instruments, for instance, sectorial guidelines; therefore, as provided under Article 270A of the Constitution, rules, regulations, standards, and guidelines made under PEPA 1997 can still be benefited from where these are not made under the provincial law. SEPA has, however, notified the Sindh Provincial rules, regulations and standards.

The discussion on regulatory requirements applicable to this Project is, therefore, based on the Sindh law, the SEPA 2014, the Regulations; and, the rules, regulations, standards, and guidelines developed under the SEPA 2014. There are provincial laws which come under the umbrella of environmental protection; for instance, Forest Act 1927, but due to irrelevance with the project setting such laws are not reviewed here.

The Sindh Environmental Protection Act 2014 requires proponents to follow the rules, regulations, guidelines and standards pertaining to the objectives of the development initiative. The proponent: **M/s Altaf Tai Builders and Developers** are required to follow all applicable policy, legal and administrative frameworks. These include legal provisions relevant to environmental & social protection applicable to the planning, construction & operation phases, which must be considered as well to ensure that the activities of the proposed project are aligned with sustainability principles.

The laws and regulations relevant to the proposed project are briefly reviewed below.

2.1 Sindh Environmental Protection Act, 2014

The Sindh Environmental Protection Act, 2014 (2014 Act) was passed by the Sindh Assembly on February 24, 2014. The 2014 Act is the basic legislative tool empowering the provincial government to frame regulations for the protection of the environment. The 2014 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 2014 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 provisions of the SEPA 2014 have a direct bearing on the proposed Project:

- Section 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'

- Section 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.'

- Section 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
- (d) release of emissions or discharges from industrial or commercial operations as prescribed.

- Section 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'.

- Section 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'

- Section 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.

- Section 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'.

- Section 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'.

- Section 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 management plan containing a comprehensive appraisal of the environmental aspects of the project'.

- Section 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 & compensatory measures taken with respect to the project; and

(c) recommendations for further minimizing or mitigating the adverse environmental impact of the project.

- Section 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'.

- Section 31(1): 'The Agency shall cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, along with an invitation to the publish to furnish their comments thereon within a specified period'.

- Section 31(3): ''All comments received under sub-section (1) and (2) shall be duly considered by the Agency while reviewing the environmental impact assessment or strategic impact assessment, and decision or action taken thereon shall be communicated to the persons who have furnished the said comments.

2.2 Sindh Environmental Protection Agency (Environmental Assessment) Regulations 2021

The Sindh Environmental Protection Agency (Environmental Assessment) Regulations 2021, revised from the preceding document introduced in 2014, define Schedules (I, II, & III) of projects falling under the requirement of an Environmental Checklist, IEE, or EIA respectively.

Schedule I: A project falls into Schedule I if it is considered as having minimal environmental impact, and the screening of the project through a checklist, documents its environmental compliance.

Schedule II: A project falls in Schedule II if it is likely to have adverse environmental impacts, but of lesser degree or significance and all the mitigation measures to handle the impact is manageable. Such types of projects need IEE report inducing EMP.

Schedule III: Projects are categorized in Schedule III if they generate significant adverse environmental impacts that require a comprehensive management plan, or if the project is located within or passes through: a) Areas declared by the Government of Pakistan as environmentally sensitive (National Parks/Sanctuaries/Game Reserve), b) Areas of international significance (e.g. protected wetland as designated by the RAMSAR Convention), or c) Areas designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as cultural heritage sites.

According to Sindh Environmental Protection Agency Environmental Assessment Regulations, 2021, a project falling in any category listed in Schedule III shall file an EIA with the Sindh Environmental Protection Agency (SEPA). This specific project can be categorized as:

Schedule III: Projects Requiring an EIA

Category (I) Urban development and tourism

(2) Residential, Commercial High-rise buildings subject to compliance of building by laws of

relevant organizations more than 500,000 sq. feet

Filing: Regulation 9 requires submission of two hardcopies and two electronic copies accompanied by an application form (schedule-V), copy of receipt of payment of review fee, NOC from relevant departments (where applicable).

Preliminary scrutiny: Regulation 10 states that at any time after the submission of the report, the agency shall review the report and inform the proponent for submission of the need for any additional information at any time.

Review: The agency shall review the report after issuing confirmation of completeness as per Regulation 9.

Validity: Regulation 15 defines the validity period of approval of an IEE or EIA to be three years from date of construction and must start within three years of report approval. A three-year extension at a time may be granted upon the agency's discretion with or without the submission of a fresh IEE or EIA.

2.3 Guidelines for Public Consultation

Public consultation is mandated under 2014 Act. 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 & 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 involve stakeholders; and mechanisms to ensure stakeholders' consideration are taken into account'.

As above, the Guidelines for Public Consultation introduces 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. However, there are instances where in middle of a project on direction of tribunal or court environmental assessment carried out with public consultation.

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.

2.4 Sindh Environmental Quality Standards

On January 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 2.1 shows SEQS for ambient air.

Table 2. 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*	80 µg/m^3	Ultraviolet Fluorescence Method
	24 hours**	120 µg/m^3	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m^3	Gas Phase Chemiluminescence
	24 hours**	40 µg/m^3	
Oxides of Nitrogen as (NO_2)	Annual Average*	40 µg/m^3	Gas Phase Chemiluminescence
	24 hours**	80 µg/m^3	
O_3	1 hour	130 µg/m^3	Non dispersive UV

			absorption method
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m^3	High volume Sampling, (Average flow rate not less than 1.1m^3/minute)
	24 hours**	500 µg/m^3	
Respirable Particulate Matter (PM_{10})	Annual Average*	120 µg/m^3	B Ray absorption method
	24 hours**	150 µg/m^3	
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average*	40 µg/m^3 ***	B Ray absorption method
	24 hours**	75 µg/m^3	
	1 hour	15 µg/m^3	
Lead (Pb)	Annual Average*	1 µg/m^3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5 µg/m^3	
Carbon Monoxide (CO)	8hours**	5 mg/m^3	Non Dispersive Infra Red (NDIR) method
	1hours	10 mg/m^3	

***Annual arithmetic mean 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.**

***** or 9 µg/m^3 plus baseline, whichever is low**

Table 2.2 shows the standards for motor vehicle noise.

Table 2. 2 The Motor Vehicle Ordinance (1965) and Rules (1969)

Parameter	Standards (maximum permissible limit)	Measuring method
Noise	85dB(A)	Sound-meter at 7.5meter from the source

Table 2.3 shows the Sindh environmental quality standard for noise.

Table 2. 3 Sindh Environmental Quality Standard for Noise

S. No.	Category of Area / Zone	Effective from 1st January, 2015	
		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 2.4.

Table 2.4 Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents

S. #	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	
3	Biological Oxygen Demand $(BOD)_5$ at 20°C	80	250	80	mg/l
4	Chemical Oxygen Demand (COD)	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 2.5.

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 tolerant Coliform bacteria)	Must not be detectable in any 100-ml sample	Essential Inorganics (mg/liter)		
			13	Aluminum (Al) mg/l	≤ 0.2
			14	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	15	Arsenic (As)	≤ 0.05
			16	Barium (Ba)	0.7
			17	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 resent in 95% of the samples taken throughout any 12-month period.	18	Cadmium (Cd)	0.01
			19	Chloride (Cl-)	< 250
			20	Chromium (Cr)	≤ 0.05
			21	Copper (Cu)	2
			Organic (mg/L)		
			22	Phenolic compounds	<0.0002
			Toxic Inorganics (mg/liter)		
			23	Cyanide (CN)-	≤ 0.05
			24	Fluoride (F)	≤ 1.5
			25	Lead (Pb)	≤ 0.05
			26	Manganese (Mn)	≤ 0.5
Physical			27	Mercury (Hg)	≤ 0.001
4	Color	< 15 TCU	28	Nickel (Ni)	≤ 0.02
5	Taste	Non-objectionable/ Acceptable	29	Nitrate (NO_3)-	≤ 50
6	Odor	Non-objectionable/ Acceptable	30	Nitrite (NO_2)-	≤ 3
7	Turbidity	< 5 NTU	31	Selenium (Se)	≤ 0.01
8	Total Hardness as $CaCO_3$	< 500 mg/l	32	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					
11	Alpha Emitters bq/L	0.1	33	Zinc (Zn)	5.0
12	Beta emitters	1			

2.5 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.

2.6 Archaeological Relics

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. The Act defines “antiquities” as ancient products of human activity, historical sites or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the Project proponents are obligated to ensure that no activity is undertaken within 61 m (200 ft.) of a protected antiquity, and to report to the GoP’s Department of Archaeology any archaeological discovery made during the course of the project. 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. Heritage Foundation has catalogued 600 historic buildings declared heritage sites under the Sindh Cultural Heritage (Preservation) Act, 1994. No such sites exist in the vicinity of project.

2.7 Pakistan Penal 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.

2.8 Sindh Solid Waste Management Board Act, 2014

The SSWMB Act, 2014 was enacted to establish a Board for collection and disposal of all solid waste, to arrange effective delivery of sanitation services, to provide pollution free environment and to deal with other relevant matters. The Board established under the Act headed by the Chief Minister or his nominee and constitutes of thirteen other ex officio members of other relevant departments. Some of the salient features and functions of the Board are; it has 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 established under the Local Government Act 2013, it has the authority to grant permission to individuals, institutions industries, factories, workshops, furnaces, compost making and power generation from the solid waste, for segregation of the recyclable material from the waste, collection, treatment, sale and purchase, recycling or disposal of any kinds of waste.

2.9 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.

2.10 Sindh Drinking Water Policy, 2017

Public Health Engineering & Rural Development Department, Government of Sindh, with the approval of Chief Minister Sindh issue 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.

The proponent shall ensure supply of clean drinking water to the construction staff.

2.11 Sindh Sanitation Policy, 2017

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 changes 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.

2.12 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.

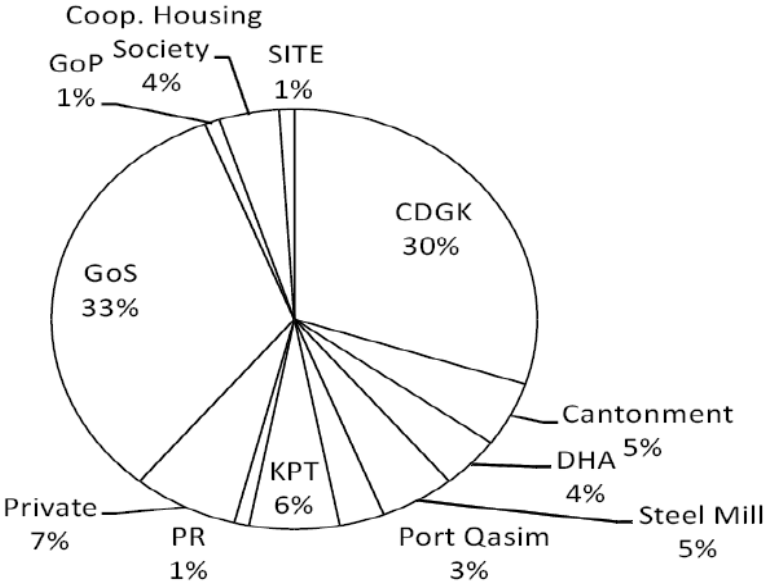


Figure 2. 1 Land Holdings by Agency in Karachi
Source: KMP 2020

The above-mentioned regulations have been quite frequently amended as needs arose, since its commencement, especially among the detailed provisions.

2.13 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". NOC from CAA for the project has been mentioned in the SBCA approval.

2.14 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.

a. buildings permitted for construction after the adoption of these Provisions shall comply with the provisions stated herein for new buildings forthwith.
b. 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

c. 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.

2.15 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. Under the act, the Sindh Occupational Safety and Health Rules 2019 have been notified. The proponent shall ensure the safety and health of workers working at the site by provision of safe working environment and Personal Protective Equipment.

2.16 IFC General EHS Guidelines

The EHS guidelines published by IFC are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of its projects; however, these guidelines have been benefited from for other projects as well. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during construction, operation, and decommissioning phase of a project or facility. Environmental issues associated with the construction and maintenance activities may include, among others, noise and vibration, soil erosion, and threats to biodiversity including habitat alteration and impacts to wildlife.

Examples of the impacts addressed in the General EHS Guidelines include:

- Construction site waste generation;
- Soil erosion and sediment control from materials storage area and site preparation activities;
- Fugitive dust & other emissions (e.g. from vehicle traffic, land clearing activities, & materials stockpiles);
- Noise from heavy equipment and truck traffic;
- Potential for hazardous materials and oil spills associated with heavy equipment operation and fueling activities.

CHAPTER 3 DESCRIPTION OF PROJECT

3.1 The Project

The proposed project "**Roshan Safa Tower 2**" is planned to be constructed on Plot No. 125, Depot Lines, Karachi Cantonment, having total area of 557057.32 Sq. FT and will serve as residential building project. The building details are described in the table below:

Table 3.1: Project Details

Project Name	Roshan Safa Tower 2
3rd Basement Plan	75 Cars and 45 Motorcycles, underground water tank and underground firefighting water tank
2nd Basement Plan	70 Cars and 64 Motorcycles, Fan Room, Air Raid Shelter, Stair Case, Lifts, Flower Bed
1st Basement Plan	61 Cars and 53 Motorcycles, Fan Room, Air Raid Shelter, Stair Case, Lifts, Flower Bed
Ground Floor Plan	5 Cars and 36 Motorcycles, Reception Hall, Funeral Parlor, Waiting Area, Flower Bed, Entrance Lobby for Shops and Entrance lobby for apartments
1st Floor Plan: (Parking Floor)	39 Cars and 17 Motorcycles, K-electric substation, Electric Meter room & Flower Bed, Corpse Room, Garbage Collector & Washrooms
2nd Floor Plan (Parking Floor)	49 Cars and 17 Motorcycles, Electric Meter room
3rd Floor Plan (Parking Floor)	48 Cars and 37 Motorcycles
4th -11th Floor Plan (Residential Floor)	120 Apartments, (15 Apartments at each floor)
12th to 16th Floor Plan (Residential Floor)	65 Apartments (13 Apartments at each floor)
17th to 22nd Floor Plan (Residential Floor)	66 Apartments (11 Apartments at each floor)
23rd to 30th Floor Plan (Residential Floor)	56 Apartments (7 Apartments at each floor)
31st Floor	Recreational facilities
Note: Emergency Stair Case is designed to provide at each floor, Fire Fighting Water Provision provide separately	
Total Apartments:	307
Height of the Building	385'-0"
Roof	SKY Tower & Lift Machine, Overhead water tank, overhead firefighting water tank and Mechanical Room
Car Parking (total)	347
Motorcycle Parking (total)	269

3.2 Status of Approvals

Following NOCs/approvals will be obtained and submitted in due time:

1. Mutation from Karachi Cantonment Board
2. Lease Documents from Military Estate Office, Karachi Circle, Karachi

Approval from Sindh Environmental Protection Agency will be a major milestone for project because Karachi Cantonment Board has made it mandatory for all the builders and developers to obtain approval of EIA under Section 17 of SEP Act 2014 from Sindh EPA as a pre-requisite of getting final approval of the building plan.

3.3 Project Location

The proposed project site is located at Plot No. 125, Depot Lines, Karachi Cantonment Board. The project site is served by Castle Street, Armenian Street & Talha Street. The microenvironment of the project comprises of residential/commercial buildings, School, mosques, restaurants and health care facilities.

The nearby landmarks include Sawera Tower, Government Girls Secondary School, Lines Area, Medical Centre, Empress Market, Rainbow Centre etc.



Figure 3.1: Archetitural view of building

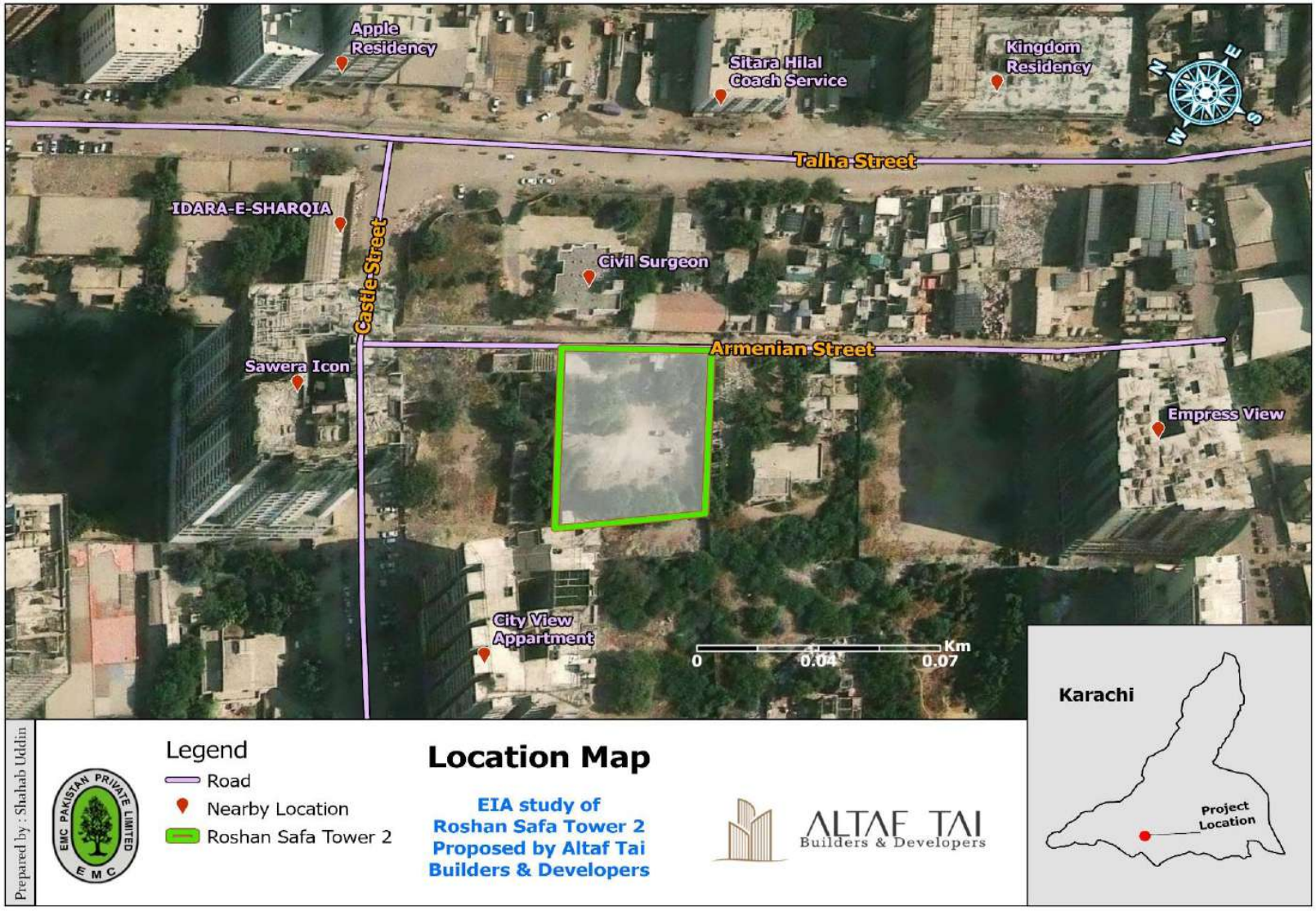


Figure 3.2: Location of Project site

3.4 Construction & Commissioning

3.4.1 Construction Schedule

It is anticipated that construction of the project will be completed in about 05 years from the date of start of construction activities. The construction & commissioning phase will consist of following major activities:

- Construction of campsite including facilities and mobilization of contractors
- Construction of foundations and auxiliary structures (piling, civil works etc.)
- Internal and External finishing
- Mechanical, electrical and other works
- Demobilization and site restoration

3.4.2 Pre-Construction/Design Phase

This, the essential phase 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 has been conducted and load bearing capacity of the soil has been established. The pre-construction activities will involve earthworks & excavations. In order to obtain geotechnical information for the design of foundation, it was considered essential to carry out subsoil investigation at the project site.

3.4.3 Construction Activities

The sequence of construction should be as follows:

- Construction of earth retaining structure (secant pile wall, contiguous pile etc.)
- Drilling and installation of dewatering wells
- Excavation of plot upto groundwater level
- Dewatering
- Excavation upto Raft bottom level
- Construction of raft foundation followed by construction of substructure.

Standard and environmentally compatible construction materials (cement, sand, steel reinforcement, bricks etc.) & techniques/construction practices will be employed besides adopting Standard Operating Procedures (SOPs) set-out in the Environmental Management Plan.

(1) Construction office & Camp

The construction contractor will develop his own camp & offices for construction purposes within the project site. Development of campsite will include the following activities:

- Leveling and compaction of the area for office and campsite
- Provision of drainage works in and around the campsite
- Laying and compaction of the gravel topping in the office and campsite
- Construction of fuel storage tank area and water tank
- Provision of fence, access and emergency gates
- Construction of septic tanks
- Installation of membrane liner for fuel storage
- Installation of security guard cabins
- Installation of sewerage pipeline with manholes for the septic system & connecting it with Sewer line
- Provision of signage for each activity center

(2) Foundations

Raft foundations work will be made in accordance with recommendation of Geotechnical investigation. Excavated during construction of foundation, material will be disposed of off-site via trucks and sent to approved dumping sites. The excavated soil will be sent to road construction contractors for appropriate utilization.

(3) Building Shell and Core Construction

Construction of the exterior enclosure or “shell’’ of the building include construction of the building’s framework (installation of beams and columns), floor decks, facade (exterior walls and cladding), and roof construction. These activities require the use of tower cranes, compressors, personnel and material hoists, front-end loaders, concrete pumps, on-site bending jigs and a variety of hand-held tools, in addition to the delivery trucks bringing construction materials to the site. At the same time, infrastructure connections are built. These include lines for water, sewer, storm water, electricity & telecommunications.

(4) Interior Construction and Finishing

This stage includes the construction of interior walls, installation of lighting fixtures and interior finishes (flooring, painting, etc.), as well as mechanical & electrical works such as the:

- Installation of elevators
- Internal and external pipe works
- Fire protection & Life safety systems
- Car Park Ventilation
- Electrical Distribution
- Emergency Lighting installations
  Lightning Protection.

(5) Civil Works

Civil works involves excavation, piling, formwork, reinforcement, concreting, masonry, plastering, painting, tinsmith's, and also waterproofing work with gas-flame sticking, construction of light separating walls, hung ceilings, flooring, lining and facing.

(6) Construction Equipment & Machinery

Conventional machinery and equipment will be used for construction activities. The equipment and machinery may include dozers, excavators, loaders, mobile crane, lorry, dump trucks, back hoe, bar bending machine, water bowzers, material hoist, passenger hoist, concrete placement booms & power generators.

(7) 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.

(8) 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 are not being used.

3.5 Subsoil Investigation

Scope of field work included drilling of five (05) boreholes up to the depth from 25.0 meters to 30.0 meters below the existing site grade. Drilling platform was almost equal to the adjacent road level. Following is the break-up of borehole depths:

Boring No.	Investigated Depth in meter (m)
BH-1	25.0
BH-2	25.0
BH-3	25.0
BH-4	35.0
BH-5	25.0

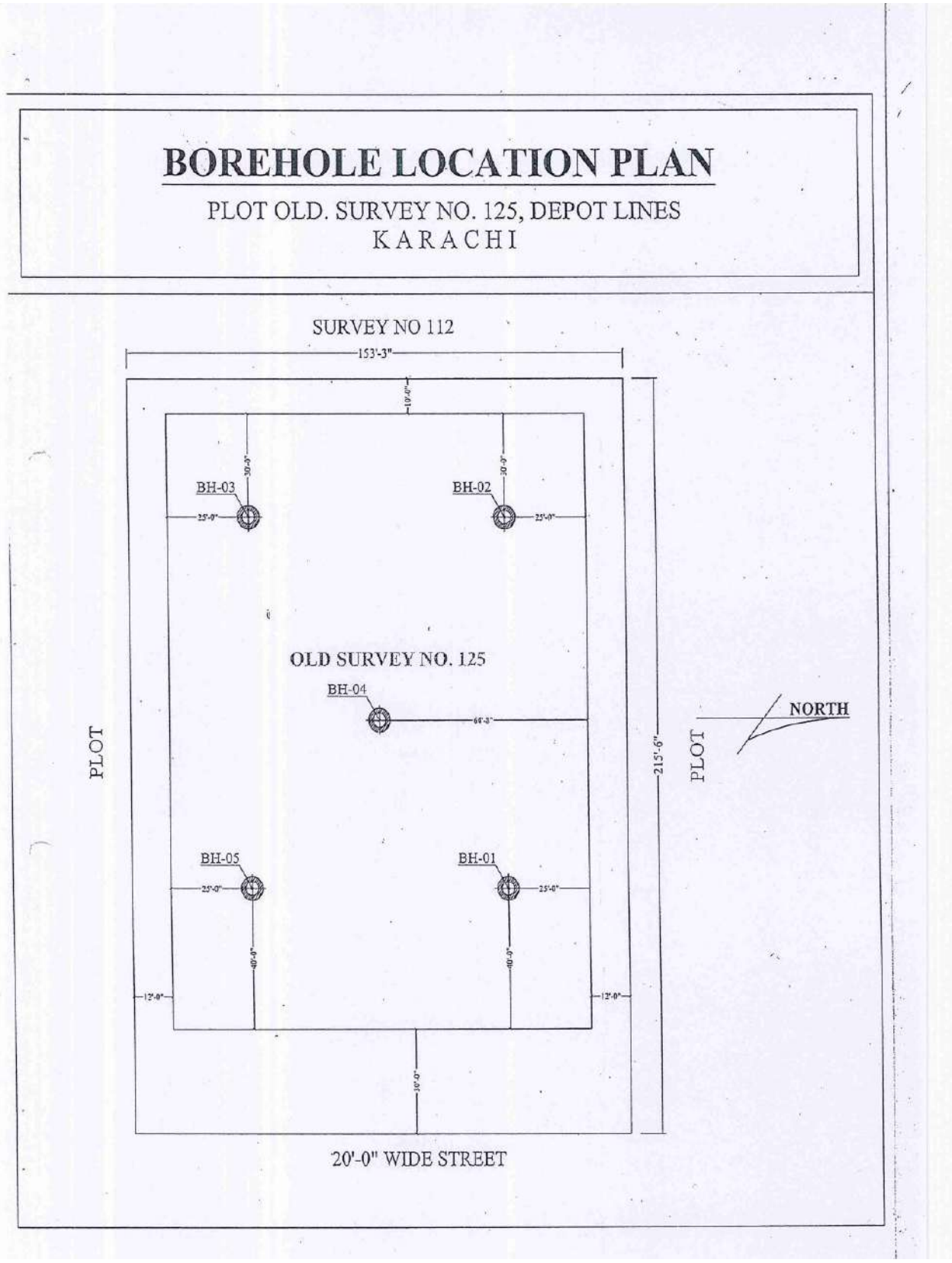


Figure 3.3: Point locations of bore water sample

Subsurface Deposits

The subsurface deposits up to the explored depth consist of the following units:

- Filling Material
- Sand
- Silt
- Gravel
- Sandstone
- Claystone
- Limestone

Following sub-sections describe the strength characteristics of the geological units and the groundwater conditions. All rocks are classified as per BS-5930.

Filling Material

Deposits of filling material including coarse grained sand and gravel. These deposits were found up to the depth of 3.0 meters.

Deposits of Filling Material	
Borehole No.	**Depth (meters)**
BH - 01	0.0 - 1.0
BH - 02	0.0 - 1.0
BH - 03	0.0 - 1.5
BH - 04	0.0 - 1.0
BH – 05	0.0 - 3.0

Groundwater Conditions

Groundwater was encountered up to the maximum explored depth of 7.31 meters in any of the boreholes drilled at the site.

3.6 Plumbing & Electrical System

3.6.1 Plumbing System

Design Codes & Standards: All plumbing work designed and installed as per CBK Byelaws, International Plumbing Code 2012, National Plumbing Code, International Fuel Gas Code, American Society for Plumbing Engineers (ASPE) Handbook (2010) and relevant British Standard Institute. Best quality available plumbing fixtures and materials will be specified.
Plumbing Fixtures Requirements: The plumbing system has been designed to meet the

minimum plumbing fixture requirements for space occupancy as per International Plumbing Code.

Scope of Plumbing System: The scope of plumbing services is as follows:

- Fixtures & Fittings (IPC: 401-427)
- Water Supply System (IPC: 601-609)
- Soil, Waste and Vent System (IPC: 701-712)
- Storm Water Drain & Rain Water Harvesting (IPC: 1101-1113)
- Fire Fighting (NFPA 10, 14, 25)

The sewage disposal from the building shall be terminated up to the building's Manhole, from where it shall be connected via septic tank to the main sewerage system.

The storm water drainage system shall be designed keeping in view the developed levels of the project area & shall be terminated from the building up to the road.

Fire protection system shall comprise of building fire hydrants, Fire hose reels, Fire sprinkler and portable fire extinguishers of various type as per appropriate needs and requirements. The fire water shall be provided through a separate pressurized main.

The relevant codes and standard have been being followed in calculation and design of various parameters of the water supply, selection of equipment for the water supply, sanitary / Plumbing, sewage disposal and fire protection systems. The related sections of following codes and standards shall be followed in the design of the above stated works.

ASTM	American Society for Testing and Material
NFPA	National Fire Protection Association (USA)
NPC	National Plumbing Code
ANSI	American Plumbing Code.
ASME	American society of Mechanical Engineer
AWWA	American water Works Association
BCP	Building Code of Pakistan

3.6.2 Water Supply:

Water supply system shall consist of water storage tanks, water supply network & the internal plumbing works. Potable water shall be provided from the overhead tanks to water supply network of the buildings.

Capacity of Overhead Water Storage Tanks: Overhead Water Storage tanks shall be provided in building to store water. The size of water storage tanks shall be determined from the population and its usage.

Design of Water Supply System:

- Pipe material used for water shall be of PPRc for hot water & PVC for cold water in internal plumbing works & G.I for external water supply network, pipe sizes shall be designed on the basis of total fixture units connected to the section.
- Table used to ascertain maximum numbers of fixture units that can pass through a pipe are adopted from National Plumbing Code USA.
- Conversion of plumbing fixture unit's ratings applicable to building units is adopted from Fundamental of Plumbing Design Volume.

Daily Water Requirement

- The estimated domestic water consumption in apartments will be 65,575 US Gallons/day.
- No commercial water consumption is required because Roshan Safa Tower 2 proposed as residential building only.
- Daily Water Requirement for Entire Project is estimated as 81,969 US Gallons/day including firefighting reserve water.

The daily water consumption requirements are estimated as follows:

Table 3.2: Water consumption

S. #	Nature of Use	Minimum Quantity of Water Per User (US Gallons/day)	No. of Users/Flat	Total Quantity of Water (US Gallons/day)
For Apartments				
1	Apartments 307 Nos.	35.6 US Gallons	6	**65,575**
For a 32-storey high-rise tower in Karachi, the water storage calculations according to the Karachi Cantonment regulations and recent fire safety amendments, a high-rise structure must incorporate completely separate or dedicated reserves for fire fighting alongside your daily domestic supply. **As calculated previously, your domestic daily requirement is 248,670 Liters / day (approx. 65,575 US Gallons).**				
For Fire Fighting Reserve				
2	Dedicated Fire Reserve: As specified for high-risk Category IV high-rises under standard Karachi Building & Town Planning Regulations, a dedicated overhead fire reserve (usually 25% of a full day's demand) alongside a heavy underground static fire tank. For a 32-storey tower, a minimum fire reserve of approximately 16,394 US Gallons) is structurally proposed.			**16,394**
Total Water Consumption (estimated)				81,969 US Gallon

3.6.3 Sewerage System:

- The Sewerage System includes collection of internal waste water through network of pipe and shall be connected to the building manhole to septic tank
- The Soil waste collected from wash basins, showers and floor drain shall run through a separate pipe network and then connected to the Gully Trap (G.T)
- The Soil waste from water closet and urinals shall pass through uPVC pipes and finally connected to manhole outside the building.
- To avoid siphon of water seals form traps, vents pipes will be installed near to traps and to be continued to the vent stack in pipe duct.
- The sewerage piping system shall consist of the requisite type & adequate number of clean outs.
- All the Manholes shall be covered however; they must have proper cleaning facility.

Following criteria shall be adopted in the design of sewerage piping network:

- Calculation of sewerage load shall be carried out on the basis of fixture units given in the National Plumbing Code.
- Total sewerage load shall be estimated using tables provided in the National Plumbing Code.
- Minimum self-scavenging velocity shall be maintained.
- Floor drain shall be provided in each toilet.
- Urinals shall be provided at locations as per Clients / Architect requirement.
- All water closets & urinals shall be vented properly through the vent piping system.
- The vent pipes shall be of PVC.

Storm Water Drainage:

The storm water drainage shall be achieved through purpose made built-in slopes in the ground all around the buildings and shall be terminated on gravity towards the Storm Water catchments / gullies at the road side.

Following design criteria shall be adopted in his design of storm water drainage system.

- Local climate i.e. rainfall rate.
- Site conditions, elevation, water level and location of other utilities etc.

3.6.4 Fire Detection & Protection Systems:

- Fire protection system shall comprise of building fire hydrants, fire hose reels, fire sprinkler and portable fire extinguishers of various kind/types. The fire water shall be fed through a pressurized main to be installed all around the individual building/ block.
- Fire hydrant system including fire hose connection point hoses and nozzles to provide a readily accessible water supply for fire department or occupants of the project area to combat fire instantly.

Fire Detection & Alarm System: Fire detection & alarm system shall be designed as per scope of works & in line with the design requirements and is covered in the electrical system design.

Fire Protection Systems: Following fire protection system shall be design keeping in view the guide-line design requirements lay in the scope of Work & Fire Protection Philosophy of Co-Operative Market.

- Fixed Fire Protection System
- Portable Fire Protection System
- Fire sprinkler system

3.6.5 Electrical & Allied Works

The electrical design development of the Project has been carried out in accordance with the prevailing international standards and local regulatory authorities to ensure the ease of maintenance, economy and safety from shock and fire hazards.

Scope of Services

- Utility Power Supply from K.E
- Backup Generator Supply
- Power Distribution including Small Wiring and accessories
- UPS / Emergency Supply
- Lighting and Controls
- Earthing & Grounding
- Lightning Protection System
- Fire Alarm and Detection System
- CCTV Surveillance System
- Audio / Audio-Video Intercom System
- Voice and Data Communication System
- CATV System

Table 3.3: Electrical Load

S.#	Description	Total Area (Sq. Ft.)	Total Lighting, Power & AC Load (kW)	Total (kW) (TCL)
1	3xBasement	61,794	48	**48**
2	Ground Floor	28785	200	**200**
3	1st Floor	27179	16	**16**
4	2nd Floor	27179	16	**16**
5	3rd Floor	27179	16	**16**
6	4th to 31th Floor Apartment	351,351.89	1224	**1224**
7	Lift Load	-	80	**80**

8	Pump Load	-	11	**11**
9	Fire Fighting Load	-	35	**35**
Total Load (KW)				**1646**
5% of total load requirement will be fulfilled from Solar Power So total load on Solar Power will be 5% of 1646 KW which is 82.3KW				

3.6.6 Gas Supplies

The gas supply for Roshan Safa Tower 2 project would be provided by the Sui Southern Gas Company Limited (SSGCL). Approval from SSGC for gas connection is being obtained.

Chapter 4 Description of Environment

4.1 Micro Environment

Presented in this chapter of the EIA study are the findings of environmental and social baseline conditions of the project area in terms of its macroenvironment and microenvironment. Information available from literature relevant to baseline of the area, surroundings and Karachi was collected at the outset and reviewed subsequently. This was followed by surveys conducted by experts to investigate and describe the existing status and scenario.

The proposed project site is categorized as commercial land. The Project falls in to the appropriate category that permits the designated land-use by the Cantonment Board Karachi. Siting of the project at Plot no. 125, Depot Lines, Karachi cantonment, Karachi by the proponent is therefore duly authorized.

The microenvironment of the project comprises of residential cum commercial units, eateries, medical centers, banks, etc.



Figure 4.1: Location of Project site

Pictorial Views of Project site and surroundings



Project site









Project site

	
Street towards bird market	Talha Street
	
Cornor of the Armanian streat	Castle street

4.2 Macro Environment

The project is located in the administrative jurisdiction of Karachi Cantonment Board. Karachi Cantonment Board occupies an area of about 993.92 km^2. The district is bounded on north by Garden area, on east by S.M.C.H.S, on south by Karachi Cantt Station and on west by Arts Council.

The Karachi Cantonment is a cantonment town of the city of Karachi, in Sindh, Pakistan. 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 water supply and electricity infrastructure. The busiest railway station of Karachi, Karachi Cantonment, is also located here.

4.2.1 Land Marks of Karachi Cantonment Board

- Karachi Cantonment Railway Station
- Muhammad Ali Jinnah Road
- Shahrah-e-Faisal
- Finance and Trade Centre
- Fleet Club
- Services Club
- St. Anthony's Church
- Govt Girls secondary Schools lines area

Some of the important landmarks have been discussed as under:

Karachi Cantonment Railway Station

Karachi Cantonment railway station often abbreviated as Karachi Cantonment is one of the principal railway stations in Karachi, Sindh, Pakistan. It is situated near Dr. Daud pota Road, Saddar. It was earlier known as Frere Street Station. Construction of the station began in 1896 and was completed in 1898 at a total cost of Rs. 80,000. The present

uilding of Karachi Cantonment station has been declared a protected heritage site by the Government of Sindh.

Karachi Cantonment Station is equipped with all basic facilities. The station has current and advance reservation offices for Pakistan Railways as well as cargo and parcel facilities.

Muhammad Ali Jinnah Road

Muhammad Ali Jinnah Road a.k.a. MA Jinnah Road is a road located in Karachi, Sindh, Pakistan. 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).

Shahrah-e-Faisal

Shahrah-e-Faisal is one of the main roads in Karachi, Pakistan. It is 18 kilometers long from Hotel Metropole to the Star Gate. It is not clear when it was built but the first Air India flight took off on October 15, 1924 from Karachi's Drigh Road Aerodrome. The name was changed to Shahrah-e-Faisal after the Islamic summit held in Lahore in 1974. Shahrah-e-Faisal was part of the National Highway in the 1970s, and thus belonged to the Government of Sindh. In the 1980s the Government of Sindh transferred it to the Karachi Metropolitan Corporation. An estimated over 0.25 million vehicles move through Shahrae Faisal daily.

4.3 Description of Physical Environment

4.3.1 Geology and Geomorphology

Geology: Karachi is the part of major synclinorium stretching from Ranpathani River in the east to Cape Monze in the west, Mehar and Mole Jabal (Mountains) in the north. Within the synclinorium a number of structures such as Pipri, Gulistan-e-Jauhar, Pir Mango and Cape Monze are exposed. The presence of concealed structures under the Malir River valley, Gadap and Maripur plains can fairly be deduced.

Rock aggregates, sand, limestone and clay are some of the potentials for gainful utilization. Gulistan-e-Jauhar member of the Gaj formation offers groundwater potential for limited use. The area is underlain by rocks of sedimentary origin ranging in age from Eocene to Recent. Major structural trends and the basin axis strike generally south but with a “bulge” to the east also called Karachi Arc (Bender and Raza 1995).

Geomorphology of Karachi*:* Karachi is located in the south of Sindh, on the coast of the Arabian Sea. It covers an area of approximately 3,600 km^2, comprised largely of flat or rolling plains, with hills on the western and northern boundaries of the urban sprawl. The city represents quite a variety of habitats such as the sea coast, islands, sand dunes, swamps, semi-arid regions, cultivated fields, dry stream beds, sandy plains, hillocks. Classified according to physiographic features, Karachi City District can be divided into three broad categories: Hilly Region (Mountain Highland), Alluvial Plain (Piedmont Plain) and Coastal Areas (Valley Floor). The metropolitan area is divided by two non-perennial river streams namely Lyari and Malir Rivers. The Malir River flows from the east towards the south and centre, and the Lyari River flows from north to the south west. Gujjar and Orangi are the two main tributaries of the Lyari River while Thaddo and Chakalo are the main tributaries of the Malir River. The dry weather flow of both rivers carries urban sewage that is ultimately drained in the Arabian Sea. Among the various physiographic features, low flat-topped parallel hills devoid of vegetation, interspersed with widespread plains and dry riverbeds are the main topographic characteristics of the city.

The greatest height of the region is 250 ft. that gradually decreases to 5 ft. above mean sea level along the coastline. The Karachi Harbour is a sheltered bay to the south-west of the city, protected from storms by the Sandspit Beach, the Manora Island and the Oyster Rocks.

The Arabian Sea beach lines the southern coastline of Karachi. Dense mangroves and creeks of the Indus delta can be found towards the south east side of the city. Towards the west and the north is Cape Monze, an area marked with projecting sea cliffs and rocky sandstone promontories.

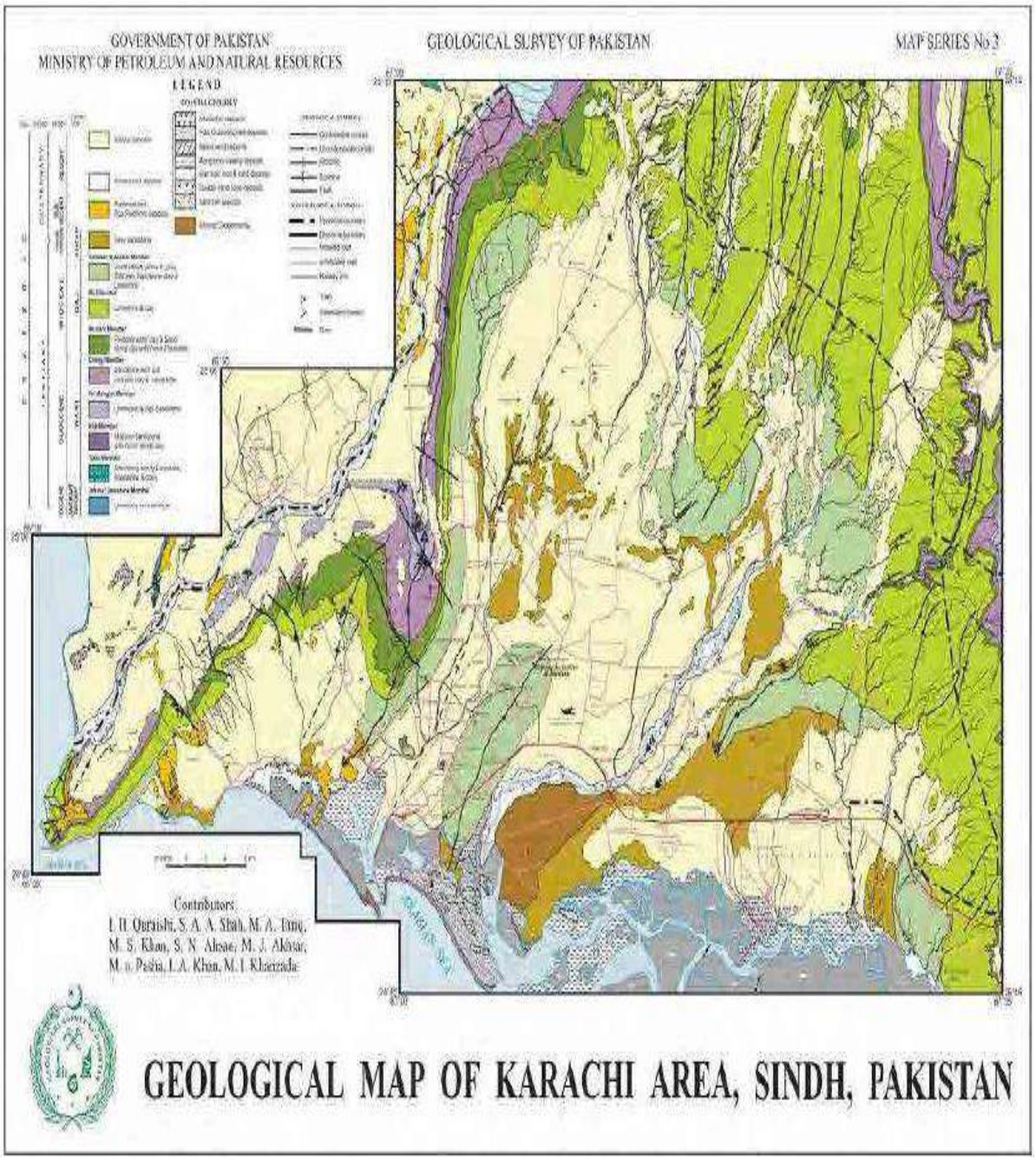


Figure 4.2: Geological Map of Karachi

The subsurface deposits up to the explored depth consist of the following units:

- Filling Material
- Sand
- Silt
- Gravel
- Sandstone
- Claystone
- Limestone

Groundwater table was not encountered up to the maximum explored depth of 30.0 meters in any of the boreholes drilled at the site at the time of the geotechnical investigation.

Detailed geotechnical report has been annexed.

4.3.2 Seismicity

Seismotectonic Study for macro environment of Project site aims at elucidating the impact of tectonic movement induced seismicity on the microenvironment. Seismicity in the Karachi region is related to the pressure potential being built at the convergence of the three lithospheric plates: Indian, Arabian, and Eurasian at the Triple Junction (Figure 4.5 & 4.6) formed by the intersection of Owen fracture zone, the Makran subduction zone and the Ornach-Nal fault. The Murray Ridge extends northward into Pakistan, to unite the Ornach-Nal-Chaman Fault system onshore, displaying a strike-slip boundary between the major tectonic plates of India and Eurasia[1].

Karachi and its environs fall in the synclinorium, described earlier as being part of Indus deltaic region. Recession of the delta and its retreat towards the southeast dried up its numerous channels, estuaries and creeks that characterize the synclines and are part of the active faults. Tectonic instability of this region can be attributed to this large number of reverse and tear faults and the recently described wrench faults.[2]

[1] (Baloch, S.M. & Quirk, D.G., Mesozoic to Neogene Tectonism and Evolution of Murray Ridge, Pak. Jour. of Hydrocarbon Research, Islamabad, 13).
[2] (Riding the mobile Karachi arc, Pakistan: Understanding tectonic threats Ghulam Sarwar and Anwar Alizai, Journal of Himalayan Earth Sciences 46(2) (2013) 9-24).

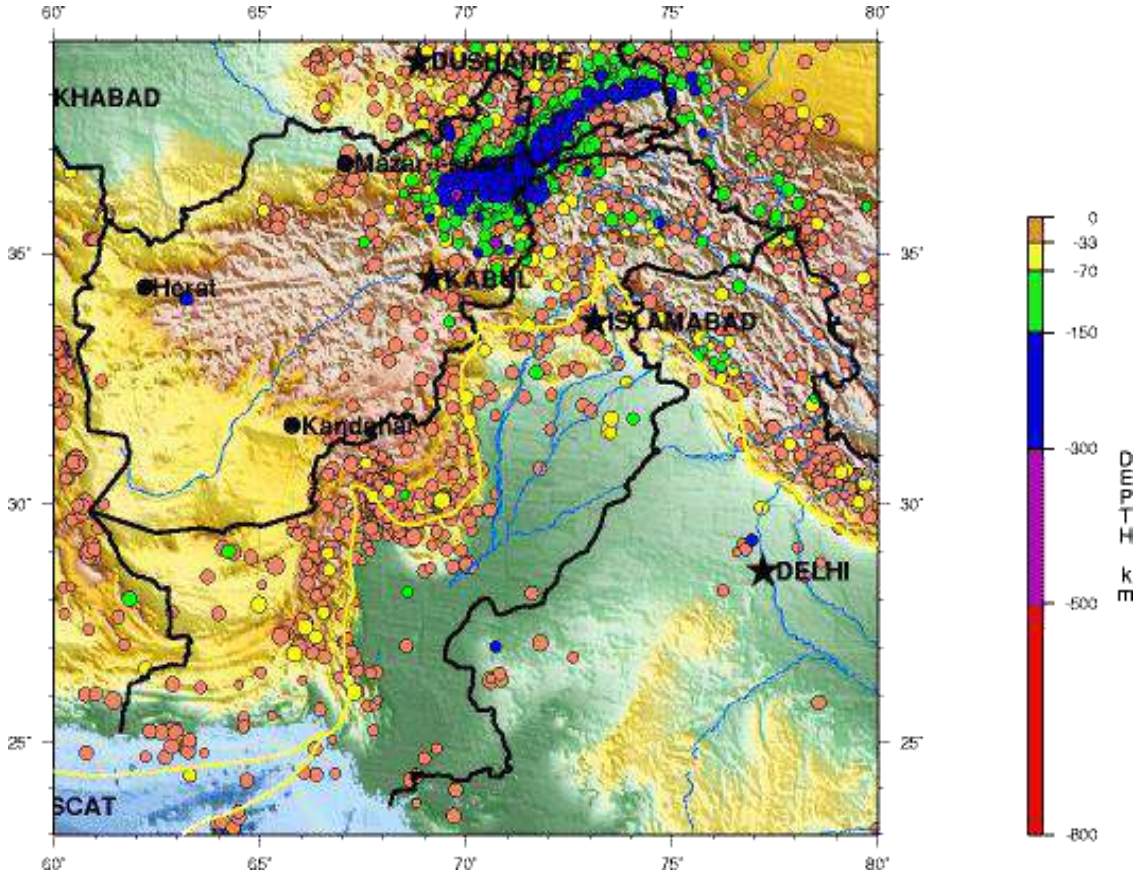


Figure 4.3: Seismicity & Natural Disasters - Pakistan, 1990-2000.

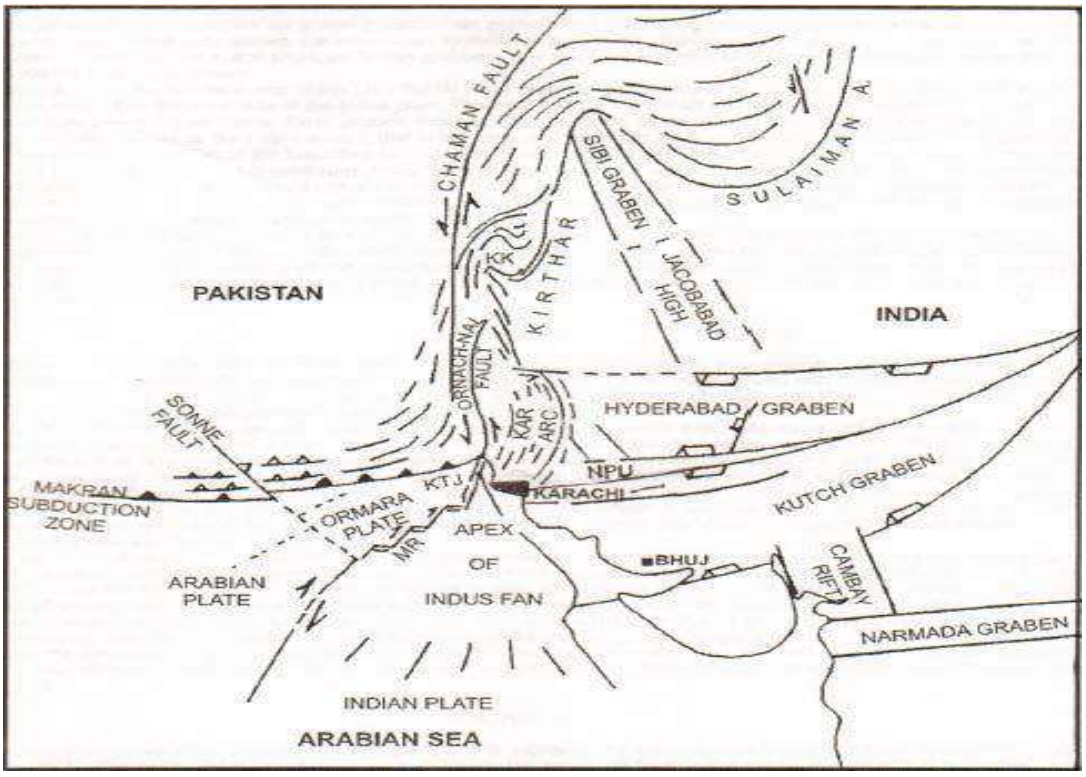


Figure 4.4: Schematic plate tectonic sketch map showing the Karachi Arc and its regional tectonic framework.

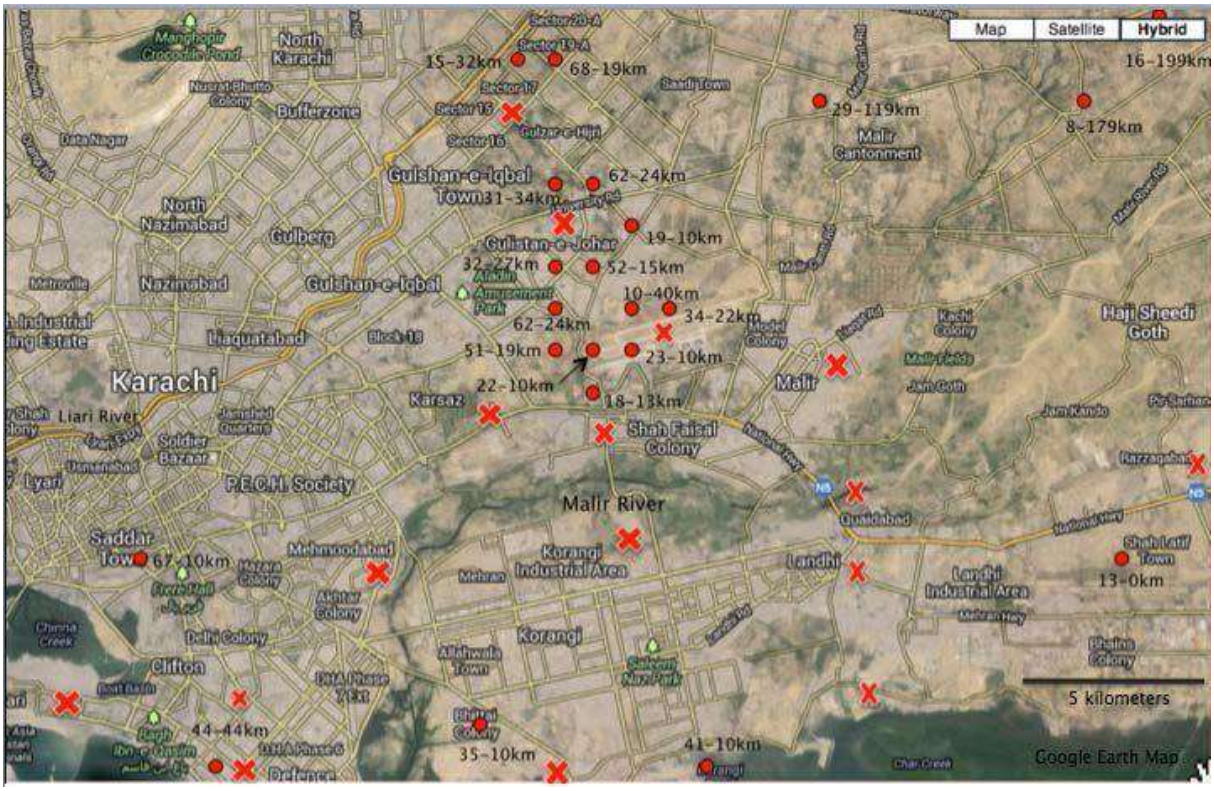


Figure 4.5: Earthquake epicenter plots for the time period 1902-2013.

The first number refers to the list numbers whereas the second number represents depth of hypocenter in kilometers. The Red Crosses represent neighborhoods plagued by recurrent seismic activity, usually of low magnitude[3]

Sarwar and Alizai have compiled a list of earthquakes during the 1902-2013 period and also produced the above map that gives a distribution of hypocenters of earthquakes during the same period. From the distribution of hypocenters, it has been inferred that the entire Karachi Arc and surrounding areas are seismically active with hypocenters ranging in depth from 0-500 kilometers. From the depth of hypocenters, it is inferred that active deformation has taken place at multi-levels ranging from shallow to deep in the basement. Quite a few of the recent epicenters are found within or in close proximity to parts of Karachi that have faced recurrent earthquake activity.

Seismic activity in the region is the result of the triple junction as well as the Karachi Arc, located in southeastern Pakistan, as a large fold and thrust belt that shows Neogene thin-skinned eastward movement (Sarwar and DeJong, 1979; Schelling, 1999). Seismic activity in and around the region shows that the Karachi Arc has been active since long in prompting the eastward movement of the delta. It is possible that the movement is related to the rebound that takes place after mass shift. Sarwar has suggested that the eastward creep of

[3] (Source: Pakistan Meteorological Department, June 2013 & Ghulam Sarwar and Anwar Alizai, Journal of Himalayan Earth Sciences 46(2) (2013) 9-24)

Karachi Arc is directly related to active subsidence of the Hyderabad graben that underlies it and also defines the northern and southern limits of the Karachi Arc.[4]

It may be added that subsidence such as that on Southern coast of Sindh, occurs naturally as a result of plate tectonic activity above active faults, and in places where fluid is expelled from underlying sediments and is common at river deltas that may have receded. Earthquakes arise and result from the release of the force along the growth fault plane. As a result, many different growth faults are created as sediment loads shift basinward and landward.

Earthquakes: Historically the coastal region has suffered a number of earthquakes. A list of earthquakes that have affected Karachi and its vicinity has been compiled by the Meteorological Department and listed by Sarwar and Alizai.

Some of the events are listed in Table-4.1.

Table 4.1: List of Earthquake in Indus Deltaic Region and surrounding within Latitude 23.0-25.0N and Longitude 67.5-71.0E

Date	Lat-N	Lat-E	Magnitude	
			Depth (km)	Richter Scale
26-09-1977	25.4	68.2	33	4.5
25-11-1982	25.6	67.9	33	4.9
17-12-1985	24.9	67.4	33	4.9
24-12-1985	24.8	67.6	33	4.7
10-09-1991	24.4	67.7	33	4.8
19-09-1991	24.3	68.7	33	4.7
23-04-1992	24.3	68.8	33	3.7
24-12-1992	25.2	67.7	33	3.6
05-02-1993	24.6	68.9	33	4.3
26-01-2001	23.4	70.3	17	7.6

The largest earthquake that was incident in 1819, had a magnitude of 8.0; it was felt over almost all over the Indian sub-continent. Eastern branch of the Indus River was blocked, long tract of alluvial land was uplifted, and there was surface faulting and subsequent subsidence in the epicentre area. This fault produced a scarp called “The Allah Bund”.

Seismicity of the Site: According to the Uniform Building Code (1997), Karachi and its adjoining areas fall in Seismic Zone-2B.

[4] (Sarwar, G., 2004. Earthquakes and the Neo-Tectonic Framework of the Kutch-Hyderabad-Karachi Triple Junction Area, Indo-Pakistan. Pakistan Journal of Hydrocarbon Research, 14, 35-40).

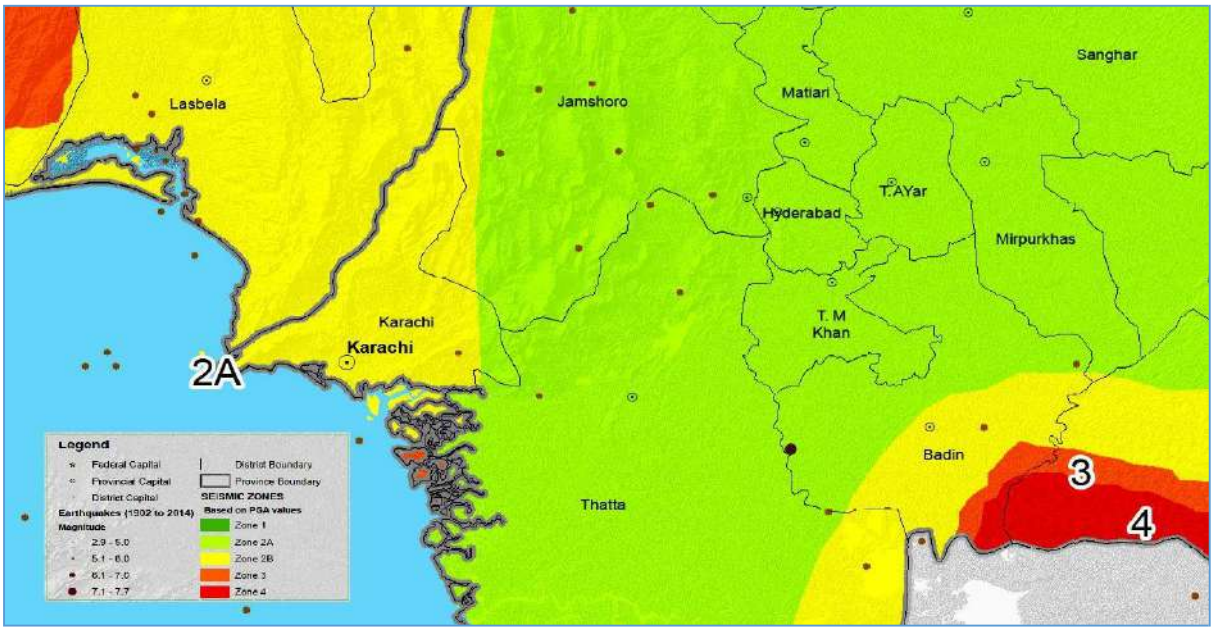


Figure 4.6: Seismic Zones in Karachi[5]

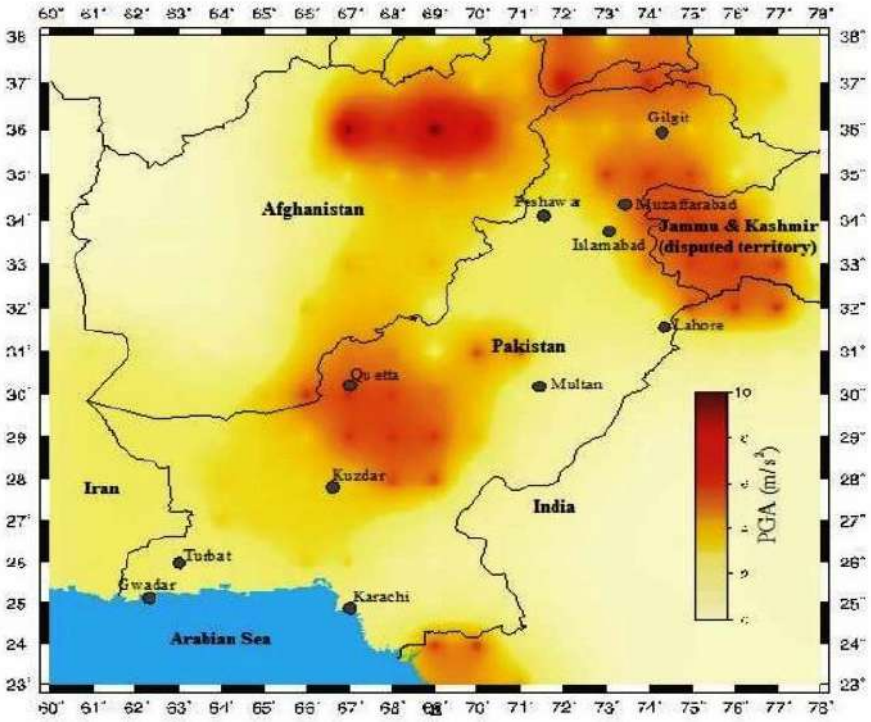


Figure 4.7: Seismic Hazard for Pakistan in terms of Peak Ground Acceleration (PGA)[6]

4.3.3 Liquefaction Features Caused by Earthquake

Liquefaction is a total loss of strength due to undrained restructuring. Disturbance, by shearing or vibration, destroys soil skeleton, with loss of grain contact and decrease of porosity, soil load is transferred to pore water, water pressure>normal stress=0, and soil acts

[5] Map data source(s): PMD, GSP, Pakistan Engineering Council – Prepared by Al hasan Systems Private Limited
[6] PMD Seismic Monitoring and Early Tsunami Warning Centre - http://seismic.pmd.gov.pk/seismicnew/map2.html

as a liquid. Drainage reduces pore water pressure, allows grain contact and thixotropic recovery of strength (Waltham, 2002). Strong shaking produces liquefaction in the fine sands and silts during the earthquake. This causes the mineral grains to settle and expel their interstitial water to the surface. If the pore-water pressure rises to a level approaching the weight of overlying soil, the granular layer behaves as a viscous liquid rather than a solid and leads to collapse of even engineered structures. Liquefaction has been abundant in areas, where groundwater lies within 10 meters of the ground surface (Husain et al., 2004). Investigators typically have designated sites as “Liquefied” on the basis of the presence of surficial liquefaction features, such as venting of sediment to the surface (i.e., sand boils), ground cracking associated with liquefaction (e.g., lateral spreading), or surface settlements. Other evidence of liquefaction includes tilting or settling of overlying structures and floating of underground structures (Olson et al., 2002). Mahmood and Shaikh (2008) investigated the “sinking” of a water tower in 2006 near Clifton area and speculated about liquefaction due to mild earthquakes.

4.4 Meteorology and Climate

The climate of the macroenvironment can be characterized by dry, hot and humid conditions and in general terms it is moderate, sunny and humid. Climatic conditions of the whole region are influenced in summer by the monsoon winds from the West and in winter by winds from North (Quetta). There is a minor seasonal intervention of a mild winter from mid-December to mid-February followed by a long hot and humid summer extending from April to September, with monsoon rains from July to mid- September. The average annual rainfall is about 160 mm, of which 70% to 80% falls during the monsoon months of July, August and September. The summer temperatures are high, rising to over 4-40°C on some days. The winters are mild, although the night temperatures may drop low when the northern winds invade the area. The mean sea level (MSL) average atmospheric pressure during June to August is around 1000 mbar. From Nov to Feb average MSL pressure rises up to 1018 mbar.

4.4.1 Temperature

The air temperature in Karachi Division and its coastal areas are generally moderate throughout the year due to presence of sea. Climate data generated by the meteorological station at Karachi Air Port represents climatic conditions for the region. The mean monthly maximum and minimum temperatures, recorded during 2001-2019 in Karachi to describe the weather conditions are shown in Table 4.1 and 4.2 respectively. The Tables indicate that the mean monthly maximum temperature in Karachi ranged between 26.8°C and 36.8°C during the 2001-2019 periods, while the mean monthly minimum temperature ranged between 12.9ºC and 29.8°C. The annual mean maximum and mean minimum temperatures during 2001-19 period were 33.0°C and 21.0°C respectively, which indicates that there has been a slight but significant rise in the mean minimum temperature during the last 19 years.

Table 4.2: Mean Monthly Maximum Temperature °C

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	27.2	29.6	33.1	34.6	35.1	34.9	32.2	32.3	33.1	36.0	33.5	30.4	**32.7**
2002	27.0	28.2	33.3	35.4	35.6	35.1	32.2	31.6	31.4	36.5	32.7	28.1	**32.3**
2003	27.6	28.5	32.4	36.6	35.7	34.9	34.1	32.6	32.5	37.0	32.2	28.3	**32.7**
2004	26.6	29.9	36.2	35.4	36.8	35.6	33.8	32.7	32.8	33.7	33.1	29.4	**33.0**
2005	24.9	26.3	31.5	35.3	35.4	36.0	33.2	32.2	34.2	35.2	33.1	28.4	**32.1**
2006	26.0	31.3	31.8	34.0	34.6	35.3	33.8	31.0	34.2	35.0	33.4	26.3	**32.2**
2007	26.9	29.4	31.4	37.7	36.0	36.4	N/A	N/A	N/A	N/A	N/A	N/A	**33.0**
2008	24.4	26.9	34.3	34.4	33.9	35.1	33.5	31.9	34.7	35.5	32.5	27.2	**32.0**
2009	26.2	29.8	33.0	36.0	36.8	35.7	34.5	33.0	32.8	35.9	33.0	28.6	**32.9**
2010	27.5	29.2	34	35.7	36.5	34.7	34.6	33.2	34.5	35.9	32.7	28	**33.0**
2011	26.9	28.5	33.2	35.8	35.3	35.3	34.2	32.8	32.9	N/A	N/A	N/A	**N/A**
2012	25.7	26.9	31.7	35.1	35.5	34.6	33.2	32.7	33.2	35.0	32.7	28.2	**32.0**
2013	26.7	28.0	33.3	34.0	35.1	36.5	33.8	32.1	33.0	35.7	32.3	28.3	**32.4**
2014	25.5	28.0	31.7	35.1	35.9	36.5	34.0	33.7	33.8	36.3	32.9	28.7	**32.7**
2015	26.3	28.9	31.5	35.9	36.0	37.7	34.1	32.3	34.6	35.8	33.0	28.6	**32.9**
2016	27.8	30.3	33.3	34.7	35.7	36.1	33.6	33.0	32.9	34.0	33.3	31.0	**33.0**
2017	25.4	30.2	32.8	35.5	36.2	36.3	33.1	33.8	33.4	36.6	32.3	28.2	**32.8**
2018	28.5	30.4	34.4	36.2	38.7	35.4	33.8	31.9	32.6	36.8	33.8	28.2	**33.4**
2019	26.3	26.8	31.3	35.4	36.0	37.2	34.7	32.5	35.7	35.8	31.5	27.1	**32.5**
2020	24.3	30.1	31.2	36.2	36.6	37.3	36.7	34.6	35.0	36.2	31.4	28.1	**33.1**
2021	26.6	31.3	34.6	37.3	37.5	36.1	34.5	32.6	36.3	34.8	34.0	27.6	**33.6**
2022	24.6	30.1	35.2	37.4	36.8	35.7	33.3	32.1	33.7	35.7	32.9	29.6	**33.1**
2023	25.6	30.9	33.3	34.5	35.5	35.9	35.0	31.4	34.4	35.1	33.0	29.4	**32.8**
2024	27.3	28.6	31.9	34.5	37.3	37.1	36.5	32.5	33.4	37.3	33.8	27.6	**33.1**
2025	27.2	30.4	34.7	37.2	36.5	35.6	34.3	33	32.4	35.3	31.8	29.2	**33.1**

Source: Pakistan Meteorological Department

Table 4.3: Mean Monthly Minimum Temperature °C

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	11.5	14.9	19.6	23.8	28.1	29.0	27.1	26.5	25.9	24.4	18.6	15.8	**22.1**
2002	12.8	13.8	19.5	23.9	27.0	28.2	29.6	25.6	24.8	22.5	17.7	14.9	**21.7**
2003	12.7	16.9	19.8	24.2	26.5	28.2	23.6	27.0	25.3	20.9	15.2	12.0	**21.0**
2004	12.9	14.5	19.1	24.8	27.3	28.8	27.5	26.3	25.3	22.4	18.0	15.4	**21.9**
2005	12.3	11.3	20.3	23.0	26.4	28.3	27.2	26.6	26.6	22.9	18.9	13.0	**21.4**
2006	11.7	18.1	19.6	24.5	27.5	28.5	28.3	26.3	26.8	25.7	19.4	14.0	**22.5**
2007	13.0	17.3	19.7	24.7	27.6	28.6	N/A	N/A	N/A	N/A	N/A	N/A	**21.8**
2008	10.1	11.1	19.6	24.0	27.3	29.1	27.9	26.8	26.6	23.8	17.6	14.9	**21.6**
2009	14.7	16.5	20.8	23.8	27.6	28.7	28.1	27.5	26.5	22.6	17.0	13.9	**22.3**
2010	12.2	14.7	21.3	25.1	28	28.2	28.3	27.2	25.8	23.9	17.4	11.1	**21.9**
2011	11	14.5	19.7	23.1	27.1	28.8	27.8	28.6	26.5	N/A	N/A	N/A	**N/A**
2012	11.2	11.9	19.1	24.5	27.2	28.0	27.9	26.9	26.4	22.7	18.6	14.2	**21.5**
2013	11.6	15.1	19.2	24.2	27.1	29.3	28.0	26.6	25.5	25.4	18.1	13.0	**21.9**
2014	9.9	13.1	18.9	24.4	27.0	29.2	28.3	27.1	26.8	23.3	19.5	13.1	**21.7**
2015	12.6	16.4	19.2	25.7	27.7	29.8	28.4	26.9	26.3	24.9	18.6	12.6	**22.4**
2016	14.8	14.9	21.7	24.6	27.9	27.9	28.1	27.1	26.4	24.0	17.1	15.5	**22.5**
2017	12.5	18.2	20.3	24.4	27.8	29.2	27.7	27.0	26.2	23.5	16.8	13.0	**22.2**
2018	12.9	15.8	20.9	25.3	27.7	28.8	28.1	26.3	25.5	23.0	19.3	13.1	**22.2**
2019	13.3	15.3	19.0	24.0	26.6	28.9	28.1	26.8	27.2	24.0	19.4	13.7	**22.2**
2020	10.8	15.3	19.1	24.7	27.7	29.7	29.4	28.1	27.3	22.7	16.0	12.5	**21.9**
2021	9.2	15.0	21.6	25.1	28.9	29.6	28.5	27.4	28.0	23.1	17.6	13.9	**22.3**
2022	12.8	15.9	21.6	25.5	28.1	28.6	27.4	27.1	26.8	22.7	19.3	13.2	**22.4**
2023	10.6	15.4	20.9	24.3	27.5	29.3	28.9	27.0	27.1	25.7	20.0	14.8	**22.6**
2024	13.6	16.8	19.7	24.8	28.1	30.0	30.3	27.5	27.0	26.3	21.9	12.6	**23.2**
2025	11.5	16.5	20.6	25.2	28.6	29.1	28.9	27.3	26.6	24.1	16.9	13.5	**22.4**

Source: Pakistan Meteorological Department

4.4.2 Precipitation

The main source of precipitation is rainfall which is received mostly in the months of July to September during SW Monsoon winds. It is very erratic as some years are very dry and there is no rain. The average rainfall is 217 mm and most of it is received in the month of July.

Occasional winter rains are also received in the months of December –February as result of NE winds which count 15-25% of total rainfall.

The record for rainfall of PMD at Karachi Airport (2001-2019) suggests that July and August are the wettest months and that the maximum rainfall recorded in Karachi during 2001-2019 period was 270.4 mm during the month of July 2003, while the maximum annual rainfall was 372.9 mm during the year 2010, followed by 367.3 mm in 2019.

Table 4.4: Monthly Amount of Precipitation (mm) at Karachi Airport

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	0.0	0.0	0.0	0.0	0.0	10.6	73.6	16.2	N/A	0.0	0.0	0.0	**33.46**
2002	0.0	2.4	0.0	0.0	0.0	N/A	N/A	52.2	N/A	0.0	0.5	0.4	**13.87**
2003	6.4	21.8	0.0	0.0	0.0	16.3	270.4	9.8	N/A	0.0	0.2	0.0	**54.15**
2004	13.7	0.0	0.0	0.0	0.0	N/A	3.0	5.6	N/A	39.3	0.0	4.3	**13.18**
2005	6.6	12.8	N/A	0.0	0.0	N/A	N/A	0.3	54.9	0.0	0.0	17.1	**18.34**
2006	N/A	0.0	N/A	0.0	0.0	0.0	66.2	148.6	21.9	0.0	3.1	61.3	**60.22**
2007	0.0	13.2	33.4	0.0	0.0	110.2	N/A	N/A	N/A	N/A	N/A	N/A	**52.26**
2008	8.0	Trace	1.1	0.0	0.0	0.0	54.0	37.5	Trace	0.0	0.0	21.0	**24.32**
2009	3.0	Trace	0.0	Trace	0.0	2.6	159.9	44.0	68.9	0.0	0.0	1.5	**55.68**
2012	0.2	0.0	0.0	0.0	0.0	Trace	Trace	8.1	121.0	0.0	0.0	22.8	**152.1**
2013	Trace	20.0	2.8	30.0	0.0	Trace	5.5	105.4	4.0	1.2	0.0	0.0	**168.9**
2014	Trace	0.0	12.4	0.0	1.3	Trace	1.1	9.9	1.4	0.0	4.6	0.0	**30.7**
2015	0.3	2.1	2.8	0.0	0.0	Trace	46.6	1.4	Trace	0.0	0.0	0.0	**53.2**
2016	3.1	0.0	Trace	0.0	0.0	65.8	1.9	96.9	Trace	0.0	0.0	0.0	**167.7**
2017	41.5	Trace	0.0	0.0	0.0	58.8	33.3	65.6	26.4	0.0	0.0	6.6	**232.2**
2018	Trace	Trace	0.0	0.0	0.0	Trace	Trace	0.8	Trace	0.0	0.0	Trace	**0.8**
2019	39.4	Trace	2.2	0.0	0.0	1.6	66.3	204	51.7	1.2	Trace	Trace	**367.3**
2020	Trace	2.6	0.5	0	0	Trace	101.2	366.8	Trace	0	3.1	0	**474.2**
2021	0	0	0	0	0	Trace	45.4	Trace	88.3	17.2	0.0	16.9	**167.8**
2022	28.5	0.4	0	0	0	21.6	348.3	127.9	43.4	0	2.6	0	**572.7**
2023	0.0	0.0	5.7	2.2	14.9	4.0	40.4	Trace	4.6	0.0	5.5	0.0	**77.3**
2024	2.2	60.6	12.3	15.1	0.0	0.5	67.1	159.4	0.6	12.0	0.0	0.0	**329.8**
2025	0.0	Trace	0.0	0.0	0.0	29.7	2.0	205.1	72.3	33.7	0.0	1.2	**344**

Source: Pakistan Metrological Department

4.4.3 Humidity

The relative humidity typically ranges from 25% (dry) to 70% (humid) over the course of a year, rarely dropping below 20% (very dry) and reaching as high as 90% (very humid).

Table 4.5: Mean Monthly Relative Humidity (Mean) at 1200 UTC (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	25.0	27.0	35.0	47.0	57.0	61.0	64.0	61.0	60.0	36.0	36.0	31.0	**45.0**
2015	38.0	41.0	37.0	45.0	60.0	56.0	69.0	67.0	56.0	47.0	28.0	31.0	**47.9**
2016	46.0	25.0	41.0	47.0	60.0	60.0	68.0	70.0	63.0	57.0	34.0	38.0	**50.8**
2017	38.0	25.0	36.0	44.0	59.0	62.0	70.0	67.0	63.0	44.0	29.0	20.0	**46.4**
2018	36.0	37.0	33.0	45.0	46.0	65.0	65.0	68.0	63.0	40.0	32.0	30.0	**46.7**
2019	**40.4**	**33.9**	**36.6**	**48.0**	**55.6**	**58.8**	**64.8**	**72.6**	**67.6**	**41.1**	**34.6**	**29.7**	**48.6**

[11] Average Weather for Karachi (https://weatherspark.com/averages/32864/Karachi-Sindh-Pakistan).

2020	29.9	28.1	34.2	44.4	57.1	56.8	65.0	74.8	62.4	38.1	32.9	29.1	46.1
2021	31.3	34.1	41.2	43.3	54.3	60.3	67.5	64.5	63.0	46.5	27.6	38.7	47.7
2022	40.5	39.1	37.7	47.1	55.3	62.1	74.7	79.1	66.3	42.0	49.4	36.5	52.5
2023	25.5	42.2	39.3	46.7	57.7	62.4	67.8	71.0	59.5	54.9	32.5	28.7	49.0
2024	42.8	35.1	34.6	48.7	52.3	57.8	69.6	73.7	66.4	50.1	47.2	22.1	50.0
2025	26.8	33.6	27.9	44.2	58.6	63.3	64.2	68.0	68.2	33.5	31.2	30.2	45.8
Source: Pakistan Meteorological Department													

The wind direction and speed between the summer and winter monsoon seasons are rather unsettled and large variations are noted both with respect to speed and direction.

The wind direction and speed between the summer and winter monsoon seasons are rather unsettled and large variations are noted both with respect to speed and direction.

Table 4.6: Wind Speed (m/s) at 12:00UTS

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	2.6	3.4	4.3	5.6	7.5	8.1	6.8	7.3	5.5	3.7	2.0	2.4	**4.9**
2002	3.6	3.9	4.0	6.5	8.5	8.2	9.8	7.3	7.7	3.3	2.9	3.2	**5.7**
2003	4.0	5.0	5.4	5.2	7.7	8.8	6.7	7.1	6.0	3.2	3.1	3.0	**5.4**
2004	3.4	3.7	4.0	6.0	8.0	9.0	10.0	9.5	7.3	3.8	1.0	2.5	**5.7**
2005	3.6	4.2	4.8	5.1	7.1	7.5	9.0	6.9	6.4	3.9	2.0	1.5	**5.2**
2006	2.0	3.0	3.0	6.2	8.0	7.7	8.3	6.2	4.7	4.2	2.2	3.0	**4.9**
2007	2.0	3.7	4.0	4.0	6.0	6.3	N/A	N/A	N/A	N/A	N/A	N/A	**4.3**
2008	4.3	7.6	8.2	10.5	12.6	7.6	11.0	9.3	8.7	6.6	5.1	3.9	**7.9**
2009	7.0	7.2	7.9	9.3	9.8	9.7	9.5	9.3	9.1	6.1	5.0	3.9	**7.8**
2012	5.8	6.6	9.3	9.8	12.3	12.8	13.1	11.2	8.4	7.1	5.7	5.8	**9.0**
2013	5.2	6.9	9.0	10.3	11.5	10.8	12.0	11.2	10.3	7.7	5.1	4.5	**8.7**
2014	5.9	8.9	8.6	11.5	12.4	13.4	12.8	11.6	11.7	8.3	6.0	4.5	**9.6**
2015	6.9	10.3	10.1	11.5	12.8	12.3	13.7	12.3	10.5	8.7	5.6	5.8	**10.0**
2016	7.5	8.7	4.8	1.1	13.0	11.7	11.8	10.5	12.1	9.2	5.5	5.2	**8.4**
2017	7.0	8.0	10.8	12.1	12.8	11.5	12.1	10.3	8.7	8.5	5.4	7.4	**6.9**
2018	6.3	7.0	9.5	10.2	10.8	11.1	12.3	12.4	12.2	8.7	6.1	6.8	**9.4**
2019	6.7	8.9	10.2	11.7	12.1	11.7	13.7	9.1	8.5	8.0	6.9	7.4	**9.6**
2020	9.0	9.4	9.0	10.5	13.3	10.9	10.1	8.9	9.4	7.3	6.2	5.5	**9.1**
2021	6.1	7.6	9.7	8.5	11.7	12.7	12.6	11.1	8.8	8.1	6.7	6.6	**9.2**
2022	6.8	7.9	8.9	9.9	12.5	12.5	9.5	7.0	8.8	7.0	6.1	4.8	**8.5**
2023	7.0	7.7	9.2	10.1	11.7	11.5	11.3	12.3	9.1	7.9	6.9	6.6	**9.3**
2024	7.1	7.1	8.1	9.9	10.1	11.3	10.0	10.2	9.5	7.2	6.8	6.3	**8.6**
2025	6.7	7.7	9.4	10.5	10.6	11.6	10.6	9.7	8.9	8.5	6.2	5.5	**8.8**
Source: Pakistan Meteorological Department													

Table 4.7: Wind Direction at 12:00UTS

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	S54W	S43W	S42W	S45W	S46W	S45W	N52W	S59W	S44W	N56W	S45W	**S06W**
2002	S67W	S52W	S51W	S55W	S51W	S42W	S54W	S45W	S48W	S56W	N54W	**S41W**
2003	S60W	N50W	S45W	S48W	S45W	S68W	S60W	S47W	S43W	S54W	S50W	**S27W**
2004	N27E	S46W	S53W	S49W	S52W	S54W	S54W	S62W	S56W	S47W	S45W	**N86E**
2005	N63E	S51W	S50W	S52W	S63W	S48W	S54W	S49W	S87W	S54W	S52W	**N23W**
2006	S48W	S62W	S50W	S57W	S64W	S60W	S67W	S78W	S51W	S53W	S49W	**N79E**
2007	S30W	S62W	S47W	S55W	S58W	S47W	S41W	S55W	S60W	S48W	S48W	**N45E**
2008	N45E	S47W	S54W	S51W	S52W	S39W	S50W	S52W	S46W	S39W	S38W	**N**
2009	N45E	S45W	S41W	S58W	S46W	S46W	S56W	S49W	S56W	S42W	S39W	**S45E**
2012	S3E	N56E	S62W	S46W	S61W	S51W	S66W	S51W	S53W	S41W	S41W	**N9W**
2013	N39W	S54W	S56W	S54W	S61W	S40W	S53W	S52W	S55W	S47W	S17W	**N50W**
2014	S72E	S54W	S43W	S46W	S46W	S45W	S54W	S48W	S85W	S45W	S49W	**S45E**
2015	S72E	S54W	S43W	S48W	S50W	S40W	S54W	S55W	S50W	S41W	S	**S58W**
2016	S43W	S36W	S48W	S54W	S54W	S45W	S48W	S36W	S51W	S45W	S43W	**S36W**

2017	S83E	S56W	S51W	S45W	S45W	S44W	S66W	S57W	S48W	S51W	S59W	**N45E**
2018	S39W	S39W	S46W	S51W	S50W	S45W	S45W	S48W	S46W	S46W	S42W	**S18W**
2019	S24W	S65W	S45W	S44W	S42W	S37W	S48W	S46W	S53W	S35W	N59E	**N55E**
2020	N31E	S12W	S52W	S55W	S49W	S44W	S47W	S55W	S47W	S38W	S4E	**N35E**
2021	S21W	S38W	S44W	S42W	S52W	S53W	S55W	S48W	S40W	S41W	S22E	**S40E**
2022	N45E	S54W	S57W	S59W	S57W	S56W	S62W	S59W	S60W	S48W	S32W	**S32W**
2023	S22E	S45W	S40W	S58W	S65W	S38W	S56W	S74W	S57W	S53W	S40E	**S84E**
2024	S3E	S8E	S50W	S51W	S41W	S45W	S54W	S72W	S57W	S27W	S40W	**N41E**
2025	S4E	S38W	S30W	S33W	S32W	S36W	S34W	S40W	S42W	S5E	S16W	**S5W**
Source: Pakistan Meteorological Department												

The term "heat island" describes built environment that are hotter than nearby natural areas. An urban heat island refers to a city or metropolitan area that is significantly warmer than its surrounding natural areas due to human activities. The temperature difference usually is larger at night than during the day and is most apparent when winds are weak. UHI is most noticeable during the summer and winter seasons. It is estimated that the annual mean air temperature of a city with 1 million or above inhabitants can be 1–3°C warmer than its surroundings. In the evening, the difference can be as high as 12°C. The heat island can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality.

The city of Karachi has been growing exponentially in terms of urbanization and population growth. The city hosts more than 22 million populations with a density of 4,115 persons per kilometer square (km^2). The urban area density has increased from 233 km^2 in 1947 with a population size of 0.4 million to 3,566 km^2 in 2004 with a population size of 14 million (Qureshi et al., 2008). Rapid urbanization and global warming have initiated UHI effect over the city. A strong incidence of UHI is generally associated with a severe heat wave hazard in terms of sensible temperature. UHI effect is the unique feature of the June 2015 heat wave in Karachi. It is expected that with growing global warming incidence and poor coping strategies, UHI would become a major health risk for the vulnerable segment of population in mega-cities around the globe such as Karachi.

Causes of Urban Heat Island Effect: The principal reason for the night time warming is the retention of short-wave solar radiation absorbed during the day time by the building material consisting of concrete and asphalt. These materials are commonly used in urban areas for pavement and roofs that have significantly different thermal and radiative properties compared to the surrounding rural areas. This causes a change in the energy balance of the metropolitan area, often leading to higher temperatures than surrounding rural areas. This energy is then slowly released during the night as a long wave radiation, making cooling a slow process. Because of this phenomenon, the minimum temperatures of Karachi remained extremely high during the heat-wave event.

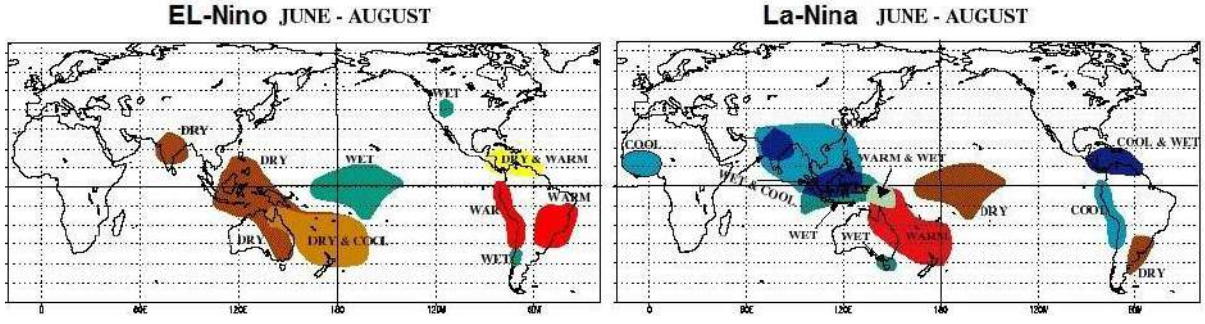
There are several causes of an urban heat island effect in Karachi.

- Reduced and slow process of evapotranspiration due to shrinking green areas and spaces in the city. With a decreased amount of vegetation, the city loses the shade, cooling effect of trees and the removal of carbon dioxide.
- Geometric effects in terms of rising number of tall buildings are a significant contributing factor to urban heat island effect. Over the years, the number of tall buildings within the city has increased that provide multiple surfaces for the reflection and absorption of sunlight, and thus increasing the efficiency with which the city is heated. This is called the "urban canyon effect". Another effect of increased number of buildings is the blockage of wind, which also inhibits cooling by convection and pollution from dissipating.
- Waste heat from automobiles, air conditioning, industry, and other sources also contributes to the UHI. High levels of pollution in urban areas can also increase the UHI, as many forms of pollution change the radiative properties of the atmosphere.

Aside from the effect on temperature, UHI can produce secondary effects on local meteorology, including the altering of local wind patterns and humidity, which have been discussed in the previous section. The UHI effect described above has been one of the major causes of unprecedented large number of heat related deaths in Karachi. Future climate scenarios suggest that the frequency of this kind of disasters may increase with the rise of temperature in future.

4.4.6 Impact of Climate Change - Karachi

Karachi may face significant risks due to climate change, particularly from rising sea levels, which could reach up to approximately 8 feet by the year 2100. Climate change is also expected to influence monsoon dynamics, potentially reducing summer precipitation levels and causing delays in the onset of the monsoon season. Another report indicates that the impacts of climate change in Karachi are likely to intensify by 2030, with global warming contributing to coastal flooding due to sea level rise. Various seminars and public gatherings have been held in the city to raise awareness among government authorities and the public regarding global warming, with experts urging the development of both short-term and long-term strategies to mitigate its effects on natural resources. In addition, Karachi faces an increasing threat from high-intensity cyclonic events, as super cyclones are projected to grow stronger and more frequent in the coming years.



List of cyclones that affected Karachi and the Sindh coast: Cyclones that form in the Arabian Sea do not usually hit Karachi or the Sindh coast; however, during 1902, 1907, 1944, 1964, 1985, 1999, 2007 and 2010, cyclones made landfall along the Sindh coast including Karachi. Other cyclones listed below caused rainfall as remnants, and recent years have shown increased cyclone activity influencing coastal weather conditions.

- In June 1907, a tropical storm struck the coast near Karachi.
- On 27 July 1944, a cyclone left some 10,000 people homeless in Karachi.
- On 12 June 1964, a deadly cyclone made landfall near Karachi.
- On 15 December 1965, a powerful cyclone impacted the city with heavy casualties reported.
- In May 1985, a cyclonic storm made landfall to the east of Karachi; however, it weakened over the sea before reaching the city.
- In November 1993, a Category 1 cyclone approached the Sindh-Gujarat border but dissipated due to high vertical wind shear.
- In June 1998, remnants of a Category 3 Gujarati cyclone caused fatalities in and around the city.
- In May 1999, a Category 3 major cyclone (one of the strongest recorded in the Arabian Sea) struck near the city, causing around 700 deaths in Sindh including Karachi.
- In May 2001, a powerful Category 3 cyclone struck near the Gujarat border, causing rainfall along the Sindh coast without major damage.
- In October 2004, Cyclone Onil approached the Sindh coast and later recurved, causing heavy rainfall and fatalities in Karachi.
- In early June 2007, Super Cyclone Gonu caused strong winds and light rainfall as it moved toward Oman.
- In June 2007, Cyclone Yemyin passed near Karachi causing significant loss of life before moving toward Balochistan.
- In November 2009, remnants of Cyclone Phyan caused gusty winds along the Sindh coast.
- In June 2010, Cyclone Phet (one of the strongest Arabian Sea cyclones) made landfall near the city as a weakened system, causing casualties.
- In November 2010, remnants of Cyclone Jal caused drizzle and dusty winds in Karachi.
- In November 2011, outer bands of Cyclone Keila brought light precipitation to the region.
- Cyclone Vayu (June 2019) caused minor storm surges and enhanced rainfall activity along the Sindh coast.
- Cyclone Kyarr (October 2019) caused coastal flooding in Karachi and Sindh.
- Cyclone Nisarga (June 2020) caused rough sea conditions along the coast.
- Cyclone Tauktae (May 2021) generated strong winds and dust storms in Karachi and surrounding coastal areas.
- Cyclone Biparjoy (June 2023) made landfall near the Sindh coast, causing strong winds, heavy rainfall, coastal flooding and evacuation in vulnerable areas.
- Cyclonic activity during 2024–2025 remained moderate; however, changing climate patterns indicate increasing intensity and unpredictability of Arabian Sea cyclones impacting the Sindh coastline.

List of Notable floods in Karachi: Most flooding in Karachi occurs during the monsoon season. Although improvements in infrastructure have helped reduce impacts, excessive and irregular rainfall still leads to urban flooding.

- On 7 August 1953, the city received a record 24-hour rainfall of about 278.1 mm, causing widespread flooding.
- On 1 July 1977, 207 mm rainfall in 24 hours caused severe flooding and loss of life.
- In 2003, heavy monsoon rainfall (284.5 mm over two days) caused widespread flooding in Sindh including Karachi.
- In 2006, after a drought period, heavy rainfall on 17 August (77 mm) caused urban flooding and disruption.
- In 2007, multiple rainfall events associated with Cyclone Yemyin and monsoon depressions caused severe flooding and casualties.
- On 18 July 2009, intense rainfall (245 mm in 4 hours) caused major flooding, followed by another event on 31 August.
- On 13 September 2011, heavy rainfall caused widespread urban flooding.
- In August–September 2019, multiple heavy rainfall spells caused significant flooding and damage.
- On 6 July 2020, intense rainfall caused widespread urban flooding and losses.
- In August 2020, Karachi recorded 345 mm rainfall, breaking previous records and causing severe flooding.
- In 2022, exceptionally heavy monsoon rains across Sindh contributed to regional flooding impacts affecting Karachi.



Figure 4.8 - Urban Flooding in Karachi following heavy monsoon rains (2025) [13]

[13] https://www.japantimes.co.jp/news/2025/08/21/asia-pacific/pakistan-karachi-rain-flooding/

List of droughts in Karachi: Drought conditions are uncommon but may occur when monsoon rainfall is significantly below normal.

- A major drought occurred from 1996 to 2002, peaking between 1998 and 2001, considered the worst in 50 years.
- In 2004, extremely low rainfall conditions persisted, though post-monsoon rainfall occurred due to Cyclone Onil.
- In 2005, drought conditions continued with limited rainfall events.
- In 2009, drought-like conditions emerged due to El Niño effects, although monsoon rainfall later improved conditions.
- In recent years (2018 and parts of 2023), below-normal rainfall indicated localized dry conditions, though not prolonged drought.

List of dust storms in Karachi: Windstorms generally occur due to monsoon systems or tropical disturbances, while dust storms may occur due to western disturbances or pre-monsoon conditions and are locally known as “Andhi.”

- On 1 September 1926, a windstorm affected Karachi with limited recorded data.
- On 31 May 1986, a severe dust storm caused fatalities, injuries, and infrastructure damage due to high wind speeds.
- On 4 July 1994, a windstorm associated with a monsoon system caused casualties.
- On 23 June 2007, a major dust storm followed by heavy rainfall caused widespread damage and loss of life.
- On 22 February 2008, a dust storm reduced visibility significantly due to westerly winds.
- On 19 March 2012, a mild dust storm caused reduced visibility and moderate winds.
- On 19 May 2012, another dust storm affected the city with moderate wind speeds.
- In June–July 2020, multiple dust storms caused damage and disruption across Karachi.
- On 18 May 2021, a strong dust storm associated with Cyclone Tauktae impacted the city.
- In recent years (2023–2025), intermittent dust storms and wind events have continued to occur, reflecting changing climatic conditions and increased variability in pre-monsoon weather patterns.

4.5 Ambient Air Quality & Noise

Transportation system and indiscriminate burning of garbage are the dominant sources of air pollution in Karachi. Operation of defective vehicles, use of low-quality fuel, and increase in the number of vehicles beyond the capacity of roads are the main reasons for deterioration of ambient air quality. However, the impact of air pollution emanating from transportation system has been found limited to the roadways and that too at traffic intersections and on the middle of the road. Emissions from stationary sources e.g. residential and business districts associated with fuel combustion for domestic use and power generation are significant but have limited extent.

The environmental impact from vehicular exhaust emission is often neglected in Pakistan due to the lack of awareness in our society, which is the major factor contributing to vehicle emission that includes NO2 (Nitrogen Oxide), Carbon dioxide (CO2), Carbon Monoxide (CO) and other pollutants. The implementation of CNG vehicles in Karachi must count as a significant achievement by any standards. It is perhaps the first instance, after Brazil and India, of alternative transport fuels being implemented on such a large scale in a low-income country. However due to adhoc attitude and lack of long-term policies, demand of natural gas including CNG outstripped supply, leading to curtailment of CNG supply in urban centers.

4.5.1 Ambient Air and Noise at Project Site

An Ambient Air monitoring study and Noise monitoring were conducted in the microenvironment of the proposed project site. The results of Ambient Air quality and Noise monitoring are presented in below;

Table 4.8: Ambient Air monitoring results

Date	Time	CO (mg/m^3)	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SPM ($\mu g/m^3$)
03.09.2026	10:00	0.11	26	22	20	113	23	236
	11:00	0.13	28	23	22	115	23	238
	12:00	0.14	29	25	23	116	25	240
	1:00	0.15	30	26	25	118	26	243

	2:00	0.16	32	28	26	120	26	246
	3:00	0.18	33	30	28	123	28	248
	4:00	0.19	35	31	29	125	30	251
	5:00	0.20	36	33	31	126	30	256
	6:00	0.22	38	35	32	128	32	259
	7:00	0.23	40	36	33	130	33	262
	8:00	0.25	42	38	35	132	33	263
	9:00	0.26	43	40	36	133	35	265
	10:00	0.28	45	41	38	135	36	268
	11:00	0.30	46	43	41	136	38	277
04.09.2026	00:00	0.31	47	44	43	138	40	273
	1:00	0.32	49	45	45	141	41	275
	2:00	0.33	51	47	47	143	43	277
	3:00	0.35	52	49	49	145	45	280
	4:00	0.38	53	52	51	147	47	283
	5:00	0.41	55	53	53	149	45	285
	6:00	0.39	52	56	56	151	44	289
	7:00	0.36	48	50	58	153	42	293
	8:00	0.32	45	47	66	152	40	296
	9:00	0.33	40	44	61	148	38	301
	10:00	0.28	37	41	62	142	35	306
MIN		0.11	26	22	20	113	23	236
MAX		0.41	55	56	66	153	47	306
AVG		0.26	41.2	39.1	40.5	134.2	35.1	268.5
SEQS		5	40	80	120	150	75	500
LDL-Limits		0ppm	0ppm	0ppm	0ppm	10 µg/m^3	2.5 µg/m^3	1 µg/m^3

NOISE LEVEL TEST REPORT

S. NO.	LOCATION/SOURCE	SEQS Limits: *65dB(A) *Leq		
		Noise Level Readings		
		Minimum	Maximum	Average
1	Front side Left corner Boundary	53.1	54.5	53.8
2	Front side Right corner Boundary	55.8	56.7	56.2
3	Back side Left corner Boundary	53.5	55.7	54.6
4	Back side Right corner Boundary.	56.9	57.5	57.2

Ambient Air and Noise Monitoring – pictorial view









4.6 Water Resources, Water Quality and Drainage

Hydrogeologically, the city of Karachi lies in the Hub 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 Hub River, Hub Dam as well as the Malir and the Lyari Rivers. The Hub 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.

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 Hub Lake/Hub Dam and the Indus River. Water from Hub Dam and the Indus River, through Keenjhar Lake, 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.

Water Supply & Sewerage System: The water supply and sewerage system is managed by Karachi Water Supply & Sewerage Board (KW&SB). Present water supply system of Karachi City has a supply capacity of about 650 MGD.



Figure 4.9 - Major Water Supply Facilities for Karachi [16]

Karachi had been allotted 650 MGD from River Indus through Keenjhar-Gujjo Water Supply System. However, they actual supply is below 580 MGD. KW&SB had planned to revive Haleji Lake to supply 65 MGD to Karachi or to tap this capacity from Keenjhar-Gujjo canal system for supply to Karachi. So far no substantial work on either of the projects have been reported. To meet the Karachi water demand, K-IV project was conceived in 2007 to supply 650 MGD additional water to Karachi. The project has been delayed several times, and the Phase-I of the project which was to supply about 260 MGD water to Karachi is yet to be completed.

As mentioned in the table above, the given water supply of 653 MGD may further be curtailed to about 406 MGD due to considerable losses in the water supply system[1011].

Sewerage Facilities: Karachi city consists of three treatment districts, TP-1, TP-2 and TP-3. However, the amount of sewage treated at these treatment plants are only about 1/3 of the total planned amount of 472 MGD, which is the amount of sewage expected from the water supply. Currently, most of the sewage generated in Karachi is discharged into rivers and seas without any treatment. KWSB is working on the S III project (see below) to strengthen/construct new interceptors and sewage treatment plants. Under this project, the current situation of untreated effluent will be greatly improved by guiding water to sewage treatment plant through interceptors constructed on the right bank of the Lyari River and the left bank of the Malir River. Of the three sewage treatment plants, TP-1 and TP-2 use the trickling filter process, and TP-3 uses the stabilization pond process. The outline of the sewage treatment districts in Karachi city are shown in Figure 4.15. In addition to the sewage treatment plant, Karachi city owns 6 nos. of disposal stations, 32 sewage lift pumping stations, 5,670 km of sewer pipes, and 250,000 manholes as sewage transmission facilities. Since the amount of sewage actually flowing in is smaller than the amount of sewage expected from the treatment district of each sewage treatment plant, it is presumed that the sewer pipes are damaged or clogged[17].

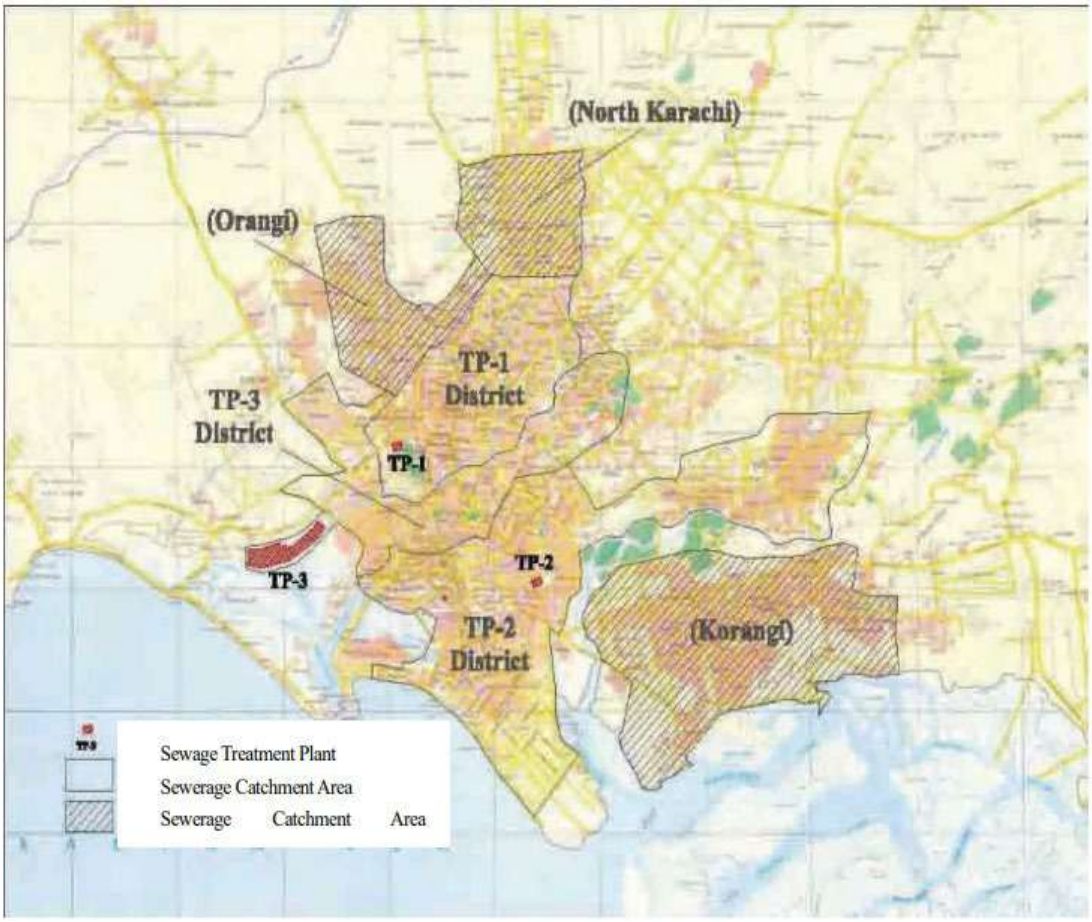


Figure 4.10 - Karachi's Sewage Treatment Districts

[14] Zaidi, A., & Zafar, S. (2018, May). Karachi: An Expanding City with Rising Disasters. In *World Environmental and Water Resources Congress 2018: Watershed Management, Irrigation and Drainage, and Water Resources Planning and Management* (pp. 337-342). Reston, VA: American Society of Civil Engineers.

[15] https://openjicareport.jica.go.jp/pdf/12367207_01.pdf

[16] https://openjicareport.jica.go.jp/pdf/12367207_01.pdf

[17] https://openjicareport.jica.go.jp/pdf/12367207_01.pdf

the city's sewage (about 470MGD) and industrial waste (about 90MGD) are being dumped into the sea largely without treatment[12].

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 and which delivered its final report in February 2017 and was head by Justice Mohammad Iqbal Kalhoro. Treatment of sewage, a much-neglected issue, saw a revival under the commission. As of February 2017, all the three sewerage treatment plants of Karachi were dysfunctional, each had a capacity of about 50MGD. A fourth treatment plant has been planned to be set up in Korangi. Commission under Justice Amir Hani Muslim lasted till January 2025. In terms of sewage disposal and treatment, following achievements can be credited to the efforts of commission[131415];

- Rehabilitation work on TP-1 (SITE) is likely to end in the first half of 2020 as the government is increasing its capacity to 150MGD.
- TP2 (Mehmoodabad) is permanently closed because of a land-related dispute, so the government is setting up a 180MGD plant in Korangi instead (TP4) which should be operational by late 2020.
- TP3 (Mauripur) became functional last year. The provincial government first increased its capacity to 73MGD and is now taking it to 180MGD. These three plants will do primary and secondary treatment of wastewater, which will let the KWSB discharge it into the sea in line with the National Environmental Quality Standards (NEQS)/SEQS.
- Five industrial effluent treatment plants are scheduled to be built in the SITE, Trans-Lyari, F.B, Landhi and Superhighway areas.

Private sector has also sprung into action, for instance, HUBCO has submitted an unsolicited proposal to the Sindh Public-Private Partnership Unit (PPPU) to set up a wastewater recycling plant at TP-1 (SITE) of 50MGD capacity[16].

Water Quality

Drinking water quality is one of the greatest factors affecting human health. However, drinking water quality in many countries, especially in developing countries is not desirable and poor drinking water quality has induced many waterborne diseases. 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 2021 to assess of the water quality of cities of Pakistan revealed that Karachi, inhabits approximately 16.025 million (Population Census Report, 2017) people and houses about 60% of the industries of the country (UN Census, 2021). The water supply of Karachi is dependent on surface water and groundwater sources. Surface water sources include Haleji Lake, Keenjhar Lake and Hub Dam, while 44 groundwater source includes Dumlottee well-fields. Altogether, 28 fixed sources were monitored for drinking water quality. Out of these sources, 93% were found as unsafe for drinking. The groundwater of the city belongs to mainly Sodium-Chloride (92%) and a minor involvement from Sodium-Bicarbonate (8%). This indicates the presence of seawater belonging to the Sodium-Chloride facies and permanent type water hardness. The situation of water quality in Karachi continues to worsen since 2002 (23%) and no remarkable improvement could be seen up to the recent study of 2020 (7%)[19].

These findings suggest that the water as received by the residents is not safe for drinking. Although water quality has not been tested yet, groundwater pollution by nitrates, pesticides, heavy metals and hydrocarbons discharged into the environment is not negligible. The salinity of groundwater in Southern Sindh, particularly in the coastal areas has increased since over pumping has induced seawater to flow in, causing what is known as seawater intrusion. The fact, also acknowledged by KW&SB that 150 MGD (681,900 m^3/day) of water supplied to the consumers is chlorinated and bypasses the KW&SB filter plants is an important indicator of the need of addressing this issue on a priority basis.

[19] https://pcrwr.gov.pk/wp-content/uploads/2021/10/Drinking-Water-Quality-in-Pakistan-2021.pdf

Sixty Seven out of 84(80%) drinking water samples collected from surface and subsurface (ground water sources) used for drinking purpose were found unsafe for human consumption due to presence of Total coliforms (bacteriological contamination) beyond the WHO recommended values (0/100ml). 30(36%) water samples were found fecal contaminated i.e. presence of E.coli. The E.coli concentration lies in the range of 01 too numerous to count cfu / ml exceeding WHO limit recommended for drinking water (0/100ml). While, only seventeen water samples (20%) were found bacteriological safe for drinking purpose.

Overall data shows that out of 84 samples 67(80%) were found unsafe for drinking purpose, while only 17(20%) samples were found fit for human consumption for analyzed parameters under prescribed standards.

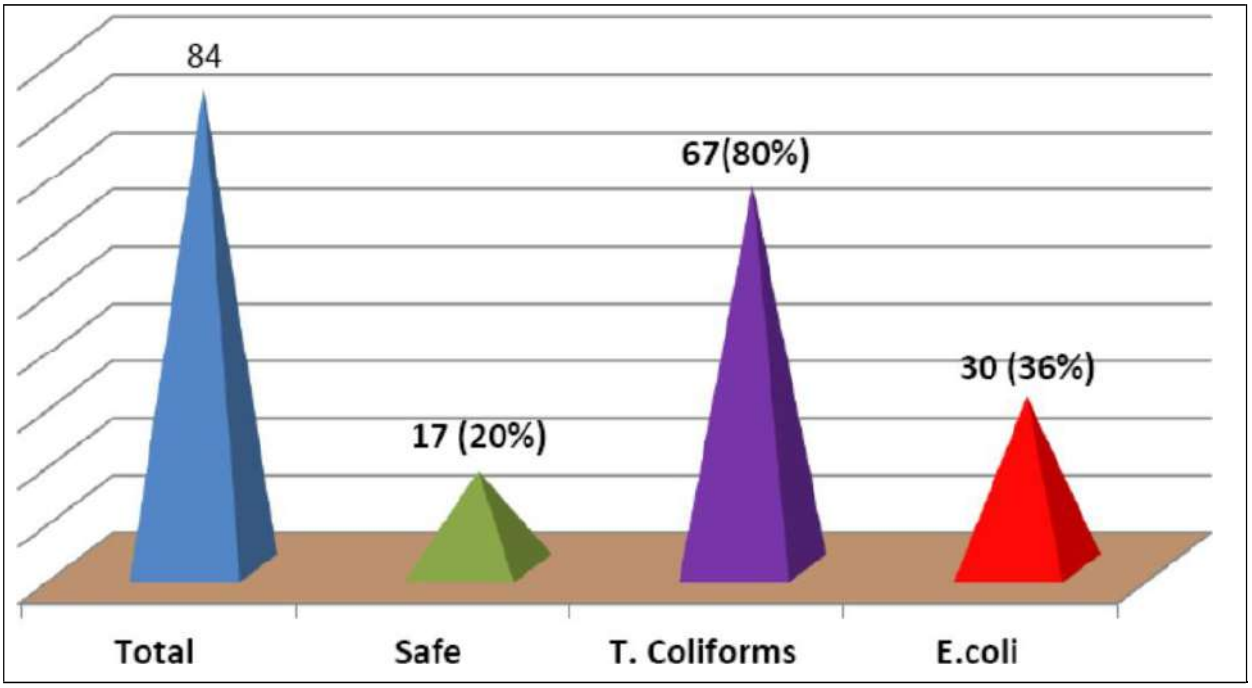


Figure 4.9: Percentage samples beyond permissible limits for bacteriological contamination in Karachi

As per the fifth interim report of implementation commission, rehabilitation of filter plants was at an advance stage of procurement and work orders were expected to be issued[17].

Ground Water Quality of the project area

The analytical results indicate that the water is generally acceptable in terms of pH, color, turbidity, fluoride, nitrate, residual chlorine, and most tested heavy metals and chemical parameters. However, TDS (4,760 mg/L), total hardness (1,532 mg/L), and chloride (1,221 mg/L) were significantly higher than the specified SEQS limits. Microbiological parameters, including total coliform, fecal coliform, and E. coli, were reported as nil. Overall, the results indicate that the water has high salinity/hardness and elevated chloride levels, and therefore may require appropriate treatment before being considered suitable for drinking purposes.

Table 4.10: Ground water Quality of the project area.

S. NO.	PARAMETERS TO BE ANALYZED	STANDARDS SEQS	LDL	UNITS	RESULTS
1	pH value	6.5 – 8.5	0.01	SU	7.34
2	Oduor	Non-Objectionable / Acceptable	-	Physical	Acceptable
3	Taste	Non-Objectionable / Acceptable	-	Physical	Acceptable
4	Color	≤ 15	1.0	TCU	BDL
5	Turbidity	< 5	0.01	NTU	0.12
6	Total Dissolved Solids (TDS)	< 1000	1.0	mg/L	**4,760**
7	Total Hardness as $CaCO_3$	< 500	0.1	mg/L	**1,532**
8	Fluoride (as F^-)	≤ 1.5	0.01	mg/L	0.32
9	Chloride (as Cl^-)	< 250	0.1	mg/L	**1,221**
10	Nitrate (NO_3)	≤ 0.50	0.01	mg/L	0.12
11	Nitrite (NO_2)	≤ 3	0.001	mg/L	0.22
12	Cyanide (as CN-) total	≤ 0.05	0.001	mg/L	BDL
13	Phenolic Compound as (Phenols)	< 0.002	0.001	mg/L	BDL
14	Aluminum (Al)	≤ 0.2	0.001	mg/L	BDL
15	Antimony (Sb)	≤ 0.005	0.001	mg/L	BDL
16	Arsenic	≤ 0.05	0.01	mg/L	BDL
17	Cadmium	0.01	0.001	mg/L	BDL
18	Chromium, Total	≤ 0.05	0.01	mg/L	BDL
19	Copper	2	0.01	mg/L	0.026
20	Lead	≤ 0.05	0.001	mg/L	BDL
21	Mercury	≤ 0.001	0.001	mg/L	BDL
22	Selenium	0.01	0.001	mg/L	BDL
23	Nickel	≤ 0.02	0.01	mg/L	BDL
26	Boron	0.3	0.01	mg/L	BDL
26	Residual Chlorine	0.2-0.5 at Consumer End	0.01	mg/L	0.32
26	Zinc	5.0	0.01	mg/L	0.24
27	Manganese	≤ 0.5	0.01	mg/L	BDL
28	Barium	0.7	0.01	mg/L	BDL
29	Total Coliform	0cfu/100ml	0	cfu	NIL
30	Fecal Coliform	0cfu/100ml	0	cfu	NIL
31	Escherichia Coli(E-Coli)	0cfu/100ml	0	cfu	NIL

Flooding in Karachi: The problem of urban flooding is quite significant in Karachi which is the industrial and business hub of Pakistan. Karachi had experienced severe floods which occurred periodically. Urban flooding is caused by heavy rainfall overwhelming drainage capacity. The primary cause of flooding in Karachi city is torrential rainfall due to tropical storm and monsoon which saturate soil and create huge surface runoff. Floods in urban conditions are flashy in nature and occur both on built up surfaces like roads and streets, parking lots, yards, parks etc. and creeks of urban areas like the Lyari, the Gizri, and the Korangi creek.

[17] Judicial commission submits its fifth report in SC by Mohammad Hussain Khan. https://www.dawn.com/news/1450835

Table 4.11: Drainage characteristics of River Basins of Karachi				
River Basin	**Length of Streams**	**Basin Area Sq.km**	**Branching Ratio**	**Drainage Density km/sq.km**
Malir River Basin	725	2167	Dendritic	3.4
Lyari River Basin	180	578	Dendritic	5.6
Budnai Basin	46	95	Dendritic	5.7

4.6.1 Storm Water Drainage

Following Table outlines storm water drainages and nallahs under each township administration. Drainages are artificial water channels for storm water drainage; on the contrary, nallahs are natural water channels. Mostly drainages are connected to nallahs and some drainage is connected to river directly; Nallahs discharge into rivers such as Lyari River and Malir River receiving storm water. As sewage collection system in Karachi City is not enough and its maintenance is not satisfactory, storm water drainage and nallahs have to receive sewage all year long in addition to storm water in rainy season.

Table 4.12: Town-wise Storm water Drainage/Nallah Length			
Town	**Depth (m)**	**Width (m)**	**Length (km)**
1. Keamari Town	1.21	0.91~3.04	7.62
2. SITE Town	2.13	3.65	16.08
3. Baldia Town	1.22	2.43	11.77
4. Orangi Town	1.52	2.43~3.65	34.1
5. Lyari Town	1.37	0.6~13.7	19.4
6. Saddar Town	1.37	3.05	11.14
7. Jamshed Town	1.5	2.43	33.8
8. Gulshan -e- Iqbal Town	3.64	2.4~15.2	28.0
9. Faisal Town	1.22~4.57	1.52~24.0	20.1
10. Landhi Town	1.22	2.43	35.36
11. Korangi Town	1.52	2.74	36.4
12. North Nazimabad Town	1.22	2.4	30.7
13. North Karachi Town	1.22	2.4	45.1
14. Gulberg Town	1.37	2.4	22.1
15. Liaquatabad Town	1.52	3.65	19.5
16. Malir Town	1.22	3.04	6.15
17. Bin Qasim Town	1.22	3.64	14.63
18. Gadap Town	1.22	3.65	24.43
Total			416.38
Source: KWSB			

There are no exclusive pumping facilities for storm water drainage in Malir. However, many pumping stations called “ejector” which were constructed for sewage discharge to natural nallahs or rivers have worked as storm water pumping facilities in rainy season.

However, at times roads are cleaned afterwards by town administration and silt/garbage is transferred to drains again. This is said to be how inundation is caused. In addition to the other mentioned issues in Malir Town many drains and nallahs have been already encroached on by illegal houses and buildings. Storage enforcement of building code and other relevant laws.

Another major issue with malfunctioned drains / nallahs is that garbage is easily and routinely dumped to these facilities, which leads to their reduced sections. Comprehensive solid waste management system has to be introduced. There are no exclusive pumping facilities for storm water drainage in Karachi City. However, many pumping stations called “ejector”, which were constructed for sewage discharge to natural nallahs or rivers have worked as storm water pumping facilities in rainy season.

Roadside drains are cleaned by KW&SB one to two months before monsoon season comes every year. Removed and collected silt/garbage is conveyed to designate solid waste disposal sites. However, roads are cleaned afterwards by town administration and silt/garbage is transferred to drains again. This is said to be how inundation is caused. In addition to above mentioned administrative issues, many drains and nallhas have been already encroached on by illegal houses and buildings. Strong enforcement of building code and other relevant laws is expected. Another major issue with malfunctioned drains/nallahs is that garbage is easily and routinely dumped to these facilities, which leads to their reduced sections. Comprehensive solid waste management system has to be introduced.

4.6.2 Solid Waste Management

Karachi city generated more than 10,000 ton / day of municipal solid waste and dumped at the landfill site without proper planning and segregation. Out of the total amount of municipal solid waste 60% of the total amount of municipal solid waste are dumped on the landfill site and rest of 40% remain on the street and did not collect from the towns.

Out of 18 towns only eleven towns such as, Gulshan, Gulberg, Gaddap, Korangi, Liaquatabad, Landhi, Malir, North-Nazimabad, North Karachi, Shah Faisal and Bin Qasim towns dumped their garbage at the Jam Chakro landfill site and too much without any proper planning and segregation of the garbage. Rest of four towns dump their waste at the Gond Pass landfill town near Hub River due to its being much near to the town as compared to Jam Chakro landfill site. Three towns of them i.e., Jamshed town, Saddar town and S.I.T.E town are those that dumped their waste at both landfill sites.

Out of the total municipal solid waste generated, 80% contains recyclable material and the remaining 20% is organic type waste. On the basis of analysis of the municipal solid waste, the study reveals that pH is slightly alkaline, moisture content is less than 50% and the amount of heavy metal like, Lead, Cadmium, Chromium and Nickel are beyond the

permissible limits. They are responsible for casting adverse impacts on the environment as well as for contaminating groundwater in the vicinity of the landfill site sites through leaching formation.

The existing system of solid waste management in the city is inefficient and inadequate to cope with the present and future need of increasing solid waste quantities. There are no planned disposal sites for the city. The current practice of the illegal dumping of solid waste in and around the city has created a serious environmental and public health problem. For sustainable development, it is essential to establish sound, economical and technical methods of solid waste management.

Sindh Solid Waste Management Board – SSWMB has been established under the Sindh Solid Waste Management Board Act 2014 for effective Integrated Solid Waste Management in Sindh including Karachi. SSWMB is embarking in garbage collection from door to door and construction of garbage transfer stations, material recovery facilities, construction of composting facilities and energy generation etc.

4.7 Biological Environment

The proposed site is located in an already developed area of Karachi. The building and other structures including power-lines are roosting places for a number of birds, mainly the pigeons and kites. Except for these roosting places and old trees, there is hardly any place in the microenvironment where wildlife can prosper. The only vegetation left is the invasive species including Prosopis juliflora, Calatropis procera, Conocarpus erectus and Eucalyptus.

Natural vegetation is restricted all over the urban area to depression areas where moisture would be available for greater part of the year and longer period of time. The native vegetation is of the desert scrub type comprising a wide variety of bushes and shrubs.

The impoverished as well as degraded environment resulting from non-availability of surface as well as groundwater and discharge of untreated wastewater into Lyari and Malir River has irreversibly reduced the biodiversity of the indigenous as well as introduced vegetation and hence it offers very little chance for the survival/growth of fauna in the macro environment of Karachi City District. There are even otherwise no habitats of large and small animals, birds or reptiles within Karachi City District. Domestic livestock, particularly goats, sheep and camels, are found grazing in the suburban towns. Water availability is the main constraint for the distribution of many animal species.

Large wild mammals are virtually absent in the areas within Karachi City District. There are a number of characteristic bird species that have adapted to the agricultural environment in the outskirts and suburban areas. These include Indian Roller, common mynah, pigeon, and house sparrow. The areas are characterized by shrubs that are heavily browsed and by a network of livestock trails that provide ready access to practically all wildlife habitats.

4.8 Description of Socio-Economic Environment

The social baseline chapter provides a comprehensive review of the socio-economic conditions of the project area. This socio-economic profile is based on a literature review and several primary data gathering activities including site visits, sample socio-economic survey of stakeholders in the area and consultations with primary and secondary stakeholders. This social baseline provides an overview of the socio-economic conditions of the people who reside and work in the project vicinity. It also includes an assessment of public utilities and social services (education and health facilities) in the area.

International best practice for EIA studies demands an alignment of the proposed project components with the Sustainable Development Goals (SDGs) defined by the UN. In 2017, the global indicator framework was developed and agreed upon by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs). Indicator 11.3 of Goal 11 of UN Sustainable Development Goals (SDGs) focuses on achieving sustainable development of cities through improvement in urban planning and management in participatory and inclusive ways by 2030. For the sustainable development of Karachi, integrating the project design of the proposed Roshan Safa Tower 2 project to ensure alignment with relevant aspects of SDG Goal 11 is essential to ensure development that is socially acceptable and environmentally sound.

This chapter is divided into the macro and micro environment of the project area. Macro environment encompasses Karachi Cantonment and District South which is the larger administrative area of the project. The macro environment covers administrative setup, demography, education and health profile of the area. The immediate neighborhood of the project has been defined as the micro-environment of the project. The micro environment covers land use, education, health and utilities profile of the area.

4.9 Macro Environment

4.9.1 Administrative Context

The proposed project is planned for development on Plot No. 125, near Depot Lines, Karachi Cantt, which falls under the jurisdiction of sub-division Karachi Cantonment of District South Karachi. District South comprises of 5 sub-divisions and 2 Cantonments namely, Saddar sub-division, Garden sub-division, Lyari sub-division, Aram Bagh sub-division, Civil Line sub-division, Karachi Cantonment and Clifton Cantonment.

Demography

Karachi Cantonment Board is the oldest Cantonment of Karachi Region, which was established in 1842 after the advent of British Empire in Sindh. Being capital city, all major businesses & educational residential activities etc. were part of KCB. Its delimitation process continued at different intervals but major bifurcation started during 1970s – 80 when lines area was excluded and further remaining area was bifurcated into CBC and KCB. As a result

its dynamics have changed with the reduction of its area which at the moment is 12.46 sq.km. The following table provides a comparison of district and sub- division population between 1998 and 2023 census.

Table 4.13 - Population of Karachi Division & Its Districts

Name of Administrative Unit	Area S.Q Kilometres	Population Density Per S.Q Kilometers	Total Population of the Area	2017- 2023 Average Annual Growth rate
Karachi Division	3,527	5779.10	20,382,881	4.10
District Central	69	55,396.01	3,822,325	4.30
District East	139	28,213.97	3,921,742	5.32
District South	122	19,096.43	2,329,764	4.71
District West	370	7,241.57	2,679,380	4.35
District Keamari	559	3,700.27	2,068,451	2.07
District Korangi	108	28,971.95	3,128,971	3.29
District Malir	2,160	1,126.04	2,432,248	3.99
Gadap town (sub-division)	1,104	90.90	100,351	7.76
Source: Pakistan Bureau of Statistic 2023				

According to the 1998 census the total population of district South was 1,478,047 which increased to 1,791,751 in 2017 census, showing an increase of 21% or an average annual growth rate of 1.06% between the 2 censuses (nearly 2 decades). Similarly, the total population of Karachi Cantonment was 58,088 according to the 1998 census which increased to 68,877 according to the 2017 census. The population increase and average annual growth rate is almost the same as the District averages.

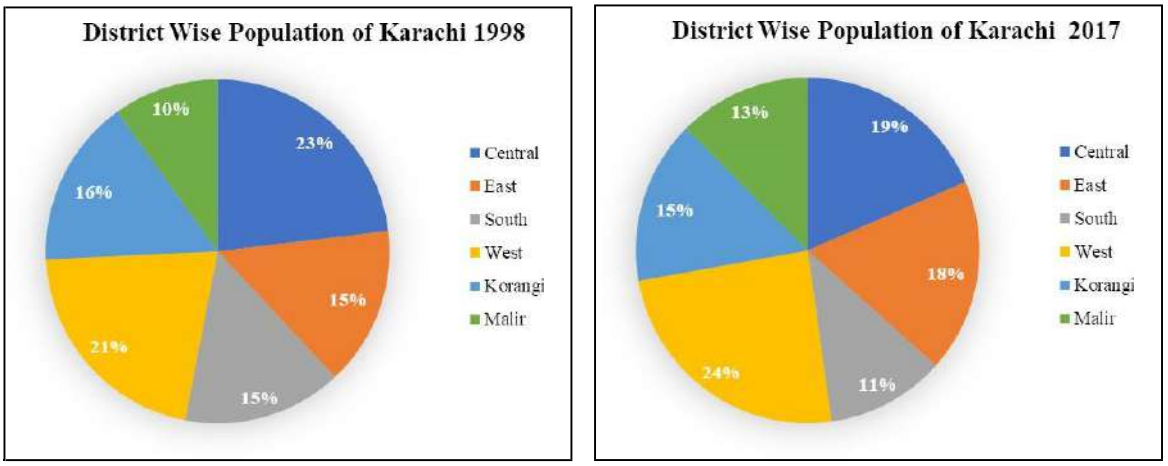


Figure 4.10: District-Wise Population according to the 1998 and 2017 Census

According to the 1998 census, District South comprised 15% of the entire city population. According to the latest census the population of District South comprises 11% of the city population making it the least populated district of Karachi. The population of District South is expected to increase in the coming years because there are many high-rise projects being planned in the area. Over time, many low-income settlements in the district that are now home to large pockets of residential and commercial establishments thriving with people from other parts of Sindh and the rest of Pakistan, that have made Karachi their second home and work for the upper income-classes living in Clifton and DHA.

4.9.2 Education Facilities

The educational infrastructure in Karachi South is physically well developed. The government is providing maximum possible educational facilities so that a fair opportunity may be provided to the people of the district to enhance their human capital. There are a number of schools, colleges and institutes in the district. The noteworthy institutions of the district are Sindh Madressatul Islam University, DOW University of Health Sciences, Jinnah Sindh Medical University, D. J. Sindh Government Science College, Saint Joseph's College for Women, Saint Patrick's College and Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST). There are enormous government and private schools in district South-Karachi. The figure / data are not available of Post Graduate Colleges/ Colleges, Higher Secondary School/ Secondary School and Primary School at district level; however, the data is available only at division level.

Table 4.14: District-wise Number of Schools, Enrollment and Staff (2017-23)

District Name	No. of Schools				Enrollment			Teacher		
	Boys	Girls	Mixed	Total	Boys	Girls	Total	Male	Female	Total
Central Karachi	*117*	*141*	*348*	*606*	*44,822*	*58,510*	*103,332*	*1,803*	*4,996*	*6,799*
East Karachi	*51*	*64*	*163*	*278*	*23,022*	*29,106*	*52,128*	*870*	*2,271*	*3,141*
South Karachi	*70*	*87*	*173*	*330*	*26,122*	*35,824*	*61,946*	*1,079*	*2,496*	*3,575*
West Karachi	*128*	*101*	*340*	*569*	*38,562*	*45,454*	*84,016*	*1,443*	*1,909*	*3,352*
Malir Karachi	*136*	*113*	*414*	*663*	*34,548*	*32,333*	*66,881*	*1,540*	*1,148*	*2,688*
Korangi Karachi	*97*	*94*	*220*	*411*	*35,192*	*46,918*	*82,110*	*1,025*	*3,082*	*4,107*

Source: SEMIS Census 2017 - 2023

Sindh Education Management Information System (SEMIS)

The number of schools, enrollment and teachers shows here active involvement of the residents of the District South in the education sector. The following table illustrates that according to School Education Statistics 2016-17, District South Karachi has a large number of schools with electricity, washrooms, drinking water and boundary facilities. The data also shows that people of District South are more educated and well aware about the importance of education and are prepared to pay exorbitant school and college fees for the education of their children.

Table 4.15: District wise Basic and Advance Facilities in School

District	Schools	Electricity	Washroom	Drinking Water	Boundary Wall	Lab/Science Lab	Library	Play Ground	SMC
Central Karachi	*607*	*447*	*484*	*507*	*529*	*121*	*56*	*370*	*591*
East Karachi	*264*	*223*	*241*	*219*	*238*	*59*	*25*	*84*	*259*
South Karachi	*482*	*383*	*426*	*356*	*432*	*49*	*49*	*180*	*465*
West Karachi	*363*	*232*	*301*	*256*	*340*	*82*	*27*	*173*	*359*
Korangi Karachi	*550*	*397*	*431*	*391*	*509*	*46*	*37*	*288*	*533*
Malir Karachi	*591*	*240*	*398*	*302*	*479*	*56*	*21*	*106*	*573*
Source: SEMIS Census 2017 – 2023									
Sindh Education Management Information System (SEMIS)									

4.9.3 Health Facilities

District South provides health facilities not only for its own inhabitants but also for the resident of its adjoining districts. The Jinnah Postgraduate Medical Center, Civil Hospital, Sindh Institute of Urology and Transplantation, National Institute of Cardio Vascular Diseases, National Institute of Child Health, Sindh Institute of Skin Diseases and Lyari General Hospital are the biggest in the district. Hundreds of patients are admitted and treated monthly. The Karachi Metropolitan Corporation (KMC) Hospitals / Maternity Home are also working in the district. In addition to this, number of dispensaries is also functioning at different places in the district under the supervision and administrative control of K.M.C / D.M.C South.

Apart from the Government run health institutions, dozens of private hospitals like South City Hospital, DHA Medical Centre, Psycho Social Centre, Hilal-E-Ahmar House Hospital, Ziauddin Clifton Campus Hospital and Medilink Hospital, OMI-Orthopedic and Medical Institute, 7 Day Adventist Hospital, Clifton Clinics, National Medical Centre Pvt. Ltd are few to be mentioned here along with many private clinics are also functioning in the district.

The following tables show the number of health practitioners and paramedical personnel in Karachi.

Table 4.16: District wise Government Medical and Paramedical Personnel in Karachi 2023

District	Doctors	Nurses	L.H. V	Dispensers / Dressers	X-Ray Technicians	Lab Technicians	O.T Technicians	X-Ray Assistants	Lab. Assistants	O.T. Assistants	Midwives
Karachi Central	579	207	15	82	12	17	25	0	3	12	26
Karachi South	324	115	4	51	14	23	33	0	8	8	2
Karachi East	245	18	22	26	4	0	3	0	4	1	6
Karachi West	356	83	19	67	12	14	22	5	12	15	19
Karachi Malir	234	25	14	53	9	4	6	0	10	5	18
Karachi Korangi	252	90	38	-	-	-	-	0	8	8	25
Source: - Directorate General of Health Services, Hyderabad.											
Source: - BOS, Government of Sindh (Development Statistics of Sindh-2018).											

Table 4.17: District wise Government Health Facilities with Bed Capacity in Karachi 2023

District	Hospital		Hospital Beds		Dispensaries		R.H Centers		T.B. Centre		B.H. Units		M.C.H.C.	
	Teaching	Civil, Specialized & Taluka	Teaching	Civil, Specialized & Taluka	No.	Beds	No.	Beds	No.	Beds	No.	Beds	No.	Beds
Karachi Central	-	-	3,150	-	5	-	-	-	8	-	2	-	3	6
Karachi South	2	4	-	960	5	-	-	-	10	5	-	-	-	-
Karachi East	-	-	361	-	5	-	-	-	5	97	4	-	4	-
Karachi West	1	1	-	248	14	15	4	20	8	-	7	14	5	6
Karachi Malir	-	1	-	48	7	-	2	8	4	-	14	22	6	-
Karachi Korangi	-	7	-	724	8	-	-	-	7	-	8	16	4	41
Source: - Directorate General of Health Services, Hyderabad.														
Source: - BOS, Government of Sindh (Development Statistics of Sindh-2022).														

The public health facilities in Karachi are highly centralized in a few locations and cannot cater to a large part of the population. The above-mentioned public health facilities data is not updated in the government records thus subject to some shortcomings. The health care facilities of district South Karachi is better than other districts of Karachi division because there are number of existing good government and private hospital. The people are easily availing for this facility.

4.10 Micro Environment of Project Area

The proposed project site is proposed for construction on Plot No. 125, near Depot Lines, Karachi Cantonment, Saddar. Saddar is a main hub of commercial and business activities where thousands of customers visit daily. The Empress Market is a marketplace situated near the proposed project; it is amongst the most popular and busy places for shopping in Karachi. The micro environment of the project area comprises of several residential and commercial buildings. The project site faces Empress View Apartments in its immediate west, Hormusjee Katrak Hall on its immediate south, empty plot on its immediate north and the Student Biryani on its immediate east.

4.10.1 Land Use

The project site is located in a high-density locality where some of the earliest commercial centers of the old city exist. It has a mixed-use environment i.e. it is used for both residential and commercial purposes. The residential area constitutes of apartments as well and some old high-rise buildings. The commercial activities in the area include eateries, hotels & restaurants and dry fruits market. Most of the people residing in the area belong to the middle-income households.

4.10.2 Education Facilities

There are many private educational institutes in the project area. The area residents have access to excellent education facilities including primary and secondary level schools as well as intermediate colleges. The educational institutes in the surrounding area include St. Patrick School which is located at a distance of 0.38 Km from the project site, St. Mark's English High School which is at a distance of 0.24 km, St. john Homeopathic Medical College Boys Secondary School which is at a distance of 0.2 km, Army Public School & College which is at a distance of 0.84 km, Karachi Grammar School Middle Section which is at a distance of 0.24 km, St. Paul's High School which is located at a distance of 0.68 Km and St. Joseph College for Women which is located at a distance of 0.55 Km from the project site.

4.10.3 Healthcare Facilities

There are private and some government healthcare facilities in the area. The most common diseases reported in the area include Fever, Typhoid and Blood Pressure. The residents of the area mostly avail the facility of private hospital and only out of frustration due to lack of funds and long-lines, some go to government hospitals. The health facilities in the vicinity of project which include Kausar Medical Center which is located at a distance of 0.11 Km from the project site, Parsi General Hospital which is located at a distance of 0.24 Km, Taj Medical Complex which is located at a distance of 0.4 Km, Neurospinal & Cancer Care Hospital which is located at a distance of 0.34 Km and Midway Hospital which is located at a distance of 0.36 Km. The residents of the area prefer to go to Jinnah Hospital and NIVCD hospital in emergency.

4.10.4 Water Supply and Waste Management

The water supply in the area falls under the jurisdiction of Karachi Water and Sewerage Board (KWSB). The water supply in the area is adequate for domestic use and the nearby residents do not use water tankers for household use. This mismanagement of sewerage system leads to a lot of problems during the monsoon seasons

Solid waste management of the area falls under the jurisdiction of Karachi Cantonment. The condition of solid waste in the project area is unsatisfactory. There is no proper infrastructure for solid waste management. People usually dump their waste directly dump to empty plots in the surroundings.

4.10.5 Electricity & Gas Supply

The area residents were mostly satisfied with the electricity supply in the area as load shedding is infrequent in the area. The area suffers from gas load shedding during the winter season.

4.10.6 Traffic

The traffic flow in the project area remains high due to the presence of commercial activities and limited parking space. Most vehicles are parked along the roadside, resulting in traffic congestion in and around the project area. Traffic congestion becomes particularly severe during peak hours, coinciding with office and school timings. Most drivers use the Saddar route to access Clifton, I.I. Chundrigar Road, and Keamari, which further contributes to traffic congestion in the area.
A traffic assessment has been conducted, and the assessment report will be shared

Chapter 5 Information Disclosure, Consultation & Participation

Stakeholder consultation has become an important requirement of the EIA study after the enactment of the guidelines for public consultation under the Pakistan Environmental Protection Act (PEPA) 1997. After the 18th Amendment to the Constitution, the Government of Sindh passed the Sindh Environmental Protection Act 2014, which also stresses the importance of engaging with the concerned primary and secondary stakeholders during the EIA study. The enquiry report on water commission has also highlighted the important issues pertaining to resource utilization in particular 'water supply and waste water disposal'. There again the criticality of public rights on resource availability and utilization is tied up with sustainability principles.

Sindh Environmental Protection Act 2014 requires the proponent to engage in public consultation with the primary and secondary stakeholders in the project to enable a comprehensive environmental impact assessment study that not only covers the micro environment but also encompasses the macro environment. Micro environment is considered to be the immediate surroundings of an area while the macro environment is the larger area including the District and Union Council in which the project is located.

The proposed project Roshan Safa Tower 2, residential building falls under the jurisdiction of Cantonment Board Saddar, District South Karachi. The proposed project activities involve the construction of a residential building up to Thirty two floors.

While in the short-term, the impacts might be felt only in the micro environment of the project, in the long-term, the impacts may also spread to other nearby neighborhoods and activities including traffic management, swift passageway for fire tenders and ambulance and stress on existing utilities in lieu of these perceived impacts, meaningful engagement with the project stakeholders has been carried out to identify the potential positive and negative impacts, assess the magnitude of these impacts from a social perspective and prescribe solutions that identify Best Management Practices (BMPs) in the construction and operations of the proposed high-rise residential building project. In this chapter, an overview of the various stakeholders has been given, the engagement interventions carried out with the stakeholders and the concerns and suggestions raised by them.

5.1 Stakeholder Mapping

In order to better understand the different stakeholder groups for this project, a stakeholder mapping exercise has been carried out whereby the different stakeholder groups and their interests in the project are discussed in this section:

1. **Local People/Neighborhood:** Individuals or groups in the vicinity of the project site are informed regarding the project background and context. Due to their proximity to the project site, they are often the most vulnerable stakeholders and therefore, consultation

with these stakeholders is carried out throughout the project life. The consultation exercise provides opportunity to appraise the stakeholders regarding the consultation process, identify likely project impacts, and record concerns of local communities. Moreover, intensive stakeholder engagement during the planning stage of the project provides a basis for reducing the trust deficit and encourages confidence-building.

2. **Proponents:** The main aim of the project proponent is to accomplish the objectives of the project through cost-effective and sustainable project activities. To this end, the project proponent has to recognize that strong associations and responsive relations with stakeholders would go a long way to achieve the project objectives. Therefore, the proponent has to strive to engage stakeholders at all levels from the outset; inform them regarding project goals, design and alternatives. Moreover, they have to keep trying to create public understanding and acceptance of the proposal through commitment to implement the promised objectives. They have to accomplish the project through general acceptance of the design and keep improving through use of public inputs on alternatives and mitigation measures.
3. **Government Agencies:** The government agencies involved in the EIA process is mandated to have their policy and regulatory responsibilities addressed in impact analysis and mitigation consideration. For the competent authority, an effective public involvement program will ensure a project proposal that effectively incorporates environmental and social concerns. During the EIA review, the most important concern for SEPA is a transparent public consultation process and a strong stakeholder engagement plan that can address the concerns and suggestions of all stakeholders.
4. **NGOs/Interest groups:** Comments from NGOs and specific interest groups often provide a useful policy perspective on the project's methodology and implementation mechanisms. For example, due to the vast exposure of certain NGOs and interests' groups, alternative measures for reaching the project goals may be advised that is more environmentally friendly and socially acceptable.
5. **Other Groups:** Other interest groups include those who are experts in particular fields and can make a significant contribution to the EIA study. The advice and knowledge of relevant institutions who are directly concerned with the project are often sought. More often than not, a range of experts from these groups are consulted and their input is solicited based on the project requirements.

5.2 Primary and Secondary Stakeholders

Primary stakeholders are those who have a direct interest in the project which includes residents, commercial entities and institutions falling in the immediate environs of the project area. Secondary stakeholders include the relevant government agencies and public interest groups which may indirectly influence or be influenced by the project. The concerns and input from both primary and secondary stakeholders are important to identify the issues arising from the construction and/or operation phase of the project and propose mitigation measures that minimize the negative project impacts and enhance the positive ones.

Within the project vicinity, the primary stakeholders are Parsi Compound, Sawera Tower. commercial interests in the immediate vicinity including Empress View, Rainbow Center and Student Biryani. There are numbers of other commercial centers which make Saddar attractive and accessible for all kinds of customers. Usually, customers are low-to-high income class as this area is located at the junction which links the old city area and new city area. Earlier, it evolves as a need of officials and residential of area but with a passage of time it becomes denser in terms of shopping area, population and social activity hub. A large bunch of people attracted towards it not because of excess of goods but also because of its economic stability of products and availability of all kind of local and foreign goods. A diverse range of community groups including Muslims, Hindus, Christians and Parsis have been associated with these markets for over a century.

In the markets of the area, informal and formal eateries are placed after intervals, mostly placed on the ground floor and people enjoy food during shopping. Socialization is also strong as seen by observing the strong sense of community which is evident among the merchants and residents in the same building. Sometimes, the buildings have shops, residences, godowns and workshops too. Hence, the nature of buildings in the area is mixed as it caters to multiple functions at the same time.

The secondary stakeholders for this project include the utility companies that operate in the area including K-Electric, SSGC and KWSB as well as the regulatory authorities mandated to ensure environmental protection in the city, which falls under the remit of SEPA and compliance with building and construction laws which is looked after by SBCA. The primary and secondary stakeholders for Roshan Safa Tower 2 have been identified in the table below.

Table 5.1: Stakeholders for Roshan Safa Tower 2

Neighborhood	*Residential Interests* • Parsi Compound • Residents • Sawera Tower *Commercial* • Stores at Sawera Tower • Govt Girls Secondary School Line area • Student Biryani
Government Agencies & Other Service Providers	• Sindh Environmental Protection Agency (SEPA) • Cantonment Board Saddar • Karachi Water & Sewerage Board (KWSB) • Traffic Police • K-Electric • Sui Sothern Gas Company (SSGC) • DMC Saddar • Sindh Building & Control Authority (SBCA)

5.3 Consultation Approach & Methodology

5.3.1 Consultation with Primary Stakeholders

A Neighborhood Survey was conducted to identify residential and commercial interests in the area that may face direct impacts from the proposed development. The survey was conducted in two stages. In the first stage, several site visits were carried out to identify all stakeholders that either reside or work in the project vicinity and conduct an initial identification of potential positive and negative impacts. Relevant public service institutions directly involved in service provision in the areas were also identified.

During the second stage, a social survey field team used a pre-designed semi-structured template to engage 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. A 'Project Brief' providing the salient features of the project were also handed over the available stakeholders as part of the information disclosure process.

Moreover, the team inquired about the current situation of the area such as the status of utilities, security and law and order situation in the project area from the residents near the project site. Several open-ended questions were also included in the questionnaire to ensure that the respondents could openly share their opinions and suggestions relevant to the study. The following table shows the stakeholders that were approach during the Neighborhood Survey.

Table 5.2: Consultation with Primary Stakeholders

S. No	Stakeholders	Location	Stakeholder's Type	Date
1	Mr. Rizwan	Area Resident	Local person	04-09-2026
2	Mr. Aamir Ali	Store keeper at Sawera Tower	Residential	04-09-2026
3	Mr. Muhammad Aamir	Small Food Cart (Channa/Paya) Owner	Residential	04-09-2026
4	Mr. Basharat & Mr. Mohsin	Govt Girls Secondary School Lines Area	Administrator	04-09-2026
5	Dr. Shahbaz Ahmed Hashmi	Medical Centre for Federal Government Servants, Karachi	Civil Surgeon / Associate Physician,	04-09-2026

5.4 Consultation Feedback

The comments, concerns and suggestions received from stakeholders during the neighborhood survey have been collated in this section. The comments solicited from stakeholders were helpful in the screening of the potential environmental & social aspects of the project.

5.5 Concerns & Suggestions: Neighbourhood Survey

The social team from EMC carried out consultations in the project area during the 1st week of September 2026. The consultations were carried out with residential and commercial stakeholders near the project site. Project brief was handed over to the available persons (building supervisors) where consultations could not be carried out, to enable the stakeholders to contact the survey team for any clarifications and/or suggestions in the near future. The following major issues and concerns were raised by the primary stakeholders:

All contacted persons commented that this project is beneficial for the area because business is likely to increase as more residents will mean more customers for their business. They added that the proposed project would provide ample business space to earn their livelihood especially for those shopkeepers who have lost their shops in the anti-encroachment drive. Nearly one thousand shops of four markets were demolished in the surroundings of the iconic Empress Market in an attempt to restore the British-era structure to its original shape on the directives of the Supreme Court. Thus, the stakeholders were pleased to know that additional development in the area will increase much-needed economic activity in the area and increase the sales of the shopkeepers and markets. They responded positively about the project are being constructed to provide the residential facilities with all basic utilities in the center of the city which will fulfil the rising demand of the housing in this mega city of the country into some extent. Socioeconomic activities will bring a good change in the lives of the people of the area. Employment and modernization would raise the standard of living of the inhabitants.

All utilities are available in the area as the proposed site is situated in the center of the city. The area is oldest and hub of the trading and commercial activities.

Electricity connections have long been supplied to residents and commercial centers of the Saddar by KE. Sui Southern Gas Company (SSGC) has been providing gas for domestic and commercial usage, whereas Karachi Water & Sewerage Board (KWSB) will supplies water to the area. The quality of these basic services and infrastructure is expected to have a profoundly positive impact on the project's property prices.

Most of the contacted people were mix groups upper middle class and the high income, so livelihood opportunity is important matter for them. They say that the opening of new business means increases in customers and new jobs opportunities for skilled and educated employees, in this way new doors of livelihood resources would open in the area.

Table 5.3: Primary Stakeholder Consultations Pictures

	
Consultation with local resident	
	
Dr. Shahbaz Ahmed Hashmi Civil Surgeon Medical Centre for Federal Government Servants, Karachi	
	
Govt Girls Secondary School Lines Area	Consultation with Mr. Basharat & Mr. Mohsin





Consultation with Mr. Aamir Ali local resident

Table 5.4: Social consultation feed back

S. No	Name of Person	Status	Comments
1	Mr. Rizwan	Resident	Due to construction planning, travelling of street is safe. Waste accumulation at corner of street is now controlled at some extent. Water shortage is problem due to water supply infrastructure. So, Water supply and its infrastructure need to be improved for new residential building
2	Mr. Aamir Ali	Store Keeper at Sawera Tower	Having positive response toward Roshan Safa Tower 2 due to new job opportunities
3	Muhammad Aamir	Small Food Cart (Channa/Paya) Owner	Having No objection on construction But concern on Road Crossing after start heavy construction and having objection on solid waste
4	Mr. Basharat &	Administrator at Govt Girls	They have serious concern related to Solid waste at corner of Armanian Street

	Mr. Mohsin	Secondary School Lines Area	right Infront on school entrance. This concern increases when solid waste ignite by anyone. Because of heavy smoke students and school staff feel suffocated.
5	Dr. Shahbaz Ahmed Hashmi	Civil Surgeon / Associate Physician, Medical Centre for Federal Government Servants, Karachi	- We don't have objection for high rise residential building. But we concern, proponent must consider our working hours.

Chapter 6 Screening of Potential Impacts & Proposed 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, 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 deficiencies in infrastructure which has been overburdened as a result of increased demand of water supply, waste disposal and road congestion. The deficiencies having been created due to the non-sustainable development activities introduced in the megapolis for over two decades.

The environmental aspects of the project as identified by situation analysis are related to the following:

- Physical environment,
- Biological environment, and
- Socio-economic environment.

Description of microenvironment and macroenvironment in the previous chapters have provided a classification of the micro-site based on assessment of impact using both primary and secondary data on climate, air quality & noise, hydrology, geology, geomorphology, soil characteristics and seismicity, ecology, built environment including road network and traffic movement, and the socioeconomic aspects pertinent to siting of the project and its adaptation in the emerging situation of intense construction activity in Karachi. Mitigation measures have been proposed wherever required.

- Screening of potential environmental impacts on the physical environment is related to:
- Siting of the Project
- Topography, Geology and Seismicity of the microenvironment
- Vulnerability of soil to liquefaction
- Availability of utilities in the area
- Air, water and noise pollution and other forms of nuisance during construction at site, and in the microenvironment (neighborhood) and macroenvironment of site
- Burden on Infrastructure
- Capacity of adjoining roads, traffic movement, and congestion

The phases of project are:

- Planning and Designing
- Construction
- Operation

6.1 Impact Assessment Methodology

Potential environmental impacts of the proposed Project on different features of micro and macro-environment pertain to construction and operation of mixed-use building project.

The screening process proceeds by identifying the potential environmental aspects of siting the project, identifying the potential environmental impacts at pre-construction, construction and operational stages of the project and identifying the residual impacts after adoption of mitigation measures that may be needed at the outset of activities. The impacts on environmental resources from the proposed project will be short-term and temporary in nature.

Environmental impact of a project is worked out using various factors, so that an environmental management plan can be evolved to take mitigation measures.

Impacts assessment strategy at different stages of the project is summarized as per Fig. 6.1 below:

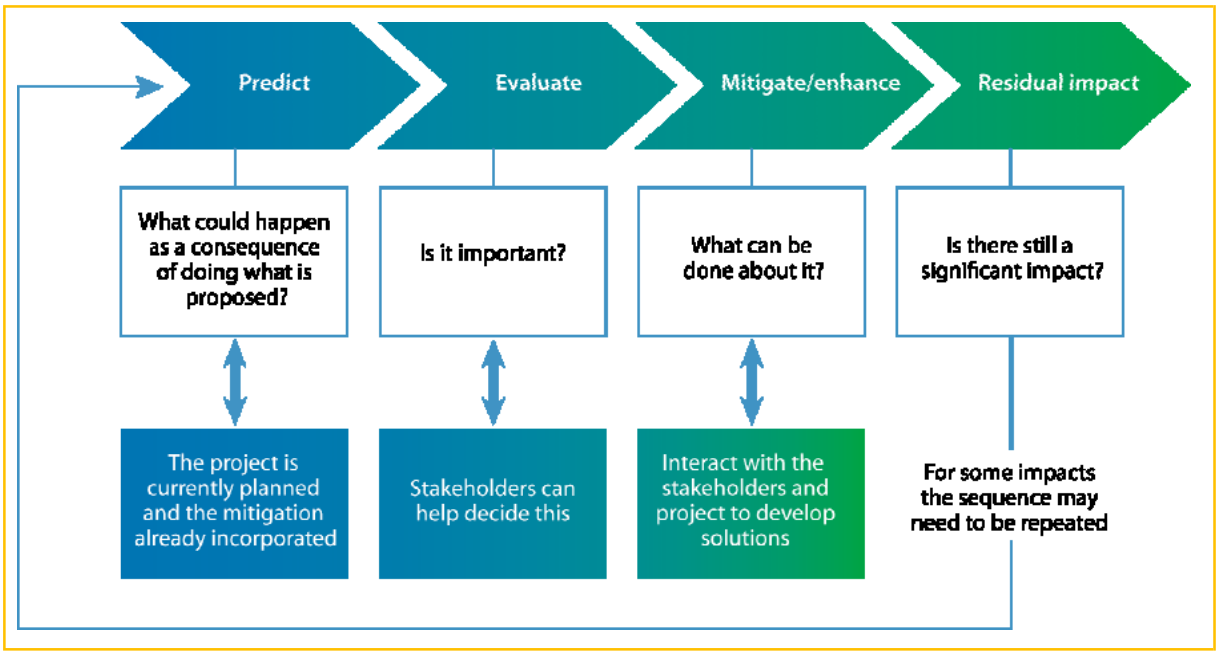


Figure 6.1: Impact Assessment Strategy

A systematic strategy was developed to provide an assessment of the likely impacts on the micro and macro-environment of the Project site. The strategy included:

6.2 Environmental Aspects of Sitting of Project

- Aspects related to the Siting of the proposed project and requirement of mitigation measures are as follows: Availability of infrastructure facilities for establishment of project in Karachi Cantonment (KCB). Advantage of this aspect has already been taken by other builders and developers who have gone ahead with the construction of mixed used ventures in the area.
- Approval from Sindh Environmental Protection Agency would also be sought through submission of this EIA report.
- Area is being densified with several commercial cum residential buildings. Siting of the project will therefore, would not add to the negative impacts such as water, air, and noise pollution, that may have already been incurred to some extent due to the said development, or to the existing level of pollution that has been allowed for such development.
- This Project would least likely cause any annoyance to the living environment, or disturb the peace and tranquility of its surroundings.
- The project site has no sensitive areas such as protected sites including wildlife sanctuaries, game reserves or national parks, or any archaeological, historical or cultural heritage within the zone of influence; as such its siting would have no impact in this regard. Removal of trees or greenery would not be involved as project site is a vacant plot.
- The air quality of the air-shed of the macro-environment as well as that of the site itself will have no significant impact due to siting of the Project.
- Land acquisition for the project is not involved as the land is owned by the proponent.
- Proposed project would share the water resources available in the area. NOC from the relevant agency has been taken for the connection of water supply.
- The project site is not close to polluting units of the industrial estates. The site is therefore not directly impacted by the emissions and discharges from the industrial units.

Mitigation measures

- The proposed project would entail substantial improvement of the landscape. The project shall be constructed strictly in accordance with the existing environmental legislations, building codes, NFPA codes and applicable building codes therefore, are not expected to contribute to pollution of the environment.

The following Checklist provides the screening of potential environmental impact on different components of ecosystem of the proposed project.

Table 6.1: Checklist provides the Screening of Potential Environmental impacts

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area ..... ?			
Densely Populated?	√		-
Heavy Development Activities?	√		Densification allowed by authority.
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 waste disposal systems and their interactions with other urban services.		√	Taking cognizance of the situation, the proponent has already paid 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?		√	Unlikely as the building is being constructed inside the housing society.
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		√	Not envisaged

Table 6.1: Checklist provides the Screening of Potential Environmental impacts

Screening Questions	Yes	No	Remarks
cultural heritage and tourism revenues?			
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 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 construction material transport and wastes?		√	The Project involves major 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 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 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
Over usage of ground water, leading to land		√	Conservation practices will be followed

Table 6.1: Checklist provides the Screening of Potential Environmental impacts			
Screening Questions	**Yes**	**No**	**Remarks**
subsidence, lowered ground water table, and salinization?			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.

6.3 Screening of Environmental Aspects related to Siting of Project

- The Project will be sited at Plot no. 125, Depot Lines, Karachi cantt; the site falls in the appropriate category that permits the designated land-use by the relevant authority. The site is thus the only and hence the preferred alternative for siting the Project.
- The ownership of the plot lies with the M/s Altaf Tai Builders & Developers. Since the proponent is the rightful owner of the site/commercial Plot, there is no dispute with regard to siting of the project. To validate their claims on the site and on its being the only and hence the preferred alternative for establishment of their commercial project, NOCs from Cantonment and utility agencies are being obtained.
- The project when completed would require an estimated 65,575 gallons per day. Total electricity demand load is 1646 kW. 5% of load will be covered from solar PV. The proposed project is a self-contained building having its own back-up power generation, water supply supplemented by filtration system, grey water recycling, sewage treatment and disposal system through Septic Tank, in addition to provision of parking space. The relevant 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 safety and security are alleviated and eased. The Project would thus achieve its objective of providing a secure and safe building at an attractive location. This being a positive impact would be an indicator of achievement of the objectives of the Project.

6.4 Screening of Potential Impacts at Planning and Designing (Pre – Construction Phase)

There are some of the environmental aspects which will be taken into account in the planning and designing phase of project so that these may not impact the environment in both construction and operational phase. These impacts are as follows:

6.4.1 Land Acquisition

Land is owned by project proponent and the necessary approvals are being obtained.

6.4.2 Structural Stability

The seismic zone map of Pakistan (fig. 6.2) has divided the country into 05 seismic zones ranging in term of Uniform Building Code (UBC) zones with respect to ground acceleration values.

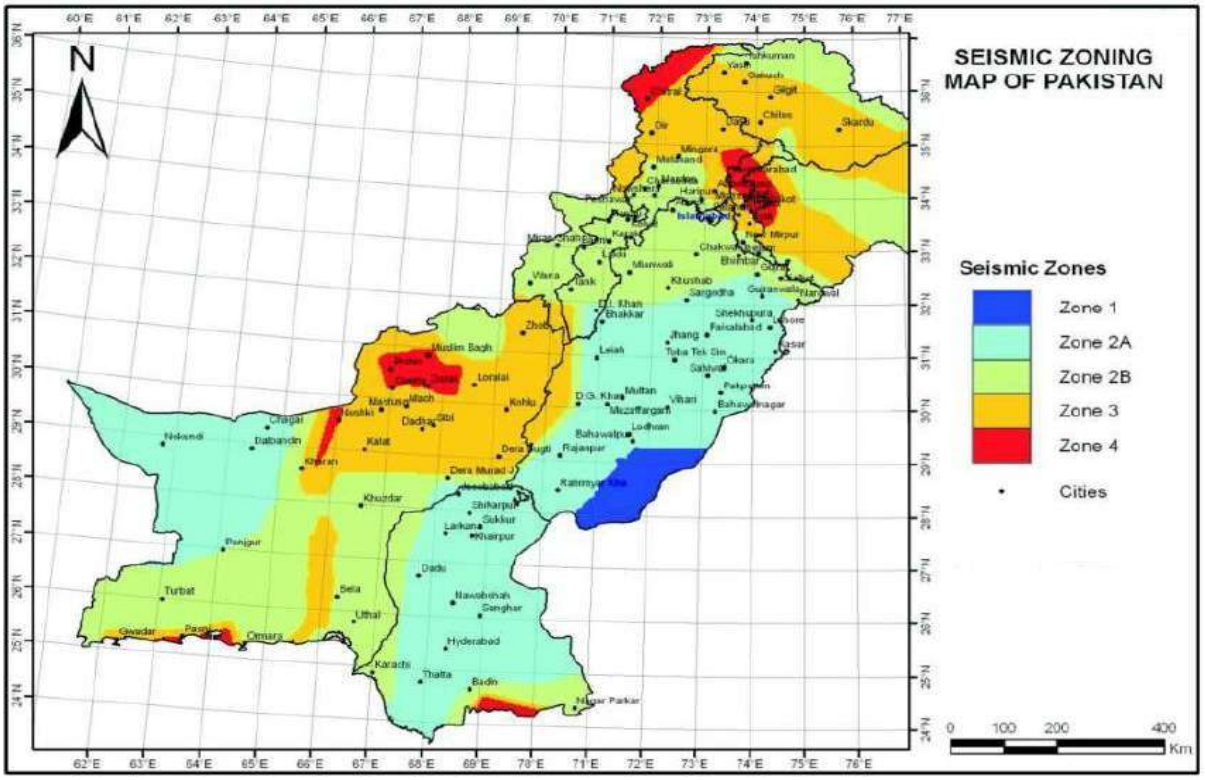


Figure 6.2: Seismic Zones of Pakistan

The recently developed guidelines for earthquake design of buildings in Karachi have assigned an expected Peak Ground Acceleration (PGA) value of 0.20g for larger buildings such as the proposed project.

The project area lies into the Uniform Building Code (UBC) Zone 2B. The intensity which is estimated in accordance with the Modified Mercalli Scale (MM) will be VIII and higher. The building structure would be reinforced concrete. There are some mitigation measures which

will be followed for further minimizing the risk involved in the stability of the building structure:

Mitigation measures

- During the construction, it will be important to maintain the stability of excavated area.
- However, during monsoons or in the case of ingress of ground water (due to inadequate dewatering) it will be essential to protect the excavation walls with shoring/bracing.

6.4.3 Reduction of Liquefaction Hazard

There are basically three possibilities to reduce liquefaction hazards when designing and constructing new buildings.

1. Avoid Liquefaction Susceptible Soils

The first possibility is to avoid construction on liquefaction susceptible soils. There are various criteria to determine the liquefaction susceptibility of a soil. By characterizing the soil at a particular building site according to these criteria one can decide if the site is susceptible to liquefaction and therefore unsuitable for the desired structure.

There are a number of different ways to evaluate the liquefaction susceptibility of a soil deposit.

a. Historical Criteria

Observations from earlier earthquakes provide a great deal of information about the liquefaction susceptibility of certain types of soils and sites. Soils that have liquefied in the past can liquefy again in future earthquakes. First, investigation would be required for previous earthquakes to see if they caused liquefaction at the site.

b. Geological Criteria

The type of geologic process that created a soil deposit has a strong influence on its liquefaction susceptibility. Saturated soil deposits that have been created by sedimentation in rivers and lakes (fluvial or alluvial deposits), deposition of debris or eroded material (colluvial deposits), or deposits formed by wind action (aeolian deposits) can be very liquefaction susceptible. These processes sort particles into uniform grain sizes and deposit them in loose state which tends to densify when shaken by earthquakes. The tendency for densification leads to increasing pore water pressure and decreasing strength. Man-made soil deposits, particularly those created by the process of hydraulic filling, may also be susceptible to liquefaction as in case of reclaimed project site.

c. Compositional Criteria

Liquefaction susceptibility depends on the soil type. Clayey soil, particularly sensitive soils, may exhibit strain-softening behavior similar to that of liquefied soil, but do not liquefy in the same manner as sandy soils are.

Soils composed of particles that are all about the same size are more susceptible to liquefaction than soils with a wide range of particle sizes. In a soil with many different size particles, the small particles tend to fill in the voids between the bigger particles thereby reducing the tendency for densification and pore-water pressure development when shaken.

The geologic process described above produce rounded particles. The friction between angular particles is higher than between rounded particles, hence a soil deposit with angular particles is normally stronger and less susceptible to liquefaction.

d. State Criteria

The initial "state" of a soil is defined by its density and effective stress at the time it is subjected to rapid loading. At a given effective stress level, looser soils are more susceptible to liquefaction than dense soils. For a given density, soils at high effective stresses are generally more susceptible to liquefaction than soils at low effective stresses.

2. Build Liquefaction Resistant Structures

If it is necessary to construct on liquefaction susceptible soil because of space restrictions, favorable location, or other reasons, it may be possible to make the structure liquefaction resistant by designing the foundation elements to resist the effects of liquefaction.

A structure that possesses ductility, has the ability to accommodate large deformations, adjustable supports for correction of differential settlements, and having foundation design that can span soft spots can decrease the amount of damage a structure may suffer in case of liquefaction (Committee on Earthquake Engineering, NRC, 1985). To achieve these features in a building there are various aspects to consider:

a. Shallow foundation Aspects

It is important that all foundation elements in a shallow foundation is tied together to make the foundation move or settle uniformly, thus decreasing the amount of shear forces induced in the structural elements resting upon the foundation. The well-reinforced perimeter and interior wall footings are tied together to enable them to bridge over areas of local settlement and provide better resistance against soil movements. A stiff foundation mat is a good type of shallow foundation, which can transfer loads from locally liquefied zones to adjacent stronger ground.

Buried utilities, such as sewage and water pipes, should have ductile connections to the structure to accommodate the large movements and settlements that can occur due to liquefaction.

b. Deep foundation Aspects

Liquefaction can cause large lateral loads on pile foundations. Piles driven through a weak, potentially liquefiable, soil layer to a stronger layer not only have to carry vertical loads from the superstructure, but must also be able to resist horizontal loads and bending moment induced deep foundation by lateral movements if the weak layer liquefies. Sufficient resistance can be achieved by piles of larger dimensions and/or more reinforcement. It is important that the piles are connected to the cap in a ductile manner that allows some rotation to occur without a failure of the connection. If the pile connections fail, the cap cannot resist overturning moments from the superstructure by developing vertical loads in the piles.

3. Improve the Soil

The third option involves mitigation of the liquefaction hazards by improving the strength, density, and/or drainage characteristics of the soil. This can be done using a variety of soil improvement techniques.

The main goal of most soil improvement techniques used for reducing liquefaction hazards is to avoid large increases in pore water pressure during earthquake shaking. This can be achieved by densification of the soil and/or improvement of its drainage capacity.

a. Vibroflotation

Vibroflotation involves the use of a vibrating probe that can penetrate granular soil to depths of over 100 feet. The vibrations of the probe cause the grain structure to collapse thereby densifying the soil surrounding the probe. To treat an area of potentially liquefiable soil, the vibroflot is raised and lowered in a grid pattern. Vibro Replacement is a combination of Vibroflotation with a gravel backfill resulting in stone columns, which not only increases the amount of densification, but provides a degree of reinforcement and a potentially effective means of drainage.

b. Dynamic Compaction

Densification by dynamic compaction is performed by dropping a heavy weight of steel or concrete in a grid pattern from heights of 30 to 100 ft. It provides an economical way of improving soil for mitigation of liquefaction hazards. Local liquefaction can be initiated beneath the drop point making it easier for the sand grains to densify. When the excess pore water pressure from the dynamic loading dissipates, additional densification occurs

c. Stone Columns

Stone columns are columns of gravel constructed in the ground. Stone columns can be constructed by the Vibroflotation method. They can also be installed in other ways, for

example, with help of a steel casing and a drop hammer as in the Franki Method. In this approach the steel casing is driven in to the soil and gravel is filled in from the top and tamped with a drop hammer as the steel casing is successively withdrawn.

d. Compaction Piles

Installing compaction piles is a very effective way of improving soil. Compaction piles are usually made of pre stressed concrete or timber. Installation of compaction piles both densify and reinforce the soil. The piles are generally installed in a grid pattern and are generally driven to depth of up to 60 ft.

e. Compaction Grouting

Compaction grouting is a technique whereby a slow-flowing water/sand/cement mix is injected under pressure into a granular soil. The grout forms a bulb that displaces and hence densifies, the surrounding soil. Compaction grouting is a good option if the foundation of an existing building requires improvement, since it is possible to inject the grout from the side or at an inclined angle to reach beneath the building.

f. Drainage techniques

Liquefaction hazards can be reduced by increasing the drainage ability of the soil. If the pore water within the soil can drain freely, the build-up of excess pore water pressure will be reduced. Drainage techniques include installation of drains of gravel, sand or synthetic materials. Synthetic wick drains can be installed at various angles, in contrast to gravel or sand drains that are usually installed vertically. Drainage techniques are often used in combination with other types of soil improvement techniques for more effective liquefaction hazard reduction.

6.4.4 Threat to Biodiversity

The site visit of the project area by the EMC team has revealed that there is no significant Terrestrial flora and fauna of biological importance present within the project site. Therefore, there are no major threats or will be imposed upon the Terrestrial flora and fauna of the proposed project area during construction and operational phase of the project.

6.4.5 Archaeological / Cultural / Protected Area

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.

6.5 Screening of Potential Environmental Impacts at Construction Phase and their mitigation measures

The activities that take place during the construction phase of the project are leveling of site, construction and erection of building etc. and associated equipment's. The potential primary and secondary impacts on the environment due to these activities and their mitigation measures are discussed as under:

6.5.1 Site Clearance

Site preparation would include clearing, excavation, earth and fill movement, and transportation of machinery and associated equipment to the site. The said activities will not lead to extensive soil erosion, or alteration of soil quality resulting from removal of topsoil at the site.

6.5.2 Soil Erosion

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 the foundation is 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.

6.5.3 Contamination due to chemical / fuel spills

During the construction stage, the contamination of land occurs due to unchecked chemicals or fuel spillage through their improper handling, transportation and storage.

The sources of spills are:

- During refueling, the transfer of fuel from one container to the other;

- By the maintenance of vehicle and machinery;
- Leakage from the container or equipment's;
- Traffic Accident;

Mitigation measures

Actions necessary to manage the risk of contamination of land and water will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy will include:

- Fuel oils, lubricants, and chemicals will be stored in covered diked areas, underlain with impervious lining
- Vehicles and equipment's maintenance will be taken place at specified site.
- Washing of vehicles will be carried out in the designated areas.
- Construction vehicles and machinery will be examined on a regular basis for leakage prevention.
- Removal of oil and contaminated soil around the fuel and oil storage areas will be made possible by the availability of appropriate implements i.e. shovels, plastic bags and absorbent materials.
- Contaminated media will be managed with the objective of protecting the safety and health of laborer at the site, the surrounding residents, and the environment.
- Plans and procedures will be prepared, to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment.

6.5.4 Construction Waste

Typical construction waste generated during construction activity includes wasted concrete, steel and wooden scaffolding, empty cement bags, excavated soil, wood remains etc. This waste has the potential to cause negative impact on the surroundings and especially marine environment if not properly managed and disposed to approved dumpsites. Irregular storage of this waste may have posed hazards to the workers at site, residents in the neighborhood and contamination of sea water and nearby beaches. Poor waste management practices may have short term as well as long term negative impact. The following measures will be adopted to manage the disposal of construction wastes:

- Unusable wastes will be transported to be approved dumpsites.
- Excavated soil will be disposed of through the regular channel of the waste contractor.
- Proper solid waste containers of adequate capacity will be provided to cater to daily waste generation.

Other Mitigation Measure

Some other mitigation measures laid down as under will help to mitigate the impacts posed due to the construction phase of the proposed project:

- A comprehensive waste disposal plan to be developed to effectively manage this waste in large quantities.
- The construction waste which will be sent for recycling or sold to waste collection vendors like damage pipes left over steel, wooden and plastic pieces. While, the rest of the left-over waste will then be taken away to the dumping sites for disposal.
- The construction material will be kept in a covered area, especially during the rainy season.
- The excavated soil will be re-used by adopting different methods, which will be used as a filling material in other part of the project or in nearby development activities.
- Various waste containers for different types of waste will be deployed, in order to treat the waste in accordance with its nature.
- The waste bins will be properly marked for each type of waste produced during the constructional activities.
- The project area will contain the sewage and litter facility to overcome the problem of unchecked dumping of waste.
- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.
- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.

6.5.5 Ambient 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. Impacts from each source and proposed mitigation measures are as follows:

Dust Emissions:
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. The main health hazards emanate from particles smaller than 10 microns (PM^{10}) 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 Measures

The following mitigation measures will be adopted during the earthwork and construction phase:

- Water will be sprinkled daily or when there is an obvious dust problem on all exposed surfaces to suppress emission of dust.
- Dust emission from soil piles and aggregate storage stockpiles will be reduced by appropriate measures. These include:
  i. Keeping the material moist by sprinkling of water at appropriate frequency
  ii. Erecting windshield walls on three sides of the piles such that the wall project 0.5 m above the pile, and covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emissions.
- 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 will be minimized by provision of dust masks.

Vehicle and Equipment Exhaust:

Combustion exhaust from vehicles and 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 in the neighborhood. The exhaust emissions will include particulate matter (PM), hydrocarbons, Oxides of Nitrogen, Sulphur, and Carbon (NOx, SO2, CO).

Mitigation Measures

The emissions from operation of construction equipment and machinery as well as generators are not expected to have been significant as to affect the ambient air quality of the area. The small amount of exhaust emissions from the operation of generators and equipment are expected to be dispersed with the prevailing wind and may not have any significant impact on the local air quality. Adoption of following mitigation measures will result in further reduction / prevention of these emissions.

- 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.

6.5.6 Impact of Ambient Noise Level

Depending on the construction equipment used and its distance from the receptors, the commuters 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 proposed project and may result in disturbance to the nearby receptors 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 about 58.1 dB (A). The Sindh Environmental Quality Standards for noise require that the sound level in commercial areas should not exceed 65 dB (A) and 55 dB (A) during day time and night time respectively.

Mitigation Measures

- Restraining the use of noisy equipment to suit to the noise standards.
- 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.
- Project vehicles shall not be fitted with pressure horns.

6.5.7 Water Consumption

Water will be required during the construction activity for human consumption at the construction stage as well as for the construction activities including sprinkling of water for dust suppression.

Mitigation Measures

Adherence to the following measures will ensure efficient use of water during the subsequent stage of construction:

- A complete record of water consumption during the construction 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.

6.5.8 Impacts of Wastewater Generation

During the construction phase, the wastewater is generated from the project site is mainly due to the project activities, run-off from the project site during the season of precipitation, washing of the construction vehicles etc. Construction activities of the project will include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. The untreated wastewater disposal may deteriorate the water quality of the surface and groundwater resources as well as contaminate the soil quality near the project site.

The source of wastewater includes toilets, washrooms, and kitchen. The wastewater would be routed to the existing municipal drain/sewerage system or can be treated in septic pits. This wastewater would comply with the SEQS values provided that other hazardous wastes (i.e. paints etc.) are not mixed with it.

The impact of disposal of such wastewater would not be significant since it is expected to comply with the Sindh Environmental Quality Standards (SEQS) for municipal effluent.

Mitigation Measures

The following are the recommendations to reduce and control the wastewater generated during the construction activities:

- Maintenance of vehicles and equipment's used in the construction phase of the proposed project, in order to overcome the generation of wastewater at large scale.
- Washing of vehicles and construction machinery will be restricted to a designated area.
- Wastewater will not be disposed of directly into any water body, but first be treated and then the effluent will be disposed of in a proper manner.
- Development of wastewater treatment facility i.e. septic tank, at the site of the proposed project area.
- Wastewater generation will be minimized by controlling the pollutant at the source.
- The oily waste will be contained before disposing the wastewater into the sewer.
- Regular monitoring of the wastewater generation will be taken into consideration.
- Adequate portable or permanent sanitation facilities serving all workers will be provided at all construction sites.

- Sewage will not be mixed with any other waste.

6.5.9 Operation of Vehicular Traffic

It is envisaged that there would be substantial increase in the traffic volume during the construction and operation / completion of Project. Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters. Additional traffic generated by operation of commercial area on completion of the project will induce significant impact if the traffic volume is sufficient to cause congestion and becomes a hassle for the existing road users.

Mitigation Measures

The following mitigation measures are being adopted to remove the constraints to smooth flow of traffic:

- Heavy traffic during construction phase will come to the project site during late night hours.
- Speed of vehicles will be regulated during construction phase.
- 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.
- Parking of vehicles alongside the road would be prohibited at all time.
- Car parking at grade allows for free flow of cars with minimum waiting time.

6.5.10 Material Selection

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

Mitigation Measures

- The structures and materials will, in the subsequent 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-tried materials and components will be selected and selection of construction materials would be based on sustainable source.
- Construction site will be adequately isolated to prevent entry of public and general safety measures will be evocatively imposed throughout the construction period.

- Temporary inconveniences due to construction works will be minimized through planning and coordination with civic authorities.
- The production, use and disposal of building materials during the construction stage of Project 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 adequate 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.
- The design of concrete building structure with use of low energy glass on windows and doors to reduce carbon footprint.

6.5.11 Energy Use

Electricity during construction phase will he produced from diesel generators. 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 CO2, SO2, and NOx emissions, it is important to ensure that energy is used prudently and best management practices are adopted in building design. Energy saving techniques such as Energy efficient mechanical systems will be employed to conserve energy.

6.5.12 Community Health and Safety

General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction.

Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are under construction or excavations and structures which may pose falling and entrapment hazards.

Mitigation Measures

Risk management strategies may include:

- Access to the site will be restricted through a combination of institutional and administrative controls.
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined

spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials.

Disease Prevention

Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities.

Mitigation Measures

- The mobility of the community living in the area will be restricted from the project site in order to prevent from catching any type of communicable diseases.
- Any labor found to catch any type of disease will leave the site immediately; and would be given proper medical facilities.

Traffic Safety

Construction activities may result in significant increase in the movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities.

Mitigation Measures

- The incidence of road accidents involving project vehicles during construction will be minimized through a combination of education and awareness-raising, and the adoption of procedures.

Occupational Health and Safety

Site-specific occupational health and safety hazards are also critical to be identified based on job safety analysis or comprehensive hazard or risk assessment. Health and safety management planning should include the adoption of a systematic and structured approach for prevention and control of physical, chemical, and biological health and safety hazards. Contractor shall ensure that Job Hazard Analysis (JHA) is performed prior to commencing jobs. It shall also be ensured that the JHA is reviewed after the following:

- Whenever work is stopped
- Every time work conditions or the job scope changes
- Persons working or visiting the job shall review and acknowledge the JHA by their signature

Crane and Lifting Operations

For all Crane & Lifting Operations, contractor shall ensure full compliance with standard operating procedures. Contractor shall develop a site-specific pre-lift checklist which includes the following at minimum:

- Crane rigging capacity adequately for load
- Condition of slings
- Rigging condition adequate for load
- Area of swing or travel unobstructed
- Multiple crane use
- Power line approach distance maintained
- Stability and footing
- Taglines and spotters
- Illumination and weather
- Signal operator
- Job hazard analysis and other permits

All lifting and rigging activities shall be supervised and conducted by a competent person or team, Contractor shall maintain a lifting gear registry for all lifting gear on-site inclusive of a listing of all lifting gear, copies of equipment certificates (manufacturer, safe working load, serial number) and the inspection/recertification frequency.

Forklifts and Non-Road Vehicles

Contractor should ensure forklift and non-road vehicles are fit for purpose and operated according to manufacturer's requirements. Only competent operators are permitted to operate forklifts and non-road vehicles.

At minimum, all forklifts and non-road vehicles shall be equipped with following equipment:

- Seat belts
- Horn
- Emergency Brake
- Wheel chock
- Labeled Controls
- Fire Extinguishers
- First Aid Kit
- Back-up Alarm

Annual inspection shall be completed by a qualified third party, records of which shall be readily available at site.

Hazardous Substance Handling and Storage

Contractor should ensure that chemicals are handled and stored in accordance with the manufacturer recommendations found in the MSDS. Chemicals should be stored in a manner which will minimize releases to soil, groundwater or the atmosphere.

Containers and tanks which are used to store hazardous substances shall be,

- In good conditions
- Compatible with the material stored inside
- Closed when material is not being transferred into or withdrawn from them
- Flammable or combustible liquids shall not be stored in areas used for exits, stairways, or normally used for safe passages.
- Flammable chemicals shall be stored in flammable storage cabinets, room or building when the volume stored exceeds 25 gallons (95 liters).

Electrical pumps shall not be used to transfer flammable or combustible liquids. Toxic chemicals shall be stored and handled as defined in the chemical MSDS. Explosive products should be handled and stored according to applicable regulations. Explosive storage shall be located away from corrosives, flammable, oxidizers, or acids.

Scaffolding

Contractor is responsible to establish periodic inspection, certification and recertification program for scaffold works. Only qualified worker is authorized to erect, inspect and certify scaffold. All scaffolds should have a guardrail system on each open side, up to the access point. It should be equipped with toe boards having suitable access ladder.

Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries at construction site.

Mitigation Measures

Recommendations for their prevention and control include:

- Workers will be trained with lifting and materials handling techniques before the construction of the project, including the placement of weight limits above which mechanical assists or two-person lifts are necessary.
- Work site layout will be planned to minimize the need for manual transfer of heavy loads.
- Tools will be selected and work stations would be designed to reduce force requirements and holding times, which promote improved postures, including, where applicable, user adjustable work stations.

- Administrative controls, such as job rotations and rest or stretch breaks will be implemented into the work processes.

Slips and falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction site.

Mitigation Measures

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Good house-keeping practices, such as the sorting and placing loose construction materials in established areas away from foot paths, would be implemented.
- Excessive waste debris and liquid spills will be cleaned up regularly.
- Electrical cords and ropes will be located in common areas and marked corridors.
- Slip retardant footwear will be used.

Work at Heights

Falls from elevation associated with working with ladders and scaffolding are among the most common cause of fatal or permanent disabling injury at construction site. If fall hazards exist, a fall protection plan will be in place which includes one or more of the following aspects, depending on the nature of the fall hazard.

Mitigation Measures

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface.
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards as well as fall rescue procedures to deal with workers whose fall has been successfully arrested.
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces.

Struck by Objects

Construction activities of the project may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools

which can result in injury to the head, eyes, and extremities.

Mitigation Measures

Techniques for the prevention and control of these hazards include:

- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap.
- Temporary fall protection measures in scaffolds and out edges of elevated work surfaces would be used, such as hand rails and toe boards to prevent materials from being dislodged.
- Appropriate PPE such as safety glasses with side shields, face shields, hard hats, and safety shoes, would be wore.

Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise.

Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.

Mitigation Measures

Techniques for the prevention and control of these impacts include:

- The location of vehicle traffic, machine operation, walking areas, and controlling vehicle traffic will be planned and segregated through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic.
- The visibility of personnel will be ensured through the use of high visibility vests when working in or walking through heavy equipment operating areas as well as training of workers to verify eye contact with equipment operators before approaching the operating vehicle.
- Inspected and well-maintained lifting devices will be used that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Other Site Hazards

Construction of site may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms.

Mitigation Measures

- It can be prevented through the implementation of project specific plans and other applicable management practices, including:
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.

6.5.13 Employment

The project is expected to generate employment of about 100-150 workers from the construction activity. It will have positive impact on the economy of Karachi as well as the population in macro environment.

Table 6.2: 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.

6.6 Screening of Potential Impacts in Operational Phase

During operational phase of the project, various activities may have significant impact on some environmental parameters. Various environmental attributes are to be studied during this phase for their overall impact on the surrounding environment.

6.6.1 Solid Waste Generation and Disposal

There will be a considerably large quantity of solid waste generated from the residential and commercial units of the project. The solid waste will mainly include food waste, paper, packaging material, plastic bottles and glass. If not properly managed and disposed of, these wastes can pose serious environmental hazard to the occupants and visitors of the proposed building project and also to the surrounding environment.

People will throw the waste until proper waste collection system is provided. It will pollute the marine waters and pose a significant threat to marine life and fishes.

The quantity of solid waste to be managed can be segregated at source into organic and recyclable components. Nearly half of the waste generated is expected to be of organic nature i.e. biodegradable and the remaining as recyclable. Therefore, waste segregation can solve much of the solid waste management problem. The viable options after storing, collecting and transportation of segregated waste components for its ultimate safe disposal are composting and recycling, respectively which need to be carefully designed and managed appropriately.

Mitigation Measures

The following mitigation measures would be adopted to combat from the impacts imposed upon

the project site and immediate environs due to the solid waste generation activities in the operational phase:

- All solid waste shall be segregated into organic and recyclable waste at source and then collected, stored, and transported for recycling/sold to vendors for ultimate safe disposal.
- Handling and disposal of such waste shall be managed by a dedicated waste management contractor.
- The solid waste management plan will be developed and facilities for collection, storage and transportation will be established and organized.
- Appropriate waste signage will be used to increase awareness among users.
- Covered waste bins (different colors) will be provided to every building that will be ultimately collected in a storage area. This storage area will be covered so that pollutants and smell from the waste would not affect the surrounding.
- Residential and commercial units of the project will be provided different colored bins for different categories of waste.
- Storage facility for collecting waste bins will be created and established by taking into account quantities of waste generation.
- Handling and disposal of such waste will be managed by a dedicated waste managing contractor.
- Waste managing contractor should have binding to dispose the waste to official dumpsites of Karachi.

6.6.2 Waste Water Generation and Disposal

The project on becoming functional will generate wastewater which will be mainly sewage. Small quantities of hazardous waste will also be produced during the maintenance activities in the building (such as oily waste etc.). The cleaning waste generated by the use of surfactant and cleaning agents used during the operational phase. The wastewater

generated can be a potential source of pollution to the surface and ground water resources of the area.

All type of wastewater generated (i.e. drainage of sewage, showers and kitchen effluent etc.) will be directed to the wastewater treatment consisting of Septic Tank prior to disposal into a nearby out fall sewer. This will ensure the specifications stipulated in SEQS will comply.

Following additional mitigation measures will be adopted for effective management of wastewater during the operational phase of the project:

- Grease interceptor and/ or oil skimmer to be installed on kitchen effluent to maintain oil levels within SEQS limits.
- 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.

- Periodic preventive maintenance of pumps, diffusers and other ancillary equipment's.
- Periodic monitoring of wastewater to ensure compliance with SEQS.
- Provision of sedimentation tank or holding tank, so that the effluent is primary treated and then disposed of to the main sewer line.
- The cleaning agents used will be non-hazardous.

6.6.3 Waste Consumption and Quality Assurance

The water requirement for the project will mainly be catered through KW&SB. Water conversation measures will be applied in order to reduce the amount of wastewater generation in this phase. Additionally, relevant quality standards will be maintained to ensure that the water is fit for drinking purpose using guidelines of established SEQS water metrics.

- Adherence to the following mitigation measures will ensure efficient use of water during the subsequent stage of operation:
- A complete record of water consumption during the operation phase will be maintained.
- The water supply lines will be checked and repaired for leaks, if any, in order to reduce wastage of water.
- Water filtration systems will be installed to keep water purity levels within acceptable SEQS parameters, especially coliform levels which indicate presence of harmful pathogens.
- All the main water inlets will be provided with water flow meters to record consumption of water.
- Drinking water and service water sources should be clearly labeled.
- 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.
- Reuse and recycle water as much as possible for example by using gray water for flushing toilet. Gray water is the term used for the used water that goes down our sinks and shower drains. Black water is another term for the water 'and stuff' that goes down from our toilets. The gray water from bathrooms sink can be reused to flush the toilets.
- Use of water efficient sanitary fittings such as low flush toilets will be ensured throughout the Project cycle.

6.6.4 Energy Consumption

During operation phase, power supply from Karachi Electric (K-E) will 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. Energy saving techniques such as Energy efficient mechanical systems and Passive ventilation/cooling by provision of natural lighting and ventilation will be employed to conserve energy.

Mitigation Measures

Following energy conservation measures are being adopted.

- The energy-efficient lighting system installed for the project will contribute immensely to energy saving during the operational phase of the project.
- Natural lighting and ventilation shall be preferred in the buildings.
- The energy-efficient lighting system installed for the project will contribute immensely to energy saving during the operational phase of the project.
- The energy usage during the operational phase will be monitored and targets would be set for efficient use of energy.

6.6.5 Air Emissions

During the operational phase, air emissions may come from backup generators. If vented at lower heights, the exhaust gases are likely to disperse locally and cause localized pollution to the working staff. Other emissions coming from this project will be from the exhausts of additional traffic movement related to proposed project activity.

Mitigation Measures

Impacts of Emissions may be reduced to prescribed level by attempting the following mitigation measures:

- Monitor all exhausts at regular frequency to meet SEQS exhaust emissions.
- Stack height of generators will be increased to ensure better dispersion and distance covered by the pollutants in air before reaching the ground.
- Wet scrubbers / electrostatic precipitators should be installed at the exhaust of generators in case of liquid fuel usage (Like gasoline or diesel).
- Regularly carry out ambient air quality monitoring at various points on the access road and immediately outside the proposed project premises.
- Carry out regular maintenance of generators.
- An awareness program will be organized for generator operators to regularly tune-up engines and ensure proper maintenance.

6.6.6 Fire

Fire is one major hazard due to short circuiting, etc. Fires can cause loss of life and property. However, at the same time fires have the potential to severely harm the people in the vicinity and affect the environment.

Mitigation Measures

Risks involve with the fire hazard can be reduced by adopting following mitigation measures:

- For all engineering designs, IBC (International Building Control), EN 54 & NFPA (National Fire Protection Authority) codes will be followed.
- Standard fire and smoke detection and protection devices such as alarms, fire hoses and hydrants to be provided in all areas of the project.

- The facility will possess a detailed emergency and evacuation plan that will be regularly drilled to make sure that the responsible staff remains trained at all times.
- Firefighting equipment such as fire extinguishers and hydrant systems will be maintained at strategic locations within the proposed building.
- Regular inspection and servicing of the extinguishers will be undertaken by a reputable service provider and record of such inspections should be maintained.
- Fire safety signs will be prominently displayed within the floors.

6.6.7 Socioeconomic Impacts

Employment Opportunities

The labor force, whether skilled or unskilled, is the inhabitants of Karachi will be deployed at the project. This will provide them with the employment opportunities Some people will be employed by the project as management agents, caretakers, cleaners, security personnel and technicians.

Provision of Market for the Supply of Building Materials

The project will require the supply of large quantities of building materials which will be sourced locally. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

Increased Business Opportunities

The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small scale traders such as food vendors around the construction site.

Revenue to National and Provincial Government

Through payment of relevant taxes, rates and fees of the government and the local authorities, the proposed project will contribute towards the national and local revenue earning.

Table 6.3: Nature and Degree of Positive Socioeconomic Impacts

Nature of positive impact	Degree of impact	Description
II. Operation Phase		
Job opportunity	Major Positive Impact	Generate 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 macro environment by adopting Public park/greenbelt as a social responsibility

Chapter 7 Environmental Management Plan (EMP)

7.1 Introduction

7.1.1 General

The Environmental Impact Assessment (EIA) for the proposed development activities of Roshan Safa Tower 2 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; included 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 the effective implementation and management of the mitigation measures and monitoring requirements an Environmental Managements Plan (EMP) has been prepared and presented in this section. For any residual impacts (impacts remaining after applying the recommended mitigation measures) or for impacts in which there has been a level of uncertainly 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 activates at international level.

7.1.2 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 monitoring mechanism & 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 & 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.

7.2 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

7.3 Legislation and Guidelines

The EIA has discussed in detail all the legislation and guidelines (chapter 2) which has relevance to the project. Project Proponent 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. Project Proponent 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.

7.4 Organizational Structure and Roles and Responsibilities

7.4.1 Organizational Structure

The proposed project includes the following main organization:

- Altaf Tai Builders & Developers 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.

7.4.2 Roles and Responsibilities

A. General

Project Proponent: Proponent 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 construction and operation of the proposed project. The person will be responsible for ensuring the implementation of the EMP by the proponent 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 proponent will also be responsible for monitoring EMP's compliance and provide technical support in environmental issues.

Project Contractors: For the proposed project, project proponent 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 the proponent. 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.

B. Planning and Design of the Operations

Details of project Activities: Details of the project activities are provided in section 3 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: No-objection Certificate (NOC)/Approval from SEPA will not relieve the proponent of other legal obligation and hence project proponent 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 project proponent.

C. Implementation of the Operation

Co-ordination with Stakeholders: Project proponent 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: Project proponent and the contractors will ensure that monitoring of the project activities is carried out throughout the project. The 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 project proponent

management in Karachi for further action. The site representative will also report any impacts anticipated along with his recommendation for further action.

Emergency Procedures: Project proponent 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.

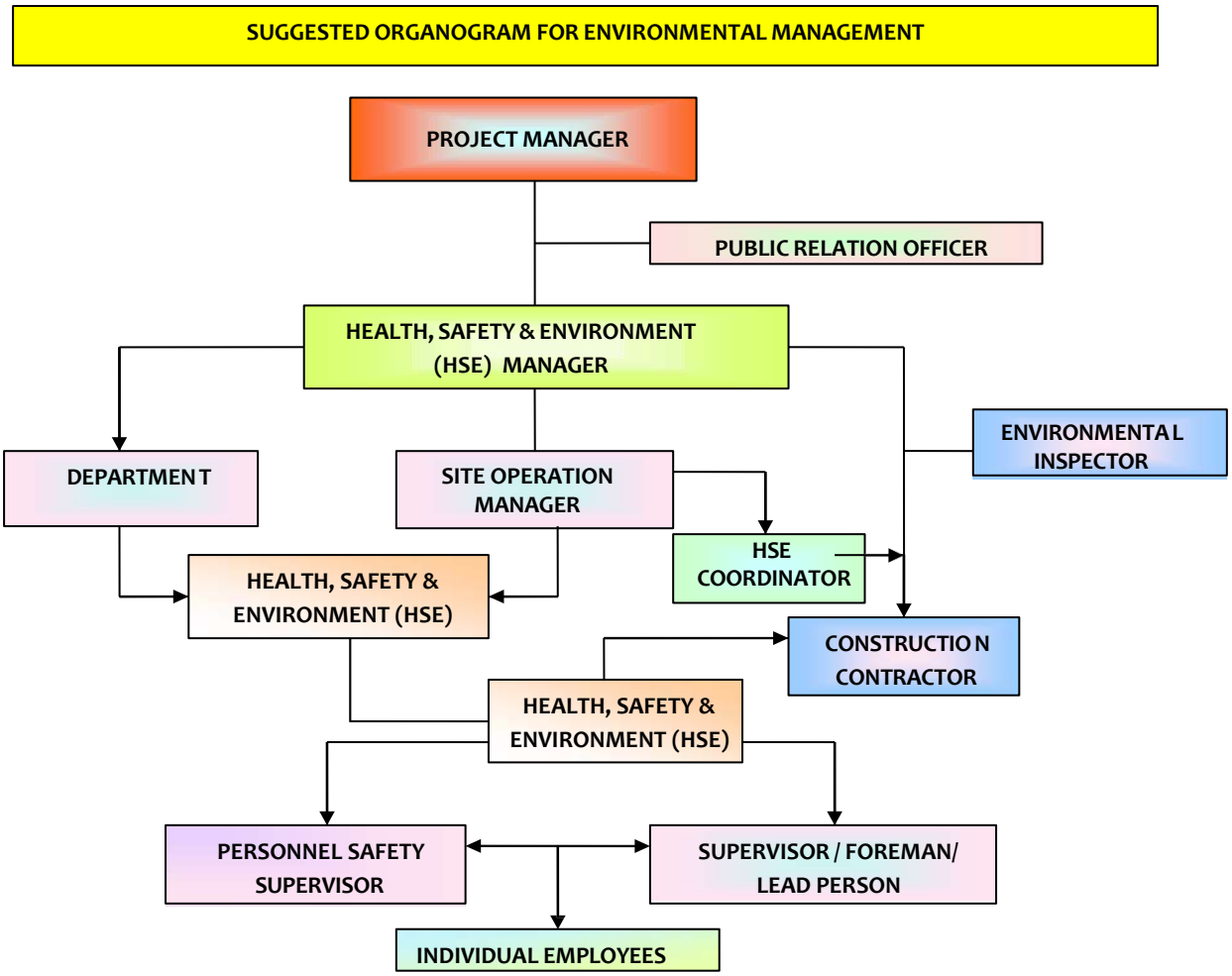
Trainings: The project contractors will be responsible for the selection and training of their staff capable of completing the project activities properly and efficiently. The contractors will be responsible for providing training to their staff members according to the training programme. The training programme is discussed briefly in section 6.14.3.

D. Communication and Documentation

Project proponent 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 project 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: Project proponent along with the construction contractor will be responsible for the final restoration of work areas.



7.5 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 incorporated in the overall management process.

7.6 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.

7.6.1 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.

7.7 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.

7.7.1 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.

7.7.2 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.

7.8 Standard Operating Procedures (During Construction phase)

7.8.1 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 Roshan Safa Tower 2 project is essential to reduce wastewater generation.

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

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.

7.8.2 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 company's corporate requirement, 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 60oC);
- 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

- 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 EPA certified waste contractors for recycling.
- Non-hazardous non-recyclable wastes such as kitchen wastes will be disposed of at 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 manager/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.

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 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.

7.8.3 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 and construction 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 equipment such as power generators comprise of greenhouse gases which typically include carbon monoxide (CO), carbon dioxide (CO_2), water vapors and other gases such as nitrogen oxides (NOx), and, in case of

sour gases, sulphur dioxide (SO_2). 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.

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.

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 Roshan Safa Tower 2 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. A layout of record keeping format for monitoring results is attached in the annexure at the end of this EMP.

7.9 Standard Operating Procedures (During Operational Phase)

7.9.1 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 and 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 Roshan Safa Tower 2 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) 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:

- 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.
- 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.

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 off.

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.

All type of wastewater generated (i.e. drainage of sewage, showers and kitchen effluent etc.) will be directed to the wastewater treatment consisting of Septic Tank prior to disposal into a nearby out fall sewer. This will ensure the specifications stipulated in SEQS will comply.

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 SEQS 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.

7.9.2 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 60oC);
- 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

- A waste management plan will be developed for the operational stage of the project. The following will be the key elements of the waste management system:
- 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, and 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.
- Operation of Vehicular Traffic

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 centers.

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.

7.9.3 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 cogeneration facility/backup generators should comply with the SEQS for air emissions and reported as per EPA 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 for 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 equipment such as power generators, etc. comprise of principal greenhouse gases which typically include carbon monoxide (CO), carbon dioxide (CO_2), water vapors and other gases such as nitrogen oxides (NOx), and, in case of sour gases, sulphur dioxide (SO_2). 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.

The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level.

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, and compliance assurance monitoring.
- Restraining the use of noisy equipment to suit to the conditions of the living environment i.e. 55 dB (A) during the day and 45 dB (A) during the night.
- Reducing equipment noise at source by selecting less noisy equipment, 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) Air and Noise Quality Monitoring

Refer to the attached Environmental Monitoring Plan for details of air and noise quality monitoring at the Roshan Safa Tower 2 Project site during operation phase.

a) Performance Indicator: Monitoring results of ambient air shall show the concentration of pollutant in ambient air.

b) Records and Comments: Records of monitoring reports shall be maintained.

7.9.4 Operation of Vehicular Traffic

1) Purpose

Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters travelling on the roads surrounding the project.

2) Scope

The nature of the Project is residential cum commercial. The two activities will produce outward and inward traffic movement. Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters travelling on the roads surrounding the project.

3) Definition

The aggregation of vehicles coming and going in a particular locality.

4) Procedure

The following measures will be adopted to remove the constraints to smooth flow of traffic:

- 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.
- Parking of vehicles alongside the road would be prohibited at all time.
- Vehicles will be parked at designated parking areas during operational phase.

7.10 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 and 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 by 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

7.11 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, project proponent will hold the primary and overall responsibility for ensuring full implementation of the EMP.

7.12 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.

7.12.1 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.

7.12.2 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.

7.12.3 Environmental Reporting

A. Final Monitoring Report (Construction Phase)

After completion of construction phase, a final monitoring report will be prepared by Proponent's 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

B. 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.

7.13 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.

7.13.1 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 project proponent 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 project proponent and contractor head offices.
- All relevant project personnel will be informed of the addition.

7.13.2 Changes to the Operation

The change management system recognizes three orders of changes:

A. 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 the proponent and sent to the SEPA for approval.

B. 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 project proponent will reassess the impact of the activity on the environment & specify additional mitigation measures if required and report the changes to SEPA.

C. 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.

7.14 Training Programme

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

7.14.1 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.

7.14.2 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.

7.14.3 Training Programme

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

A. Training log

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

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

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

C. 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	Project Proponent, 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	Project Proponent, 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	Project Proponent, 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	Project Proponent, CC	Monitoring compliance	During construction phase
1.8	Proper drainage will be provided to construction camp, construction site, especially near excavations and around proposed facility	CC	Monitoring compliance	During construction phase
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	Project Proponent, 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	Project Proponent, 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	Project Proponent, 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	CC	Monitoring	During construction

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
	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		compliance	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 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	CC	Monitoring compliance	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 equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants.	Project Proponent, CC	Maintenance records of vehicles and equipment	During construction phase
2.2.2	The stack of the backup generators during operation phase will be vented through vertical stacks to minimize exposure at ground level	CC	Monitor compliance	During operation phase
2.3	**Generator Emissions**			
2.3.1	The option of using natural gas as fuel in the back-up generators should be explored.	Project Proponent, Generator Vendor	Monitor compliance	During design phase
2.3.2	The generator will be properly tuned and maintained in good working	Project Proponent	Check maintenance	During operation

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
	condition in order to minimize exhaust emissions		records	phase
2.3.3	The diesel generator should be used for short duration with the power switched back to the main power supply as quickly as possible.	Project Proponent	Monitoring compliance	During operation phase
2.3.4	NOx emission reduction techniques should be employed	Project Proponent	Monitor NOx emissions	During operation phase
3	**Construction Noise**			
3.1	Reduce equipment noise at source by selecting less noisy equipment and machinery, maintenance and repair of construction machinery and equipment	Project Proponent, CC	Check maintenance records	During construction phase
3.2	Minimize noise from vehicles and power generators by use of proper silencers and mufflers.	Project Proponent, CC	Monitor compliance	During construction phase
3.3	Use noise-abating devices wherever needed and practicable.	Project Proponent, 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	Project Proponent, CC	Check water consumption records	During construction and operation phase
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	Project Proponent, CC	Monitor compliance	During construction phase
4.3	Water conservation program will be initiated to prevent wastage of water.	Project Proponent, 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.	Project Proponent., Maintenance Contractor	Check maintenance records and water consumption records	During operation phase
4.5	Recycle grey water for use for toilet flushing	Project Proponent	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	Project Proponent, CC	Monitor compliance	During construction and operation phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
5	**Soil Contamination**			
5.1	Fuels, lubricants, and chemical will be stored in covered bounded areas, underlain with impervious lining	Project Proponent, CC	Monitor compliance	During construction phase
5.2	Maintenance of vehicles and equipment will only be carried out in designated areas. The area will be provided with hard surface or tarpaulin will be spread on the ground to prevent contamination of soil	Project Proponent, 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	Project Proponent, CC	Check inspection / maintenance records	During construction phase
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.	Project Proponent, 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.	Project Proponent, CC	Monitor compliance	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	Project Proponent, 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	Project Proponent, CC	Monitor compliance	During construction phase
6.5	Manage vehicle movement to avoid traffic jam and long queues	Project Proponent, CC	Monitor compliance	During construction and operation phase
6.6	Prepare, implement and monitor the traffic management plan	Project Proponent	Monitor compliance	During construction and operation phase
6.7	Vehicles to use designated parking areas during operational phase.	Project Proponent	Monitor compliance	During operation

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
				phase
6.8	Parking of vehicles alongside the road should be prohibited at all time.	Project Proponent	Monitor compliance	During construction and operation phase
7	**Wastewater Generation**			
7.1	**Wastewater Generation During Construction**			
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.	Project Proponent, 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.	Project Proponent	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	Project Proponent, 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	Project Proponent	Monitor compliance	During operation phase
7.2.4	Water conservation strategies will be employed to avoid wastage of water	Project Proponent	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.	Project Proponent, 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	Project Proponent, CC	Monitor compliance	During construction phase
8.1.3	Non-hazardous non-recyclable wastes such as construction camp kitchen	Project Proponent, CC	Monitor compliance	During construction

Table 7.1: Environmental Management Plan (EMP)

S.#	Impact and Mitigation Measures	Responsibilities	Monitoring	Timing
	wastes will be disposed of in landfill site through municipal administration or approved waste contractor.			phase
8.1.4	No waste will be dumped at any location outside the proposed site boundary.	Project Proponent, 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.	Project Proponent, 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.	Project Proponent, 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	Project Proponent, CC	Check waste record register	During construction phase
8.1.8	Training will be provided to personnel for identification, segregation, and management of waste	Project Proponent, 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 strategy of reduce, reuse and recycle	Project Proponent	Monitor compliance	During operation phase
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	Project Proponent	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	Project Proponent	Check waste tracking register	During operation phase
8.2.4	Training will be provided to personnel for identification, segregation, and management of waste	Project Proponent	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	Project Proponent, Waste Contractor	Monitor compliance	During operation phase
8.2.6	Hazardous wastes will be disposed of through waste management	Project Proponent,	Monitor compliance	During operation

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
	contractors who will identify suitable disposal options for these wastes such as recycling, metal recovery, incineration or bioremediation etc.	Waste Contractor		phase
8.2.7	Various waste containers for waste collection should be placed at appropriate locations in the building	Project Proponent.	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, 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	Project Proponent, CC	Monitor compliance	During operation phase
9	**Seismicity**			
9.1	No specific mitigation measures other than to construct the facility in accordance with UBC Zone 2B	Project Proponent, 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	Project Proponent, CC	Monitor compliance	During project design phase
10.2	Buildings to be constructed with high levels of thermal insulation	Project Proponent, 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	Project Proponent, 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 residential areas, hospitals and offices.	Project Proponent, 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	Project Proponent, CC	Monitor compliance	During construction & operation phase

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	Project Proponent	Monitor compliance	During construction & operation phase
11.4	Employment preference will be given to residents of the project area	Project Proponent, CC	Monitor compliance	During construction & operation phase
11.5	Local contractors will be given preference for hiring equipment and machinery during operation	Project Proponent, 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.	Project Proponent	Monitor compliance	During design, construction & operation phase
11.7	Liaise with Locals, surrounding business and city government during all stages of the development of the project.	Project Proponent	Monitor compliance	During construction phase
11.8	A complaint register will be maintained on site during construction to record complaints of the nearby residents.	Project Proponent	Provision of complaint register	During construction phase
* (CC=Construction Contractor)				

Chapter 8 Conclusion

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 profited oriented, now they will have to share the profit with net zero energy and net zero discharge approach in the project design.

Based on the findings of the environmental impact assessment it is concluded that the environmental impacts of the construction and operation of project are manageable and can be mitigated by implementing the Environmental Management and Monitoring Plan which forms an integral part of EIA document. The screening process has through review of literature, 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 proposed project has its own back-up power generation, water supply and sewage treatment, recycling and disposal system in addition to commitment for the provision of required parking space. This being a positive impact would be an indicator of achievement of the objectives of the Project.

Construction and operation of project is not expected to have unacceptable/significant impact on the aesthetics of the microenvironment and macro environment. Nevertheless, the impact will be mitigated through careful planning, suitable landscaping, waste management, traffic management and adopting appropriate mitigation measures.

Mitigation measures will be assured by a program of environmental monitoring conducted to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged.

There are two essential recommendations that need to be followed to ensure that the environmental impacts of the project are successfully mitigated. The proponent shall ensure that:

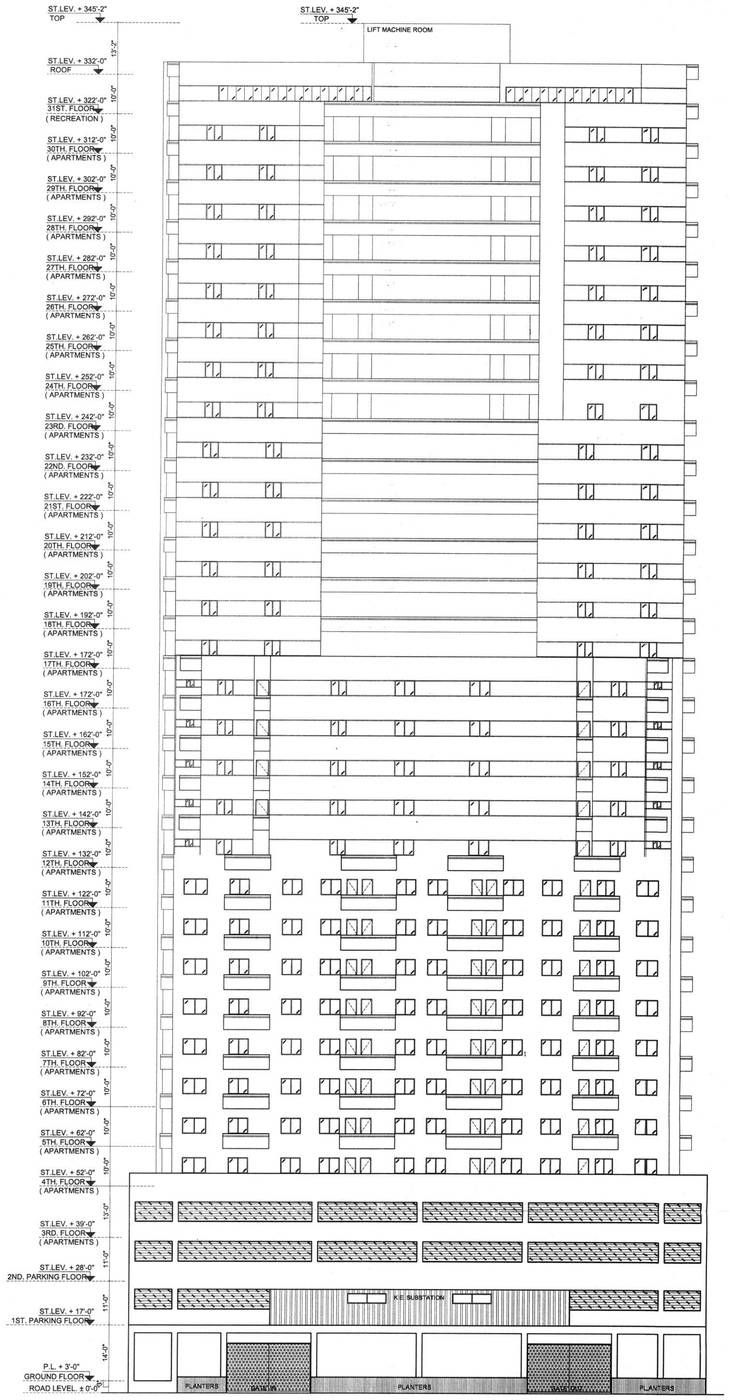
- All mitigation, compensation and enhancement measures proposed in this EIA report are implemented in full, as described in the document;
- The Environmental Management and Monitoring Plan are implemented in letter and spirit.

Screening of potential impact suggests that the Construction & operation of project will, on adoption of the suggested mitigation measures, be an environmentally acceptable proposition.

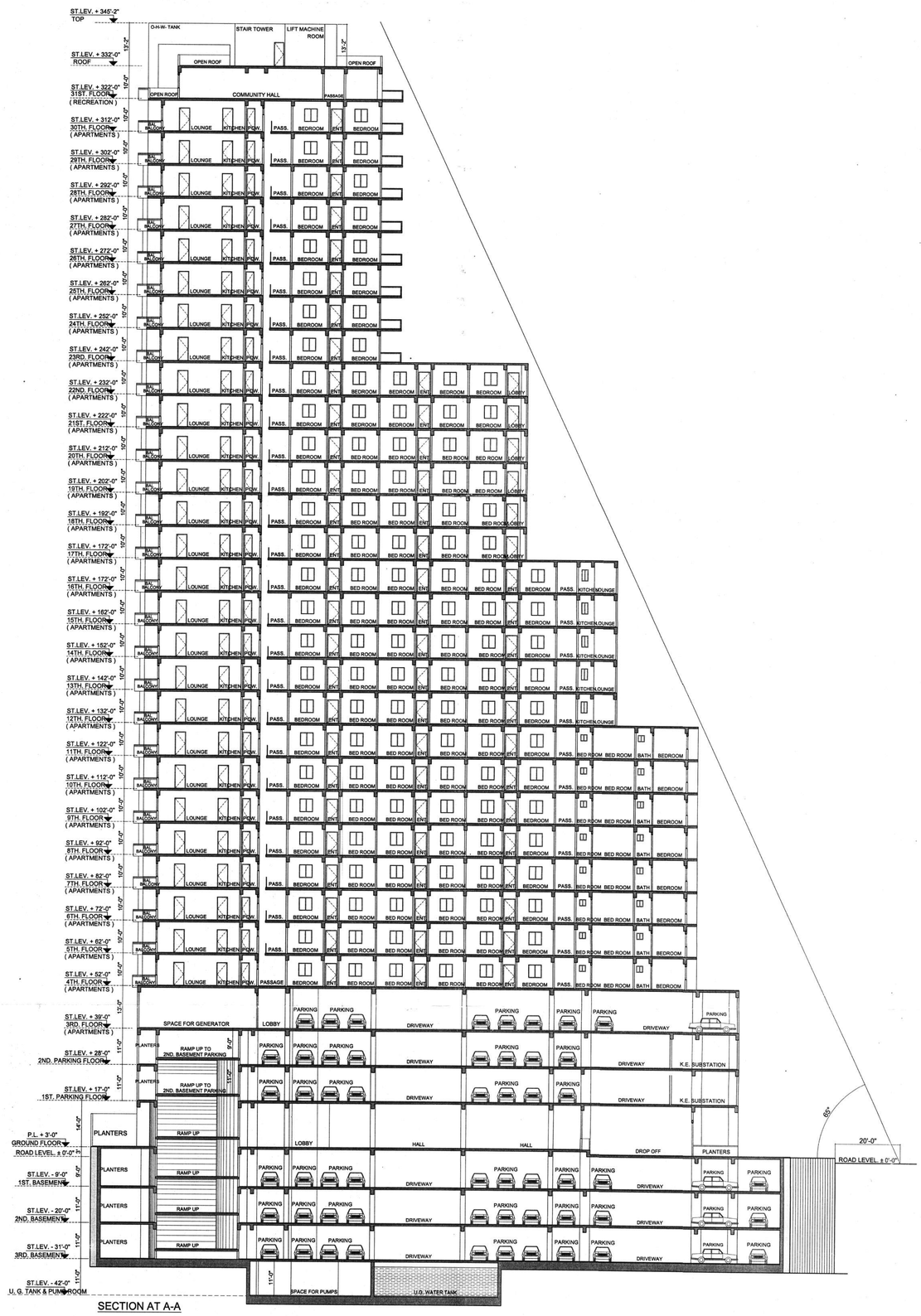
The implementation of the mitigation measures detailed in Environmental Impact Assessment report and listed in the Environmental Management Plan (EMP) of the EIA Report, including monitoring, will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the development are enhanced and mitigated to a level which is deemed adequate for the development to proceed.

Annexure

Annexure-I
Building Drawing Details



FRONT ELEVATION

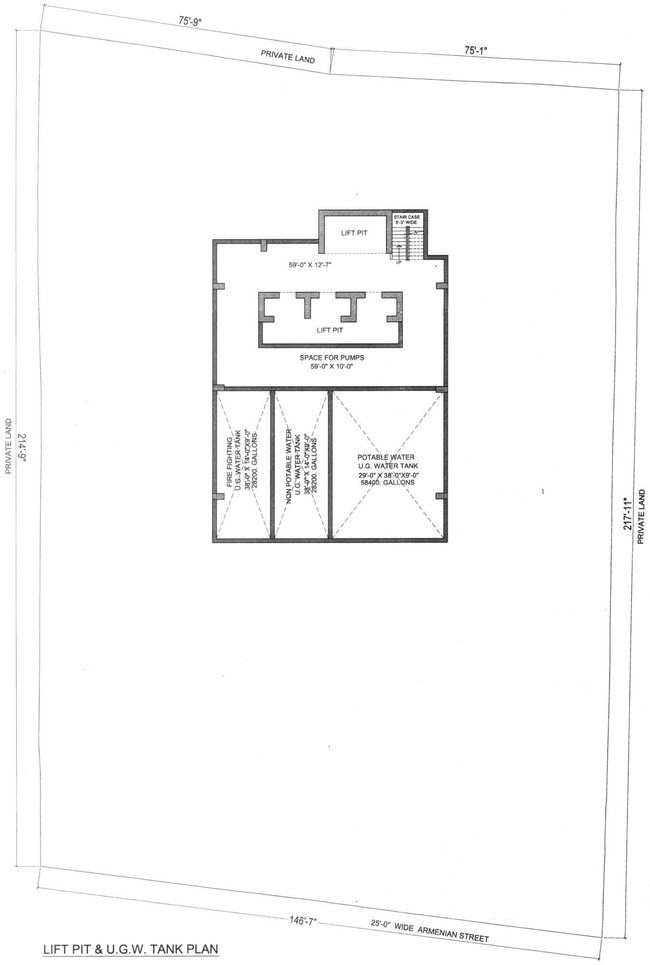


SECTION AT A-A

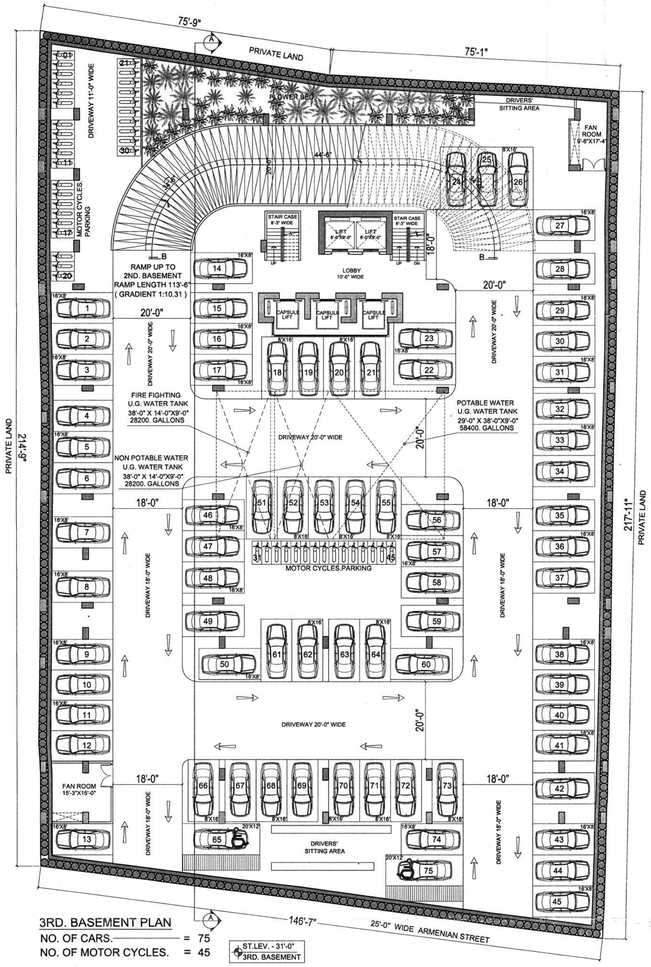
SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

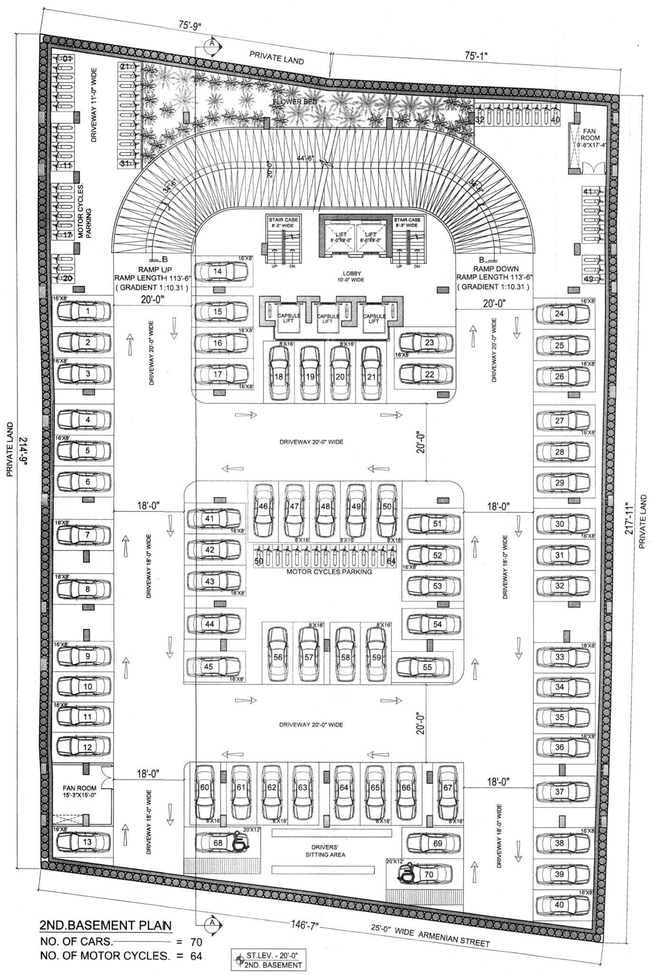
	20-06-2026
	DATE
OWNER	1/16" = 1'-0"
	SCALE
LIC. ARCHITECTS	AD-01
	DRAWN
LIC. ENGINEER	SB-125
	SCALE



LIFT PIT & U.G.W. TANK PLAN



3RD. BASEMENT PLAN
NO. OF CARS. = 75
NO. OF MOTOR CYCLES. = 45
ST.LEV. - 31'-0" 3RD. BASEMENT



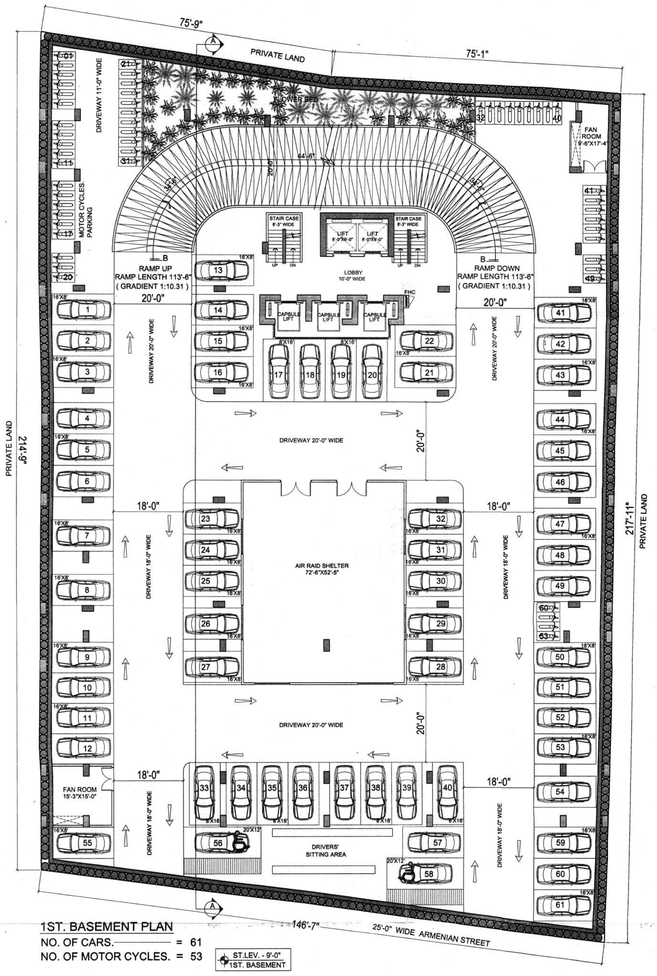
2ND.BASEMENT PLAN
NO. OF CARS. = 70
NO. OF MOTOR CYCLES. = 64
ST.LEV. - 20'-0" 2ND. BASEMENT

S W E N

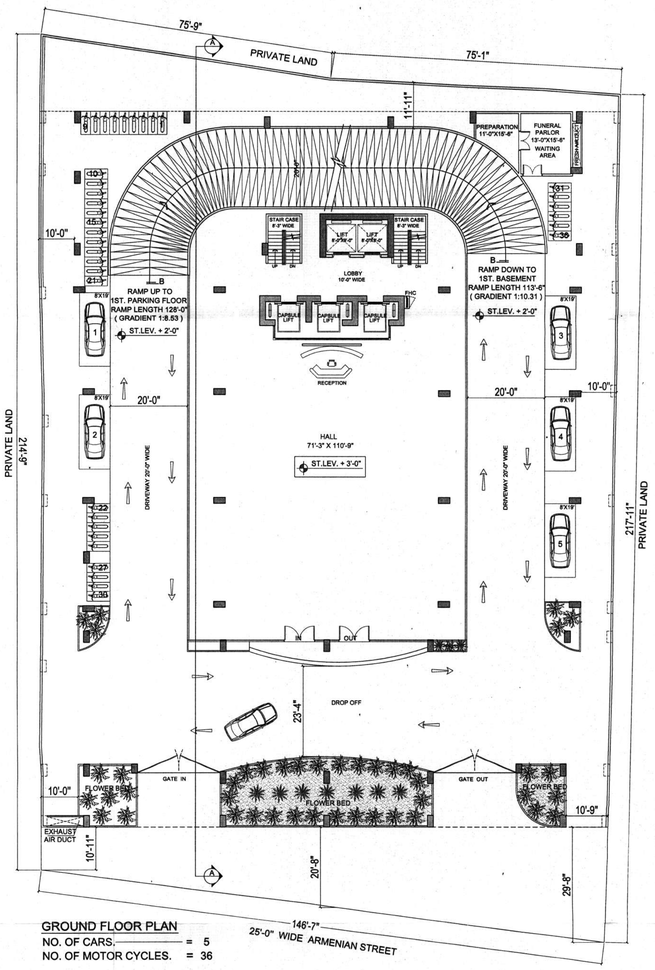
SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

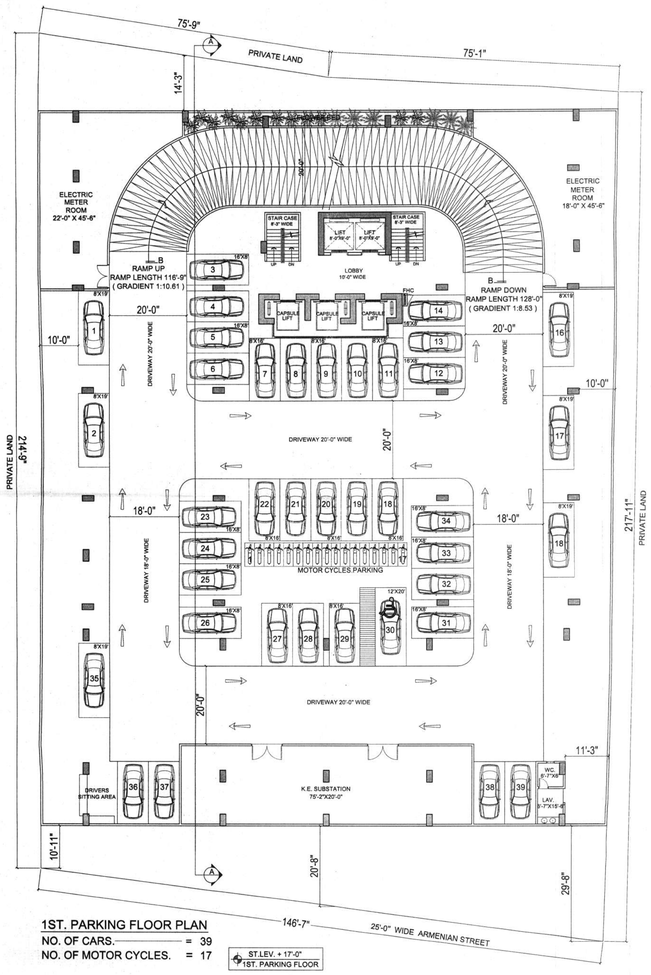
	20-06-2026
	DATE
OWNER	
	1/16" = 1'-0"
	SCALE
LIC. ARCHITECTS	AD-02
	DRAWN
	SB-125
LIC. ENGINEER	SCALE



1ST. BASEMENT PLAN
NO. OF CARS. = 61
NO. OF MOTOR CYCLES. = 53
ST.LEV. - 9'-0" 1ST. BASEMENT



GROUND FLOOR PLAN
NO. OF CARS. = 5
NO. OF MOTOR CYCLES. = 36

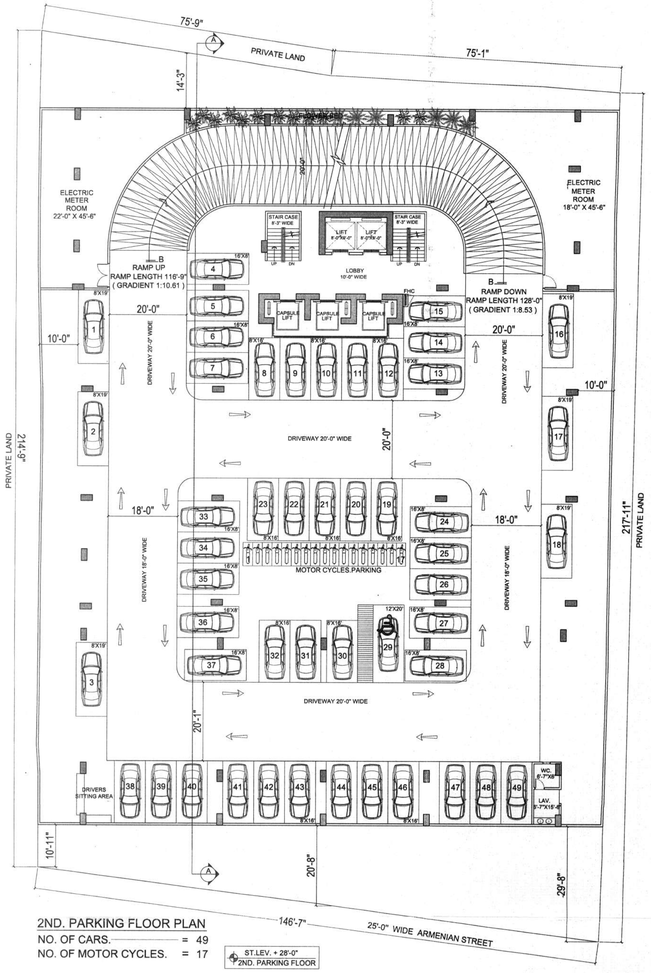


1ST. PARKING FLOOR PLAN
NO. OF CARS. = 39
NO. OF MOTOR CYCLES. = 17
ST.LEV. + 17'-0" 1ST. PARKING FLOOR

SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

OWNER	20-06-2026 DATE
	1/16" = 1'-0" SCALE
LIC. ARCHITECTS	AD-03 DRAWN
LIC. ENGINEER	SB-125 SCALE

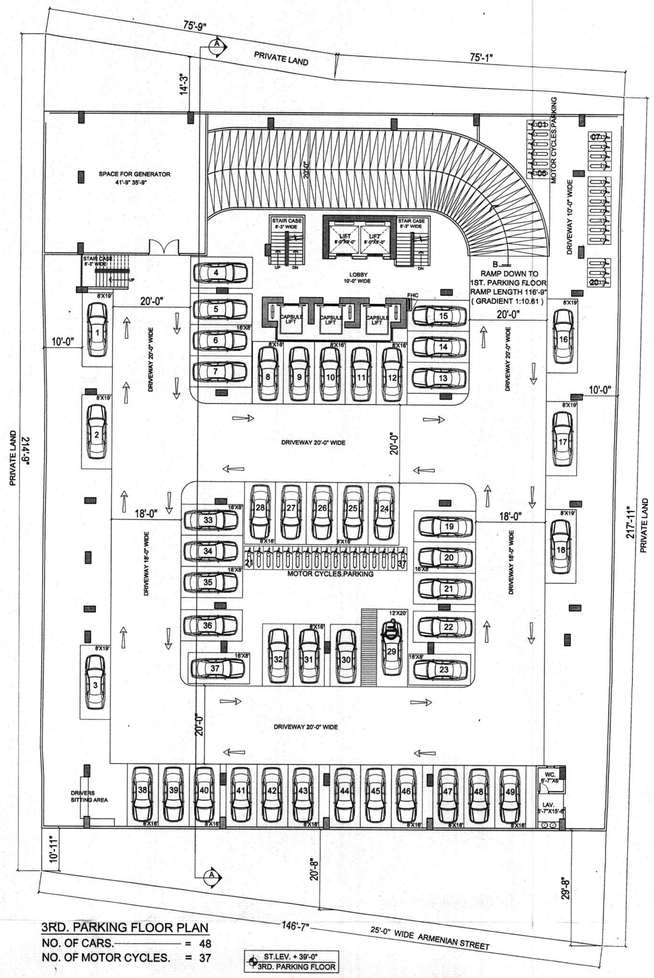


2ND. PARKING FLOOR PLAN

NO. OF CARS. ———— = 49

NO. OF MOTOR CYCLES. = 17

ST.LEV. + 26'-0" 2ND. PARKING FLOOR

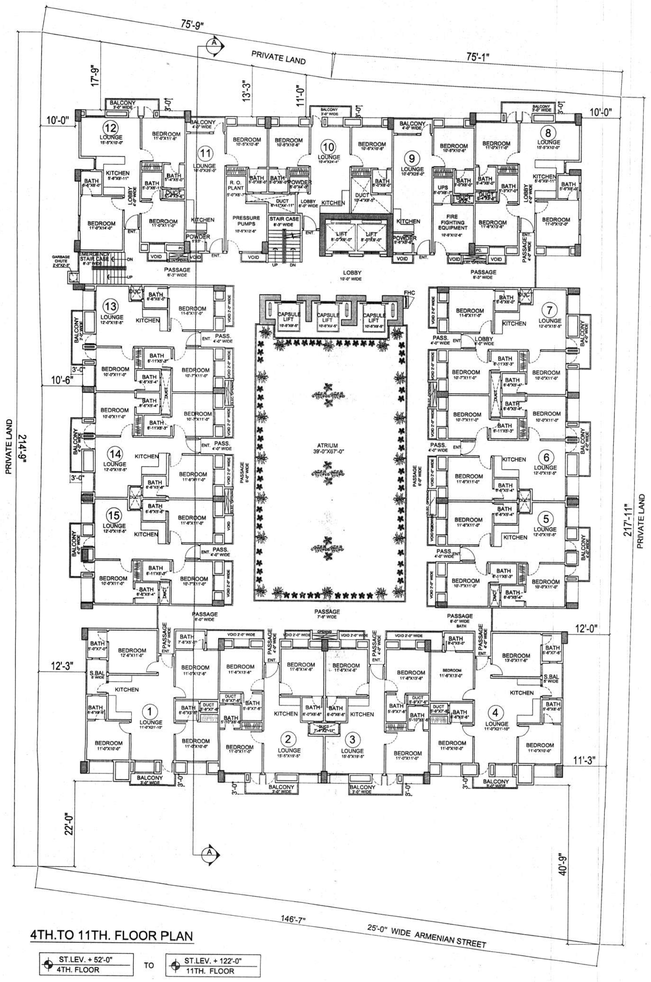


3RD. PARKING FLOOR PLAN

NO. OF CARS. ———— = 48

NO. OF MOTOR CYCLES. = 37

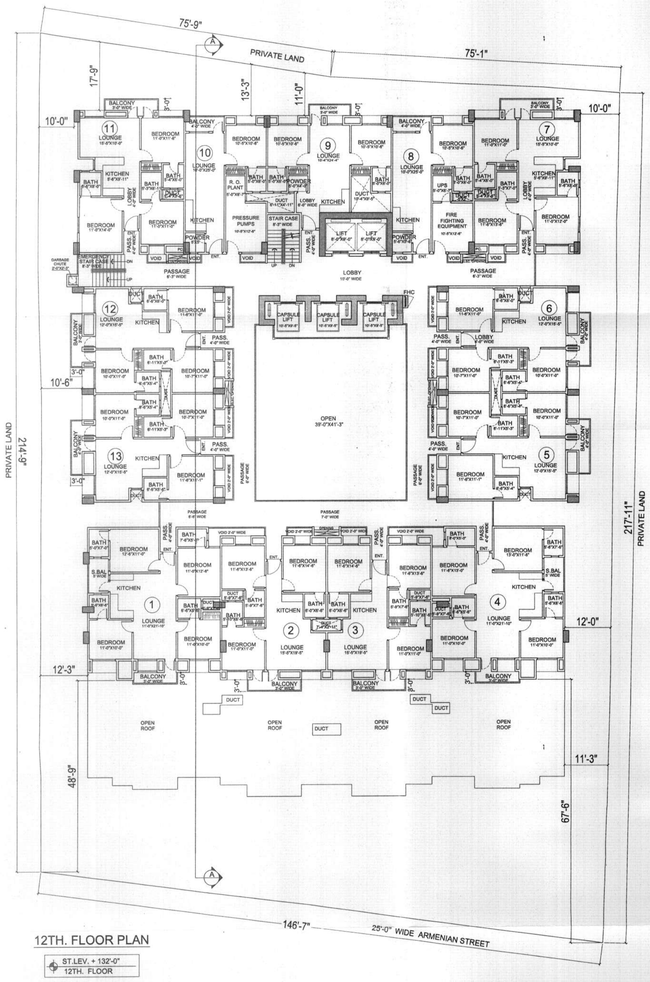
ST.LEV. + 39'-0" 3RD. PARKING FLOOR



4TH.TO 11TH. FLOOR PLAN

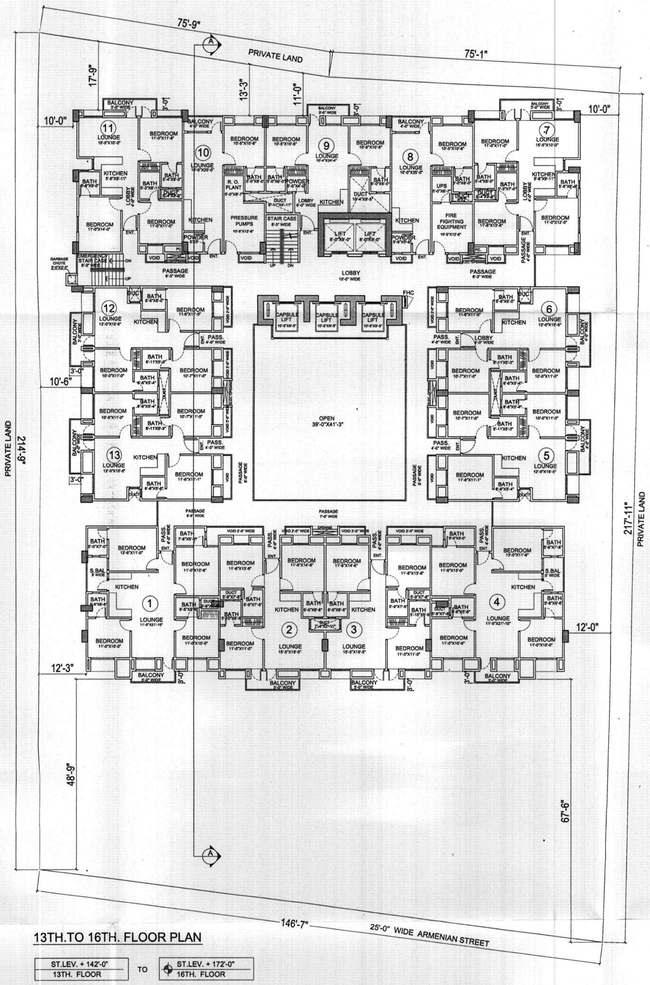
ST.LEV. + 52'-0" 4TH. FLOOR TO ST.LEV. + 122'-0" 11TH. FLOOR

SUBMISSION DRAWING	
PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.	
	20-06-2026 DATE
OWNER	1/16" = 1'-0" SCALE
LIC. ARCHITECTS	AD-04 DRAWN
LIC. ENGINEER	SB-125 SCALE



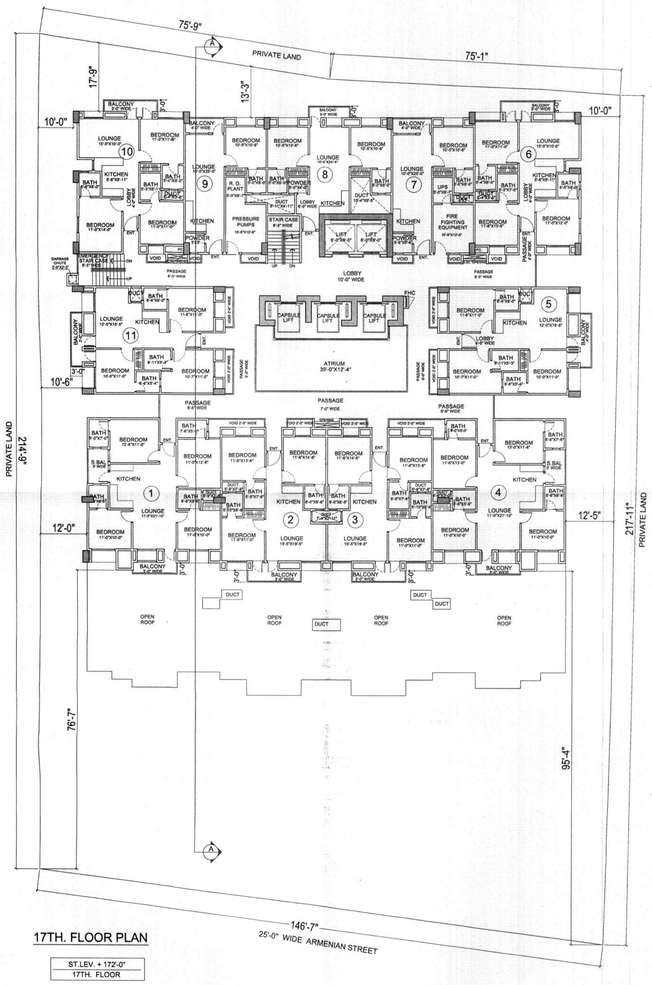
12TH. FLOOR PLAN

ST.LEV. + 132'-0" / 12TH. FLOOR



13TH.TO 16TH. FLOOR PLAN

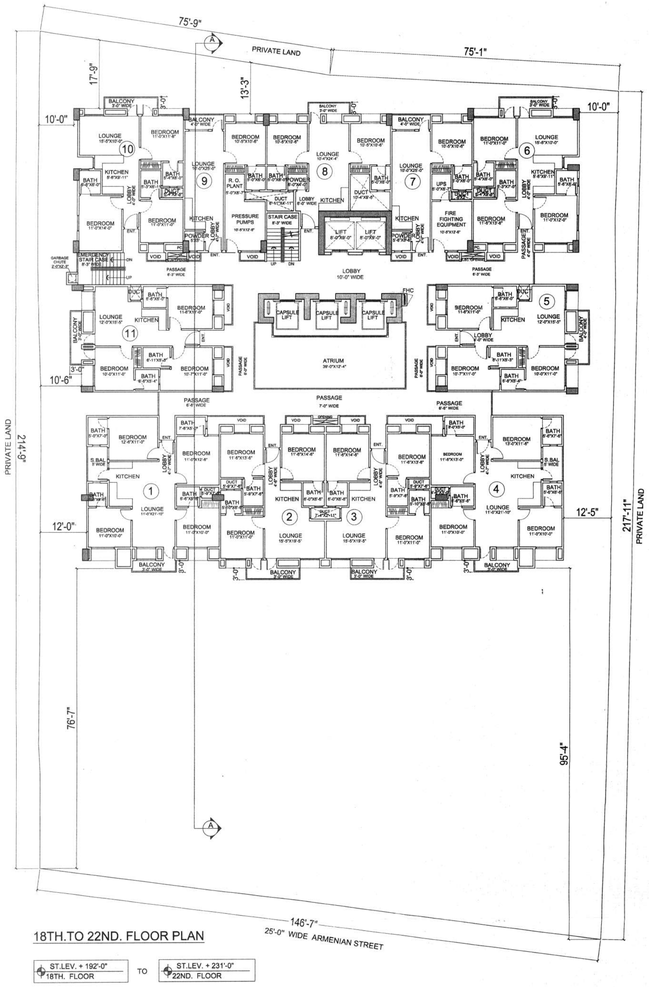
ST.LEV. + 142'-0" / 13TH. FLOOR TO ST.LEV. + 172'-0" / 16TH. FLOOR



17TH. FLOOR PLAN

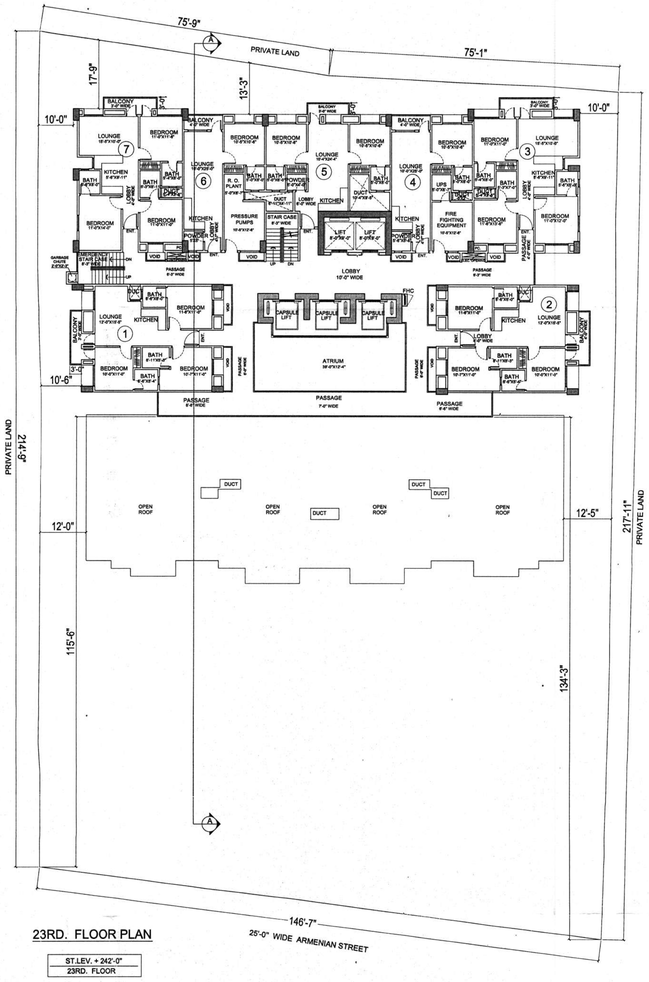
ST.LEV. + 172'-0" / 17TH. FLOOR

SUBMISSION DRAWING	
PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.	
	20-06-2026
	DATE
OWNER	1/16" = 1'-0"
	SCALE
LIC. ARCHITECTS	AD-05
	DRAWN
LIC. ENGINEER	SB-125
	SCALE



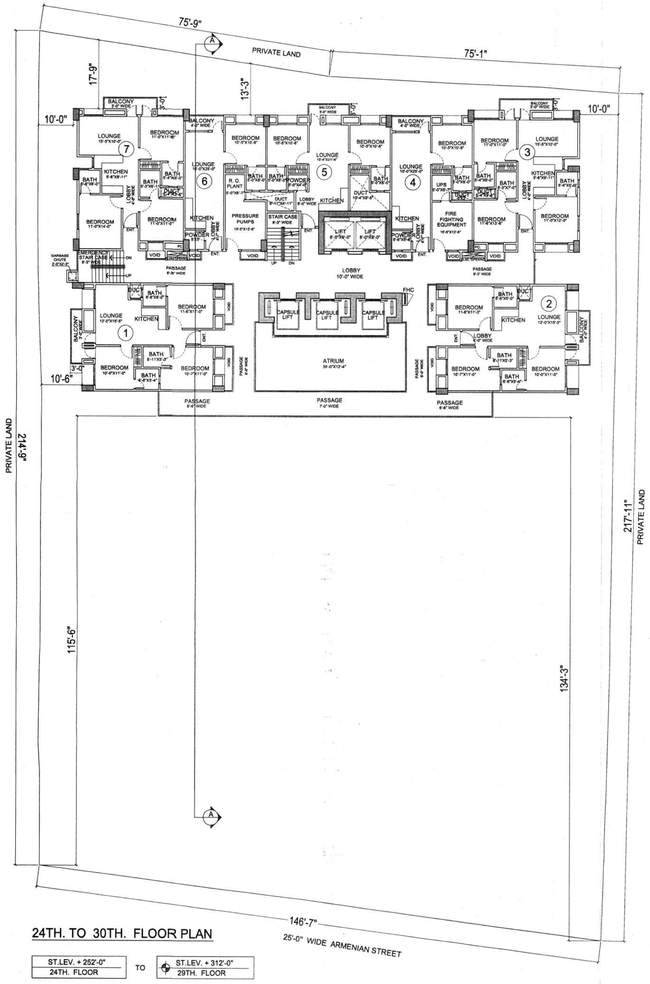
18TH.TO 22ND. FLOOR PLAN

ST.LEV. + 192'-0" 18TH. FLOOR TO ST.LEV. + 231'-0" 22ND. FLOOR



23RD. FLOOR PLAN

ST.LEV. + 242'-0" 23RD. FLOOR



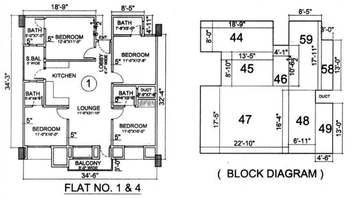
24TH. TO 30TH. FLOOR PLAN

ST.LEV. + 252'-0" 24TH. FLOOR TO ST.LEV. + 312'-0" 29TH. FLOOR

SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

OWNER	20-06-2026 DATE
	1/16" = 1'-0" SCALE
LIC. ARCHITECTS	AD-06 DRAWN
LIC. ENGINEER	SB-125 SCALE



FLAT NO. 1 & 4

(BLOCK DIAGRAM)

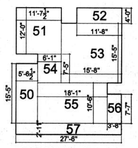
DETAIL OF AREA				ONE FLAT AREA
44 - 18'-9"	X	8'-0"	=	150.00 SQ.FT.
45 - 13'-5"	X	8'-10"	=	118.49 SQ.FT.
46 - 4'-1"	X	10'-5 1/2"	=	42.67 SQ.FT.
47 - 22'-10"	X	17'-5"	=	397.69 SQ.FT.
48 - 6'-11"	X	16'-4"	=	113.00 SQ.FT.
49 - 4'-6"	X	13'-0"	=	58.50 SQ.FT.
58 - 3'-0"	X	13'-0"	=	39.00 SQ.FT.
59 - 8'-5"	X	17'-11"	=	150.88 SQ.FT.
		TOTAL	=	2140.50 SQ.FT.

INDIVIDUAL FLAT AREA

4TH.TO 30TH. FLOOR

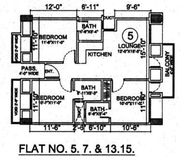


FLAT NO. 2 & 3

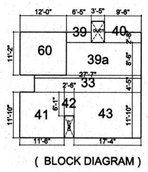


(BLOCK DIAGRAM)

DETAIL OF AREA				ONE FLAT AREA
50 - 5'-6 1/2"	X	15'-5"	=	85.42 SQ.FT.
51 - 11'-7 1/2"	X	12'-0"	=	139.44 SQ.FT.
52 - 11'-8"	X	4'-0"	=	46.64 SQ.FT.
53 - 15'-8"	X	15'-5"	=	241.47 SQ.FT.
54 - 6'-1"	X	7'-5"	=	45.11 SQ.FT.
55 - 18'-1"	X	10'-6"	=	189.84 SQ.FT.
56 - 3'-8"	X	7'-7"	=	27.74 SQ.FT.
57 - 27'-6"	X	2'-11"	=	80.30 SQ.FT.
		TOTAL	=	855.96 SQ.FT.

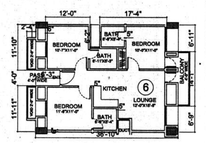


FLAT NO. 5. 7. & 13.15.

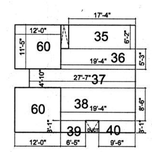


(BLOCK DIAGRAM)

DETAIL OF AREA				ONE FLAT AREA
33 - 27'-7"	X	4'-5"	=	121.90 SQ.FT.
39 - 6'-5"	X	5'-6"	=	35.31 SQ.FT.
39A - 19'-4"	X	8'-6"	=	164.30 SQ.FT.
40 - 9'-6"	X	7'-4"	=	69.63 SQ.FT.
41 - 11'-6"	X	11'-10"	=	136.04 SQ.FT.
42 - 2'-6"	X	6'-1"	=	15.20 SQ.FT.
43 - 17'-4"	X	11'-10"	=	205.01 SQ.FT.
60 - 12'-0"	X	22'-5"	=	269.04 SQ.FT.
			TOTAL =	1016.43 SQ.FT.

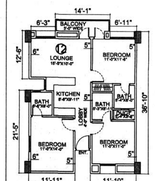


FLAT NO. 6 & 14

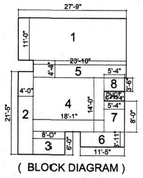


(BLOCK DIAGRAM)

DETAIL OF AREA				ONE FLAT AREA
35 - 17'-4"	X	6'-2"	=	106.92 SQ.FT.
36 - 19'-4"	X	5'-3"	=	101.48 SQ.FT.
37 - 27'-7"	X	4'-10"	=	133.21 SQ.FT.
38 - 19'-4"	X	8'-6"	=	164.30 SQ.FT.
39 - 6'-5"	X	3'-1"	=	19.77 SQ.FT.
40 - 9'-6"	X	3'-1"	=	29.26 SQ.FT.
60 - 12'-0"	X	11'-5" X 2	=	274.08 SQ.FT.
			TOTAL =	829.02 SQ.FT.

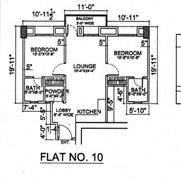


FLAT NO. 8 & 12

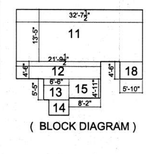


(BLOCK DIAGRAM)

DETAIL OF AREA				ONE FLAT AREA
1 - 27'-9"	X	11'-0"	=	305.25 SQ.FT.
2 - 4'-0"	X	21'-5"	=	85.68 SQ.FT.
3 - 8'-0"	X	6'-0"	=	48.00 SQ.FT.
4 - 18'-1"	X	14'-0"	=	253.12 SQ.FT.
5 - 23'-10"	X	4'-4"	=	103.18 SQ.FT.
6 - 11'-5"	X	3'-11"	=	44.76 SQ.FT.
7 - 5'-4"	X	8'-0"	=	42.64 SQ.FT.
8 - 5'-4"	X	3'-6"	=	18.65 SQ.FT.
		TOTAL	=	901.28 SQ.FT.

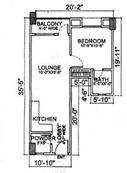


FLAT NO. 10

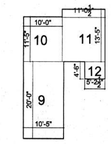


(BLOCK DIAGRAM)

DETAIL OF AREA				ONE FLAT AREA
11 - 32'-8"	X	13'-5"	=	438.29 SQ.FT.
12 - 21'-9"	X	4'-6"	=	97.87 SQ.FT.
13 - 6'-6"	X	5'-5"	=	35.23 SQ.FT.
14 - 5'-2"	X	4'-0"	=	20.68 SQ.FT.
15 - 8'-2"	X	4'-11"	=	40.19 SQ.FT.
18 - 5'-10"	X	4'-6"	=	26.23 SQ.FT.
		TOTAL	=	658.49 SQ.FT.

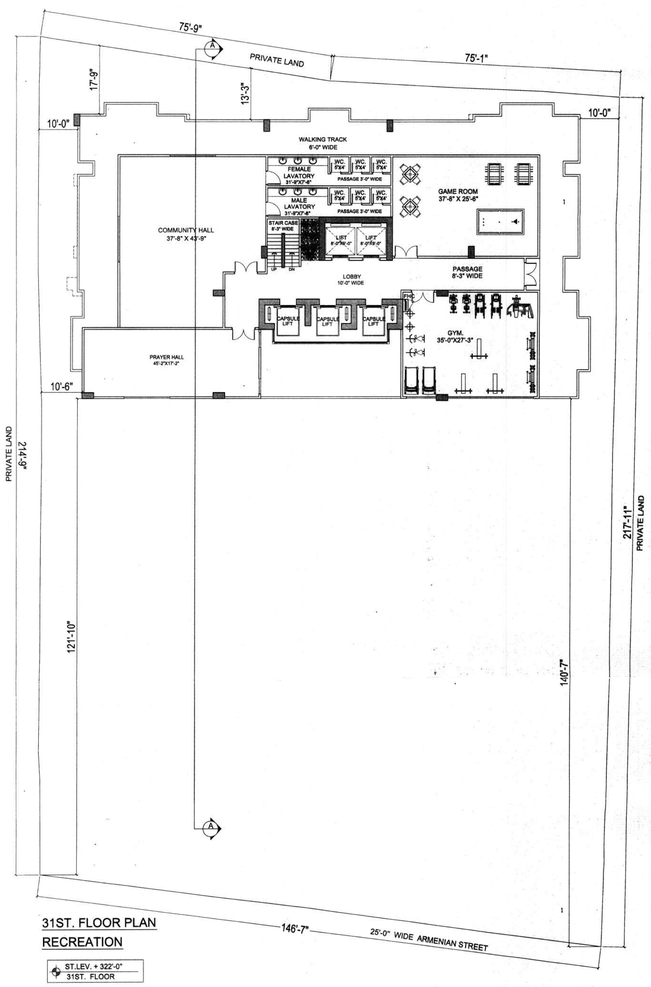


FLAT NO. 11 & 9



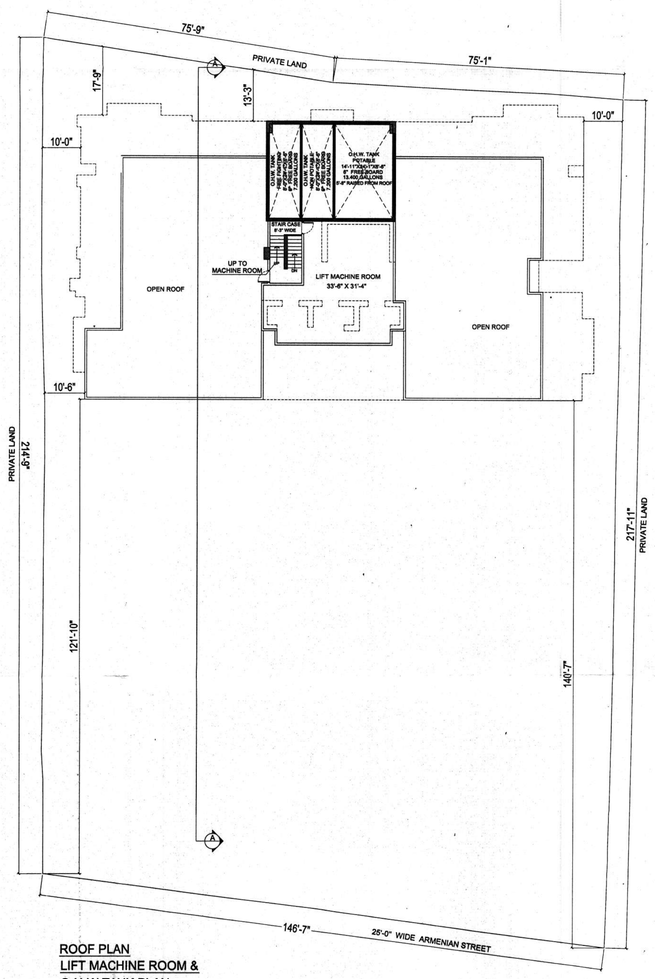
(BLOCK DIAGRAM)

DETAIL OF AREA				ONE FLAT AREA
9 - 10'-5"	X	20'-0"	=	208.40 SQ.FT.
10 - 10'-0"	X	11'-5"	=	114.20 SQ.FT.
11 - 11'-0"	X	13'-5"	=	147.62 SQ.FT.
12 - 5'-2"	X	4'-6"	=	23.26 SQ.FT.
			TOTAL =	493.48 SQ.FT.



31ST. FLOOR PLAN
RECREATION

ST.LEV. + 322'-0"
31ST. FLOOR



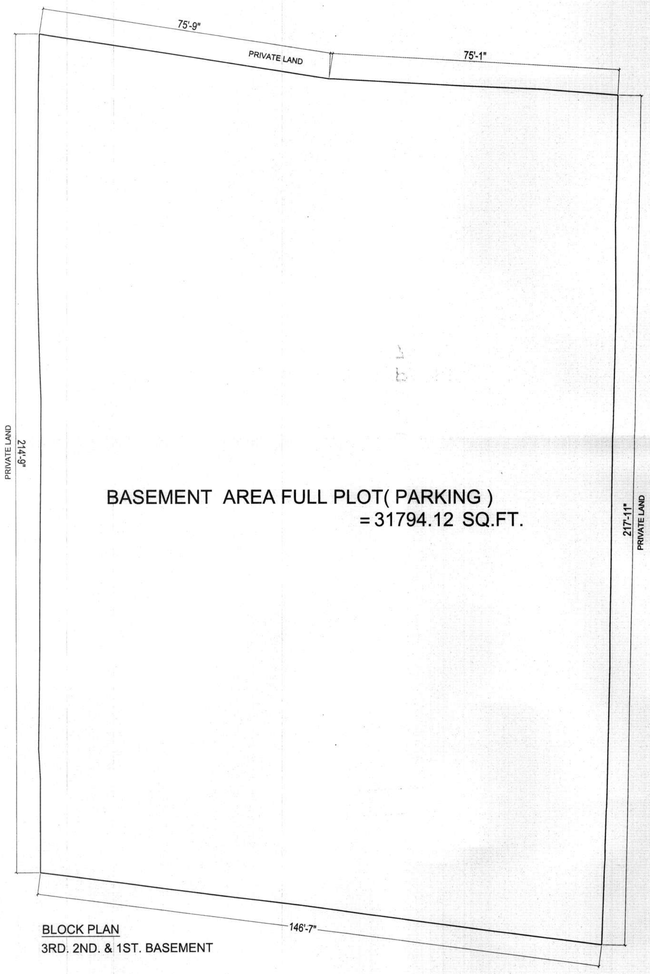
ROOF PLAN
LIFT MACHINE ROOM &
O-H-W TANK PLAN

ST.LEV. + 321'-0"
ROOF

SUBMISSION DRAWING

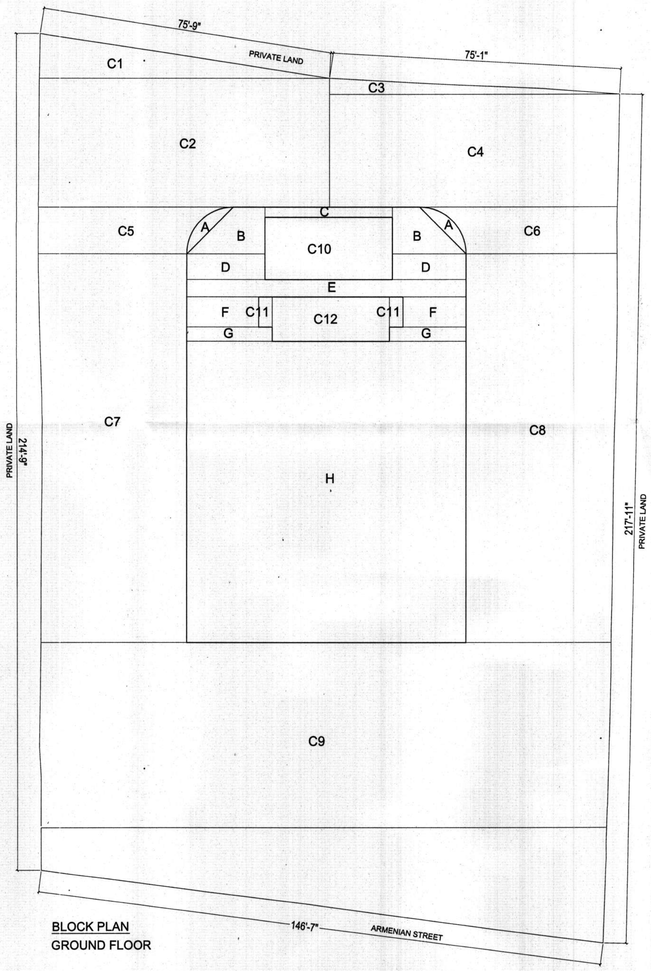
PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

OWNER	20-06-2026 DATE
	1/16" = 1'-0" SCALE
LIC. ARCHITECTS	AD-07
	DRAWN
LIC. ENGINEER	SB-125 SCALE

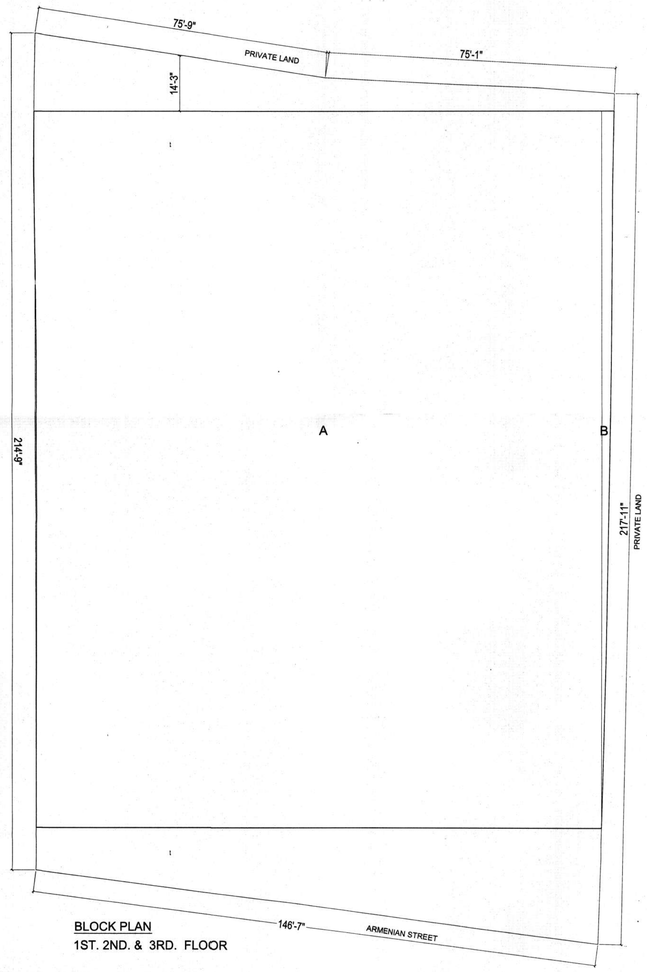


BASEMENT AREA FULL PLOT(PARKING)
= 31794.12 SQ.FT.

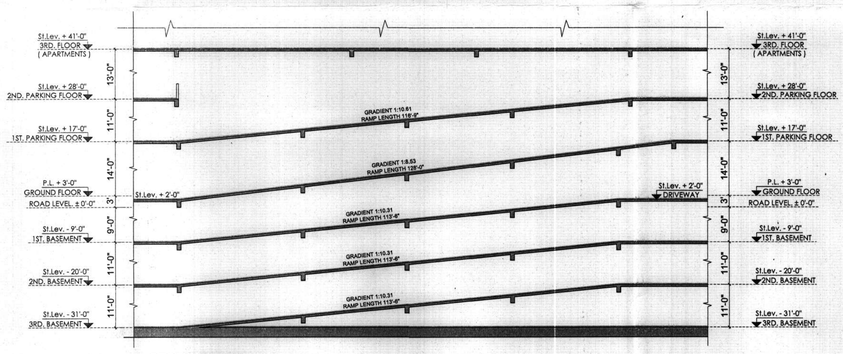
BLOCK PLAN
3RD. 2ND. & 1ST. BASEMENT



BLOCK PLAN
GROUND FLOOR

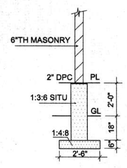


BLOCK PLAN
1ST. 2ND. & 3RD. FLOOR

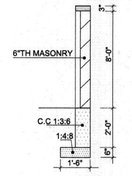


SECTION AT B-B

LEGEND
F.H.C. (FIRE HOUSE CABINET)
SD (SMOKE DETECTOR)
(FIRE EXTINGUISHER)



SEC. OF 6TH.WALL

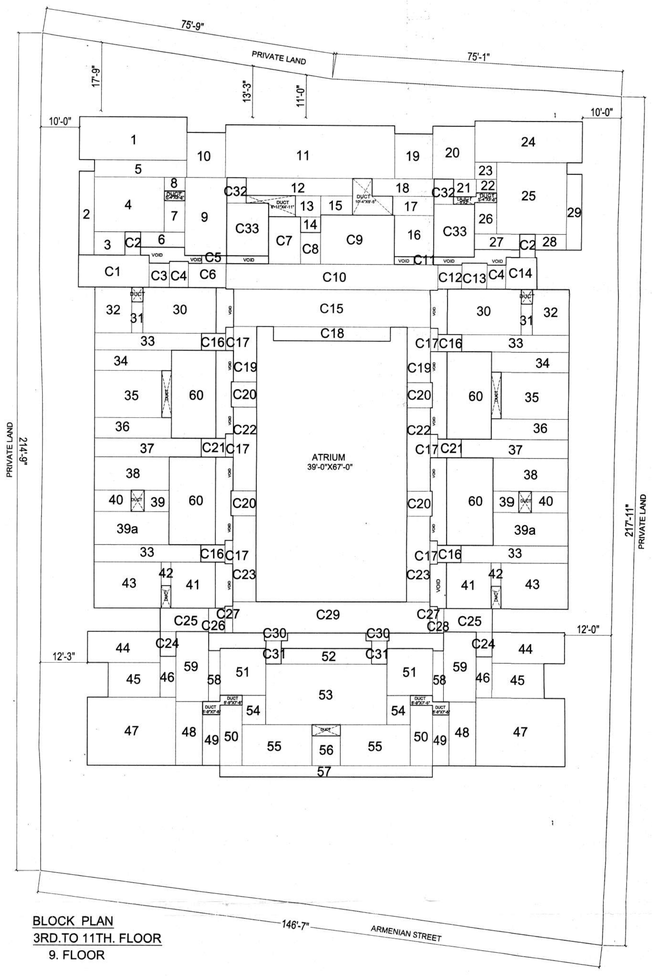


SEC. OF COMP. WALL

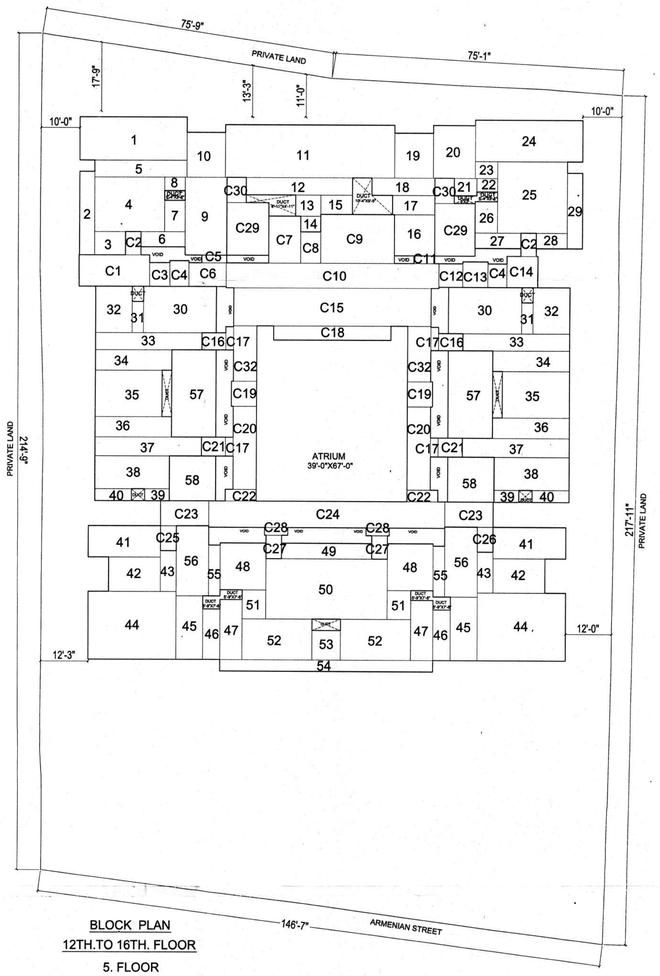
SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

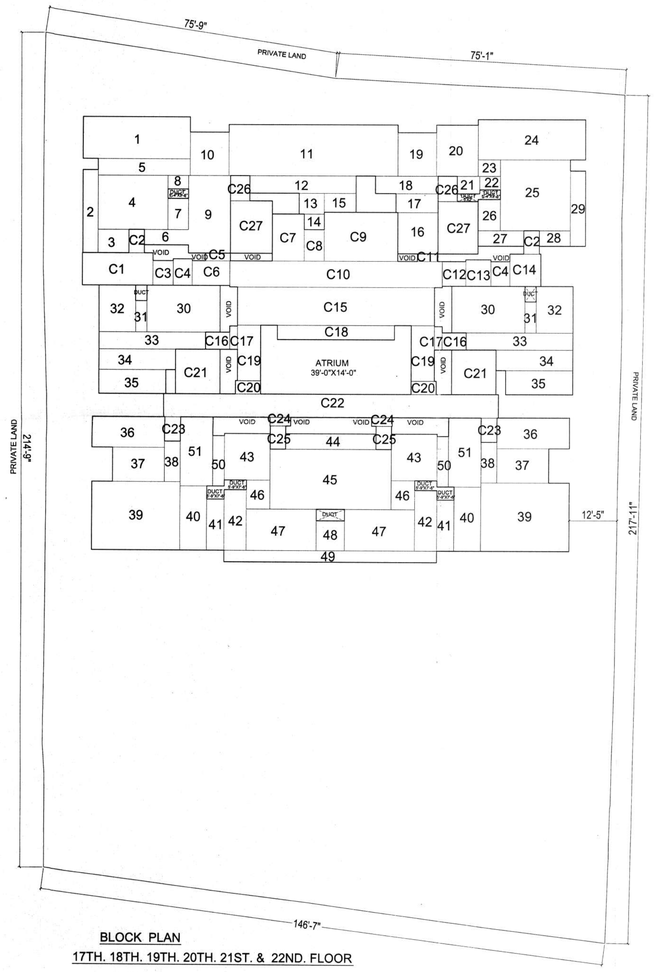
OWNER	20-06-2026 DATE
	1/16" = 1'-0" SCALE
LIC. ARCHITECTS	AD-08
	DRAWN
LIC. ENGINEER	SB-125 SCALE



BLOCK PLAN
3RD.TO 11TH. FLOOR
9. FLOOR



BLOCK PLAN
12TH.TO 16TH. FLOOR
5. FLOOR

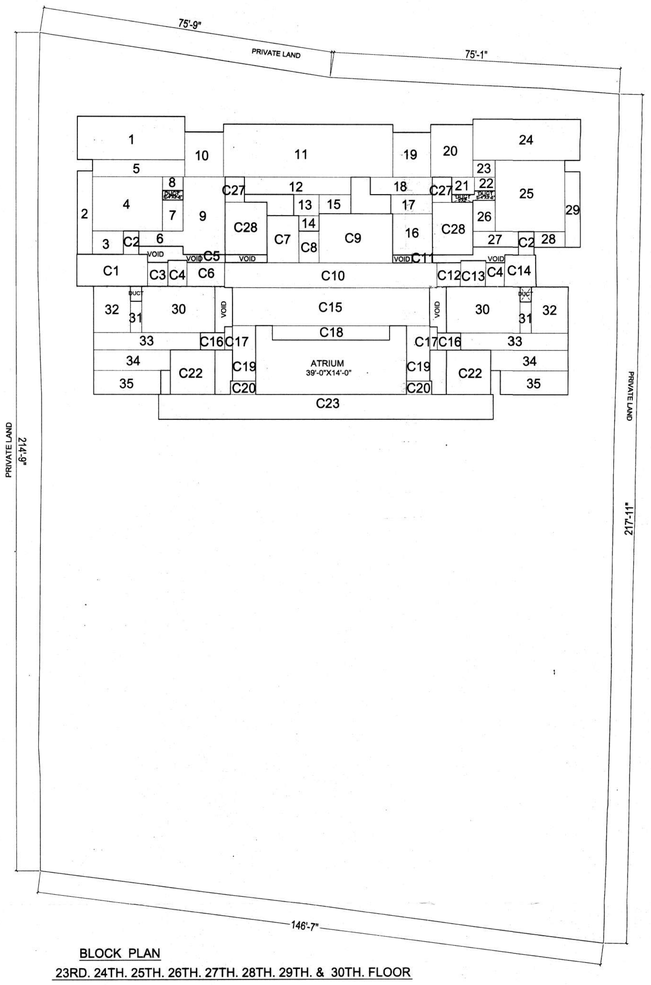


BLOCK PLAN
17TH. 18TH. 19TH. 20TH. 21ST. & 22ND. FLOOR
6. FLOOR

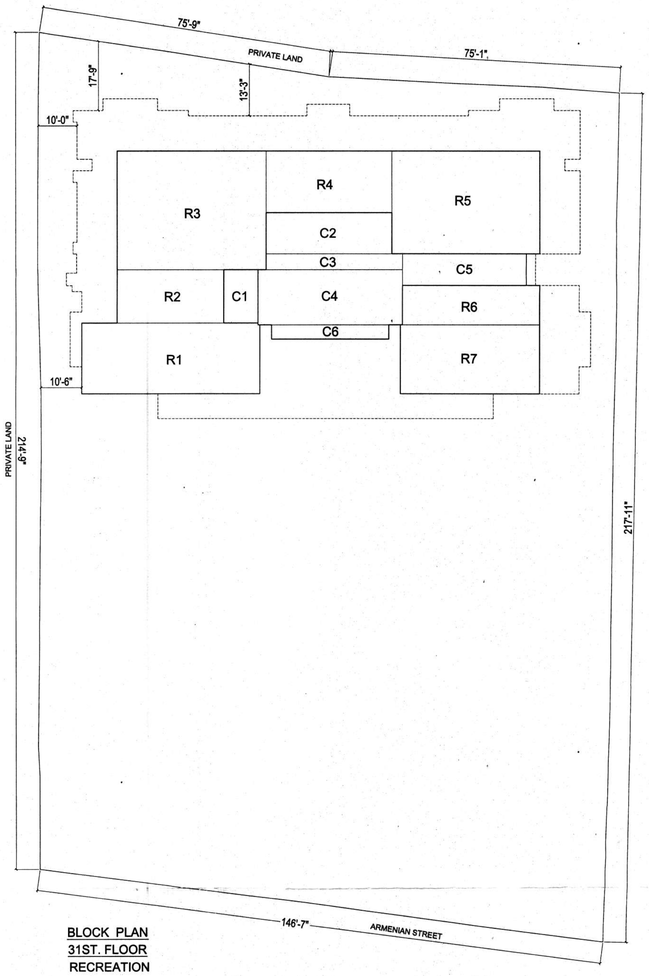
SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT
NO. 125 DEPOT LINE KARACHI.

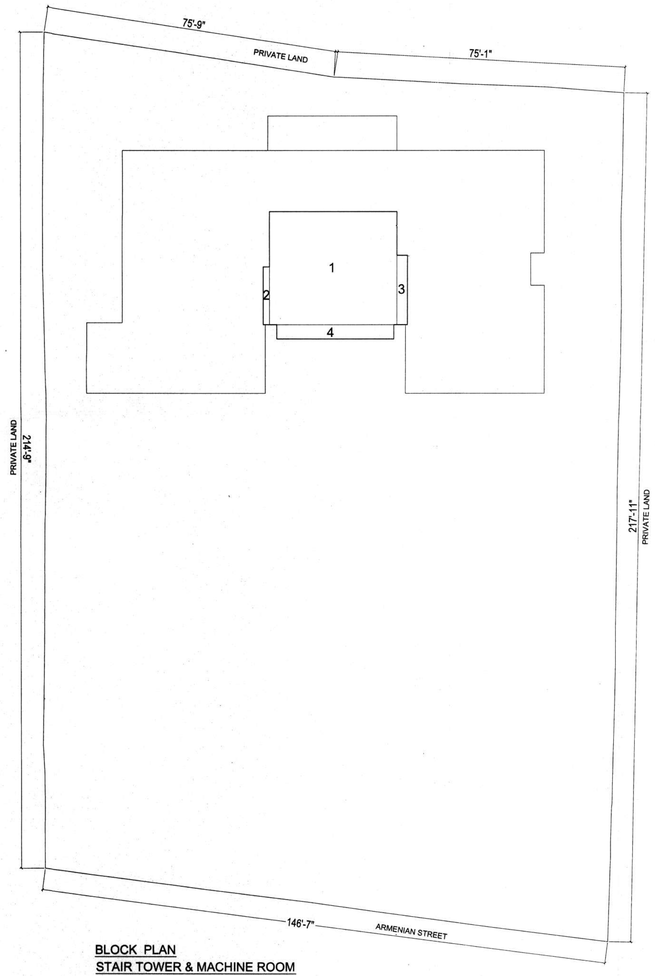
OWNER	20-06-2026 DATE
	1/16" = 1'-0" SCALE
LIC. ARCHITECTS	AD-09 DRAWN
LIC. ENGINEER	SB-125 SCALE



BLOCK PLAN
23RD. 24TH. 25TH. 26TH. 27TH. 28TH. 29TH. & 30TH. FLOOR
7. FLOOR



BLOCK PLAN
31ST. FLOOR
RECREATION



BLOCK PLAN
STAIR TOWER & MACHINE ROOM

SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT
NO. 125 DEPOT LINE KARACHI.

OWNER	20-06-2026 DATE
LIC. ARCHITECTS	1/16" = 1'-0" SCALE
LIC. ENGINEER	AD-10 DRAWN
	SB-125 SCALE

SCHEDULE OF AREA

TOTAL PLOT AREA = 3532.68 SQ.YDS
OR = 31794.12 SQ.FT.

ALLOWABLE AREA	PROPOSED AREA
ALLOWABLE FAR 1:8 = 254352.96 SQ.FT.	= 240447.82 SQ.FT.
FOOT PRINT GR. FL. 65 % = 20666.17 SQ.FT.	= 20666.17 SQ.FT.
FOOT PRINT TYP. FL. 60 % = 19076.47 SQ.FT.	= 12139.37 SQ.FT.
RECREATION 2 % TO. 5 % = 5087.05 = 12717.64 SQ.FT.	= 4900.40 SQ.FT.

SUMMARY OF PROPOSED COVERED AREA

BASEMENT- 3 AREA FULL PLOT(PARKING) = 31794.12 SQ.FT.
BASEMENT- 2 AREA FULL PLOT(PARKING) = 31794.12 SQ.FT.
BASEMENT- 1 AREA FULL PLOT(PARKING) = 31794.12 SQ.FT.

GROUND FLOOR AREA
CIRCULATION AREA = 7044.99
PARKING & DRIVE WAY = 21741.91
TOTAL = 28786.90 SQ.FT.

1ST. FLOOR PARKING AREA = 27179.37 SQ.FT.
2ND. FLOOR PARKING AREA = 27179.37 SQ.FT.
3RD. FLOOR PARKING AREA = 27179.37 SQ.FT.

4TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

5TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

6TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

7TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

8TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

9TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

10TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL 16207.91 SQ.FT.

11TH. FLOOR AREA MAIN AREA = 12139.37
CIRCULATION = 4068.54
TOTAL = 16207.91 SQ.FT.

12TH. FLOOR AREA MAIN AREA = 10575.49
CIRCULATION = 3655.96
TOTAL = 14231.45 SQ.FT.

13TH. FLOOR AREA MAIN AREA = 10575.49
CIRCULATION = 3655.96
TOTAL = 14231.45 SQ.FT.

14TH. FLOOR AREA MAIN AREA = 10575.49
CIRCULATION = 3655.96
TOTAL = 14231.45 SQ.FT.

15TH. FLOOR AREA MAIN AREA = 10575.49
CIRCULATION = 3655.96
TOTAL = 14231.45 SQ.FT.

16TH. FLOOR AREA MAIN AREA = 10575.49
CIRCULATION = 3655.96
TOTAL = 14231.45 SQ.FT.

17TH. FLOOR AREA MAIN AREA = 8651.32
CIRCULATION = 3461.84
TOTAL = 12113.16 SQ.FT.

18TH. FLOOR AREA MAIN AREA = 8651.32
CIRCULATION = 3461.84
TOTAL = 12113.16 SQ.FT.

19TH. FLOOR AREA MAIN AREA = 8651.32
CIRCULATION = 3461.84
TOTAL = 12113.16 SQ.FT.

20TH. FLOOR AREA MAIN AREA = 8651.32
CIRCULATION = 3461.84
TOTAL = 12113.16 SQ.FT.

21TH. FLOOR AREA MAIN AREA = 8651.32
CIRCULATION = 3461.84
TOTAL = 12113.16 SQ.FT.

22ND. FLOOR AREA MAIN AREA = 8651.32
CIRCULATION = 3461.84
TOTAL = 12113.16 SQ.FT.

23RD. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

24TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

25TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

26TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

27TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

28TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

29TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

30TH. FLOOR AREA MAIN AREA = 4818.18
CIRCULATION = 3982.80
TOTAL = 8800.98 SQ.FT.

31ST. FLOOR AREA
RECREATION AREA = 4772.40
CIRCULATION = 1535.36
TOTAL = 6307.76 SQ.FT.

STAIR TOWER & MACHINE ROOM AREA
TOTAL = 1134.86 SQ.FT.

TOTAL COVERED AREA = 557057.32 SQ.FT.

EXEMPTION / LESS AREA FROM FLOOR AREA

BASEMENT - 2 AREA = 31794.12 SQ.FT.
BASEMENT - 2 AREA = 31794.12 SQ.FT.
BASEMENT - 1 AREA = 31794.12 SQ.FT.
GROUND FLOOR (CIR. & PARKING) = 28786.90 SQ.FT.
1ST. FLOOR (PARKING) = 27179.37 SQ.FT.
2ND. FLOOR (PARKING) = 27179.37 SQ.FT.
3RD. FLOOR (PARKING) = 27179.37 SQ.FT.
4TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
5TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
6TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
7TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
8TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
9TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
10TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
11TH. FLOOR AREA CIRCULATION = 4068.54 SQ.FT.
12TH. FLOOR AREA CIRCULATION = 3655.96 SQ.FT.
13TH. FLOOR AREA CIRCULATION = 3655.96 SQ.FT.
14TH. FLOOR AREA CIRCULATION = 3655.96 SQ.FT.
15TH. FLOOR AREA CIRCULATION = 3655.96 SQ.FT.
16TH. FLOOR AREA CIRCULATION = 3655.96 SQ.FT.
17TH. FLOOR AREA CIRCULATION = 3461.84 SQ.FT.
18TH. FLOOR AREA CIRCULATION = 3461.84 SQ.FT.
19TH. FLOOR AREA CIRCULATION = 3461.84 SQ.FT.
20TH. FLOOR AREA CIRCULATION = 3461.84 SQ.FT.
21ST. FLOOR AREA CIRCULATION = 3461.84 SQ.FT.
22ND. FLOOR AREA CIRCULATION = 3461.84 SQ.FT.
23RD. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
24TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
25TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
26TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
27TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
28TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
29TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
30TH. FLOOR AREA CIRCULATION = 3982.80 SQ.FT.
31ST. FLOOR AREA CIRCULATION = 6307.76 SQ.FT.
STAIR TOWER & MACHINE ROOM AREA = 1134.86 SQ.FT.
TOTAL AREA = 316609.50 SQ.FT.

TOTAL PROPOSED COVERED AREA
= 557057.32 - 316609.50 = 240447.82 SQ.FT.

DETAIL OF FOOT PRINT

BASEMENT - 2 AREA = 31794.12 SQ.FT.
BASEMENT - 2 AREA = 31794.12 SQ.FT.
BASEMENT - 1 AREA = 31794.12 SQ.FT.
GROUND FLOOR (CIR. & PARKING) = 28786.90 SQ.FT.
1ST. FLOOR (PARKING) = 27179.37 SQ.FT.
2ND. FLOOR (PARKING) = 27179.37 SQ.FT.
3RD. FLOOR (PARKING) = 27179.37 SQ.FT.
4TH. FLOOR AREA = 16207.91 SQ.FT.
5TH. FLOOR AREA = 16207.91 SQ.FT.
6TH. FLOOR AREA = 16207.91 SQ.FT.
7TH. FLOOR AREA = 16207.91 SQ.FT.
8TH. FLOOR AREA = 16207.91 SQ.FT.
9TH. FLOOR AREA = 16207.91 SQ.FT.
10TH. FLOOR AREA = 16207.91 SQ.FT.
11TH. FLOOR AREA = 16207.91 SQ.FT.
12TH. FLOOR AREA = 14231.45 SQ.FT.
13TH. FLOOR AREA = 14231.45 SQ.FT.
14TH. FLOOR AREA = 14231.45 SQ.FT.
15TH. FLOOR AREA = 14231.45 SQ.FT.
16TH. FLOOR AREA = 14231.45 SQ.FT.
17TH. FLOOR AREA = 12113.16 SQ.FT.
18TH. FLOOR AREA = 12113.16 SQ.FT.
19TH. FLOOR AREA = 12113.16 SQ.FT.
20TH. FLOOR AREA = 12113.16 SQ.FT.
21ST. FLOOR AREA = 12113.16 SQ.FT.
22ND. FLOOR AREA = 12113.16 SQ.FT.
23RD. FLOOR AREA = 8800.98 SQ.FT.
24TH. FLOOR AREA = 8800.98 SQ.FT.
25TH. FLOOR AREA = 8800.98 SQ.FT.
26TH. FLOOR AREA = 8800.98 SQ.FT.
27TH. FLOOR AREA = 8800.98 SQ.FT.
28TH. FLOOR AREA = 8800.98 SQ.FT.
29TH. FLOOR AREA = 8800.98 SQ.FT.
30TH. FLOOR AREA = 8800.98 SQ.FT.
31ST. FLOOR AREA = 6307.76 SQ.FT.
STAIR TOWER & MACHINE ROOM AREA = 1134.86 SQ.FT.
TOTAL AREA = 557057.32 SQ.FT.

DETAIL OF FAR

4TH. FLOOR AREA = 12139.37 SQ.FT.
5TH. FLOOR AREA = 12139.37 SQ.FT.
6TH. FLOOR AREA = 12139.37 SQ.FT.
7TH. FLOOR AREA = 12139.37 SQ.FT.
8TH. FLOOR AREA = 12139.37 SQ.FT.
9TH. FLOOR AREA = 12139.37 SQ.FT.
10TH. FLOOR AREA = 12139.37 SQ.FT.
11TH. FLOOR AREA = 12139.37 SQ.FT.
12TH. FLOOR AREA = 10575.49 SQ.FT.
13TH. FLOOR AREA = 10575.49 SQ.FT.
14TH. FLOOR AREA = 10575.49 SQ.FT.
15TH. FLOOR AREA = 10575.49 SQ.FT.
16TH. FLOOR AREA = 10575.49 SQ.FT.
17TH. FLOOR AREA = 8651.32 SQ.FT.
18TH. FLOOR AREA = 8651.32 SQ.FT.
19TH. FLOOR AREA = 8651.32 SQ.FT.
20TH. FLOOR AREA = 8651.32 SQ.FT.
21ST. FLOOR AREA = 8651.32 SQ.FT.
22ND. FLOOR AREA = 8651.32 SQ.FT.
23RD. FLOOR AREA = 4818.18 SQ.FT.
24TH. FLOOR AREA = 4818.18 SQ.FT.
25TH. FLOOR AREA = 4818.18 SQ.FT.
26TH. FLOOR AREA = 4818.18 SQ.FT.
27TH. FLOOR AREA = 4818.18 SQ.FT.
28TH. FLOOR AREA = 4818.18 SQ.FT.
29TH. FLOOR AREA = 4818.18 SQ.FT.
30TH. FLOOR AREA = 4818.18 SQ.FT.
TOTAL AREA = 240447.82 SQ.FT.

SCHEDULE OF PARKING

TOTAL PROPOSED AREA = 240447.82 SQ.FT.
(4TH. TO 30TH. FLOOR)
240447.82 / 1000 = 240.44 OR 240. CARS
CAR OF HANDICAP CAP = 240 / 50 = 4.8 = 5 CARS
TOTAL REQUIRED = 240 + 5 = 245.00 CARS
16 % OF TOTAL CAR PARKING SPACE FOR MOTOR CYCLES
= 245 X 16 / 100. 00 = 39.20 OR 39.
ONE CAR = 6 MOTOR CYCLES
= 39 X 6 = 234. MOTOR CYCLES.
REQUIRED NET MOTOR CYCLES FOR PARKING
= 234. MOTOR CYCLE
REQUIRED NET CARS FOR PARKING
= 245 - 39 = 206. CARS

PROVIDE CARS FOR PARKING

BASEMENT - 3 = 75. CARS.
BASEMENT - 2 = 70. CARS.
BASEMENT - 1 = 61. CARS.
GROUND FLOOR = 5. CARS.
1ST. PARKING = 39. CARS.
2ND. PARKING = 49. CARS.
3RD. PARKING = 48. CARS.
TOTAL NO.S OF CARS. = 347.

PROVIDE MOTOR CYCLE FOR PARKING

BASEMENT - 3 = 45. M. CYCLE
BASEMENT - 2 = 64. M. CYCLE
BASEMENT - 1 = 53. M. CYCLE
GROUND FLOOR = 36. M. CYCLE
1ST. PARKING = 17. M. CYCLE
2ND. PARKING = 17. M. CYCLE
3RD. PARKING = 37. CARS.
TOTAL NO.S OF MOTOR CYCLES. = 269.

SUBMISSION DRAWING

PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.

	20-06-2026
	DATE
OWNER	1/16" = 1'-0"
	SCALE
LIC. ARCHITECTS	AD-12
	DRAWN
LIC. ENGINEER	SB-125
	SCALE

DETAIL OF PROPOSED COVERED AREA

BASEMENT- 3 AREA FULL PLOT(PARKING) = 31794.12 SQ.FT.
BASEMENT- 2 AREA FULL PLOT(PARKING) = 31794.12 SQ.FT.
BASEMENT- 1 AREA FULL PLOT(PARKING) = 31794.12 SQ.FT.

DETAIL OF GROUND FLOOR AREA

CIRCULATION AREA

A - 3'-6" X 8'-6" X 1/2 X 3.14 X 2 = 93.41 SQ.FT.
B - 7'-0" + 19'-0" X1/2 X12'-0" X 2 = 312.00 SQ.FT.
C - 32'-11" X 2'-7" = 84.93 SQ.FT.
D - 19'-0" X 6'-7" X 2 = 250.00 SQ.FT.
E - 72'-2" X 4'-5" = 318.99 SQ.FT.
F - 16'-4" X 7'-9" X 2 = 253.11 SQ.FT.
G - 19'-10" X 3'-8" X 2 = 145.15 SQ.FT.
H - 72'-2" X 77'-5" = 5587.40 SQ.FT.
TOTAL = 7044.99 SQ.FT.

PARKING & DRIVE WAY AREA

C1 - 75'-1" X 11'-6" X 1/2 = 431.71 SQ.FT.
C2 - 75'-2" X 33'-0" = 2480.61 SQ.FT.
C3 - 74'-11" X 4'-1" X 1/2 = 152.83 SQ.FT.
C4 - 74'-11" X 28'-10" = 2159.94 SQ.FT.
C5 - 40'-1" X 12'-0" = 480.96 SQ.FT.
C6 - 40'-10" X 12'-0" = 489.96 SQ.FT.
C7 - 38'-3" X 99'-10" = 3818.49 SQ.FT.
C8 - 38'-3" X 99'-10" = 3818.49 SQ.FT.
C9 - 147'-0" X 47'-6" = 6982.50 SQ.FT.
C10 - 32'-11" X 16'-0" = 526.72 SQ.FT.
C11 - 3'-6" X 7'-9" X 2 = 54.25 SQ.FT.
C12 - 30'-3" X 11'-5" = 345.45 SQ.FT.
TOTAL = 21741.91 SQ.FT.

AREA	TOTAL AREA
CIRCULATION AREA	7044.99 SQ.FT.
PARKING & DRIVE WAY	21741.91 SQ.FT.
TOTAL GROUND FLOOR AREA =	28786.90 SQ.FT.

DETAIL OF 1ST. 2ND. & 3RD. FLOOR PARKING AREA

ONE FLOOR

A - 146'-4" X 183'-9" = 26888.13 SQ.FT.
B - 3'-2" X 183'-9" X 1 / 2 = 291.24 SQ.FT.
TOTAL = 27179.37 SQ.FT.

AREA	TOTAL AREA
PARKING & DRIVE WAY	27179.37 SQ.FT.
TOTAL ONE FLOOR AREA	27179.37 SQ.FT.

DETAIL OF APARTMENT AREA
4TH. 5TH. 6TH. 7TH. 8TH. 9TH. 10TH. & 11TH FLOOR

MAIN AREA (ONE FLOOR AREA)

1 - 27'-9" X 11'-0" = 305.25 SQ.FT.
2 - 4'-0" X 21'-5" = 85.68 SQ.FT.
3 - 8'-0" X 6'-0" = 48.00 SQ.FT.
4 - 18'-1" X 14'-0" = 253.12 SQ.FT.
5 - 23'-10" X 4'-4" = 103.18 SQ.FT.
6 - 11'-5" X 3'-11" = 44.76 SQ.FT.
7 - 5'-4" X 8'-0" = 42.64 SQ.FT.
8 - 5'-4" X 3'-6" = 18.65 SQ.FT.
9 - 10'-10" X 20'-0" = 216.60 SQ.FT.
10 - 10'-0" X 11'-5" = 114.20 SQ.FT.
11 - 43'-8" X 13'-5" = 585.91 SQ.FT.
12 - 27'-5" X 4'-6" = 123.39 SQ.FT.
13 - 6'-6" X 5'-5" = 35.23 SQ.FT.
14 - 5'-2" X 4'-0" = 20.68 SQ.FT.
15 - 8'-2" X 4'-11" = 40.19 SQ.FT.
16 - 10'-5" X 10'-7" = 110.24 SQ.FT.
17 - 10'-11" X 4'-11" = 53.72 SQ.FT.
18 - 16'-3" X 4'-6" = 73.12 SQ.FT.
19 - 10'-0" X 11'-5" = 114.20 SQ.FT.
20 - 10'-10" X 13'-5" = 145.33 SQ.FT.
21 - 5'-10" X 4'-6" = 26.23 SQ.FT.
22 - 5'-4" X 3'-6" = 18.65 SQ.FT.
23 - 5'-9" X 4'-4" = 24.89 SQ.FT.
24 - 27'-9" X 10'-6" = 291.37 SQ.FT.
25 - 18'-1" X 18'-4" = 331.40 SQ.FT.
26 - 5'-9" X 8'-0" = 46.00 SQ.FT.
27 - 11'-10" X 4'-0" = 47.32 SQ.FT.
28 - 8'-0" X 4'-0" = 32.00 SQ.FT.
29 - 3'-11" X 19'-5" = 76.12 SQ.FT.
30 - 18'-11" X 11'-11" X 2 = 451.05 SQ.FT.
31 - 2'-11" X 8'-0" X 2 = 46.72 SQ.FT.
32 - 9'-6" X 11'-11" X 2 = 226.48 SQ.FT.
33 - 27'-7" X 4'-5" X 4 = 487.61 SQ.FT.
34 - 19'-10" X 5'-3" X 2 = 208.21 SQ.FT.
35 - 17'-4" X 11'-11" X 2 = 413.14 SQ.FT.
36 - 19'-10" X 5'-3" X 2 = 208.21 SQ.FT.
37 - 27'-7" X 4'-10" X 2 = 266.42 SQ.FT.
38 - 19'-4" X 8'-6" X 2 = 328.61 SQ.FT.
39 - 6'-5" X 5'-6" X 2 = 70.62 SQ.FT.
39A - 19'-4" X 8'-6" X 2 = 328.61 SQ.FT.
40 - 9'-6" X 7'-4" X 2 = 139.27 SQ.FT.
41 - 11'-6" X 11'-10" X 2 = 272.09 SQ.FT.
42 - 2'-6" X 6'-1" X 2 = 30.40 SQ.FT.
43 - 17'-4" X 11'-10" X 2 = 410.02 SQ.FT.
44 - 18'-9" X 8'-0" X 2 = 300.00 SQ.FT.
45 - 13'-5" X 8'-10" X 2 = 236.99 SQ.FT.
46 - 4'-1" X 10'-5 1/2" X 2 = 85.35 SQ.FT.
47 - 22'-10" X 17'-5" X 2 = 795.39 SQ.FT.
48 - 6'-11" X 16'-4" X 2 = 226.00 SQ.FT.
49 - 4'-6" X 13'-0" X 2 = 117.00 SQ.FT.
50 - 5'-9" X 15'-5" X 2 = 177.33 SQ.FT.
51 - 11'-10 X 12'-0" X 2 = 283.92 SQ.FT.
52 - 23'-4" X 4'-0" = 93.32 SQ.FT.
53 - 31'-4" X 15'-5" = 483.10 SQ.FT.
54 - 6'-1" X 7'-4" X 2 = 89.13 SQ.FT.
55 - 18'-1" X 10'-6" X 2 = 379.68 SQ.FT.
56 - 7'-4" X 7'-7" = 55.56 SQ.FT.
57 - 55'-0" X 2'-11" = 160.60 SQ.FT.
58 - 3'-0" X 13'-0" X 2 = 78.00 SQ.FT.
59 - 8'-5" X 17'-11" X 2 = 301.77 SQ.FT.
60 - 12'-0" X 22'-5" X 4 = 1076.16 SQ.FT.
TOTAL = 12139.37 SQ.FT.

CIRCULATION AREA

C1 - 18'-3" X 8'-3" = 150.56 SQ.FT.
C2 - 4'-0" X 6'-0" X 2 = 48.00 SQ.FT.
C3 - 5'-3" X 6'-3" = 32.81 SQ.FT.
C4 - 4'-11" X 6'-9" X 2 = 66.42 SQ.FT.
C5 - 6'-5" X 2'-0" = 12.84 SQ.FT.
C6 - 9'-8" X 6'-3" = 60.37 SQ.FT.
C7 - 8'-3" X 12'-1" = 99.66 SQ.FT.
C8 - 5'-2" X 8'-1" = 41.77 SQ.FT.
C9 - 19'-0" X 12'-7" = 239.02 SQ.FT.
C10 - 54'-11" X 6'-7" = 361.37 SQ.FT.
C11 - 5'-4" X 2'-0" = 10.66 SQ.FT.
C12 - 6'-1" X 6'-3" = 38.00 SQ.FT.
C13 - 6'-6" X 6'-9" = 43.87 SQ.FT.
C14 - 8'-0" X 8'-3" = 66.00 SQ.FT.
C15 - 50'-11" X 9'-9" = 496.47 SQ.FT.
C16 - 6'-3" X 4'-5" X 4 = 110.50 SQ.FT.
C17 - 2'-0" X 6'-0" X 6 = 72.00 SQ.FT.
C18 - 30'-3" X 3'-8" = 110.71 SQ.FT.
C19 - 14'-3" X 6'-0" X 2 = 171.00 SQ.FT.
C20 - 6'-6" X 6'-5" X 4 = 166.92 SQ.FT.
C21 - 6'-3" X 4'-10" X 2 = 60.37 SQ.FT.
C22 - 6'-0" X 21'-5" X 2 = 257.04 SQ.FT.
C23 - 6'-0" X 22'-1" X 2 = 264.96 SQ.FT.
C24 - 4'-1" X 6'-4" X 2 = 51.65 SQ.FT.
C25 - 12'-6" X 6'-0" X 2 = 150.00 SQ.FT.
C26 - 4'-3" X 6'-4" = 26.90 SQ.FT.
C27 - 2'-0" X 6'-10" X 2 = 27.32 SQ.FT.
C28 - 1'-10" X 6'-4" = 11.58 SQ.FT.
C29 - 50'-11" X 8'-0" = 407.36 SQ.FT.
C30 - 6'-0" X 2'-0" X 2 = 24.00 SQ.FT.
C31 - 4'-0" X 6'-0" X 2 = 48.00 SQ.FT.
C32 - 5'-0" X 6'-6" X 2 = 65.00 SQ.FT.
C33 - 10'-10" X 13'-6" X 2 = 292.41 SQ.FT.
TOTAL = 4068.54 SQ.FT.

TOTAL COVERED AREA OF ONE FLOOR
TOTAL = 12139.37 + 4068.54 = 16207.91 SQ.FT.

MAIN AREA	12139.37 SQ.FT.
CIRCULATION	4068.54 SQ.FT.
TOTAL ONE FLOOR AREA	16207.91 SQ.FT.

DETAIL OF APARTMENT AREA
12TH. 13TH. 14TH. 15TH. & 16TH FLOOR

MAIN AREA (ONE FLOOR AREA)

1 - 27'-9" X 11'-0" = 305.25 SQ.FT.
2 - 4'-0" X 21'-5" = 85.68 SQ.FT.
3 - 8'-0" X 6'-0" = 48.00 SQ.FT.
4 - 18'-1" X 14'-0" = 253.12 SQ.FT.
5 - 23'-10" X 4'-4" = 103.18 SQ.FT.
6 - 11'-5" X 3'-11" = 44.76 SQ.FT.
7 - 5'-4" X 8'-0" = 42.64 SQ.FT.
8 - 5'-4" X 3'-6" = 18.65 SQ.FT.
9 - 10'-10" X 20'-0" = 216.60 SQ.FT.
10 - 10'-0" X 11'-5" = 114.20 SQ.FT.
11 - 43'-8" X 13'-5" = 585.91 SQ.FT.
12 - 27'-5" X 4'-6" = 123.39 SQ.FT.
13 - 6'-6" X 5'-5" = 35.23 SQ.FT.
14 - 5'-2" X 4'-0" = 20.68 SQ.FT.
15 - 8'-2" X 4'-11" = 40.19 SQ.FT.
16 - 10'-5" X 10'-7" = 110.24 SQ.FT.
17 - 10'-11" X 4'-11" = 53.72 SQ.FT.
18 - 16'-3" X 4'-6" = 73.12 SQ.FT.
19 - 10'-0" X 11'-5" = 114.20 SQ.FT.
20 - 10'-10" X 13'-5" = 145.33 SQ.FT.
21 - 5'-10" X 4'-6" = 26.23 SQ.FT.
22 - 5'-4" X 3'-6" = 18.65 SQ.FT.
23 - 5'-9" X 4'-4" = 24.89 SQ.FT.
24 - 27'-9" X 10'-6" = 291.37 SQ.FT.
25 - 18'-1" X 18'-4" = 331.40 SQ.FT.
26 - 5'-9" X 8'-0" = 46.00 SQ.FT.
27 - 11'-10" X 4'-0" = 47.32 SQ.FT.
28 - 8'-0" X 4'-0" = 32.00 SQ.FT.
29 - 3'-11" X 19'-5" = 76.12 SQ.FT.
30 - 18'-11" X 11'-11" X 2 = 451.05 SQ.FT.
31 - 2'-11" X 8'-0" X 2 = 46.72 SQ.FT.
32 - 9'-6" X 11'-11" X 2 = 226.48 SQ.FT.
33 - 27'-7" X 4'-5" X 2 = 243.80 SQ.FT.
34 - 19'-10" X 5'-3" X 2 = 208.21 SQ.FT.
35 - 17'-4" X 11'-11" X 2 = 413.14 SQ.FT.
36 - 19'-10" X 5'-3" X 2 = 208.21 SQ.FT.
37 - 27'-7" X 4'-10" X 2 = 266.42 SQ.FT.
38 - 19'-4" X 8'-6" X 2 = 328.61 SQ.FT.
39 - 6'-5" X 3'-1" X 2 = 39.54 SQ.FT.
40 - 9'-6" X 3'-1" X 2 = 58.52 SQ.FT.
41 - 18'-9" X 8'-0" X 2 = 300.00 SQ.FT.
42 - 13'-5" X 8'-10" X 2 = 236.99 SQ.FT.
43 - 4'-1" X 10'-5 1/2" X 2 = 85.35 SQ.FT.
44 - 22'-10" X 17'-5" X 2 = 795.39 SQ.FT.
45 - 6'-11" X 16'-4" X 2 = 226.00 SQ.FT.
46 - 4'-6" X 13'-0" X 2 = 117.00 SQ.FT.
47 - 5'-9" X 15'-5" X 2 = 177.33 SQ.FT.
48 - 11'-10 X 12'-0" X 2 = 283.92 SQ.FT.
49 - 23'-4" X 4'-0" = 93.32 SQ.FT.
50 - 31'-4" X 15'-5" = 483.10 SQ.FT.
51 - 6'-1" X 7'-4" X 2 = 89.13 SQ.FT.
52 - 18'-1" X 10'-6" X 2 = 379.68 SQ.FT.
53 - 7'-4" X 7'-7" = 55.56 SQ.FT.
54 - 55'-0" X 2'-11" = 160.60 SQ.FT.
55 - 3'-0" X 13'-0" X 2 = 78.00 SQ.FT.
56 - 8'-5" X 17'-11" X 2 = 301.77 SQ.FT.
57 - 11'-6" X 22'-5" X 2 = 515.66 SQ.FT.
58 - 12'-0" X 11'-7" X 2 = 277.92 SQ.FT.
TOTAL = 10575.49 SQ.FT.

CIRCULATION AREA

C1 - 18'-3" X 8'-3" = 150.56 SQ.FT.
C2 - 4'-0" X 6'-0" X 2 = 48.00 SQ.FT.
C3 - 5'-3" X 6'-3" = 32.81 SQ.FT.
C4 - 4'-11" X 6'-9" X 2 = 66.42 SQ.FT.
C5 - 6'-5" X 2'-0" = 12.84 SQ.FT.
C6 - 9'-8" X 6'-3" = 60.37 SQ.FT.
C7 - 8'-3" X 12'-1" = 99.66 SQ.FT.
C8 - 5'-2" X 8'-1" = 41.77 SQ.FT.
C9 - 19'-0" X 12'-7" = 239.02 SQ.FT.
C10 - 54'-11" X 6'-7" = 361.37 SQ.FT.
C11 - 5'-4" X 2'-0" = 10.66 SQ.FT.
C12 - 6'-1" X 6'-3" = 38.00 SQ.FT.
C13 - 6'-6" X 6'-9" = 43.87 SQ.FT.
C14 - 8'-0" X 8'-3" = 66.00 SQ.FT.
C15 - 50'-11" X 9'-9" = 496.47 SQ.FT.
C16 - 6'-3" X 4'-5" X 2 = 55.25 SQ.FT.
C17 - 2'-0" X 6'-0" X 4 = 48.00 SQ.FT.
C18 - 30'-3" X 3'-8" = 110.71 SQ.FT.
C19 6'-6" X 6'-5" X 2 = 83.46 SQ.FT.
C20 - 6'-3" X 4'-10" X 2 = 60.37 SQ.FT.
C21 - 6'-0" X 21'-5" X 2 = 257.04 SQ.FT.
C22 - 8'-0" X 3'-0" X 2 = 48.00 SQ.FT.
C23 - 12'-6" X 6'-5" X 2 = 160.50 SQ.FT.
C24 - 61'-0" X 6'-9" = 411.75 SQ.FT.
C25 - 4'-1" X 6'-4" X 2 = 51.65 SQ.FT.
C26 - 6'-0" X 2'-0" X 2 = 24.00 SQ.FT.
C27 - 4'-0" X 6'-0" X 2 = 48.00 SQ.FT.
C28 - 5'-0" X 6'-6" X 2 = 65.00 SQ.FT.
C29 - 10'-10" X 13'-6" X 2 = 292.41 SQ.FT.
C30 - 6'-0" X 14'-3" X 2 = 171.00 SQ.FT.
TOTAL = 3655.96 SQ.FT.

TOTAL COVERED AREA OF ONE FLOOR
TOTAL = 10575.49 + 3655.96 = 14231.45 SQ.FT.

MAIN AREA	10575.49 SQ.FT.
CIRCULATION	3655.96 SQ.FT.
TOTAL ONE FLOOR AREA	14231.45 SQ.FT.

DETAIL OF APARTMENT AREA
17TH. 18TH. 19TH. 20TH. 21ST. & 22ND. FL.

MAIN AREA (ONE FLOOR AREA)

1 27'-9" X 11'-0" = 305.25 SQ.FT.
2 - 4'-0" X 21'-5" = 85.68 SQ.FT.
3 - 8'-0" X 6'-0" = 48.00 SQ.FT.
4 - 18'-1" X 14'-0" = 253.12 SQ.FT.
5 - 23'-10" X 4'-4" = 103.18 SQ.FT.
6 - 11'-5" X 3'-11" = 44.76 SQ.FT.
7 - 5'-4" X 8'-0" = 42.64 SQ.FT.
8 - 5'-4" X 3'-6" = 18.65 SQ.FT.
9 - 10'-10" X 20'-0" = 216.60 SQ.FT.
10 - 10'-0" X 11'-5" = 114.20 SQ.FT.
11 - 43'-8" X 13'-5" = 585.91 SQ.FT.
12 - 27'-5" X 4'-6" = 123.39 SQ.FT.
13 - 6'-6" X 5'-5" = 35.23 SQ.FT.
14 - 5'-2" X 4'-0" = 20.68 SQ.FT.
15 - 8'-2" X 4'-11" = 40.19 SQ.FT.
16 - 10'-5" X 10'-7" = 110.24 SQ.FT.
17 - 10'-11" X 4'-11" = 53.72 SQ.FT.
18 - 16'-3" X 4'-6" = 73.12 SQ.FT.
19 - 10'-0" X 11'-5" = 114.20 SQ.FT.
20 - 10'-10" X 13'-5" = 145.33 SQ.FT.
21 - 5'-10" X 4'-6" = 26.23 SQ.FT.
22 - 5'-4" X 3'-6" = 18.65 SQ.FT.
23 - 5'-9" X 4'-4" = 24.89 SQ.FT.
24 - 27'-9" X 10'-6" = 291.37 SQ.FT.
25 - 18'-1" X 18'-4" = 331.40 SQ.FT.
26 - 5'-9" X 8'-0" = 46.00 SQ.FT.
27 - 11'-10" X 4'-0" = 47.32 SQ.FT.
28 - 8'-0" X 4'-0" = 32.00 SQ.FT.
29 - 3'-11" X 19'-5" = 76.12 SQ.FT.
30 - 18'-11" X 11'-11" X 2 = 451.05 SQ.FT.
31 - 2'-11" X 8'-0" X 2 = 46.72 SQ.FT.
32 - 9'-6" X 11'-11" X 2 = 226.48 SQ.FT.
33 - 27'-7" X 4'-5" X 2 = 243.80 SQ.FT.
34 - 19'-10" X 5'-3" X 2 = 208.21 SQ.FT.
35 - 17'-4" X 6'-2" X 2 = 213.85 SQ.FT.
36 - 18'-9" X 8'-0" X 2 = 300.00 SQ.FT.
37 - 13'-5" X 8'-10" X 2 = 236.99 SQ.FT.
38 - 4'-1" X 10'-5 1/2" X 2 = 85.35 SQ.FT.
39 - 22'-10" X 17'-5" X 2 = 795.39 SQ.FT.
40 - 6'-11" X 16'-4" X 2 = 226.00 SQ.FT.
41 - 4'-6" X 13'-0" X 2 = 117.00 SQ.FT.
42 - 5'-9" X 15'-5" X 2 = 177.33 SQ.FT.
43 - 11'-10 X 12'-0" X 2 = 283.92 SQ.FT.
44 - 23'-4" X 4'-0" = 93.32 SQ.FT.
45 - 31'-4" X 15'-5" = 483.10 SQ.FT.
46 - 6'-1" X 7'-4" X 2 = 89.13 SQ.FT.
47 - 18'-1" X 10'-6" X 2 = 379.68 SQ.FT.
48 - 7'-4" X 7'-7" = 55.56 SQ.FT.
49 - 55'-0" X 2'-11" = 160.60 SQ.FT.
50 - 3'-0" X 13'-0" X 2 = 78.00 SQ.FT.
51 - 8'-5" X 17'-11" X 2 = 301.77 SQ.FT.
TOTAL = 8651.32 SQ.FT.

CIRCULATION AREA

C1 - 18'-3" X 8'-3" = 150.56 SQ.FT.
C2 - 4'-0" X 6'-0" X 2 = 48.00 SQ.FT.
C3 - 5'-3" X 6'-3" = 32.81 SQ.FT.
C4 - 4'-11" X 6'-9" X 2 = 66.42 SQ.FT.
C5 - 6'-5" X 2'-0" = 12.84 SQ.FT.
C6 - 9'-8" X 6'-3" = 60.37 SQ.FT.
C7 - 8'-3" X 12'-1" = 99.66 SQ.FT.
C8 - 5'-2" X 8'-1" = 41.77 SQ.FT.
C9 - 19'-0" X 12'-7" = 239.02 SQ.FT.
C10 - 54'-11" X 6'-7" = 361.37 SQ.FT.
C11 - 5'-4" X 2'-0" = 10.66 SQ.FT.
C12 - 6'-1" X 6'-3" = 38.00 SQ.FT.
C13 - 6'-6" X 6'-9" = 43.87 SQ.FT.
C14 - 8'-0" X 8'-3" = 66.00 SQ.FT.
C15 - 50'-11" X 9'-9" = 496.47 SQ.FT.
C16 - 6'-3" X 4'-5" X 2 = 55.25 SQ.FT.
C17 - 2'-0" X 6'-0" X 2 = 24.00 SQ.FT.
C18 - 30'-3" X 3'-8" = 110.71 SQ.FT.
C19 - 6'-0" X 14'-3" X 2 = 171.00 SQ.FT.
C20 - 6'-6" X 3'-5" X 2 = 44.46 SQ.FT.
C21 - 11'-6" X 11'-5" X 2 = 262.66 SQ.FT.
C22 - 86'-8" X 6'-0" = 519.96 SQ.FT.
C23 - 4'-1" X 6'-4" X 2 = 51.65 SQ.FT.
C24 - 8'-0" X 3'-0" X 2 = 48.00 SQ.FT.
C25 - 4'-1" X 6'-0" X 2 = 48.92 SQ.FT.
C26 - 5'-0" X 6'-6" X 2 = 65.00 SQ.FT.
C27 - 10'-10" X 13'-6" X 2 = 292.41 SQ.FT.
TOTAL = 3461.84 SQ.FT.

TOTAL COVERED AREA OF ONE FLOOR
TOTAL = 8651.32 + 3461.84 = 12113.16 SQ.FT.

MAIN AREA	8651.32 SQ.FT.
CIRCULATION	3461.84 SQ.FT.
TOTAL ONE AREA	12113.16 SQ.FT.

DETAIL OF APARTMENT AREA
23TH. 24TH. 25TH. 26TH. 27TH. 28TH. 29TH. & 30TH. FLOOR.

MAIN AREA (ONE FLOOR AREA)

1 27'-9" X 11'-0" = 305.25 SQ.FT.
2 - 4'-0" X 21'-5" = 85.68 SQ.FT.
3 - 8'-0" X 6'-0" = 48.00 SQ.FT.
4 - 18'-1" X 14'-0" = 253.12 SQ.FT.
5 - 23'-10" X 4'-4" = 103.18 SQ.FT.
6 - 11'-5" X 3'-11" = 44.76 SQ.FT.
7 - 5'-4" X 8'-0" = 42.64 SQ.FT.
8 - 5'-4" X 3'-6" = 18.65 SQ.FT.
9 - 10'-10" X 20'-0" = 216.60 SQ.FT.
10 - 10'-0" X 11'-5" = 114.20 SQ.FT.
11 - 43'-8" X 13'-5" = 585.91 SQ.FT.
12 - 27'-5" X 4'-6" = 123.39 SQ.FT.
13 - 6'-6" X 5'-5" = 35.23 SQ.FT.
14 - 5'-2" X 4'-0" = 20.68 SQ.FT.
15 - 8'-2" X 4'-11" = 40.19 SQ.FT.
16 - 10'-5" X 10'-7" = 110.24 SQ.FT.
17 - 10'-11" X 4'-11" = 53.72 SQ.FT.
18 - 16'-3" X 4'-6" = 73.12 SQ.FT.
19 - 10'-0" X 11'-5" = 114.20 SQ.FT.
20 - 10'-10" X 13'-5" = 145.33 SQ.FT.
21 - 5'-10" X 4'-6" = 26.23 SQ.FT.
22 - 5'-4" X 3'-6" = 18.65 SQ.FT.
23 - 5'-9" X 4'-4" = 24.89 SQ.FT.
24 - 27'-9" X 10'-6" = 291.37 SQ.FT.
25 - 18'-1" X 18'-4" = 331.40 SQ.FT.
26 - 5'-9" X 8'-0" = 46.00 SQ.FT.
27 - 11'-10" X 4'-0" = 47.32 SQ.FT.
28 - 8'-0" X 4'-0" = 32.00 SQ.FT.
29 - 3'-11" X 19'-5" = 76.12 SQ.FT.
30 - 18'-11" X 11'-11" X 2 = 451.05 SQ.FT.
31 - 2'-11" X 8'-0" X 2 = 46.72 SQ.FT.
32 - 9'-6" X 11'-11" X 2 = 226.48 SQ.FT.
33 - 27'-7" X 4'-5" X 2 = 243.80 SQ.FT.
34 - 19'-10" X 5'-3" X 2 = 208.21 SQ.FT.
35 - 17'-4" X 6'-2" X 2 = 213.85 SQ.FT.
TOTAL = 4818.18 SQ.FT.

CIRCULATION AREA

C1 - 18'-3" X 8'-3" = 150.56 SQ.FT.
C2 - 4'-0" X 6'-0" X 2 = 48.00 SQ.FT.
C3 - 5'-3" X 6'-3" = 32.81 SQ.FT.
C4 - 4'-11" X 6'-9" X 2 = 66.42 SQ.FT.
C5 - 6'-5" X 2'-0" = 12.84 SQ.FT.
C6 - 9'-8" X 6'-3" = 60.37 SQ.FT.
C7 - 8'-3" X 12'-1" = 99.66 SQ.FT.
C8 - 5'-2" X 8'-1" = 41.77 SQ.FT.
C9 - 19'-0" X 12'-7" = 239.02 SQ.FT.
C10 - 54'-11" X 6'-7" = 361.37 SQ.FT.
C11 - 5'-4" X 2'-0" = 10.66 SQ.FT.
C12 - 6'-1" X 6'-3" = 38.00 SQ.FT.
C13 - 6'-6" X 6'-9" = 43.87 SQ.FT.
C14 - 8'-0" X 8'-3" = 66.00 SQ.FT.
C15 - 50'-11" X 9'-9" = 496.47 SQ.FT.
C16 - 6'-3" X 4'-5" X 2 = 55.25 SQ.FT.
C17 - 2'-0" X 6'-0" X 2 = 24.00 SQ.FT.
C18 - 30'-3" X 3'-8" = 110.71 SQ.FT.
C19 - 6'-0" X 14'-3" X 2 = 171.00 SQ.FT.
C20 - 6'-6" X 3'-5" X 2 = 44.46 SQ.FT.
C21 - 11'-6" X 11'-5" X 2 = 262.66 SQ.FT.
C22 - 86'-8" X 6'-0" X 2 = 1039.92 SQ.FT.
C23 - 4'-1" X 6'-4" X 2 = 51.65 SQ.FT.
C24 - 8'-0" X 3'-0" X 2 = 48.00 SQ.FT.
C25 - 4'-1" X 6'-0" X 2 = 48.92 SQ.FT.
C26 - 5'-0" X 6'-6" X 2 = 65.00 SQ.FT.
C27 10'-10" X 13'-6" X 2 = 292.41 SQ.FT.
TOTAL = 3982.80 SQ.FT.

TOTAL COVERED AREA OF ONE FLOOR
TOTAL = 4818.18 + 3982.80 = 8800.98 SQ.FT.

MAIN AREA	4818.18 SQ.FT.
CIRCULATION	3982.80 SQ.FT.
TOTAL ONE AREA	8800.98 SQ.FT.

DETAIL OF RECREATION AREA
AT 31ST. FLOOR

RECREATION AREA

R1 - 42'-6" X 18'-2" = 772.22 SQ.FT.
R2 - 22'-7" X 13'-9" = 310.47 SQ.FT.
R3 - 38'-7" X 30'-6" = 1176.69 SQ.FT.
R4 - 32'-5" X 15'-10" = 513.20 SQ.FT.
R5 - 38'-2" X 26'-5" = 1008.45 SQ.FT.
R6 - 35'-5" X 10'-1" = 357.03 SQ.FT.
R7 - 35'-11" X 17'-8" = 634.34 SQ.FT.
TOTAL = 4772.40 SQ.FT.

CIRCULATION AREA

C1 - 8'-10" X 13'-9" = 121.41 SQ.FT.
C2 - 32'-5" X 10'-7" = 343.00 SQ.FT.
C3 - 35'-2" X 4'-1" = 143.49 SQ.FT.
C4 - 37'-3" X 14'-3" = 530.81 SQ.FT.
C5 - 34'-8" X 8'-3" = 285.94 SQ.FT.
C6 - 30'-3" X 3'-8" = 110.71 SQ.FT.
TOTAL = 1535.36 SQ.FT.

TOTAL COVERED AREA AT 31ST. FLOOR
TOTAL = 4772.40 + 1535.36 = 6307.76 SQ.FT.

RECREATION AREA	4772.40 SQ.FT.
CIRCULATION	1535.36 SQ.FT.
TOTAL ONE AREA	6307.76 SQ.FT.

DETAIL OF STAIR TOWER & LIFT MACHINE ROOM AREA

1 - 32'-11" X 28'-11" = 952.04 SQ.FT.
2 - 1'-7" X 14'-9" = 23.30 SQ.FT.
3 - 2'-9" X 17'-9" = 48.81 SQ.FT.
4 - 30'-3" X 3'-8" = 110.71 SQ.FT.
TOTAL = 1134.86 SQ.FT.

MACHINE ROOM & STAIR TOWER
TOTAL AREA 1134.86 SQ.FT

SUBMISSION DRAWING	
PROPOSED BUILDING ON PLOT NO. 125 DEPOT LINE KARACHI.	
OWNER	20-06-2026
	DATE
	1/16" = 1'-0"
	SCALE
LIC. ARCHITECTS	AD-11
	DRAWN
LIC. ENGINEER	SB-125
	SCALE

Annexure-II
Environmental Testing Reports

Quality TESTING SERVICES

EPA Certified Lab
EPA/LAB/Certificate/QTS-11/2013

BUREAU VERITAS Certification

QMS/III/018 WA	
Revision : 03	Date 14.01.2021

Client Name:	**Roshan Safa Tower 2**	**Test Report No**	**EMC/QTS/TST/26/6159**
Address:	**125, Depot lines, Karachi**	**Sampling Duration**	**24hrs.**
Sampling Description	**Ambient Air Monitoring**		

PARAMETERS								
Date	**Time**	**CO (mg/m^3)**	**NO ($\mu g/m^3$)**	**NO_2 ($\mu g/m^3$)**	**SO_2 ($\mu g/m^3$)**	**PM 10 ($\mu g/m^3$)**	**PM 2.5 ($\mu g/m^3$)**	**SPM ($\mu g/m^3$)**
03.09.2026	10:00	0.11	26	22	20	113	23	236
	11:00	0.13	28	23	22	115	23	238
	12:00	0.14	29	25	23	116	25	240
	1:00	0.15	30	26	25	118	26	243
	2:00	0.16	32	28	26	120	26	246
	3:00	0.18	33	30	28	123	28	248
	4:00	0.19	35	31	29	125	30	251
	5:00	0.20	36	33	31	126	30	256
	6:00	0.22	38	35	32	128	32	259
	7:00	0.23	40	36	33	130	33	262
	8:00	0.25	42	38	35	132	33	263
	9:00	0.26	43	40	36	133	35	265
	10:00	0.28	45	41	38	135	36	268
	11:00	0.30	46	43	41	136	38	277
04.09.2026	00:00	0.31	47	44	43	138	40	273
	1:00	0.32	49	45	45	141	41	275
	2:00	0.33	51	47	47	143	43	277
	3:00	0.35	52	49	49	145	45	280
	4:00	0.38	53	52	51	147	47	283
	5:00	0.41	55	53	53	149	45	285
	6:00	0.39	52	56	56	151	44	289
	7:00	0.36	48	50	58	153	42	293
	8:00	0.32	45	47	66	152	40	296
	9:00	0.33	40	44	61	148	38	301
	10:00	0.28	37	41	62	142	35	306
MIN		0.11	26	22	20	113	23	236
MAX		0.41	55	56	66	153	47	306
AVG		0.26	41.2	39.1	40.5	134.2	35.1	268.5
SEQS		5	40	80	120	150	75	500
LDL-Limits		0ppm	0ppm	0ppm	0ppm	10 $\mu g/m^3$	2.5 $\mu g/m^3$	1 $\mu g/m^3$

Office No.505, Anum Estate Building, Opposite Duty Free Shop, Main Shahrah-e-Faisal, Karachi.
Tel. No. 92-21-34311466, 92-21-34382860, 92-21-34321532, Fax. No. 92-21-34311467

Email: info@qts.com.pk

Client Name:	**Roshan Safa Tower 2**	**Test Report No**	**EMC/QTS/TST/26/6159**
Address:	**125, Depot lines, Karachi**	**Sampling Duration**	**24hrs.**
Sampling Description	**Ambient Air Monitoring**		

ANALYTICAL TEST REPORTS

Parameter	SEQS	Unit	Avg Obtained Conc.	Methodology
Carbon Monoxide (CO)	5.0	mg/m³	**0.26**	Non-Dispersive Infra-Red (NDIR)
Nitrogen oxide (NO)	40.0	µg/m³	**41.2**	Chemiluminescence
Nitrogen Dioxide (NO_2)	80.0	µg/m³	**39.1**	
Sulphur Dioxide (SO_2)	120.0	µg/m³	**40.5**	Ultraviolet Fluorescence Method
Ozone (O_3)	130.0	µg/m³	**27.1**	Non-Dispersive UV Absorption Method
Particulate Matter (PM_{10})	150.0	µg/m³	**134.2**	β Ray Absorption Method
Particular Matter ($PM_{2.5}$)	75.0	µg/m³	**35.1**	
Suspended Particulate Matter (SPM)	500.0	µg/m³	**268.5**	

IFC=International Finance Corporation.
WHO= World Health Organization.
SEQS= Sindh Environmental Quality Standards.
µg/m3= Micrograms per Cubic Meter
mg/m3= Milligrams per Cubic Meter
LDL=Least Detection Limit
BDL=Below Detection Limits

Remarks: All the tested parameters are within SEQS Limits for Ambient Air Quality.

Sample Analyzed By: Hassan Ali	**Signature of Laboratory Incharge:** **Name : Haseeb Arshad**

Quality Testing Services Karachi Q.T.S

Quality TESTING SERVICES

EPA Certified Lab
EPA/LAB/Certificate/QTS-11/2013

QMS/III/018 WA	
Revision : 03	Date 14.01.2021

Lab Report Ref. No.: QTS/TST/26/6160 Reporting Date: 04/09/2026
Report to: **Roshan Safa Tower 2, 125, Depot lines, Karachi.**

SAMPLE DESCRIPTION

Sample ID: Noise Level Test
Sample Description: Ambient *Noise*
No. of samples: 04
Sample Collected/Submitted by: QTS Representative
Sampling Date: 03/09/2026
Sample Receipt at QTS - Date: 03/09/2026

NOISE LEVEL REPORT

S. #.	LOCATION/SOURCE	SEQS Limits: 65dB(A) *Leq		
		Noise Level Readings		
		Minimum	Maximum	Average
1	Front side Left corner Boundary	53.1	54.5	53.8
2	Front side Right corner Boundary	55.8	56.7	56.2
3	Back side Left corner Boundary	53.5	55.7	54.6
4	Back side Right corner Boundary.	56.9	57.5	57.2

SEQS=Sindh Environmental Quality Standard.
***dB (A) Leq: Time weighted average of the level of sound in decibel on scale which is relatable to human hearing.**

Terms & Conditions:

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- This report is intended only for your guidance & not for legal purpose or for advertisement.

Remarks: The Average concentration of Noise Level within SEQS Limits.

Sample Analyzed by: Hassan Ali	**Signature of Laboratory In charge:** _____ **Name: Haseeb Arshad**

Quality Testing Services Karachi Q.T.S

Office No.505, Anum Estate Building, Opposite Duty Free Shop, Main Shahrah-e-Faisal, Karachi.
Tel. No. 92-21-34311466, 92-21-34382860, 92-21-34321532, Fax. No. 92-21-34311467
Email: info@qts.com.pk

Quality TESTING SERVICES

EPA Certified Lab
EPA/LAB/Certificate/QTS-11/2013

QMS/III/018 WA	
Revision : 03	Date 14.01.2021

Report Ref. No.: QTS/TST/26/6161 Reporting Date: 04/09/2026

Report to: **Roshan Safa Tower 2, 125, Depot lines, Karachi.**

SAMPLE DESCRIPTION

Sample ID: Bore Water
Sampling Method: APHA 1060- A & B
Sample Type: Grab Sample
Sample Collected/Submitted by: QTS Representative
Sampling Date :03/09/2026
Sample Receipt at QTS - Date :03/09/2026

ANALYTICAL TEST REPORT

S. NO.	PARAMETERS TO BE ANALYZED	STANDARDS SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	pH value	6.5 – 8.5	0.01	SU	7.34	USEPA 150.1
2	Oduor	Non-Objectionable / Acceptable	-	Physical	Acceptable	Physical
3	Taste	Non-Objectionable / Acceptable	-	Physical	Acceptable	Physical
4	Color	≤ 15	1.0	TCU	BDL	APHA-2020 B/C
5	Turbidity	< 5	0.01	NTU	0.12	APHA-2130 B
6	Total Dissolved Solids (TDS)	< 1000	1.0	mg/L	**4,760**	Hach 8160
7	Total Hardness as $CaCO_3$	< 500	0.1	mg/L	**1,532**	EDTA Titration.Hach-8213
8	Fluoride (as F^-)	≤ 1.5	0.01	mg/L	0.32	USEPA 340.1
9	Chloride (as Cl^-)	< 250	0.1	mg/L	**1,221**	Hach 8206
10	Nitrate (NO_3)	≤ 0.50	0.01	mg/L	0.12	Hach -8039
11	Nitrite (NO_2)	≤ 3	0.001	mg/L	0.22	Hach - 8153
12	Cyanide (as CN-) total	≤ 0.05	0.001	mg/L	BDL	Hach 8027
13	Phenolic Compound as (Phenols)	< 0.002	0.001	mg/L	BDL	USEPA-420.1
14	Aluminum (Al)	≤ 0.2	0.001	mg/L	BDL	APHA-3111 D
15	Antimony (Sb)	≤ 0.005	0.001	mg/L	BDL	APHA-3111 B
16	Arsenic	≤ 0.05	0.01	mg/L	BDL	APHA-3120 B
17	Cadmium	0.01	0.001	mg/L	BDL	ASTM D-3557
18	Chromium, Total	≤ 0.05	0.01	mg/L	BDL	ASTM D-1687
19	Copper	2	0.01	mg/L	0.026	Hach 8506
20	Lead	≤ 0.05	0.001	mg/L	BDL	ASTM D-3559
21	Mercury	≤ 0.001	0.001	mg/L	BDL	ASTM D-3223
22	Selenium	0.01	0.001	mg/L	BDL	ASTM D-3859
23	Nickel	≤ 0.02	0.01	mg/L	BDL	ASTM D-1886
26	Boron	0.3	0.01	mg/L	BDL	ASTM D-3082
26	Residual Chlorine	0.2-0.5 at Consumer End	0.01	mg/L	0.32	Hach - 8167
26	Zinc	5.0	0.01	mg/L	0.24	USEPA 3500 Zn B
27	Manganese	≤ 0.5	0.01	mg/L	BDL	Hach 8034
28	Barium	0.7	0.01	mg/L	BDL	Hach 8014
29	Total Coliform	0cfu/100ml	0	cfu	NIL	APHA-SM9221B
30	Fecal Coliform	0cfu/100ml	0	cfu	NIL	APHA-SM9221F
31	Escherichia Coli(E-Coli)	0cfu/100ml	0	cfu	NIL	APHA-SM9221F

SEQS = Sindh Environmental Quality Standards
USEPA = United State Environmental Protection Agency method
Hach USA, method
BDL= Below Detection Limit
ND= Not Detected
LDL= Least Detectable Value

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed

Comments:

*Tested parameters are not within the SEQS limit.

Sample Analyzed by: AFAQ AHMED

Signature of Laboratory In charge:
Name: Haseeb Arshad

Quality Testing Services Karachi Q.T.S

Office No.505, Anum Estate Building, Opposite Duty Free Shop, Main Shahrah-e-Faisal, Karachi.
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Email: info@qts.com.pk

Annexure-III
Land Documents

PAKISTAN National Identity Card

ISLAMIC REPUBLIC OF PAKISTAN

Name
Muhammad Altaf

محمد الطاف

Father Name
Muhammad Hanif

محمد حنیف

Gender	Country of Stay
M	Pakistan

Identity Number	Date of Birth
42201-2111247-7	16.09.1968

Date of Issue	Date of Expiry
09.06.2026	09.06.2036



Holder's Signature

42201-2111247-7

موجودہ پتہ: مکان نمبر 203، بلاک بی، محلہ آدم جی نگر
ٹیپو سلطان روڈ، کراچی شرقی

مستقل پتہ: مکان نمبر 175، بلاک اے، محلہ آدم جی نگر
ٹیپو سلطان روڈ، کراچی شرقی

880044175069
517-86-384129

Registrar General of Pakistan

گمشدہ کارڈ ملنے پر قریبی لیٹر بکس میں ڈال دیں

MILITARY LANDS & CANTONMENT DEPARTMENT
MILITARY ESTATES OFFICE, KARACHI CIRCLE, KARACHI
252-B, Sarwar Shaheed Road, Saddar, Karachi.
Tele:021-99202220 Fax No.021-99201941 Email: meokarachi123@gmail.com

No. K-7/125/26 Dated: 06 Aug, 2026.

To

Mr. Fawad Ahmed Versiani & 05 others
R/o Bungalow No. 125, Depot Lines,
Karachi Cantt.

Subject: - **MUTATION IN RESPECT OF OPEN COMMERCIAL PLOT NO. 125, MEASURING 3588.77 SQ. YARDS, DEPOT LINES, KARACHI CANTT.**

Reference your application dated **07/07/2026**.

2. Without prejudice to the rights of the Government of Pakistan in the Ministry of Defence to resume or acquire the subject property under the law and rules in force and / or without prejudice to the right of any other claimants lawful claim over or right and / or interest in the demised property, the subject property is mutated in your name(s) in the record of this office on the basis of **Conveyance Deed** regd. as No. **2026-JMT2-Book1-1366,** dated **10/06/2026**.

3. An extract from the "General Land Register" showing the above mutation is also enclosed.

MILITARY ESTATES OFFICE KARACHI CIRCLE KARACHI

Dy. Military Estates Officer
Karachi Circle Karachi

Copy to:-

1. The Cantonment Executive Officer,
   Karachi Cantonment, **Karachi.**
2. Master File (**Land Branch**).

EXTRACT FROM
PROPOSED AMENDMENTS TO

THE GENERAL LAND REGISTER

Cantonment:- Karachi Cantt.

Survey No. 125.

		EXISTING ENTRIES
Detail and Date of Mutation. Subsidiary Survey No. Volume and Page of Register.	1 2 3	Lease hold rights of this holding transferred by the existing sub-lessee in favour of 1. Mr. Fawad Ahmed Versiani S/o Muhammad Shafi Versiani (8% share) 2. Mst. Masooma W/o Mr. Sohail (20% share) 3. Mst. Mumtaz W/o Muhammad Iqbal (10% share) 4. Muhammad Altaf S/o Muhammad Hanif (50% share) 5. Muhammad Mubashir Kaba S/o Abdul Qadeer (7% share) 6. Syed Akbar Ali S/o Syed Bara Mian (5% share) by way of Sale vide Conveyance Deed dated 10/06/2026. Authority: MEO Order dated 06/08/2026.
Area in Acres/ Sq.Yards/ Sq.Mtr.	4	**3588.77** Sq. Yards
Description.	5	Open Commercial Plot No. **125**, Depot Lines, Karachi Cantt.
Class.	6	B-3
By whom managed.	7	MEO
Landlord.	8	Government of Pakistan
Holder of occupancy rights.	9	**1. Mr. Fawad Ahmed Versiani** holding **CNIC No. 42101-1892140-7** **S/o Muhammad Shafi Versiani (8% share)** **2. Mst. Masooma** holding **CNIC No. 42201-8297587-4** **W/o Mr. Sohail (20% share)** **3. Mst. Mumtaz** holding **CNIC No. 42301-6358666-6** **W/o Muhammad Iqbal (10% share)** **4. Muhammad Altaf** holding **CNIC No.42201-2111247-7** **S/o Muhammad Hanif (50% share)** **5. Muhammad Mubashir Kaba** holding **CNIC No. 42101-9866897-3** **S/o Abdul Quadeer (7% share)** **6. Syed Akbar Ali** holding **CNIC No.42301-3821019-9** **S/o Syed Bara Mian (5% share)**
Nature of Holder's rights.	10	Lease in Schedule-IX-C of the CLA Rules, 1937
Rent Payable Per Annum — To Central Government	11	Rs. 14,356/-
Date of expiry of lease.	12	25/08/2107
Remarks	13	Conveyance Deed duly regd. as No. **2026-JMT2-Book1-1366,** dated **10/06/2026** by the Sub-Registrar-I, Saddar Town, Karachi.

Dated the 06 Aug, 2026.
Station:- Karachi .

MILITARY ESTATES OFFICE * KARACHI CIRCLE KARACHI *

DY. MILITARY ESTATES OFFICER
KARACHI CIRCLE KARACHI

Military Lands & Cantonment Deptt
Karachi Cantonment Board
259, Sarwar Shaheed Road, Karachi Cantt

Tele: (021) 99332967
Fax: (021) 99332969

No: KCB/Rev.Br/125/Depot Line/ 1432.
Dated: 23-06-2026

To,

1. Mr. Muhammad Altaf,
2. Mst. Masooma w/o Sohail,
3. Mst. Mumtaz w/o Muhammad Iqbal,
4. Mr. Fawad Ahmed Versiani,
5. Mr. Muhammad Mubashir Kaba,
6. Mr. Syed Akbar Ali,
Plot/Survey No. 125, Depot Line,
Karachi Cantt.

SUBJECT: **PROVISIONAL NO DEMAND & ASSESSMENT CERTIFICATE.**

Reference Your application received vide KCB dairy No.3972 dated 18-06-2026.

2. It is intimated that Plot/Survey No. 125, Depot Line, Karachi Cantt has been assessed at Annual Rental Value of Rs.11357/- per annum, Furthermore, nothing is outstanding on account of House Tax & Conservancy Charges paid vide Challan No. KCB-2025/26-R-111298 dated 31-12-2025 for the period from 01-07-2025 to 30-06-2026.

3. TIP Tax Paid vide Challan No. KCB-2025/26-I-9166503 dated 22 June 2026.

4. Owner/Occupant is bound to pay any tax/charges/fee etc. if any could not be recovered before 2025-26.

5. This provisional No Demand Certificate is not valid for future sale/purchase transaction and registration of any deed (Sale Deed / Conveyance Deed / Gift Deed / General Power of Attorney / Sub-General Power of Attorney / Special Power of Attorney etc.) before the concerned Registrar/Sub-Registrar.

6. You are required to mutate the subject property in your favor in the record of Military Estates Officer, Karachi Circle, Karachi and provide copy of Mutation Letter & GLR to update record in your favor in the record of this office.

NOTE:

This NDC is about House Tax, Conservancy Tax & Misc. charges & other charges payable against the Board.

This NDC is not valid for any kind of transfer between seller and purchaser. The applicant is bound to pay Transfer Tax at the time of sale and purchase.

Cantt Executive Officer,
Karachi Cantonment

Copy to:-

1. The Sub-Registrar, Saddar Town-I, Karachi.
2. The Sub-Registrar, Saddar Town-II, Karachi.
3. The Sub-Registrar, Jamshed Town-I, Karachi.
4. The Sub-Registrar, Jamshed Town-II, Karachi.
5. The Sub-Registrar, Clifton-I, Karachi.
6. The Sub-Registrar, Clifton-II, Karachi.
7. Master File.

Military Lands & Cantonment Deptt
Karachi Cantonment Board
259, Sarwar Shaheed Road, Karachi Cantt

Tele: (021) 99332967
Fax: (021) 99332969

No: KCB/Rev.Br/125/Depot Line/ 1432
Dated: 23-06-2026

To,

1. Mr. Muhammad Altaf,
2. Mst. Masooma w/o Sohail,
3. Mst. Mumtaz w/o Muhammad Iqbal,
4. Mr. Fawad Ahmed Versiani,
5. Mr. Muhammad Mubashir Kaba,
6. Mr. Syed Akbar Ali,
Plot/Survey No. 125, Depot Line,
Karachi Cantt.

SUBJECT: **PROVISIONAL NO DEMAND & ASSESSMENT CERTIFICATE.**

Reference Your application received vide KCB dairy No.3972 dated 18-06-2026.

2. It is intimated that Plot/Survey No. 125, Depot Line, Karachi Cantt has been assessed at Annual Rental Value of Rs.11357/- per annum, Furthermore, nothing is outstanding on account of House Tax & Conservancy Charges paid vide Challan No. KCB-2025/26-R-111298 dated 31-12-2025 for the period from 01-07-2025 to 30-06-2026.

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4. Owner/Occupant is bound to pay any tax/charges/fee etc. if any could not be recovered before 2025-26.

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6. You are required to mutate the subject property in your favor in the record of Military Estates Officer, Karachi Circle, Karachi and provide copy of Mutation Letter & GLR to update record in your favor in the record of this office.

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Cantt Executive Officer,
Karachi Cantonment

Copy to:-

1. The Sub-Registrar, Saddar Town-I, Karachi.
2. The Sub-Registrar, Saddar Town-II, Karachi.
3. The Sub-Registrar, Jamshed Town-I, Karachi.
4. The Sub-Registrar, Jamshed Town-II, Karachi.
5. The Sub-Registrar, Clifton-I, Karachi.
6. The Sub-Registrar, Clifton-II, Karachi.
7. Master File.

C744090

E-STAMP

حکومتِ سندھ

BOP-0238-845767

GoS-KHI-85A7920B6665E7EE

Non-Judicial

Rs 7,000/-

Description	: Power of Attorney - 27(a)
Principal	: MST. MASOOMA [42201-8297587-4]
Attorney	: MUHAMMAD ALTAF [42201-2111247-7]
Applicant	: MUHAMMAD ALTAF [42201-2111247-7]
Stamp Duty Paid by	: MUHAMMAD ALTAF [42201-2111247-7]
Issue Date	: 19-May-2026, 01:10:28 PM
Paid Through Challan	: 20266E56F78AE035
Amount in Words	: Seven Thousand Rupees Only

20/5/2026

BAN ... VERIFIED
... Y
... JAMSHED TOWN II

Please Write Below This Line

You can verify your e-Stamp paper by scanning the QR code or online at www.estamps.gos.pk using the 'Verification Through Web' option.

SUB REGISTRAR JAMSHED TOWN II

General Power Of Attorney			
Application No.	20262AA68ED98CC9	**Status**	Registry Approved
District	Karachi East	**Sub Registrar Office**	Jamshed Town-II
Registered No.	2026-JMT2-Book4-244	**Property No.**	PN-2026728F985BD07F
Registry Article	General Power Of Attorney	**Land Type**	Others
Total Property Value	7,000	**Previous Entry No.**	
Submission Date	20-05-2026	**Completion Date**	22-06-2026
Property Address	Leasehold Commercial Open Plot of Land bearing Survey No. 125 (Old No. 5), measuring 3588.77 Sq. Yards, or thereabout, Depot Lines, Karachi		

Applicant Name: Kashan Ahmed Memon

Approved By: Farooq Ahmed Shaikh - Sub-Registrar (Jamshed Town-II)

SUB REGISTRAR-II

Principal

1.

Name	FAWAD AHMED VERSIANI	Picture	Thumb Impression
CNIC	42101-1892140-7	 20-05-2026 05:25 PM	 20-05-2026 05:25 PM
NTN	--		
Passport	--		
ATL Status	Active		
Relation	S/O		
Relation Name	MUHAMMAD SHAFI VERSIANI		
Contact No.	0000-0000000		

2.

Name	MST. MASOOMA	Picture	Thumb Impression
CNIC	42201-8297587-4	 20-05-2026 05:25 PM	 20-05-2026 05:24 PM
NTN	--		
Passport	--		
ATL Status	Active		
Relation	W/O		
Relation Name	SOHAIL		
Contact No.	0000-0000000		

3.

Name	MST. MUMTAZ	Picture	Thumb Impression
CNIC	42301-6358666-6	 20-05-2026 05:23 PM	 02-06-2026 02:35 PM
NTN	--		
Passport	--		
ATL Status	Active		
Relation	W/O		
Relation Name	MUHAMMAD IQBAL		
Contact No.	0000-0000000		

4.

Name	MUHAMMAD MUBASHIR KABA	Picture	Thumb Impression
CNIC	42101-9866897-3		
NTN	--		
Passport	--		
ATL Status	Active		

5.			
Name	SYED AKBAR ALI	Picture	Thumb Impression
CNIC	42301-3821019-9	 20-05-2026 05:25 PM	 20-05-2026 05:25 PM
NTN	--		
Passport	--		
ATL Status	Active		
Relation	S/O		
Relation Name	SYED BARA MIAN		
Contact No.	0000-0000000		

Attorney					
1.					
Name	MUHAMMAD ALTAF			Picture	Thumb Impression
CNIC	42201-2111247-7			 20-05-2026 05:26 PM	 20-05-2026 05:26 PM
NTN	--				
Passport	--				
ATL Status	Active				
Relation	S/O				
Relation Name	MUHAMMAD HANIF				
Contact No.	0000-0000000				
Acre		Ghunta			
Square Yard		Square Feet			

Witnesses

ame	MUHAMMAD SUFYAN ALTAF	Picture	Thumb Impression
NIC	42201-8379040-1	 20-05-2026 05:27 PM	 20-05-2026 05:27 PM
TL Status	Active		
Relation			
Relation Name	S/O MUHAMMAD ALTAF		
Contact No.	0300-0000000		

2.

Name	MOHAMMED MINHAJ ALTAF	Picture	Thumb Impression
CNIC	42201-1643253-9	 20-05-2026 05:27 PM	 20-05-2026 05:27 PM
ATL Status	Active		
Relation			
Relation Name	S/O MOHAMMED ALTAF		
Contact No.	0300-0000000		

Fee/Tax Detail

Fee/Tax	Challan No.	Bank	Deposit Date	Paid Amount
Stamp Duty				
20266E56F78AE035				
BOP				
20-05-2026				
7000				
Registration Fee				
20269D73C901E0EC				
BOP				
20-05-2026				
500				
Scanning/Copying/Duplication Fee				
202681D2B916E48F				
BOP				
20-05-2026				
1300				

Additional Information

GENERAL POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, shall come we (1) MST. MASOOMA W/O SOHAIL Muslim, adult, (holding CNIC No. 42201-8297587-4) resident of House No. 45-B, National Stadium Block-A KDA Officers Society Karachi (holding 20% undivided share), (2) MST. MUMTAZ W/O MUHAMMAD IQBAL, Muslim, adult, (holding CNIC No. 42301-6358666-6) resident of House No. 52/1 Lane-16, Khayaban-e-Badban Phase-VII DHA Karachi, (holding 10% undivided share) (3) MR. FAWAD AHMED VERSIANI S/O MUHAMMAD SHAFI VERSIANI, Muslim, adult, (holding CNIC No. 42101-1892140-7) resident of House No. B-17-A1, Memon Complex Block-M North Nazimabad Karachi, (holding 8% undivided share), (4) MR. MUHAMMAD MUBASHIR KABA S/O ABDUL QUADEER, Muslim, adult, (holding CNIC No. 42101-9866897-3) resident of 1002 Roshan Residency, allama Iqbal Road, Karachi (holding 7% undivided share) and (5) MR. SYED AKBAR ALI S/O SYED BARA MIAN, Muslim, adult, (holding CNIC No. 42301-3821019-9) resident of House No. 111 Street No.3 Gulshan-e-Faisal Bath Island Clifton Karachi (holding 5% undivided share), do hereby nominate constitute and appoint MR. MUHAMMAD ALTAF S/O MUHAMMAD HANIF Muslim, adult, (holding CNIC No. 42201-2111247-7) resident of House No. 203 Block-B Adamjee Nagar Tipu Sultan Road Karachi (holding 50% undivided share), (hereinafter called the Attorney) the Principals and Attorney have jointly purchased an immovable property viz a Leasehold Commercial Open Plot of Land bearing Survey No. 125 (Old No. 5), measuring 3588.77 Sq. Yards, or thereabout, Depot Lines, Karachi, (hereinafter referred to as the Said Plot) as co-owners having acquired the same by way of purchase vide Conveyance Deed dated 20-5-2026 registered in the office Sub Registrar-II Jamshed Town Karachi under Registration No. 2026-JMT2-Book1-1365 dated 10-6-2026 and Attorney has undertook to develop the above Said Plot by raising a multi storey commercial project accordingly the Principals are desirous to appoint the above said Attorney as our true and lawful Attorney to act on our behalf and in our names and we have delegated and confronted following powers to the above Said Attorney:

1. To cause mutation of the Said Plot in our names in the records of Karachi Cantonment Board and Military Estate Office or any other authority or authorities and, in this connection, to sign all Applications, Deeds, Documents and appear personally and through the representatives before the Said Authorities.

2. To manage, control supervise, lookafter and deal with various matters relating to the proposed project to be developed/constructed on the above Said Plot on his sole discretion and to pay all the dues, demands, charges and expenses for construction and development of the said proposed project, to the concerned departments and contractors.

3. To apply and obtain layout plans, Building Plans, Completion Plans and Regularization Plans in respect of the project proposed to be constructed on the said plot as per rule and regulations of KMC, MPGO, SBCA, Karachi Cantonment Board and Military Estate Office and any other competent authorities, subsequently to obtain from these authorizes occupancy certificates as required prior to giving physical possession to the respective allottees of flats/shop/commercial premises which are proposed to be constructed on the aforesaid plot and also to pursue the House Building Finance Corporation or any such institution including Banks, thereby to enable the assigns, allottees of the flats and shops and Commercial Premises on the said plot to procure loan from the above finance Corporation in lieu of assigning the respective flats/shop of the allottees and indemnifying the principal with regard to the said liability.

4. To obtain NOC from the authorities concerned for advertising of the proposed project on the Said Plot.

5. To open and maintain Bank Account in any schedule Bank of Pakistan. With an unrestricted mandate to operate the account.

6. To make application to the City Government Karachi, Water and Sewerage Board, Sindh Building Control Authority or Authorities, Sui Southern Gas Company, K-Electric, PTCL and other authorities for sewerage and Electric Power and Water Connections and all other matters relating to the development of this site of the aforesaid plot and utilization thereof and to pay all taxes, cesses, dues, demands, fees charges and installments in respect of the aforesaid purpose to the concerned Departments, Authority, Body, Party, Tribunal Corporation.

7. To raise buildings or carry out construction on the Said Plot.

8. To sale, book, allocate Apartments, shops, flats, offices, showrooms and commercial premises in

9. To appear and act before all Courts whether Civil, Criminal, Revenue or special and whether original, divisional appellate or extra ordinary jurisdiction and before any Sub-Registrar or District Registrar and before the City Government, Sindh Building Control Authority for the above said purposes

10. To look after and manage the said plot.

11. To develop the said plot by raising constructions thereon after getting the building plan approved from the Competent Authority which includes SBCA/KBCA and permissions from all necessary departments i.e. Air Headquarters/Pakistan Air Force, Civil Aviation Authority, MPGO, Karachi Cantonment Board and Military Estate Office, Town Municipal Corporation (if required) for the purpose of developing a commercial/residential building on the said plot consist of showrooms/shops on the ground floor and flats and/or offices on the upper storeys.

12. To apply, for permission/exemption from the Competent Authority, and/or any other authority/authorities under the provisions of all applicable and enforceable laws of land and for the permission and/or sanction for development of the said plot and for that purpose to make any declarations, sign forms in our names and on our behalf as our Attorney shall deem fit and proper also to appear before authorities and/or State Government in connection with the said plot as aforesaid and generally to connected with the matters relating to in the manner our said Attorney may deed fit and proper and conducive in connection with the permission for development of the said plot as and generally to do various acts, deeds, matters and things connected with the matters relating to in the manner our said Attorney may deem fit and proper and conductive in connection with all matters pertaining to said plot.

13. To get the proposed building plan approved and to apply for and to obtain completion certificate, completion plan/regularization plan and occupancy certificate from the concern authorities including SBCA/KBCA/KCB and/or any other authority empowered to do so at the relevant times.

14. To sell and transfer and hand over the possession of the flats, offices, units, shops, showrooms which are proposed to be constructed on the Said-Plot on our behalf to any person which our said Attorney may deem fit.

15. To sell, transfer, convey and assign and to hand over the possession of the proposed shops/units/flats/offices/showrooms on our behalf to the proposed purchasers/allottee (if any) and in this connection to sign and execute Conveyance Deed, Sale Deed, Lease Deed, Licence Deed, Sub-Licence Deed, Release Deed, Relinquishment Deed, Gift Deed, Sub Lease, Rectification Deed, or any other instruments or documents purporting to transfer the proposed flats, offices, shop, showrooms, units etc together with proportionate undivided share, right title and interest therein Declarations, Indemnity Bond, Affidavits, Undertakings, Rectification Deed, or any other document required for the purpose of transfer of Premises, Flats, Offices, Shops, Showrooms, Units etc and to sign, execute and present the same before the concerned Sub Registrar for the purpose of registration and also to sign all other deeds, documents, writing, affidavits whatsoever as may be required by the Sub-Registrar as per prevailing procedure and applicable laws.

16. To make and prepare and/or cause to be made and prepared all such layout, sub-division, plans, specifications and designs and/or any alterations in the existing plans and/or specifications as may be necessary, required and advisable at the discretion of our said Attorney for the purpose of constructing the buildings on the said plot to Karachi Development Authority, Karachi Cantonment Board and Military Estate Office and/or any other concerned authority and/or Government of Pakistan and/or Local bodies and to engage the services of any Architect, Engineer, Consultant, or any person as may be necessary or fees and premium required for getting the plans sanctioned and do all other acts and things as may be necessary for getting the plans of the proposes building/s sanctioned by the Municipal and other building control, civil authorities and environment control authorities.

17. To sign and execute all applications, affidavit, representations, complaints, objections, forms, memorandum of appeals, agreement, undertakings, indemnity bonds, receipts, letters and all other documents of whatsoever nature in respect of the Said Plot and to present the same before the authorities concerned and to admit execution thereof.

18. To pay and discharge all ground rent, taxes, rates, assessments, charges, deductions, expenses and outgoings whatsoever due and payable or which may hereafter become due and payable for or on account of the said plot from the date of the said agreement onwards

19. To commence, carry out and complete and/or cause to be commenced and completed construction work on the said plot in accordance with the sanctioned plans and specifications and so as any construction

Commissioner, Assistant Commissioner and Commissioner and/or any other Competent Authority or authorities including but not limited to Karachi Building Control Authority/Sindh Building Control Authority, Master Planning Group Offices, Karachi Cantonment Board and Military Estate Office for the time being are strictly observed.

20. To invite offer for the purpose of construction of building structure on the said plot, to accept such offers and such consideration and on such terms and conditions as the said Attorney may in his absolute discretion deem fit, to give the construction contract of such person(s) as our said Attorney may deem fit and proper and to get all said building or structure duly completed by the said contractors and to enter into such arrangements with such and other person or persons or body or bodies whether corporate or otherwise for the purpose of development of the said plot wholly partly or in stages and for construction of building or structure thereon and/or furnishing the premises therein as the said Attorney may in his absolute discretion deem fit and to pay, the cost of building or structure and furnishing of the buildings/project to such contractors and other persons or bodies and to obtain valid receipts and discharges therefore in his own name to enter into contracts for supply of materials, labour and for all other services as may be required for development and construction of the building or structure on the said plot on such terms and conditions as our said Attorney may in his absolute discretion deem fit and proper relating with the said plot.

21. To carry on correspondence with all concerned authorities and bodies including the Government of Pakistan and its departments, the Karachi Development Authority, City District Government Karachi and/or City Survey Officer, Karachi Building Control Authority/Sindh Building Control Authority, Master Planning Group Offices, Karachi Cantonment Board and Military Estate Office for the time being in connection with the sanction of plans, obtaining of floor space index for the construction proposed to be carried out on the said plot and any other matters pertaining to the said plot.

22. To appear and represent us before any and all concerned authorities and parties as may be necessarily required and/or advisable in the sole discretion of our said Attorney for or in connection with the development of the said plot and to make such agreement(s) arrived at such arrangement as may be conducive to the development work and completing the same relating with the said plot.

23. To enter upon the said plot at any time, affix board, put barbed wire, fencing or construct a compound wall on the said plot or any portion thereof as per demarcation thereof.

24. To represent us before the public, local and/or private authorities in respect of the development of the said plot and to make such of the actions and things as may necessary for effectually commencing the said development work and completing the same.

25. To make applications for connections, electric supply and other incidental requirements which may be required for the purpose of development of the aforesaid plot.

26. To apply for refund of deposits made or to be made with the Municipal Corporation and other concerned authorities and receive the said refunds relating to the said plot.

27. To institute bring continue and prosecute and/or defend all the suits and legal proceedings including suits, appeals revisions and F.R.As, Rent Cases, Revisions, Constitution Petitions Criminal Complaints, Applications which may hereafter be filed by or against me in respect of the Said Plot and to act as Plaintiff or Defendants, Appellant or Respondent, Applicant or Opponent as the case may be on my behalf in any Court or Courts, Civil or Criminal or Revenue/Rent Controller of original jurisdiction Appellate jurisdiction, Revision jurisdiction, constitutional jurisdiction, to engage and depute, Pleaders, Lawyers Advocates or Solicitors to conduct or defend suits or other legal proceedings now pending or instituted all suits and other legal proceedings and sign and verify Vakalatnamas, appeals, Plaints Written Statements, Miscellaneous Applications, Revisions, Reviews, Constitutions Petitions and to sign and swear affidavits and other necessary papers or applications in respect of such suits and proceedings to submit to arbitration all disputes that may arise and accept such payment thereof as the said Attorney may deem fit or proper and also to sign and prefer Memos of Appeal or Revision or other proceedings in any Court or Courts and also to give evidence or cause to be given evidence to summon evidence and to fully represent me in all suits and legal proceedings before all courts, including Civil Court Rent Controller High Court of Sindh, High Courts of other Provinces, Supreme Court of Pakistan and all subordinate Courts to them as fully and effectually as we could do the same if personally present. To compromise and withdraw all the legal proceedings and to sign and verify which compromise or withdrawal application and to submit the same to concerned courts and admit such compromise or withdrawals from concerned courts.

28. To appear and act on our behalf in all the courts, civil, revenue or criminal, whether original or appellate and any other offices of Government or District Board. Municipal Board or any other local

Manage the said plot.

30. To do any act, deed or thing, as our said Attorney may deem fit and proper and necessary in the best interest of the said plot.

31. For any of the purpose mentioned hereinabove to sign all applications, appears, undertakings, terms and conditions as may be required from time to time.

32. To advertise in the newspapers and electronic media/social media for the booking of shops/units/flats/offices/showrooms in the said proposed building to be constructed to enter into agreements for the booking of such shops/units/flats/offices/showrooms and shops with the prospective allottees on and for such price or consideration and upon such terms and conditions as our said Attorney shall deem fit and proper and for the same and also to execute all such writings as may be necessary, effectually entering into the said agreements for booking of shops/units/flats/offices/showrooms and to do all such necessary acts and things as may be necessary or proper.

33. To apply for no objection certificate or necessary permissions from the Municipal Corporation (Fire Brigade Department) for occupying the said building and to do all acts, deeds or things for the said purpose.

34. And to do everything whatever which may be at the sole discretion of our said Attorney deemed fit, or expedient for book the proposed shops/units/flats/offices/showrooms of the said plot and which we ourselves could to it personally present and as if this power had not been executed merely because that the said plot in our names.

35. And general to do and cause to be done all acts, deeds, matters and things as our said Attorney shall think fit and proper for the purpose of booking of proposed shops/units/flats/offices/showrooms to be constructed on the said plot, as amply and effectual as we could have personally done as merely the said plot in our names.

36. To warn off and prohibit and if necessary, proceed against, in due form of law against all trespassers of the said plot and to take appropriate steps whether by action or otherwise and to abate all nuisances.

37. To apply for inspection and inspect documents and records, to obtain copies of documents and papers relating to the said plot.

38. To appoint advocates, lawyers, for all the matters relating to the above purpose and to fix and pay their remunerations and to terminate any such of them for any mater relating to the above purposes and to fix and pay their remunerations and to terminate any such of them said Attorney may deem proper and to likewise make such appointments.

39. And generally, to do all other acts, deeds and things relating to the aforesaid matters.

AND THEIR PRINCIPAL HEREBY AGREE TO RATIFY AND CONFIRM all and whatsoever the said Attorney may lawfully do or cause to be done by virtue of these presents.

IN WITNESS WHEREOF we have signed hereunder this _____ day of May 2026 in the presence of witnesses:-

WITNESSES:

1._____
Name: Muhammad Sufyan Altaf
CNIC No.42201-8379040-1

(1)_____

MST. MASOOMA W/O SOHAIL

CNIC No. 42201-8297587-4

2._____
Name: Mohammed Minhaj Altaf

MST. MUMTAZ W/O

MUHAMMAD IQBAL

CNIC No. 42301-6358666-6

(3)_____

FAHAD AHMED VERSIANI S/O

MUHAMMAD SHAFI VERSIANI

CNIC No. 42101-1892140-7

(4)_____

MUHAMMAD MUBASHIR KABA

S/O ABDUL QUADEER

CNIC No. 42101-9866897-3

(5)_____

SYED AKBAR ALI S/O

SYED BARA MIAN

CNIC No. 42301-3821019-9

EXECUTANTS/PRINCIPALS

Specimen Signatures of Attorney

_____

MUHAMMAD ALTAF S/O

MUHAMMAD HANIF

CNIC No. 42201-2111247-7

Annexure-IV
Soil Investigation Report

MRS. FEROZ AFAQ AHMED KHAN

REPORT
ON
GEOTECHNICAL INVESTIGATION FOR BUILDING ON PLOT OLD SURVEY 125 DEPOT LINES SADDAR, KARACHI

NOVEMBER, 2021

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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MRS. FEROZ AFAQ AHMED KHAN

REPORT
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REPORT
ON
GEOTECHNICAL INVESTIGATION
FOR BUILDING
ON PLOT OLD SURVEY NO. 125
DEPOT LINES, SADDAR
KARACHI

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APPENDIX

REPORT
ON
GEOTECHNICAL INVESTIGATION
FOR BUILDING
ON PLOT OLD SURVEY NO. 125
DEPOT LINES, SADDAR
KARACHI

1. INTRODUCTION:

Mrs. Feroz Afaq Ahmed Khan has planned to construct a building on Plot Old Survey No. 125, Depot Lines, Saddar, Karachi. The project shall comprise of lower ground plus ground plus 22 upper floors.

M/s Bashir Associates are providing consultancy services for the project.

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, 2021.

The program of investigation comprised of drilling five boreholes, varying in depth from 25.0 to 35.0 m.

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
B.E.(Civil),M.Engg.ATT.Bangkok
PEC Regn:Civ/2917 Consult/882

2. PROGRAM OF INVESTIGATION:

Field Investigation:

The program of subsurface investigation at the project site consisted of drilling five boreholes. The boring was accomplished by rotary method.

Following is the break-up of borehole depths:

Boring No.	Investigated Depth (m)
BH-1	25.0
BH-2	25.0
BH-3	25.0
BH-4	35.0
BH-5	25.0

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.

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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
- pH value
- Sulphate content
- Chloride content

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.

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3. SUBSURFACE CHARACTERISTICS:

Subsoil investigation has revealed that top 1.5-3.0m substrata consist of hard, clayey SILT, very dense, silty SAND and fragmented SANDSTONE deposits. This is underlain by friable to hard, SANDSTONE and medium hard, SILTSTONE deposits continue upto the investigated depth of 35.0 m.

Major subsurface deposits can be described as follows:

- Brown, hard, clayey SILT with interlayers of sand
- Brown, very dense, silty, fine to coarse SAND with gravel
- Brown, fragmented SANDSTONE
- Brown to Brownish gray, medium to hard, SANDSTONE
- Brown, medium hard, SILTSTONE
- Brownish gray / Grayish brown, friable to medium hard, SANDSTONE

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 7.0-8.0 m below existing ground level.

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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 Consultant, the proposed building will have lower ground level whose base will be at about 1.5 m below the existing ground level. Taking into account the subsoil condition and anticipated structural loads, it is recommended that the proposed structure be supported on **raft foundation** placed at 2.5-3.0 m 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 bearing capacity of **raft foundation** placed at 2.5-3.0 m depth below the existing ground level must be adopted as **3.50 tons/ft^2.**

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.

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4.4 Modulus of Subgrade Reaction:

Modulus of subgrade reaction at 2.5-3.0 m depth may be adopted as 140 kcf.

4.5 Seismic Coefficients:

According to the Uniform Building Code (1997), the soil profile falls in 'S_B' category corresponding to '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_B'	0.20	0.20

4.6 Cement Type:

American Concrete Institute (ACI) gives the requirements for concrete exposed to sulphate (SO_4) 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, P.E.
B.E. (Civil), M. Engg. (AIT)
AMASCE, MIE (Pak), Consult 882

Saif Ahmed Saeed
B.E.(Civil),M.Engg.ATT.Bangkok
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CERTIFICATE

This is to certify that I, Saif Ahmed Saeed, am submitting the soil investigation report for building on Plot Old Survey No. 125, Deport Lines, Saddar, Karachi, which has been carried out under my guidance and supervision. The recommended bearing capacity is given on page 5 and summarized below:

- Allowable bearing capacity of **raft foundation** placed at 2.5-3.0 m depth below the existing ground level must be adopted as **3.50 tons/ft^2.**

I certify that following conditions have been observed while performing the entire soil investigation:

1. I was present at site from 18.10.21 to 02.11.21 when field work of the subsoil investigation was in progress on above site.

2. The representative of subsoil testing laboratory Mr. Jam Miral 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
GEOTECHNICAL ENGINEER
PEC REGN No. CIV/2917

Saif Ahmed Saeed
B.E.(Civil),M.Engg.ATT.Bangkok
PEC Regn:Civ/2917 Consult/882

LIST OF REFERENCES

1. FOUNDATION ANALYSIS & DESIGN

   BY J.E. BOWLES

2. FOUNDATION DESIGN & CONSTRUCTION

   BY M.J. TOMLINSON

3. SOIL MECHANICS & FOUNDATIONS

   BY PUNMIA

4. SOIL MECHANICS

   BY LAMB & WHITMAN

5. FOUNDATION ENGINEERING

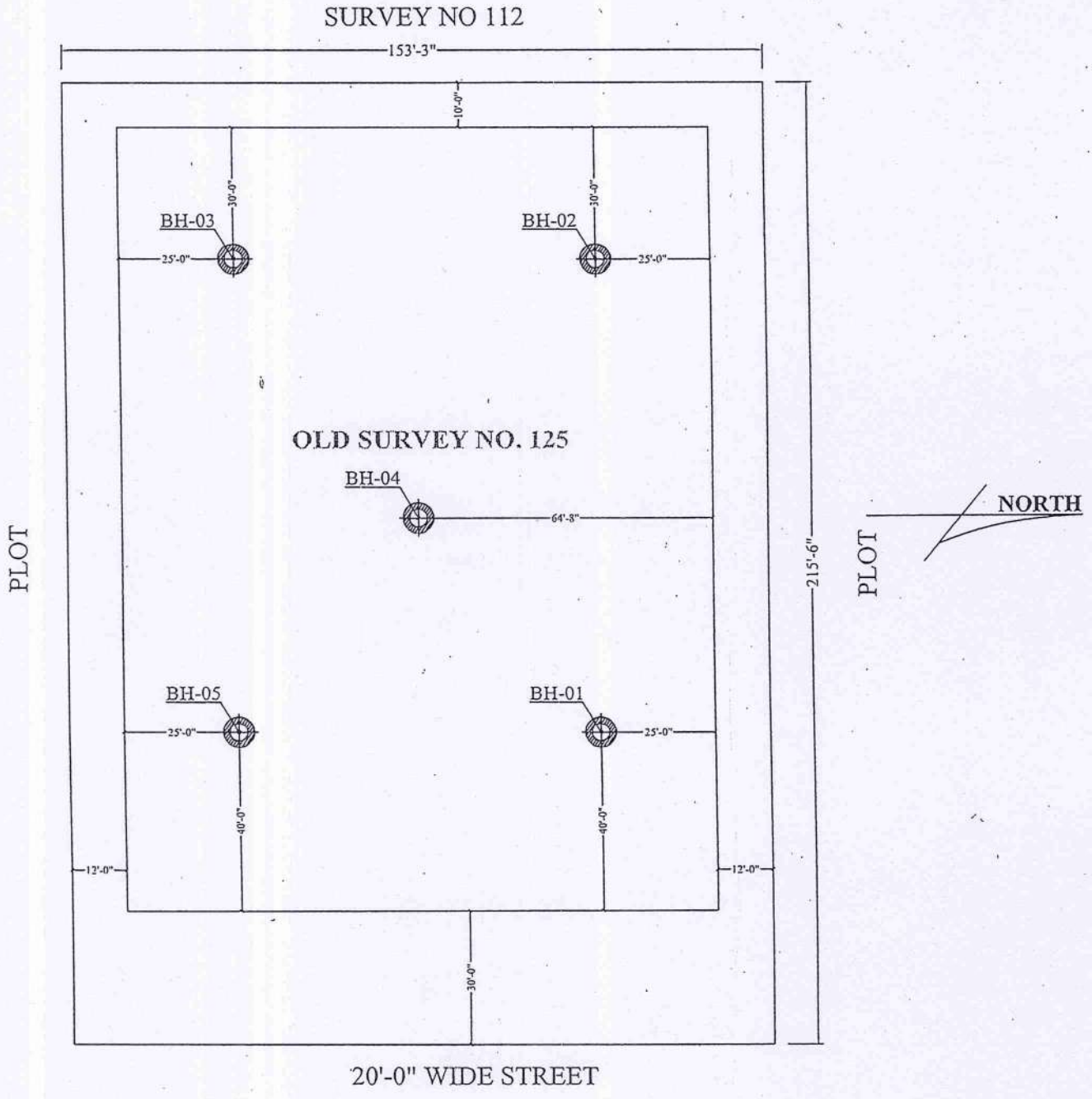
   BY PECK, HANSON &THORNBURN

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APPENDIX

BOREHOLE LOCATION PLAN

PLOT OLD. SURVEY NO. 125, DEPOT LINES
KARACHI



SERVICES

SUBSURFACE EXPLORATION LOG

Project: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth: 7.31 m

Geologist: Jam Miral

Type of Boring: ROTARY

Date: 18.10.21 To 20.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
1.0	DS SPT-1		Brown, sandy silt, trace roots		15				
1.5		ML	Brown, stiff, clayey SILT with interlayers of sand					129.37	Waxed Core 1.57-1.67
	CORE					40	07		02
	CORE					47	07		Waxed Core 3.00-3.10
									04
	CORE		Brown to Brownish gray, medium to hard, SANDSTONE			40	15	24.45	Waxed Core 4.50-4.63
	CORE					90	44		06
									Waxed Core 6.63-6.77
									Waxed Core 7.56-7.66
	CORE					56	15		08
8.7								4.92	Waxed Core 8.80-8.93
	CORE		Brown, medium hard, SILTSTONE			83	43		Waxed Core 9.04-9.18
10.5								137.91	10
	CORE		Brownish gray, friable to medium hard, SANDSTONE			72	25		Waxed Core 10.50-10.67
	CORE					53	15		12
									Waxed Core 13.07-13.20
	CORE					60	18		13.74-13.85
									14
	CORE					61	08	34.03	Waxed Core 15.55-15.67
									16
	CORE					67	07		Waxed Core 17.77-17.83
								21.57	18
	CORE					39	Nil		Waxed Core 18.10-18.17
19.5									Waxed Core 19.50-19.65
20			Brown, medium hard, SILTSTONE						20

SERVICES

Sheet 2 of 2

SUBSURFACE EXPLORATION LOG

Project: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth: 7.31 m

Geologist: Jam Miral

Type of Boring: ROTARY

Date: 18.10.21 To 20.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
21	CORE		Brown, medium hard, SILTSTONE			56	30		
	CORE		Brownish gray, medium hard, SANDSTONE			43	07		Waxed Core 21.13-21.23
	CORE					38	07	35.29	22
25	CORE					44	22		Waxed Core 23.84-23.96
			BOTTOM OF BOREHOLE						24
									Waxed Core 24.72-24.85
									25

SERVICES

Sheet 1 of 2

SUBSURFACE EXPLORATION LOG

Project PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth 7.31 m

Geologist Jam Miral

Type of Boring ROTARY

Date 21.10.21 To 22.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
1.0	DS SPT-1		Brown, sandy silt, trace roots		23				
1.5		SM	Brown, medium dense, silty, fine to coarse SAND, trace gravel						
	DS		Brown, fragmented, SANDSTONE						02
3.0	DPT-1				50/2"			170.14	
	CORE					27	07		Waxed Core 3.15-3.26
									04
	DS DPT-2				50/2"				06
	CORE					43	09	15.55	Waxed Core 6.30-6.44
									Waxed Core 7.65-7.80
	CORE					40	08		08
	CORE					63	60	41.27	Waxed Core 9.10-9.26
			Brown to Brownish gray, friable to medium hard, SANDSTONE						10
	CORE					60	40		Waxed Core 10.50-10.63
	CORE					64	20	17.56	12 Waxed Core 12.08-12.20
	CORE					63	30		Waxed Core 13.70-13.81 14
	CORE					53	40		Waxed Core 15.00-15.15 16
	CORE					59	14	19.95	Waxed Core 16.65-16.76 18
	CORE					43	09		Waxed Core 18.00-18.13
20								30.58	Waxed Core 19.50-19.67 20

SERVICES

Sheet 2 of 2

SUBSURFACE EXPLORATION LOG

Project PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth 7.31 m

Geologist Jam Miral

Type of Boring ROTARY

Date 21.10.21 To 22.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
21	CORE		Brownish gray, medium hard, SANDSTONE			40	33		
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			63	17		Waxed Core 21.46-21.58
22.5									22
	CORE		Brownish gray, medium hard, SANDSTONE			77	33		Waxed Core 23.44-23.58
	CORE							25.65	24
25						80	40		Waxed Core 24.00-24.15
			BOTTOM OF BOREHOLE						25

SERVICES

Sheet 1 of 2

SUBSURFACE EXPLORATION LOG

Project PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth 7.31 m

Geologist Jam Miral

Type of Boring ROTARY

Date 24.10.21 TO 26.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
1.5	DS DPT-1		Brownish gray, fragmented sandstone, trace gravel, trace limestone pieces		50/2"				Waxed Core 1.70-1.82
3.0	CORE	ML	Brown, hard, clayey SILT with interlayers of sand			40	08	2.64	02
4.5	CORE		Brown, hard, SANDSTONE			33	08	122.53	04 Waxed Core 4.28-4.40
	CORE		Brownish gray, friable to medium hard, SANDSTONE			51	07	21.92	Waxed Core 5.65-5.75
	CORE					47	27		06 Waxed Core 6.05-6.14
	CORE					59	16		08 Waxed Core 8.68-8.85
	CORE					41	15	14.45	Waxed Core 9.25-9.35
	CORE					50	43		10 Waxed Core 10.50-10.61
	CORE					47	20	9.93	12 Waxed Core 12.22-12.34
	CORE					71	12		Waxed Core 13.65-13.75 14
	CORE					63	28		Waxed Core 15.15-15.30 16
17	CORE								
18	CORE		Brown, medium hard, SILTSTONE			53	32	24.66	Waxed Core 17.48-17.66 18
	CORE		Grayish brown, friable to medium hard, SANDSTONE			50	16		Waxed Core 18.25-18.39
20									20

SUBSURFACE EXPLORATION LOG

Project: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth: 7.31 m

Geologist: Jam Miral

Type of Boring: ROTARY

Date: 24.10.21 To 26.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
	CORE		Grayish brown, friable to medium hard, SANDSTONE			53	37	21.52	Waxed Core 20.80-20.95
	CORE					53	15		Waxed Core 21.00-21.11
	CORE					49	33		Waxed Core 22.50-22.61
	CORE					40	27	13.01	Waxed Core 24.00-24.15
25			BOTTOM OF BOREHOLE						

22

24

25

SERVICES

Sheet 1 of 2

SUBSURFACE EXPLORATION LOG

Project: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth: 7.92 m

Geologist: Jam Miral

Type of Boring: ROTARY

Date: 27.10.21 To 29.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
1.5	DS DPT-1	SM	Brown, very dense, silty, fine to coarse SAND with gravel		50/3"				
3.0	DS DPT-2		Brown, fragmented SANDSTONE with gravel		50/2"				02
	CORE		Brownish gray, friable to medium hard, SANDSTONE			20	07	83.09	04 Waxed Core 4.39-4.50 4.95-5.09
	CORE					60	27		Waxed Core 5.77-5.90
	CORE					97	57	23.60	06 Waxed Core 6.10-6.22
	CORE					60	33		08 Waxed Core 8.64-8.80
	CORE					60	19		10
11	CORE					30	09	12.65	Waxed Core 10.33-10.47 10.50-10.63
	CORE		Brown, medium hard, SILTSTONE			99	60	11.58	12 Waxed Core 12.26-12.38
	CORE					90	40		Waxed Core 13.75-13.88
14	CORE		Grayish brown / Brownish gray, friable to medium hard, SANDSTONE			85	31	20.89	14 Waxed Core 14.61-14.80 Waxed Core 15.00-15.10
	CORE					99	16		16 Waxed Core 16.80-16.92
	CORE					99	31		18
20								47.83	Waxed Core 19.34-19.45 20

SERVICES

Sheet 2 of 2

SUBSURFACE EXPLORATION LOG

Project: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth: 7.92 m

Geologist: Jam Miral

Type of Boring: ROTARY

Date: 27.10.21 to 29.10.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
21	CORE		Brown, medium hard, SANDSTONE			67	53		Waxed Core 20.58-20.75
	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			31	11		22 Waxed Core 22.33-22.50
	CORE					37	10	63.16	Waxed Core 23.77-23.92
	CORE					49	24		24
	CORE					40	13	15.71	Waxed Core 25.17-25.33 26 Waxed Core 26.67-26.77
28.5	CORE					40	30		Waxed Core 27.10-27.35 28
	CORE		Brown, medium hard, SILTSTONE with interlayers of sandstone			61	25		Waxed Core 29.68-29.85 30
	CORE					65	20	17.88	Waxed Core 31.24-31.42 31.50-31.65
33	CORE					57	31	14.96	32
	CORE		Brownish gray, friable to medium hard, SANDSTONE			60	47		Waxed Core 33.00-33.15 34
35			BOTTOM OF BOREHOLE						35

GEOTECHNICAL SERVICES

Bore Hole No _____

Sheet 1 of 2

SUBSURFACE EXPLORATION LOG

Project PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth 7.49 m

Geologist Jam Miral

Type of Boring ROTARY

Date 31.10.21 TO 02.11.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
1.5	DS DPT-1		Brown, fragmented sandstone		50/2"			106.51	Waxed Core 1.50-1.56
	CORE		Brown, medium to hard, SANDSTONE			33	Nil	128.60	02
	CORE					40	07		Waxed Core 3.00-3.10
	CORE					57	07	105.34	04
	CORE					53	15		Waxed Core 5.83-5.93
	CORE					60	13	49.55	06
	CORE					43	09		Waxed Core 7.18-7.30 7.60-7.70
10.5									08
12	CORE		Brown, medium hard, SILTSTONE with interlayers of sand			95	40		Waxed Core 9.07-9.20
	CORE		Brownish gray, friable to medium hard, SANDSTONE			99	45		10
	CORE					70	48	18.28	Waxed Core 11.80-11.90
	CORE					80	74		12
16.5								10.10	Waxed Core 12.22-12.34
18	CORE		Brown, medium hard, SILTSTONE			40	Nil		Waxed Core 13.31-13.50
	CORE		Brownish gray, friable to medium hard, SANDSTONE			32	15		14
20								8.17	Waxed Core 15.27-15.43 15.30-15.50
									16
									Waxed Core 16.50-16.58
									18
									Waxed Core 18.07-18.28
									Waxed Core 19.50-19.64
									20

SERVICES.

Sheet 2 of 2

SUBSURFACE EXPLORATION LOG

Project PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

Ground Water Depth 7.49 m

Geologist Jam Miral

Type of Boring ROTARY

Date 31.10.21 TO 02.11.21

Depth (m)	Sample No.	CLASSIFICATION	STRATUM DESCRIPTION	Dia of Casing /Hole	SPT 'N'	Percent Recovery	R.Q.D.	Unconfined Compression (kg/sq.cm)	REMARKS (m)
	CORE		Brownish gray, friable to medium hard, SANDSTONE			40	24		
	CORE					37	33		Waxed Core 21.00-21.20
	CORE					47	14	13.01	22 Waxed Core 22.70-22.81
25	CORE					54	26		24 Waxed Core 24.08-24.20
			BOTTOM OF BOREHOLE						25

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PROJECT: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

DATE: Nov. 18, 2021.
L.R. No.: 686/21

GRAIN SIZE ANALYSIS (PER CENT FINER BY WEIGHT)
SIEVE SIZES IN mm

HYDROMETER
(DIA IN mm)

BH NO.	SAMPLE	DEPTH (m)	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
BH-2	SPT-1	1.00	-	-	-	100	97	94	90	86	77	62	47	38	22	10	03

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DATE: Nov. 18, 2021.
L.R. No.: 686/21

ATTERBERG LIMITS / MOISTURE CONTENT

S.NO.	BORING NO.	SAMPLE	DEPTH (m)	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT (%)
1.	BH-1	Waxed Core	8.80-8.93	35	12	16.69
2.	BH-1	Core	18.00-19.50	30	08	7.12
3.	BH-3	Waxed Core	1.70-1.82	37	13	10.76
4.	BH-4	Waxed Core	12.26-12.38	38	13	13.51
5.	BH-4	Waxed Core	23.77-23.92	30	10	9.60
6.	BH-4	Waxed Core	26.67-26.77	31	11	13.39
7.	BH-5	Waxed Core	16.50-16.58	35	12	10.38

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PROJECT: PLOT OLD SURVEY NO. 125, DEPOT LINES, SADDAR, KARACHI

DATE: Nov. 18, 2021.
L.R. No.: 686/21
SHEET 1 OF 2

UNCONFINED COMPRESSION / BULK DENSITY

S.NO.	BORING NO.	SAMPLE	DEPTH (m)	UNCONFINED COMPRESSION		BULK DENSITY (gm/cc)
				qu (kg/cm^2)	STRAIN (%)	
1.	BH-1	Waxed Core	1.57-1.67	129.37	1.68	2.333
2.	BH-1	Waxed Core	4.50-4.63	24.45	2.03	2.251
3.	BH-1	Waxed Core	8.80-8.93	4.92	8.54	2.103
4.	BH-1	Waxed Core	10.50-10.67	137.91	1.60	2.337
5.	BH-1	Waxed Core	15.55-15.67	34.03	2.09	2.291
6.	BH-1	Waxed Core	18.10-18.17	21.57	2.26	2.219
7.	BH-1	Waxed Core	23.84-23.96	35.29	2.18	2.305
8.	BH-2	Waxed Core	3.15-3.26	170.14	1.51	2.335
9.	BH-2	Waxed Core	6.30-6.44	15.55	2.77	2.163
10.	BH-2	Waxed Core	9.10-9.26	41.27	2.14	2.312
11.	BH-2	Waxed Core	12.08-12.20	17.56	2.69	2.179
12.	BH-2	Waxed Core	16.65-16.76	19.95	2.64	2.213
13.	BH-2	Waxed Core	19.50-19.67	30.58	1.84	2.261
14.	BH-2	Waxed Core	24.0-24.15	25.65	2.27	2.260
15.	BH-3	Waxed Core	1.70-1.82	0.64	9.41	2.062
16.	BH-3	Waxed Core	4.28-4.40	122.53	1.67	2.333
17.	BH-3	Waxed Core	5.65-5.75	21.92	1.19	2.231
18.	BH-3	Waxed Core	9.25-9.35	14.45	2.50	2.170
19.	BH-3	Waxed Core	12.22-12.34	9.93	2.57	2.142
20.	BH-3	Waxed Core	17.48-17.66	24.66	2.33	2.254

.....cont'd

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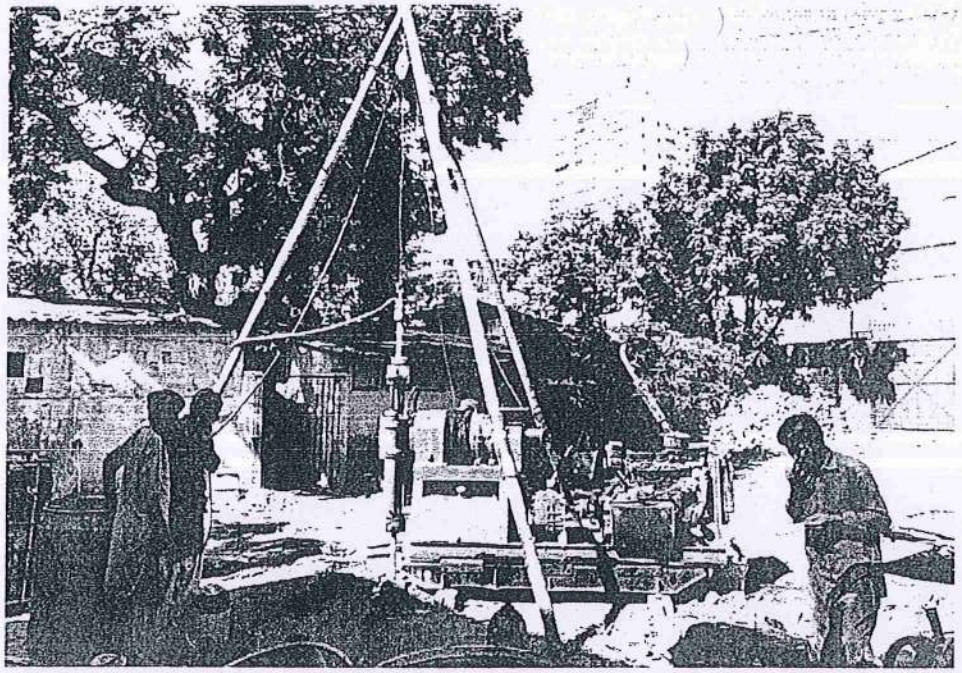
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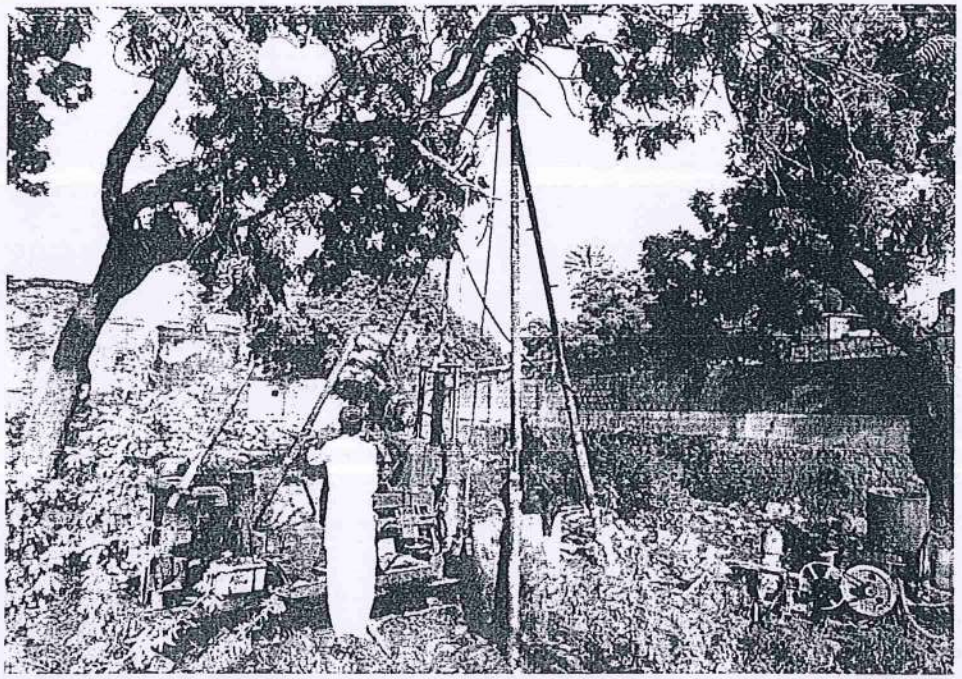
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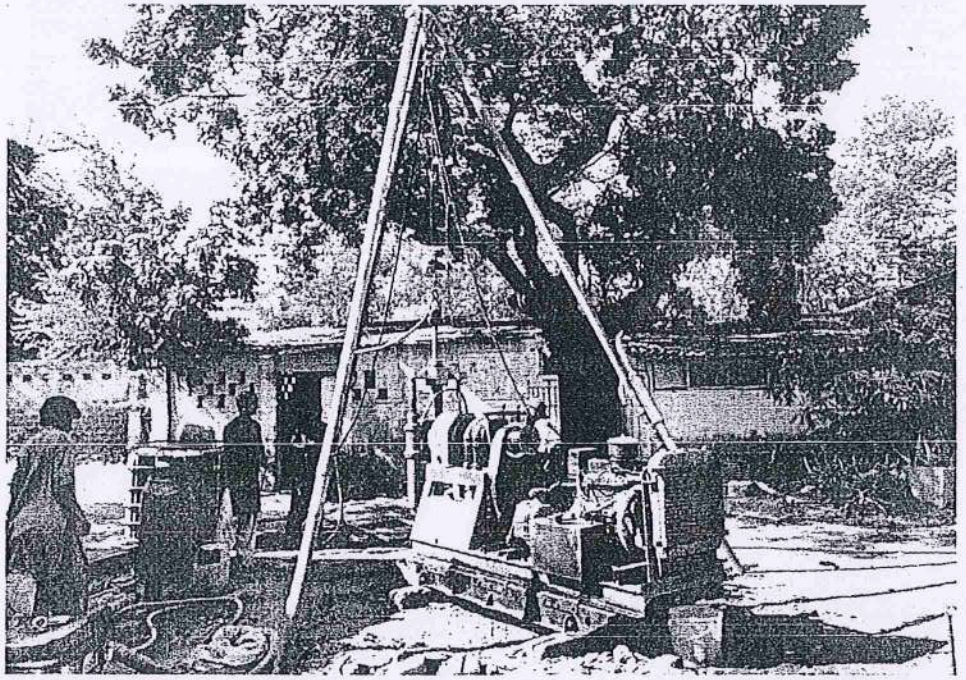
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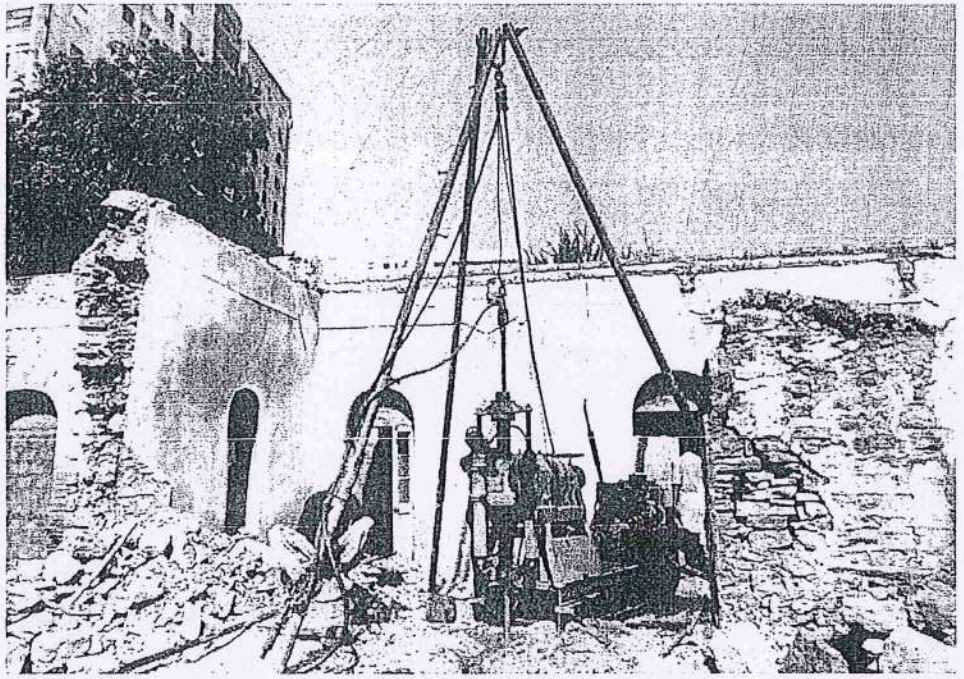
UNCONFINED COMPRESSION / BULK DENSITY

S.NO.	BORING NO.	SAMPLE	DEPTH (m)	UNCONFINED COMPRESSION		BULK DENSITY (gm/cc)
				qu (kg/cm^2)	STRAIN (%)	
21.	BH-3	Waxed Core	20.80-20.95	21.52	1.31	2.223
22.	BH-3	Waxed Core	24.00-24.15	13.01	1.30	2.160
23.	BH-4	Waxed Core	4.39-4.50	83.09	1.58	2.321
24.	BH-4	Waxed Core	6.10-6.22	23.60	1.31	2.243
25.	BH-4	Waxed Core	10.33-10.47	12.65	2.40	2.160
26.	BH-4	Waxed Core	12.26-12.38	11.58	2.98	2.151
27.	BH-4	Waxed Core	15.00-15.10	20.89	1.43	2.220
28.	BH-4	Waxed Core	19.34-19.43	47.83	1.21	2.301
29.	BH-4	Waxed Core	23.77-23.92	63.16	1.46	2.310
30.	BH-4	Waxed Core	26.67-26.77	15.71	1.34	2.174
31.	BH-4	Waxed Core	31.24-31.42	17.88	2.52	2.199
32.	BH-4	Waxed Core	33.00-33.15	14.96	1.26	2.166
33.	BH-05	Waxed Core	1.50-1.56	106.51	1.32	2.333
34.	BH-05	Waxed Core	3.00-3.10	128.60	1.28	2.335
35.	BH-05	Waxed Core	5.83-5.93	105.34	1.35	2.332
36.	BH-05	Waxed Core	7.60-7.70	49.55	1.21	2.305
37.	BH-05	Waxed Core	13.31-13.50	18.28	1.22	2.201
38.	BH-05	Waxed Core	16.50-16.58	10.10	3.99	2.155
39.	BH-05	Waxed Core	19.50-16.64	8.17	3.87	2.140
40.	BH-05	Waxed Core	22.70-22.81	14.11	1.25	2.167









Annexure-V
Traffic Impact Study



Traffic Impact Study for

Roshan Safa Tower II, Karachi

September, 2026

Exponent Engineers

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1 INTRODUCTION

1.1 Project Overview:

Man has been associated with several different activities since the inception of mankind, but travelling is the most primary activity performed by man for fulfilling his basic needs of life. Since ages the modes of travelling have been transformed with integrating demands and purposes for travel. Thus, it is not audacious to state that almost every human activity is always related with a travelling need, even when driving from one place to another for leisure, the reason for travel still exists. Enlightening the above statement, characteristics of the trips produced or attracted reveal that there are many reasons behind these and therefore trips can be classified based on reason to travel.

The above discussion suggests that all land use-based activities produce trips and thus have some impact / contribution on the traffic network in the vicinity or 'Influence Area'. However, size of this Influence Area depends on factors such as the magnitude of human activity, placement along the existing traffic network, number of trips generated and / or attracted, existing traffic situation in the area, and socio-economic characteristics of the area as well as of the people involved in the activities, etc.

The proposed project, Roshan Safa Tower II, is a residential high-rise development. The building comprises three basement levels dedicated to parking, along with parking and vehicular circulation at the ground floor, and additional parking floors from the 1st to the 3rd floor. The residential apartments are located from the 4th to the 30th floor, while the 31st floor is reserved for recreational amenities. Owing to the residential nature of the development and the concentration of parking within the lower levels, the project is expected to generate and attract trips, particularly during morning and evening peak hours. The proposed site is located in Saddar, Karachi, situated between Mansfield Street and Armenian Street, with both vehicular access and egress provided via Armenian Street.

1.2 Objectives and Scope of Study:

The study aims to analyse the impact of the generated traffic from/to the proposed development on the performance level of the traffic on the surrounding roadway network. It aims to find a smooth circulation pattern for vehicles under normal and emergency situation within the project boundary wall. Furthermore, it finds a smooth access between the proposed development and the surrounding roads and to identify what improvements may be required to adequately and safely

accommodate the generated traffic. Subsequent sections of report describe and elaborate the adopted methodology in further details. Whereas the following are the main scope of work considered during the study.

1.2.1 Trip Generation/Attraction & Distribution:

- Estimation & validation of trips generated/attracted by the project as per Sindh Building Control Authority (SBCA).
- Trip distribution is being carried out based on the actual traffic circulation in the vicinity with the help of traffic surveys conducted on various locations. On-site traffic patterns were also being observed to carry out trip distribution.

1.2.2 Access & Egress Analysis:

- Study traffic circulation around the project roads and intersections.
- Analyze and make recommendations for traffic mitigations required in project analysis zone.

1.3 Site Location:

Roshan Safa Tower II is strategically located in the heart of Karachi's Central Business District (CBD) in Saddar. The project is situated on a prime site between Mansfield Street and Armenian Street, with a total plot area of 31,794.12 square feet. The facility's access and egress are provided via Armenian Street, which serves as the primary approach route to the site and connects with the surrounding CBD road network that experiences substantial traffic activity.

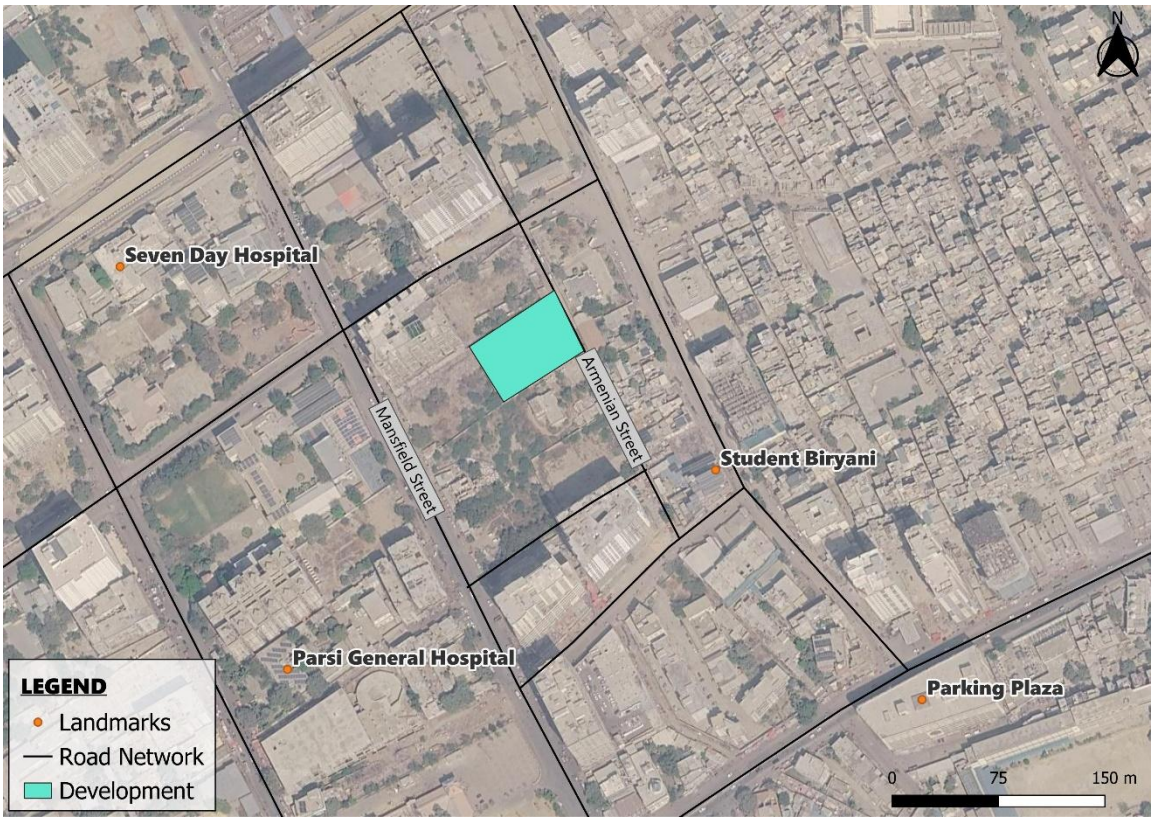


Figure 1-1 Project Location

1.4 Site Access & Egress Plan:

As discussed, the project is located between Mansfield Street and Armenian Street, and the access and egress to the development is through Armenian Street, as shown in the figure below, which is on the front side of the plot.

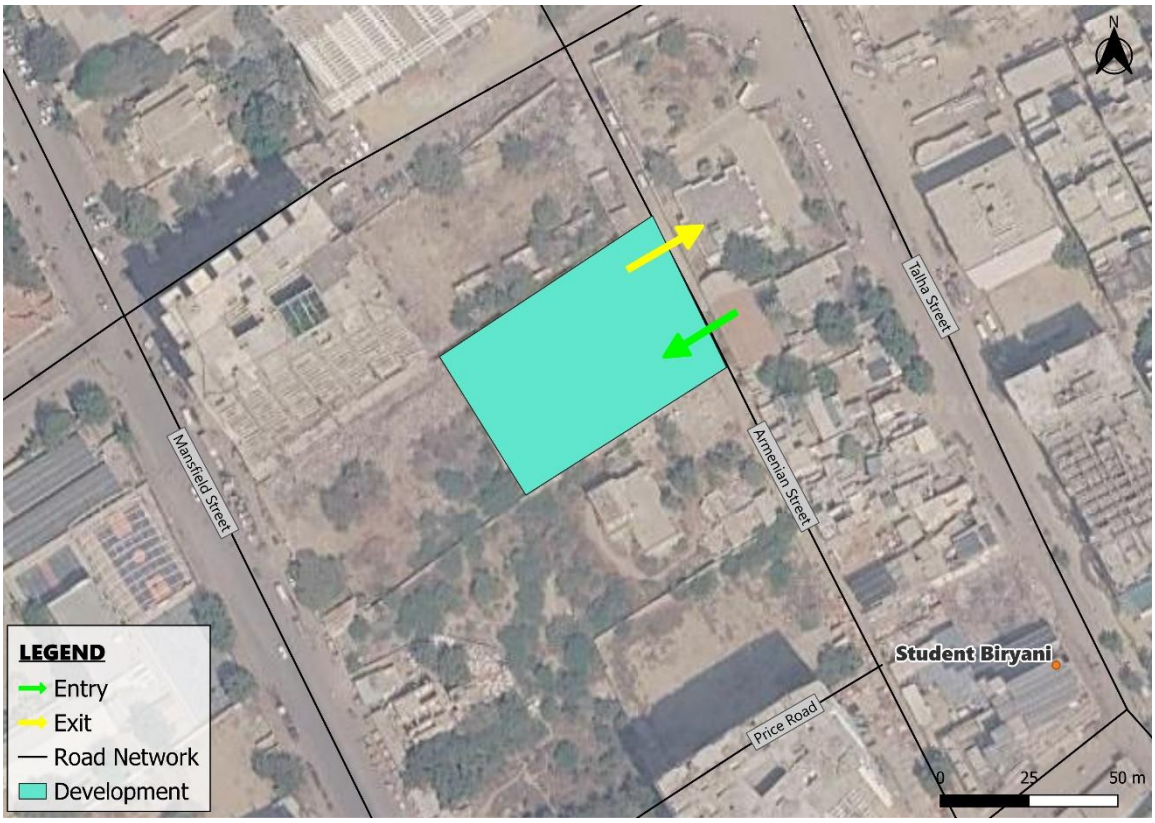


Figure 1-2 Site Entrance & Exit Plan

1.5 Land Use and Area Bifurcation:

The proposed development, Roshan Safa Tower II, is a residential high-rise comprising a 31-story structure with three basement levels:

- Basement 1-3: Parking facilities
- Ground Floor: Parking and circulation
- Floors 1–3: Parking facilities
- Floors 4–30: Residential apartments
- Floor 31: Recreational amenities

This residential development is designed to maximise the site's potential in this prime CBD location in Saddar, providing organised parking in the lower levels, residential units across the main tower floors, and recreational facilities at the top.

Table 1-1 Proposed Land Use

S. No.	Floor	Land Use	Area (sq. ft.)
1	Basement 3	Parking	31,794.12
2	Basement 2	Parking	31,794.12
3	Basement 1	Parking	31,794.12
4	Ground Floor	Circulation & Parking	28,786.90
5	1st Floor	Parking	27,179.37
6	2nd Floor	Parking	27,179.37
7	3rd Floor	Parking	27,179.37
8	4th Floor	Residential	16,207.91
9	5th Floor	Residential	16,207.91
10	6th Floor	Residential	16,207.91
11	7th Floor	Residential	16,207.91
12	8th Floor	Residential	16,207.91
13	9th Floor	Residential	16,207.91
14	10th Floor	Residential	16,207.91
15	11th Floor	Residential	16,207.91
16	12th Floor	Residential	14,231.45
17	13th Floor	Residential	14,231.45
18	14th Floor	Residential	14,231.45
19	15th Floor	Residential	14,231.45
20	16th Floor	Residential	14,231.45
21	17th Floor	Residential	12,113.16
22	18th Floor	Residential	12,113.16
23	19th Floor	Residential	12,113.16
24	20th Floor	Residential	12,113.16
25	21th Floor	Residential	12,113.16
26	22th Floor	Residential	12,113.16
27	23th Floor	Residential	8,800.98
28	24th Floor	Residential	8,800.98
29	25th Floor	Residential	8,800.98
30	26th Floor	Residential	8,800.98
31	27th Floor	Residential	8,800.98
32	28th Floor	Residential	8,800.98
33	29th Floor	Residential	8,800.98
34	30th Floor	Residential	8,800.98
35	31st Floor	Recreational	6,307.76
36	Roof	Stair Tower & Machine Room	1,134.86
Total			**557,057.32**

1.6 Study Area:

The extent of the study area is determined by identifying the intersections in the vicinity of the proposed development on which the traffic generated by the project may have a significant impact. The study area considered for the Traffic Impact Study (TIS) is presented in the relevant figure. The project site for Roshan Safa Tower II is located in Saddar, Karachi, situated between Mansfield Street and Armenian Street, with both vehicular access and egress provided via Armenian Street. Accordingly, the key junctions on Armenian Street and its immediate connecting streets will be assessed, as these intersections will be critical for traffic entering and exiting the development from the surrounding CBD network.

In addition to the above, the following factors are considered in defining the study area boundary:

- Project site location with respect to regional traffic movements.
- Existing travel patterns in the surrounding road network.
- Local traffic constraints such as one-way operations, on-street parking, road closures, and other access restrictions.

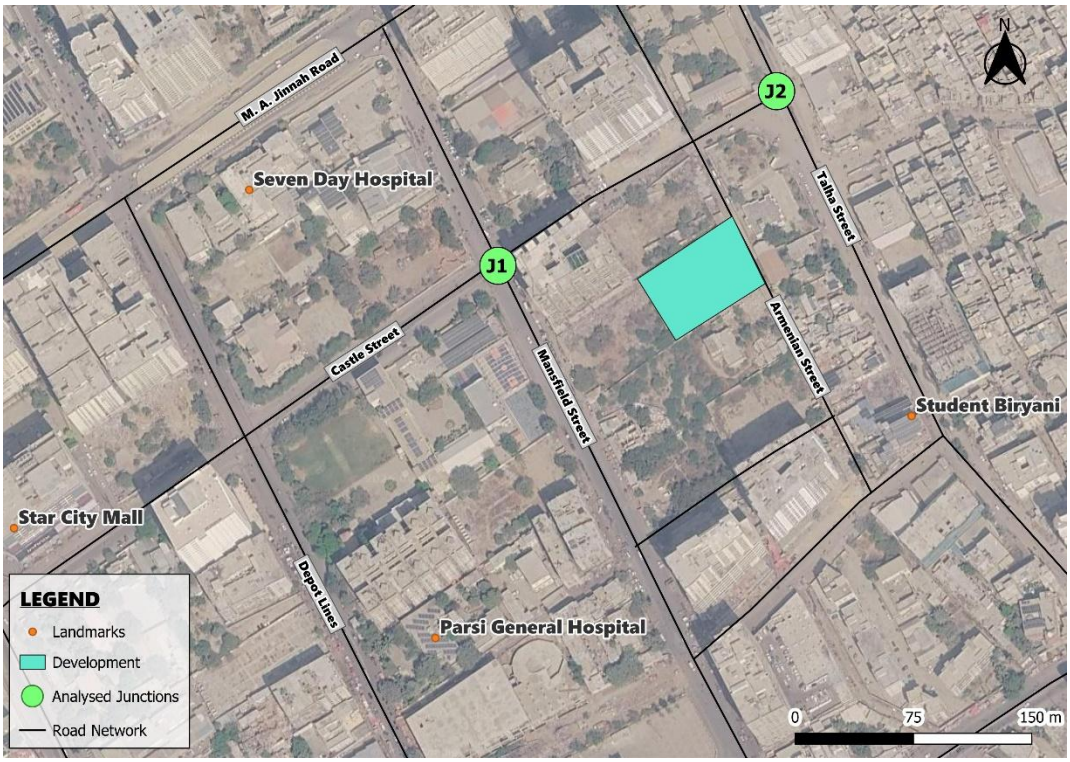


Figure 1-3 Study Area & Analyzed Junctions

1.7 Existing Road Infrastructure:

The project is located between Mansfield Street and Armenian Street. The existing major roads surrounding the proposed project are presented in the figure below.



Figure 1-4 Existing Road Infrastructure

2 EXISTING TRAFFIC

2.1 Introduction:

This part of the report discusses existing traffic conditions within the study area. This chapter summarizes information gathered from different field surveys, manual and automated traffic movement counts. Manual counts were conducted on identified critical intersections within the study area.

2.2 Field Surveys:

The survey locations were identified on the basis of their criticality in the network within the study area, whereas stated above these surveys were conducted via manual counts.

The turning movement counts (TMC) were conducted on 2 different junctions (J1 & J2) within the study area as shown in the Figure 2-1, that will be analyzed in the project vicinity.

2.3 Traffic Surveys Results:

The outcomes of traffic data collection for each survey location are summarized as under:

2.3.1 Flow Characteristics:

This refers to estimating of the following traffic parameters:

- Traffic Volume (Turning Movement Counts)
- Peak Hour

- **Traffic Volume**

Turning Movement Counts were conducted on 2 locations. Figure 2-2 and Figure 2-3 presents summarization of traffic volumes during morning & evening peak hours on typical weekday.

- **Peak Hour**

As stated in the introduction, the development under study is a residential land use. Accordingly, based on the cumulative analysis of field traffic data obtained from turning movement counts, the AM peak hour (08:00–09:00) and the PM peak hour (17:00–18:00) were identified as the most critical periods, as they represent the times when the combined effect of background traffic and project-generated traffic is expected to be highest.

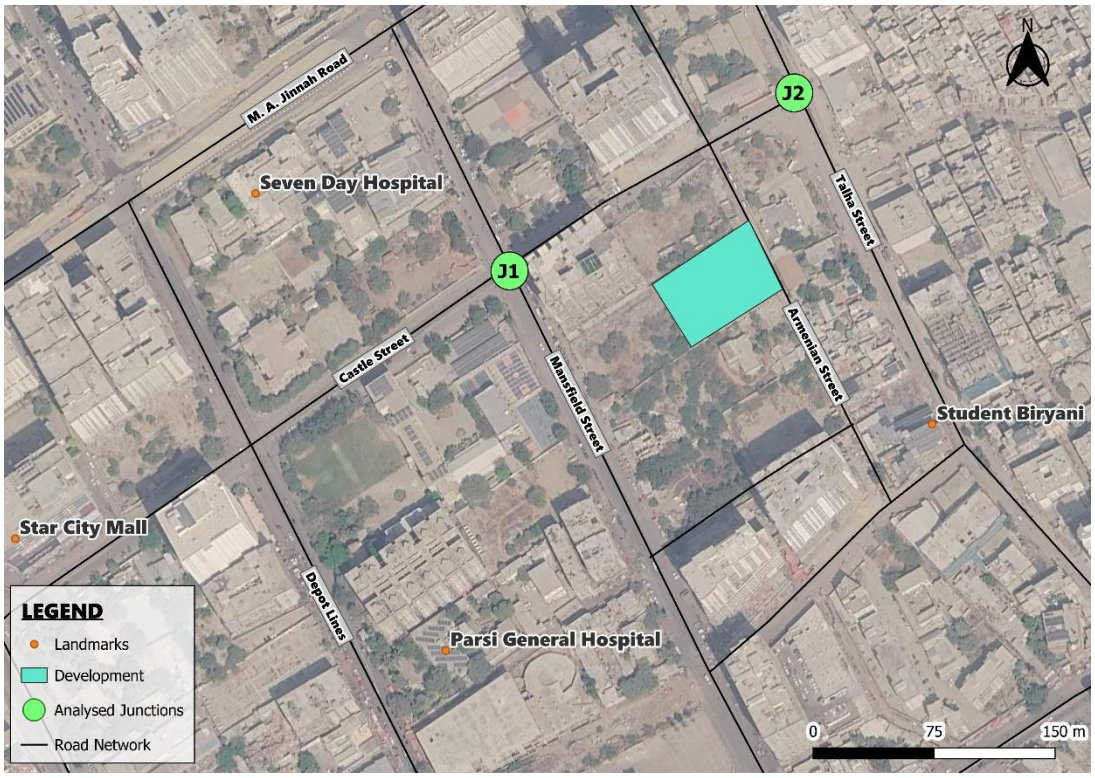


Figure 2-1 Turning Movement Counts Locations

These junctions are analyzed individually in order to depict the effect of these intersections on the network.

Classified turning movement counts (TMCs) were conducted at the two key study intersections in the immediate vicinity of Roshan Safa Tower II to establish existing traffic demand and turning patterns. The counts were undertaken during the critical AM (08:00–09:00) and PM (05:00–06:00) peak hours. The observed turning volumes for both intersections are presented below and form the basis for the subsequent operational and capacity assessment.

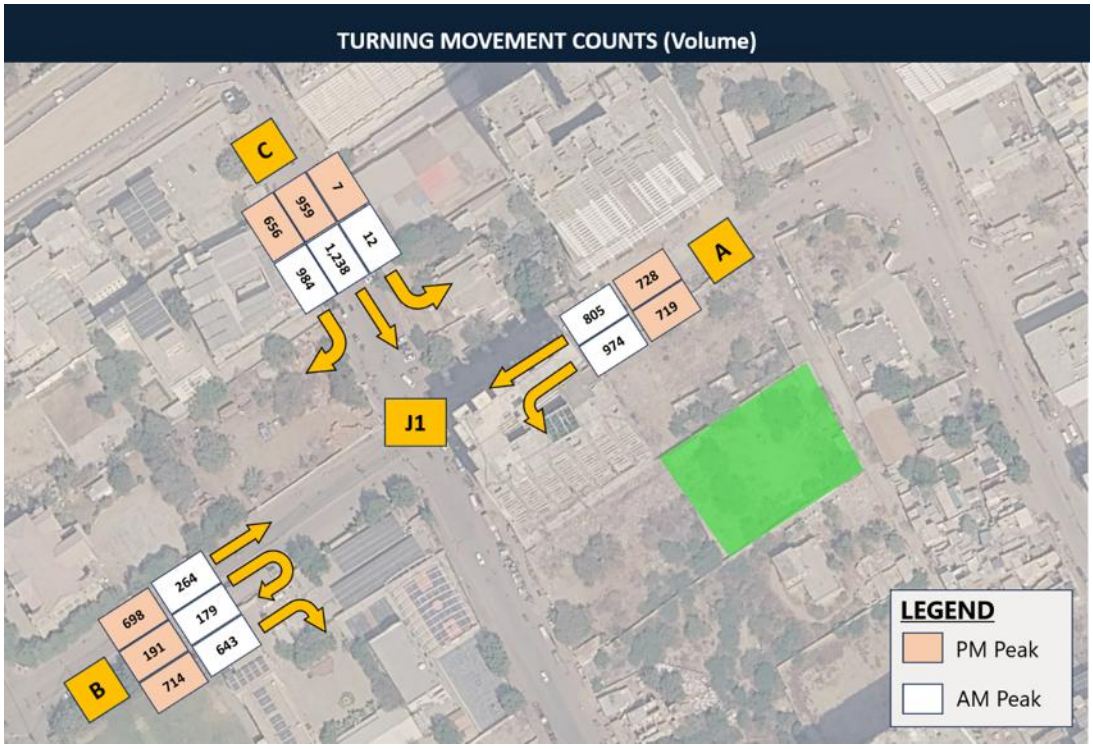


Figure 2-2 Traffic Volumes J1

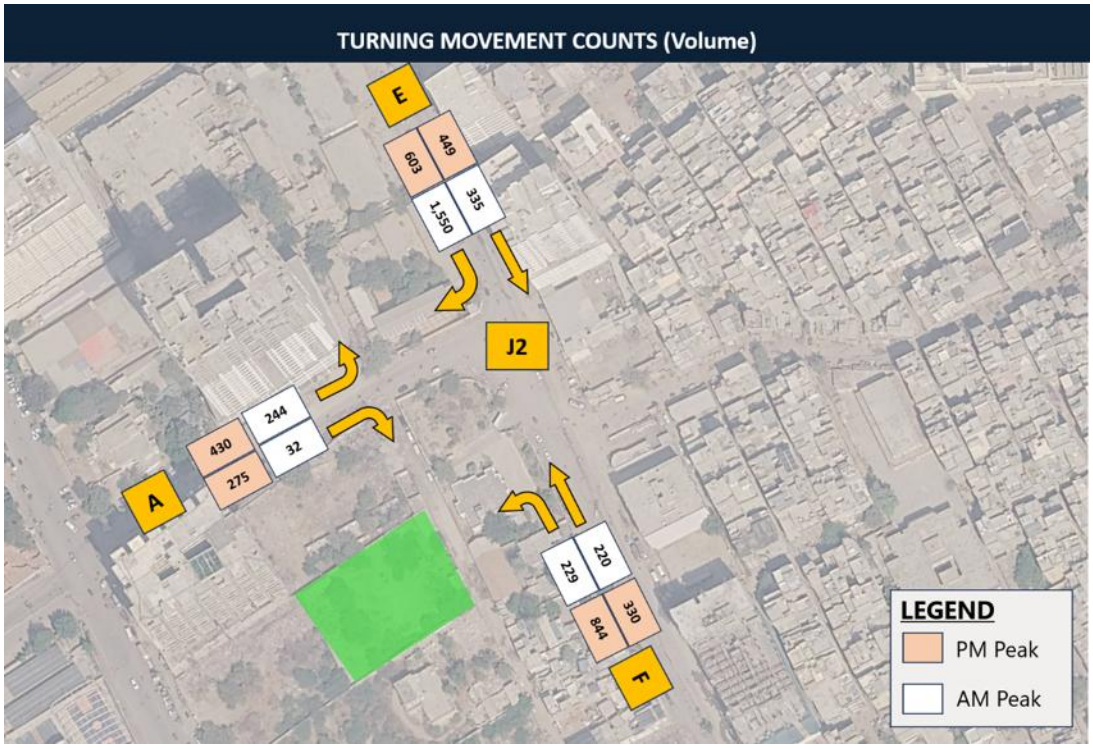


Figure 2-3 Traffic Volumes J2

2.4 Junction 1 (J1)

This junction is a four-legged unsignalized junction between Castle Street and Mansfield Street. This junction will serve the traffic entering towards proposed development from the western and northern sides.

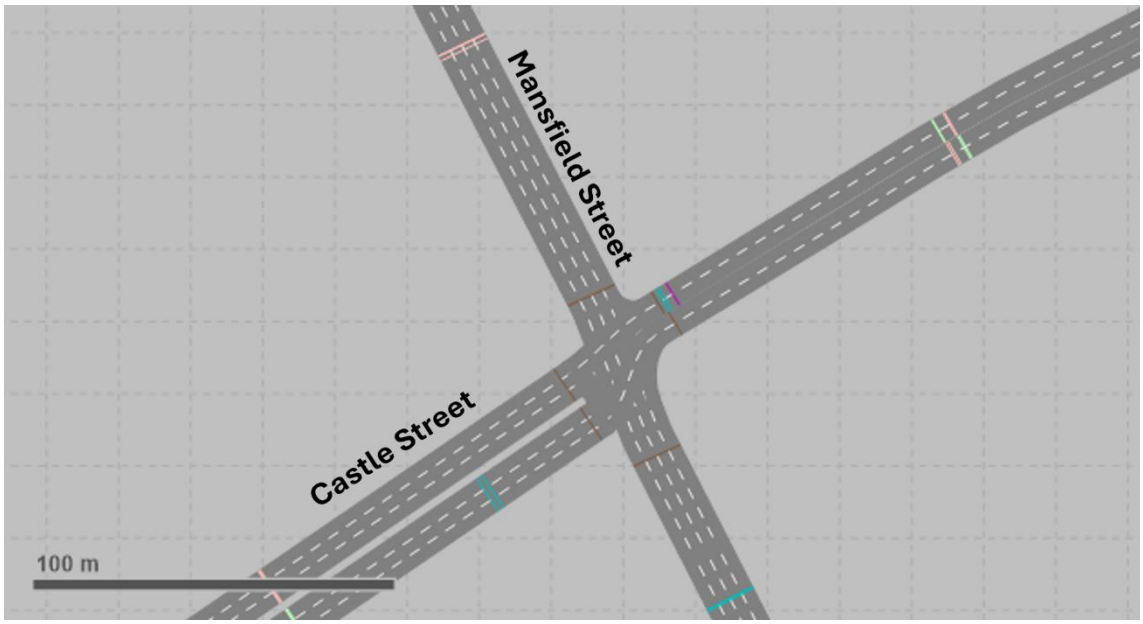


Figure 2-4 Junction 1 (Image from Traffic Model)

2.5 Junction 2 (J2)

This junction is a four-legged signalized junction between Castle Street and Talha Street. This junction will serve the traffic entering towards proposed development from the western and northern sides.

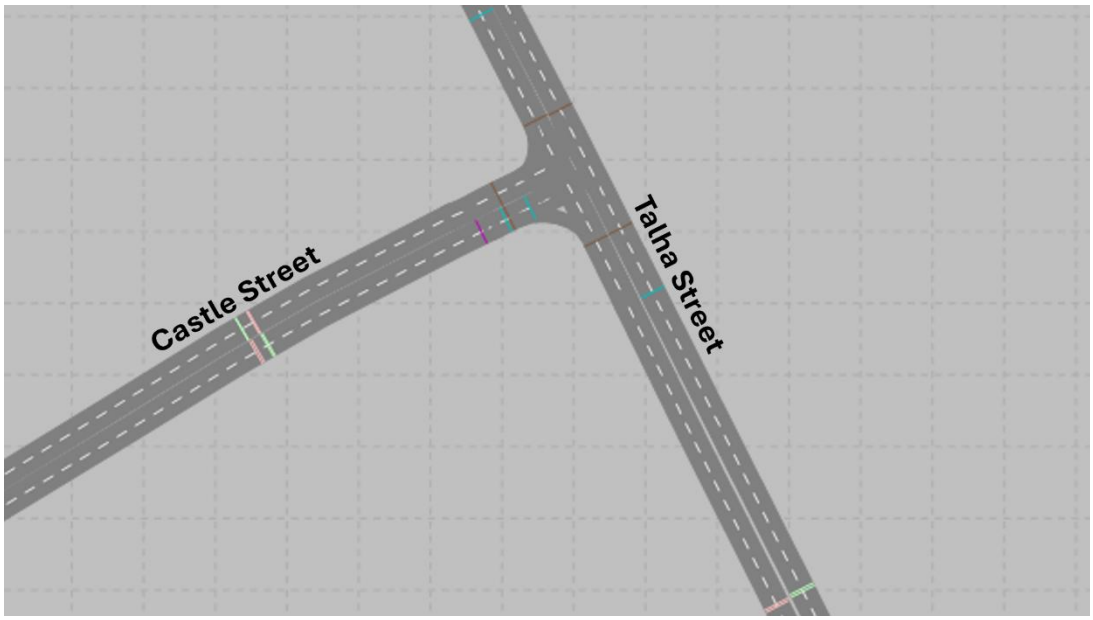


Figure 2-5 Junction 2 (Image from Traffic Model)

3 FUTURE TRAFFIC ESTIMATION

3.1 Introduction

This part of the report discusses the future traffic generation and its distribution on the road network of the study area. The section also focuses on the land uses having potential for future traffic generation within the study area. A detailed discussion on traffic distribution and traffic growth is a part of this section.

3.2 Land use in Study Area

This part of the report highlights existing land use prevailing in the study area; the section also presents a detailed discussion of future traffic estimation in the area. The proposed project comprises of residential land use with the area of 557,057.32 sq. ft.

3.3 Site Traffic

The proposed development is a residential land and is expected to produce a reasonable number of trips during both morning and evening peaks. In order to check the building's traffic impact, both peak trips were used for analysis which is similar to the existing traffic peaks revealed from field data collection. For Proposed Development trip rates assumptions were taken from a previously performed studies.

3.3.1 Trip Generation

In Pakistan since there is no prior data available from which trip generation rates for any land use could be estimated. For this particular Development, assumptions were taken from similar land use studies. Since this Development comprises of Residential building, hence for the trip generation data for residential land use was used from previously conducted studies. The trips generated by the proposed development are presented in the Table 3-1 and its entry and exit distribution in Table 3-2.

Table 3-1 Project Generated Trips for peak hour

S.NO	LANDUSE	NOS	TRIP RATE		TRIPS	
			AM	PM	AM	PM
1	Residential	307	1.5	1.6	205	192
TOTAL TRIPS					**397**	

From Table 3-1, it can be observed that the proposed development generates 205 trips during Morning peak and 192 trips during evening peak, in total 397 trips will be generated which can further be bifurcated into in and out ratio.

Table 3-2 Entry - Exit Distribution

S.NO	LANDUSE	DISTRIBUTION RATIO		PEAK HOUR TRIP DISTRIBUTION	
				Entry	Exit
1	Residential	AM	23:77	47	158
		PM	45:55	86	106

3.3.2 Traffic Distribution

The distribution trips on study area network during morning and evening entry / exit scenarios were to be ascertained. This shall have an important role in analysis for year 2026, 2030 and for year 3035 for the 85% occupancy.

It is important to mention that the trip distribution of the development's traffic has been carried out by analyzing the existing base traffic distribution.

Figure 3-1 and Figure 3-3,present details of traffic distribution from the proposed project on to the network during both morning and evening peaks. Whereas, Figure 3-2 and Figure 3-4 presents the traffic volume for the project during both AM and PM peak.

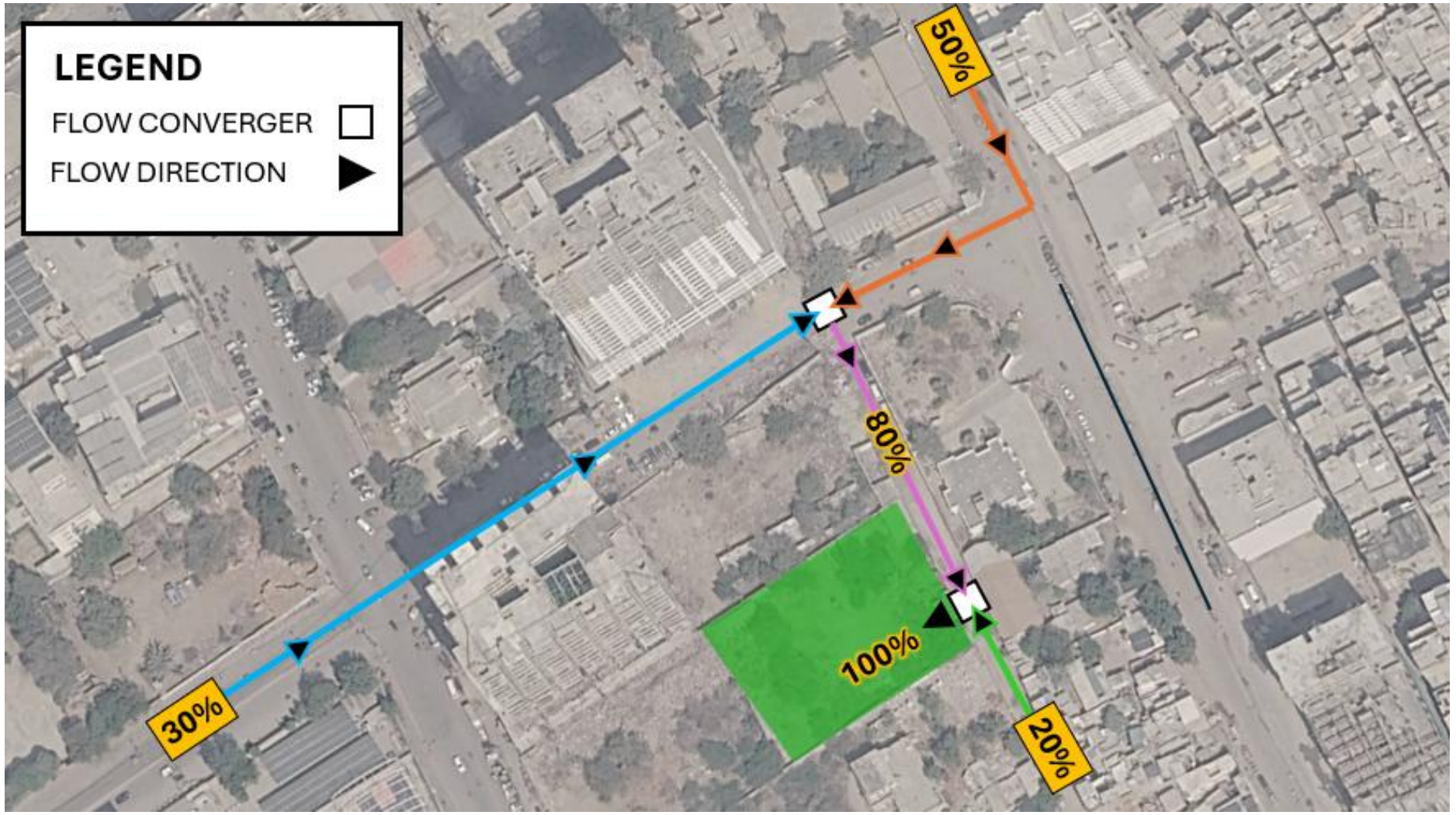


Figure 3-1 Traffic Distribution for AM & PM Peak Entry (Percentages)

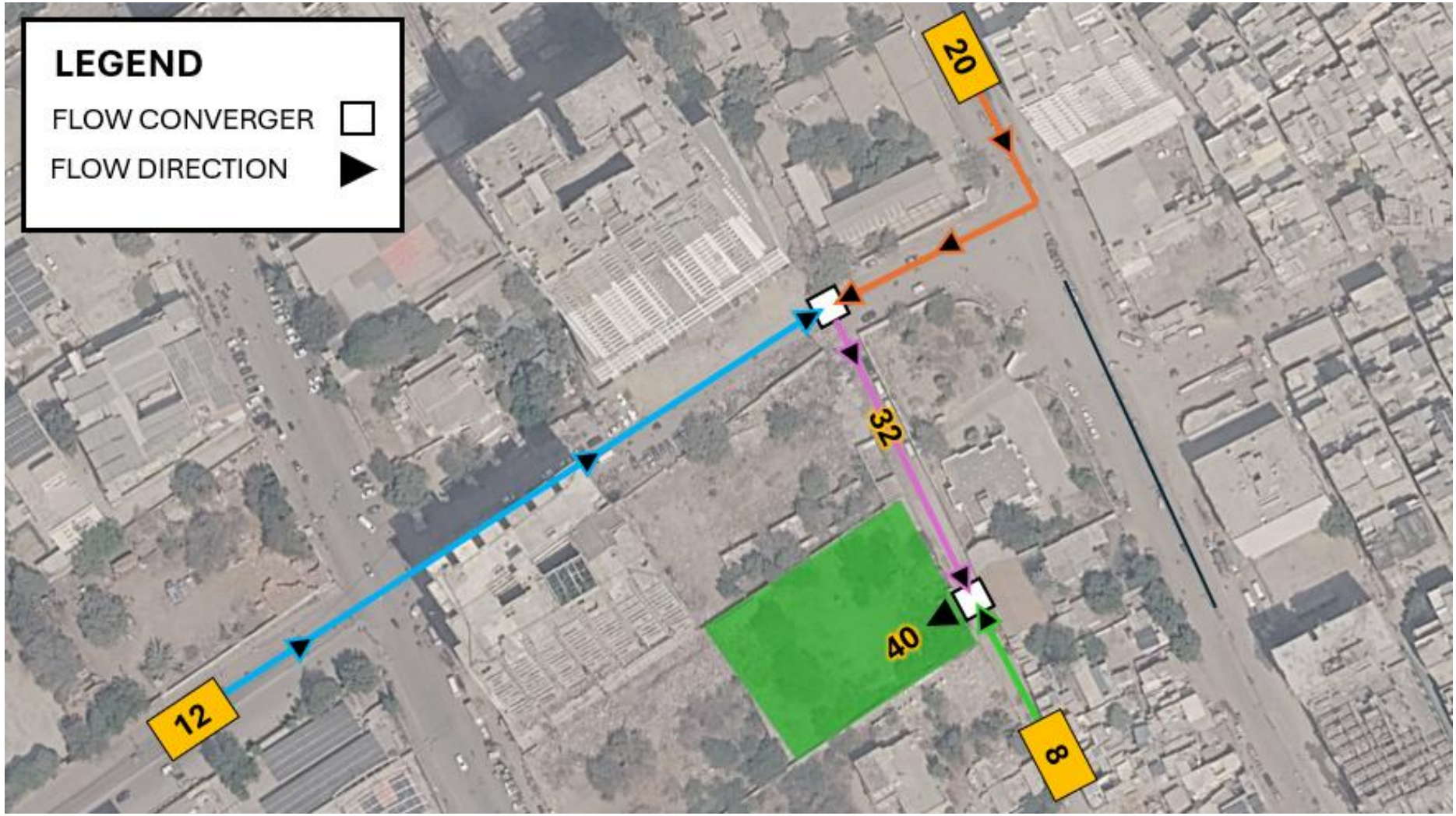


Figure 3-2 Traffic Distribution for AM & PM Peak Entry (Volumes)

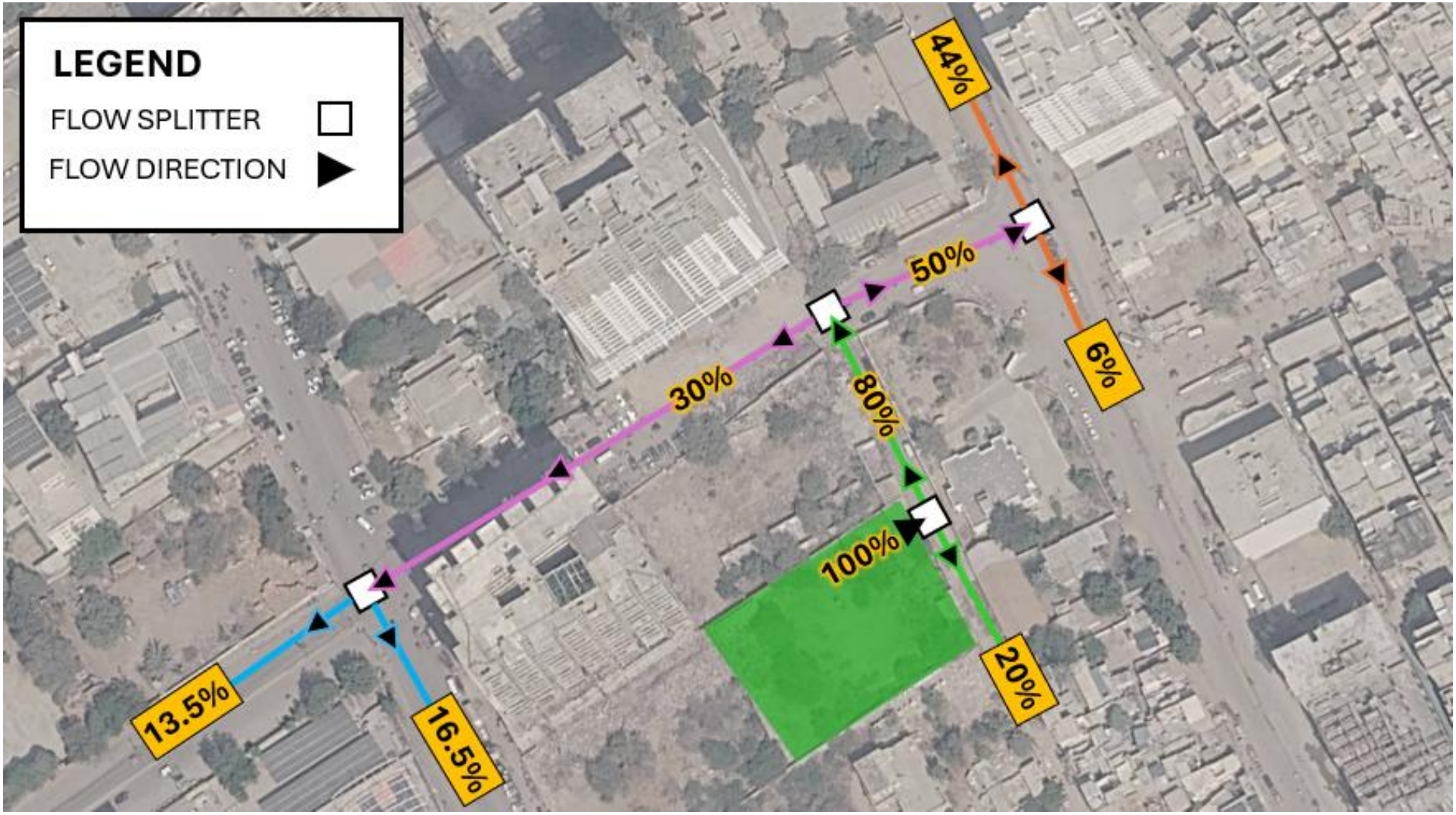


Figure 3-3 Traffic Distribution for AM Peak Exit (Percentage)

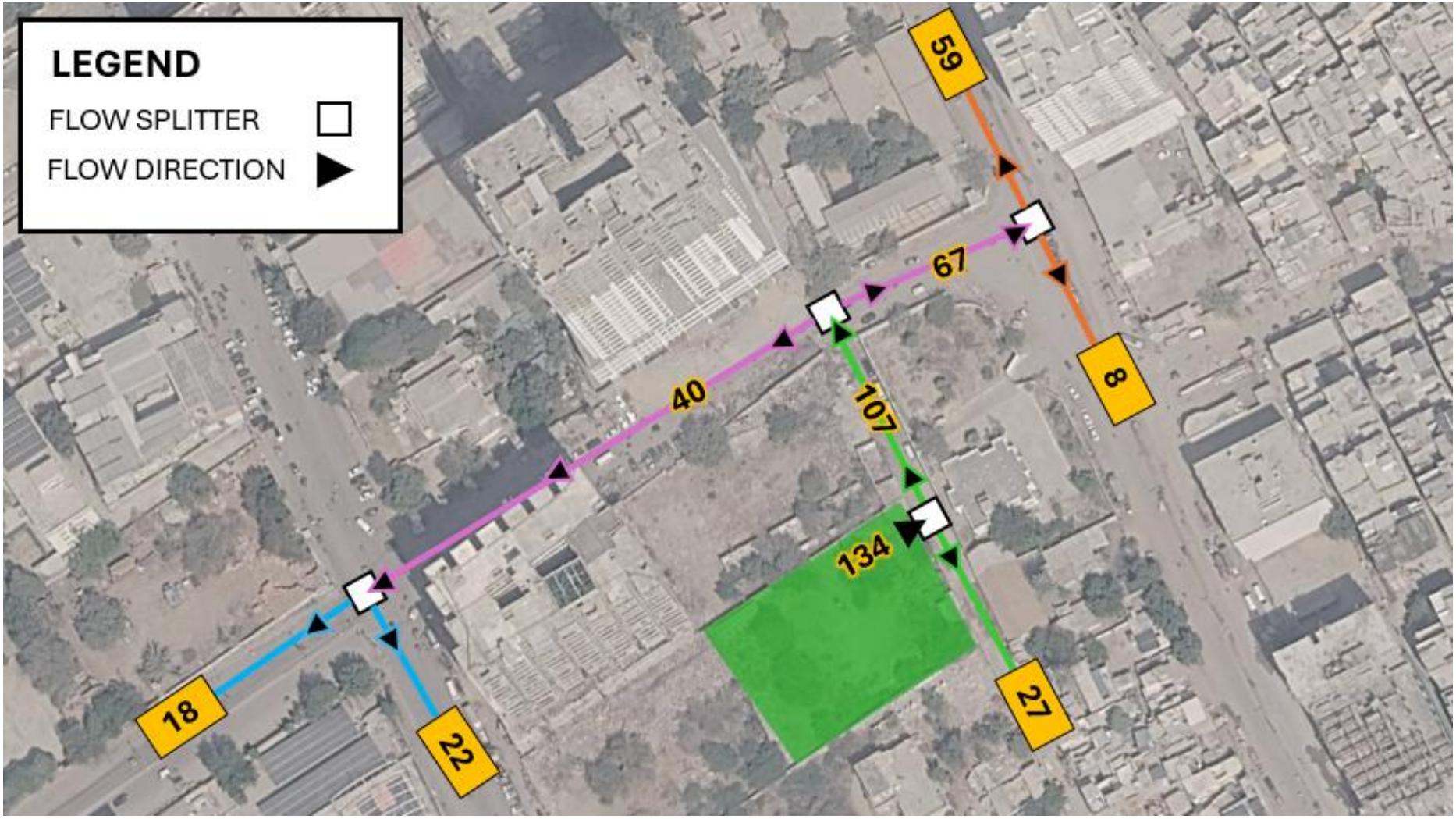


Figure 3-4 Traffic Distribution for AM Peak Exit (Volume)

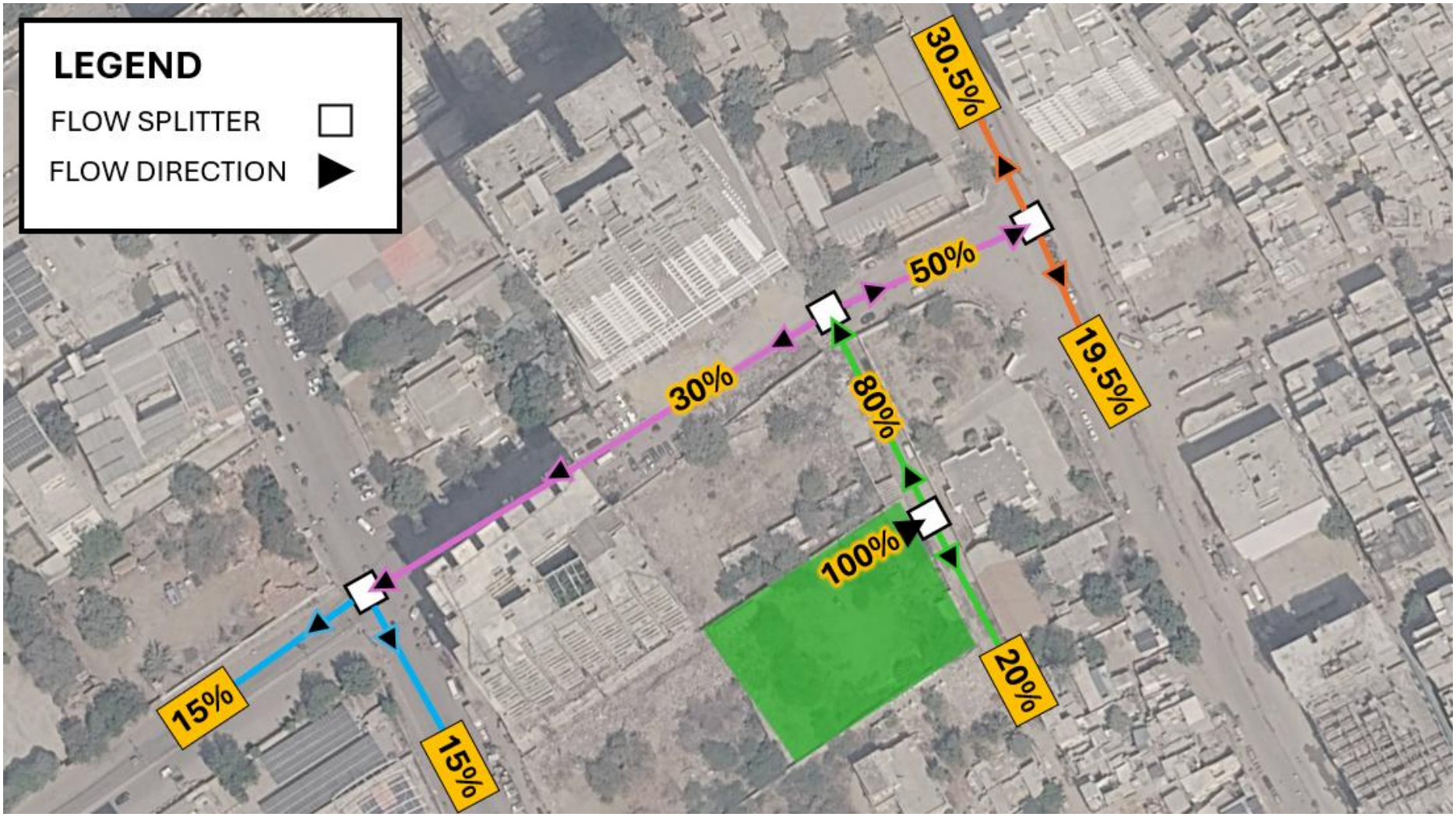


Figure 3-5 Traffic Distribution for PM Peak Exit (Percentage)

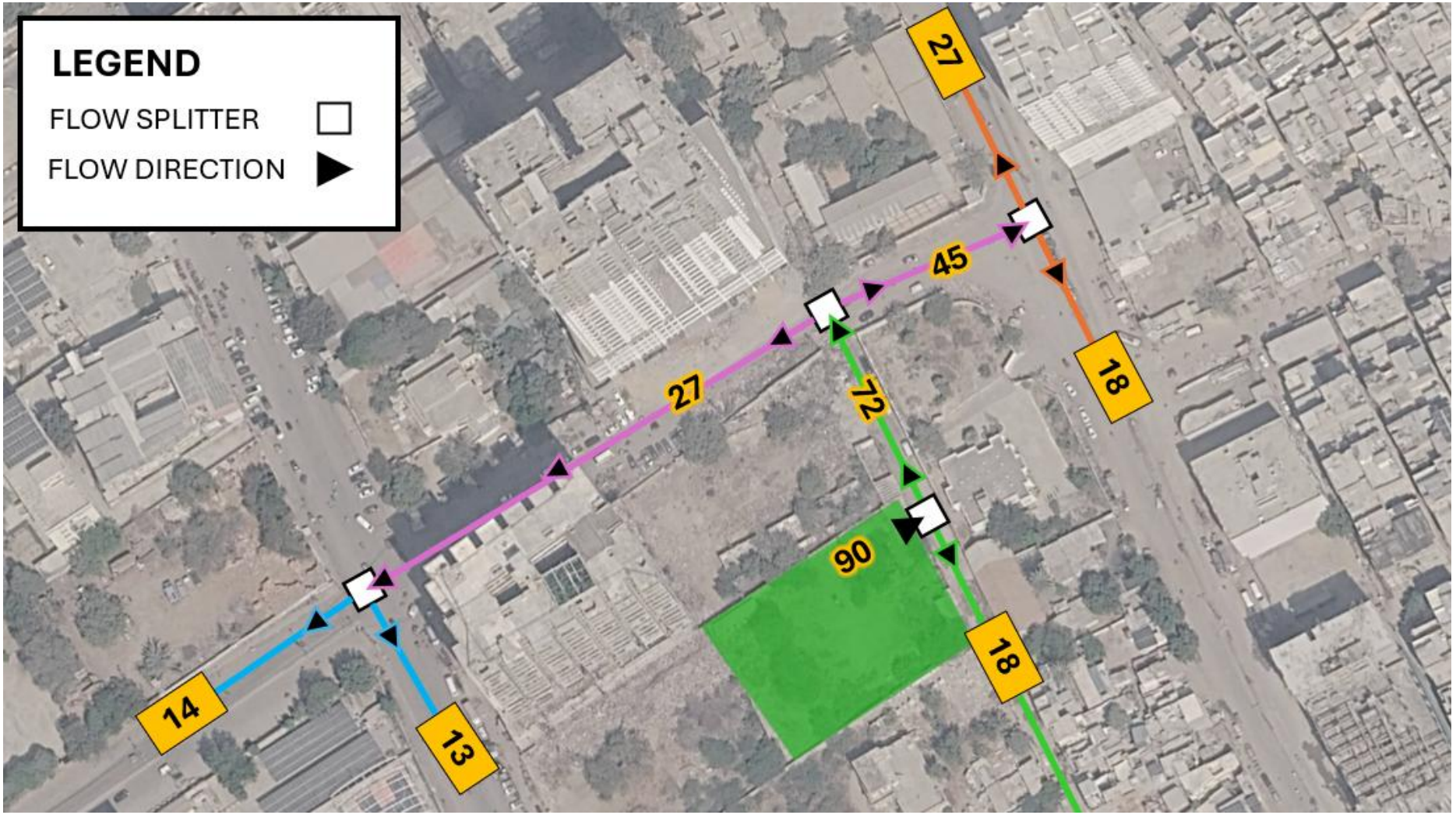


Figure 3-5 Traffic Distribution for PM Peak Exit (Volume)

3.4 Traffic Scenarios Considered

Subsequent to the discussion in section 3.3 , ten cases for analysis were considered. Case I and II was the base case for AM and PM Peak, representing the existing area situation for year 2026. However, in other case future scenario i.e. with & without development in 2026, 2030 & 2035 were considered. The details of each case and their scenario are summarized in Table 3-3:

Table 3-3 Cases & Scenarios Considered

S. No.	Case	Scenario
1.	Base Case (2026)	Scenario I: AM Peak
2.		Scenario II:PM Peak
3.	Future Case without development (2030)	Scenario III:AM Peak without Development
4.		Scenario IV:PM Peak without Development
5.	Future Case with 50% development (2030)	Scenario V:AM Peak with 30% Development
6.		Scenario VI:PM Peak with 30% Development
7.	Future Case with 85 % development (2035)	Scenario VII: With 85% Development
8.		Scenario VIII: With 85% Development
9.	Future Case with mitigation (2035)	Scenario VII: With Mitigation AM Peak
10.		Scenario VIII: With Mitigation PM Peak

3.5 Traffic Growth Estimation

Future growth in network traffic is important for any traffic impact assessment study. Generally, the growth could be regarded as a representation of typical traffic growth at the city level, which may result from macroeconomic factors such as increasing vehicle ownership and Gross Domestic Product (GDP). Such growth general remains uniform at a city level. However, its impact may vary depending on the number of people visiting the study area; for example, a Central Business District (CBD) or land uses with large commercial centres may experience more such growth than a residential neighbourhood in the city.

4 TRAFFIC IMPACT ASSESSMENT

4.1 Introduction

This section of the report discusses performance of traffic junctions within the study area. As already discussed in previous chapter, ten cases (for years 2026, 2030 & 3035) were analyzed. For remembrance the same is reproduced as Table 4-1.

Table 4-1 Cases and Scenarios Considered

S. No.	Case	Scenario
1.	Base Case (2026)	Scenario I: AM Peak
2.		Scenario II:PM Peak
3.	Future Case without development (2030)	Scenario III:AM Peak without Development
4.		Scenario IV:PM Peak without Development
5.	Future Case with 50% development (2030)	Scenario V:AM Peak with 30% Development
6.		Scenario VI:PM Peak with 30% Development
7.	Future Case with 85 % development (2035)	Scenario VII: With 85% Development
8.		Scenario VIII: With 85% Development
9.	Future Case with mitigation (2035)	Scenario VII: With Mitigation AM Peak
10.		Scenario VIII: With Mitigation PM Peak

The comparison of the above gives an indication of the traffic impact of the proposed development.

4.2 Software Used

For the analysis a software namely PTV VISSIM was used. The analysis is done by building entire road network on this software and the simulation results extracted after running the actual condition on this software.

4.2.1 PTV VISSIM:

For the purpose of micro simulation commercial software VISSIM was used. VISSIM is a behavior based multi-purpose traffic simulation program. It is a tool which gives a chance to do optimization of complex technical systems with the help of simulation. It deals with a variety of urban and highway applications, by integrating public and private transportation. Complex scenarios can be visualized to an extent of detail to demonstrate the operational aspects of the traffic model. It also provides with the opportunity to model other road users such as pedestrians and cyclists and to replicate their behavior to simulate a real life like situation. The package also provides the

user with the option to input user written programs in the form of *.vap and *.pua files, through which signal priority and other signal control options could be performed.

4.3 Model Setup

A model for study area was developed for all case and scenarios in VISSIM and simulated in VISSIM. The model developed for entire study area. As discussed earlier the models have been developed for both morning and evenings peak for all scenarios.

Model for the checking of interfacing of External and Internal Traffic Flow was developed in order to simulate the base condition so that the future options can be tested. The area of influence is being finalized based on the possibility of effecting roads in the vicinity of the project. The geometry of the entrances and exits network is developed with the help of google map and then it has been digitized on the micro simulation software i.e. VISSIM with the help of links and connectors.

Calibrating a model is important because it gives confidence on the results network would give for future scenarios and hence it should replicate the existing situation as close as possible. Various field efforts were carried out to calibrate the model such as collecting on ground delays at junctions, observing queues and delays at various locations during peak hours etc. Hence based on the field visualization and data collection it can be assimilated that the model depicted close enough conditions for existing case and hence is reliable for future cases.

4.4 Intersection Performance Criteria:

The performance of the individual intersections was evaluated based on the following performance measure.

- Level of Service (LOS) based on Average Vehicle Delay (seconds).

4.5 Road Network:

In order to have micro simulation, the road network for the project was developed considering the adjoining junctions who would play vital role in external traffic circulation and might face some effects due to the development. The study area for network development was developed and simulated in VISSIM.

4.6 Level of Service (LOS):

LOS is an index of the operational performance of the intersection based on the service measures such as delay, degree of saturation and density during a given flow period. LOS 'A' is the highest level

with LOS 'F' occurring when traffic volumes are at or close to capacity with drivers experiencing significant delays.

The assessment criteria followed for all estimating LOS for each junction is based on Table 4-2 & Table 4-3.

Table 4-2 Level of Service for Un-signalized Intersections

LOS	Unsignalized Delays (sec/veh)
A	≤10
B	> 10 to 15
C	> 15 to 25
D	> 25 to 35
E	> 35 to 50
F	> 50

Table 4-3 Level of Service for Signalized Intersections

LOS	Unsignalized Delays (sec/veh)
A	≤10
B	> 10 to 20
C	> 20 to 35
D	> 35 to 55
E	> 55 to 80
F	> 80

4.7 Calibration of Base Model:

Calibrating a model is important because it gives confidence on the results network would give for future scenarios and hence it should replicate the existing situation as close as possible. Various field efforts were carried out to calibrate the model such as collecting on ground delays at junctions, observing queues and delays at various locations during peak hours etc. Hence based on the field visualization and data collection it can be assimilated that the model depicted close enough conditions for existing case and hence is reliable for future cases. The formula for the "GEH Statistic" is:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where, 'M' is the hourly traffic volume from the traffic model (or new count), 'C' is the real-world hourly traffic count (or the old count). Calibration results are shown in Table 4-4.

Table 4-4 Calibration of Base Model

Parameters	Random Seed
GEH < 5	42
Total Observations	6
% acceptable fit	90%

4.8 Junctions Assessed

Two junctions were analysed for all cases and scenarios. The details of junction geometry are shown in Figures below.

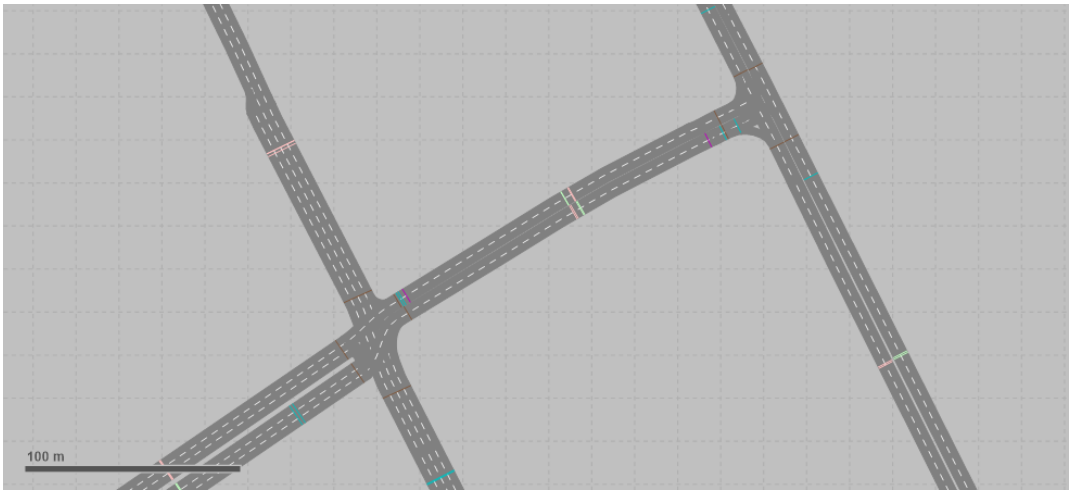


Figure 4-1 Network developed in PTV VISSIM

4.8.1 Junction 1 (J1):

This is a four-legged, unsignalized intersection between Castel Street and Mansfield Street. This junction will serve the traffic entering towards proposed development from western side. Details of the traffic coming on this junction with and without development in the future cases during morning and evening peaks is shown in Figure 4-3 and Figure 4-3.

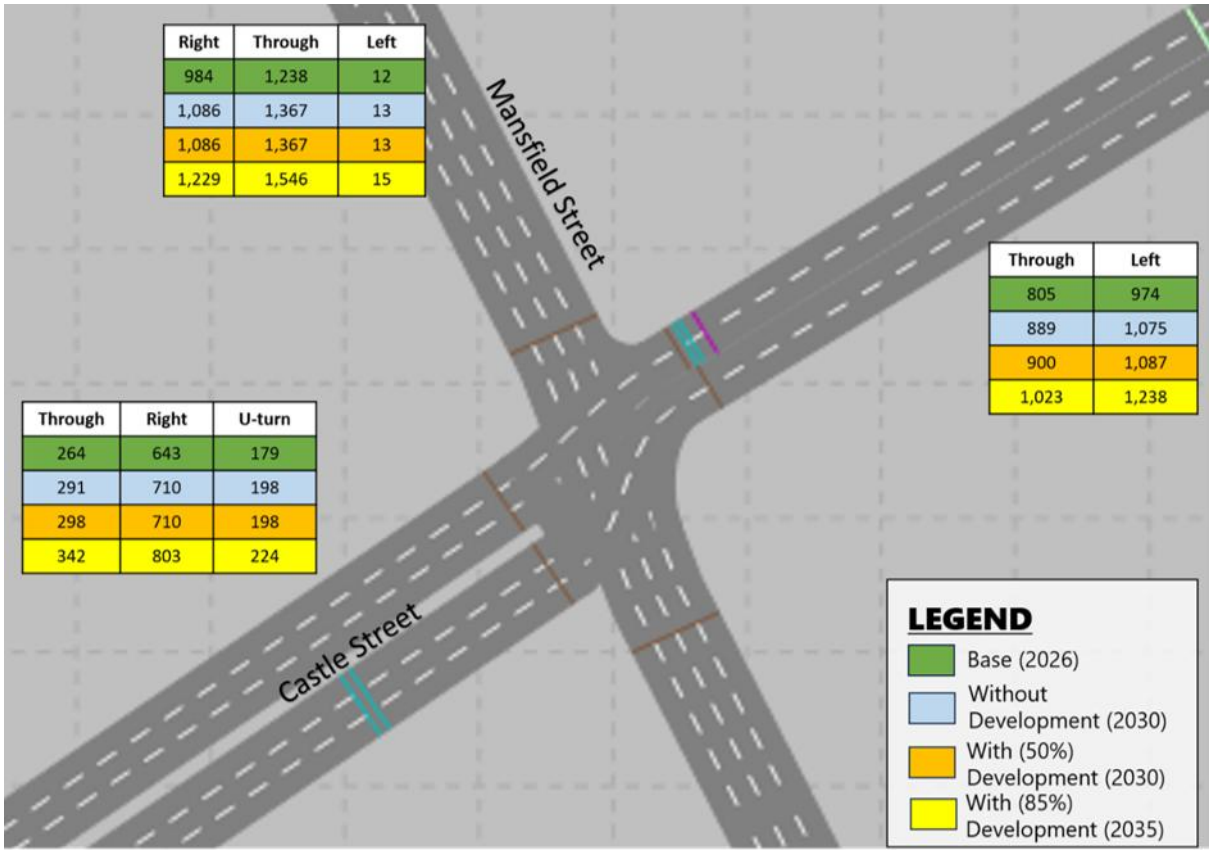


Figure 4-2 Junction 1 AM Peak

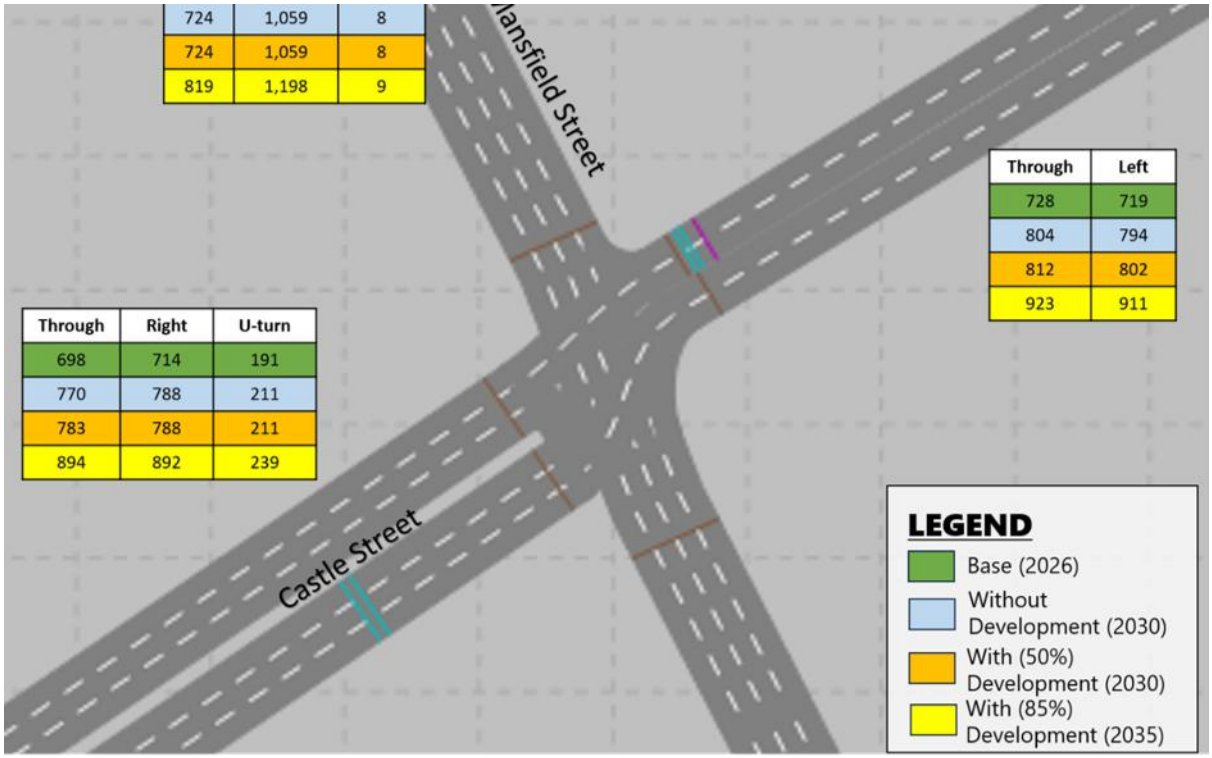


Figure 4-3 Junction 1 PM Peak

4.8.2 Junction 2 (J2):

This junction is a four-legged signalized junction between Castel Street and Armenian Street. This junction will serve the traffic entering towards proposed development from eastren side. Details of the traffic coming on this junction with and without development in the future cases during morning and evening peaks is shown in Figure 4-4 and Figure 4-5.

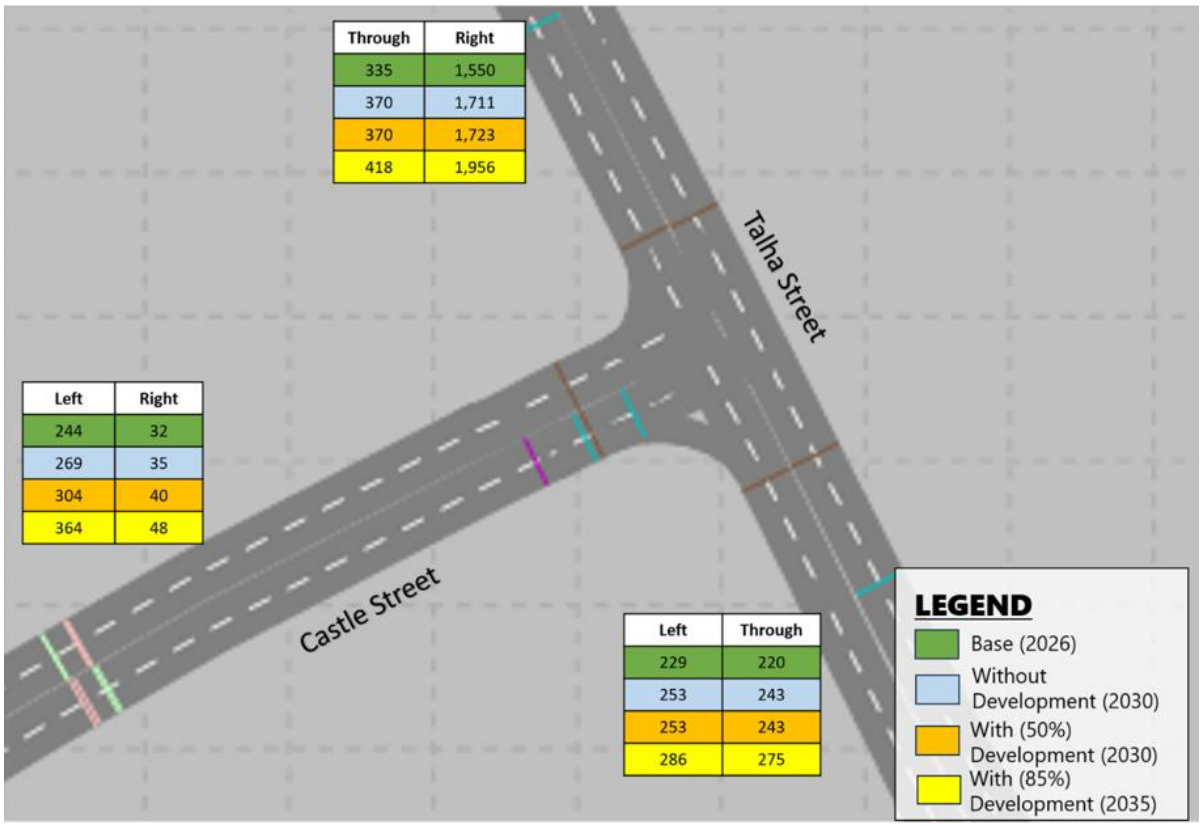


Figure 4-4 Junction 2 AM Peak

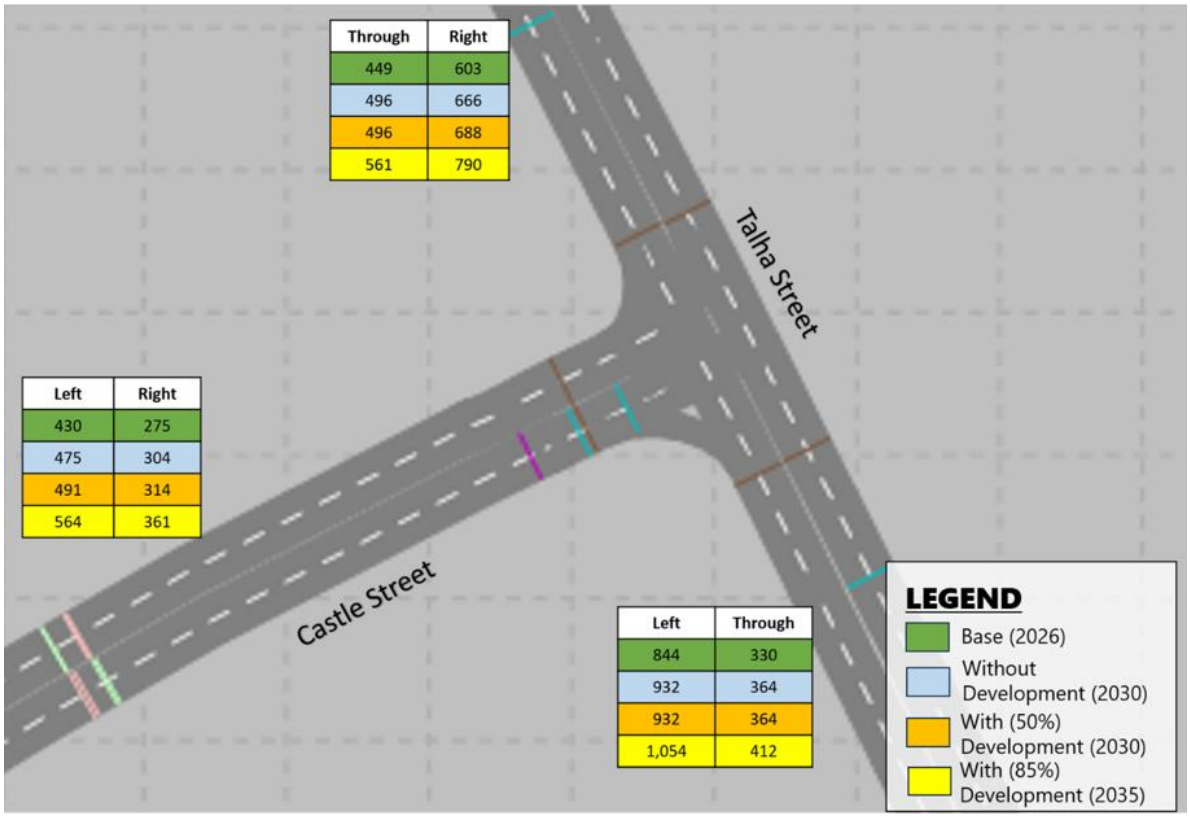


Figure 4-5 Junction 2 PM Peak

4.9 Model Results

The assessment criteria followed for all estimating LOS for each junction is based on Table 4-2. Average delays and average queue lengths on each junction were analyzed and presented in the table below.

4.9.1 Delay Results

The delay results of the junctions analysed are summarised in Table 4-5 & Table 4-6 below. It has been observed that delays, with and without Development cases, in 2026 and 2030 show only marginal differences. At Junction 1, the 2035 future scenario showed significant deterioration and is therefore subject to mitigation.

Table 4-5 Summarized Results AM

S.NO	Intersection	2026 Base		2030 Without Development		2030 With (50%) Development		2035 With (85%) Development		2035 With (85%) Development-Mitigation	
		Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS
1	Junction 1	9	A	21	C	22	C	121	F	27	C
2	Junction 2	1	A	2	A	2	A	30	D	3	A

Table 4-6 Summarized Results PM

S.NO	Intersection	2026 Base		2030 Without Development		2030 With (50%) Development		2035 With (85%) Development		2035 With (85%) Development-Mitigation	
		Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS	Average Delay (Seconds)	LOS
1	Junction 1	6	A	11	B	12	B	52	F	22	C
2	Junction 2	1	A	1	A	2	A	10	A	2	A

Table 4-7 : Access Gates Summary

S.no	Scenario	Orientation	Delay(s)		LOS		Queue (m)	
			AM	PM	AM	PM	AM	PM
1	2030 With (50%) Development	Entry	3	4	A	A	0.03	0.1
		Exit	1	1	A	A	-	-
2	2035 With (85%) Development	Entry	10	7	A	A	0.08	0.4
		Exit	6	5	A	A	-	-
3	2035 With (85%) Development -Mitigation	Entry	4	5	A	A	0.1	0.5
		Exit	1	1	A	A	-	-

4.9.2 Mitigation – Signalization of the Intersection

Whenever and wherever traffic conflicts arise, delays occur. These delays can either be managed or left uncontrolled. When traffic volume is low or insignificant, an uncontrolled delay is often the best approach, as it doesn't significantly impact the situation. However, when traffic volume is high, there's a substantial difference between controlled and uncontrolled delays. With controlled delays, delays can be distributed and managed among conflicts, reducing the overall delay that would otherwise increase due to self-distribution.

For instance, since Junction 1 (J1) experiences a significant amount of traffic and an uncontrolled delay of 121 seconds (Level of Service F), the consultant has suggested signalisation of Junction 1 to address this issue. This recommendation will be discussed in greater detail in the subsequent text.

4.9.3 Signal Implementation:

The signal proposed for Junction J1 is a fixed-time, three-phase signal. Adaptive signals, being relatively new in this region, are not recommended due to the lack of available technology and trained operators. Therefore, fixed signals are the preferred solution.



Figure 4-6 Signal Heads

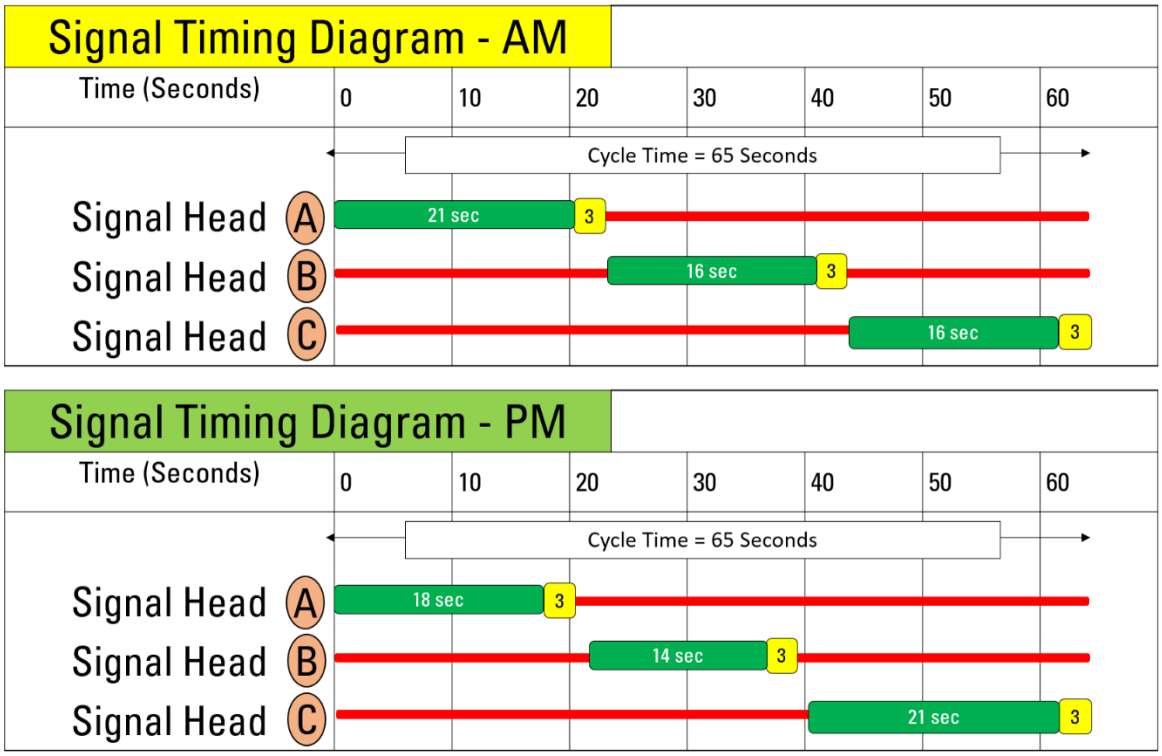


Figure 4-7 Signal Phase & Timing Diagram for junction J1

5 PARKING ADEQUACY AND INTERNAL CIRCULATION

5.1 Introduction

This section enlightens parking requirements, provisions and adequacy for the proposed project. The analysis on parking scenario of any proposed building is one of the main essences of interfacing internal traffic flow which incorporates analysis for queue adequacy and traffic conflict management.

Additionally, the section also encompasses circulation pattern of vehicles within building's parking isles. Circulation analysis is performed considering circulation of passenger vehicle.

5.2 Parking Analysis

Efficient parking provision, keeping in view the requirements of the development and its surrounding environment, is essential for the success of any building project. In the proposed Roshan Safa Tower II, parking facilities are provided on three basement levels, along with little parking at the ground floor and dedicated parking floors from the 1st to the 3rd floor. The parking analysis revealed that the proposed parking provision is sufficient to accommodate the development's parking requirements.

5.2.1 Standards for Parking Stalls Calculations

For parking analysis Sindh Building Control Authority (SBCA) provide its Standards. These standards are used to calculate parking requirements. For this development the parking requirements is calculated through this approach.

5.2.1.1 SBCA Parking Standards

Parking standard are based on parking bylaws of Sindh Building Control Authority (SBCA).

- 1 stall per 1000 sq. ft. of area would be required for Residential use.
- Parking stalls for handicapped to be provided at 1 parking every 50 parking stalls.
- Parking stall provision for motorcycles to be 16% of the total stalls required for parking of cars Six (6) motorcycles to be accommodated in 1 stall needed for car.

5.2.2 Parking Required

Parking requirement was calculated according to SBCA parking by-laws.

5.2.2.1 SBCA Parking Requirement

The required parking stalls were calculated based on above-mentioned standards. The Table 5-1, shows that there would be a surplus of 133 cars stalls 29 Motorcycles stalls and 3 disabled stalls and Table 5-2 shows floor wise parking provided in the development.

Table 5-1 Parking Requirements according to SBCA By-laws

S.no	Land Use	Parking Required			Parking Provided			Surplus /Deficit		
		Car	MC	Disabled	Car	MC	Disabled	Car	MC	Disabled
1	Residential	206	240	5	339	269	8	+133	+29	+3

Table 5-2 Floor-wise Parking

S.no	Land Use	Parking Provided		
		Car	MC	Disabled
1	Basement 3	73	45	2
2	Basement 2	68	64	2
3	Basement 1	59	53	2
4	Ground	5	36	-
5	1st Floor	39	17	-
6	2nd Floor	48	17	1
7	3rd Floor	47	37	1
Total		**339**	**269**	**8**

5.3 Swept Path Analysis

A swept path analysis has been conducted for the internal circulation of Roshan Safa Tower II to verify that vehicles can safely maneuver through the parking levels and access ramps. The assessment confirms adequate turning radii and clearances at critical points including ramp connections, parking floor layouts, and internal turning areas.



Figure 5-1 Swept path for 3rd Basement

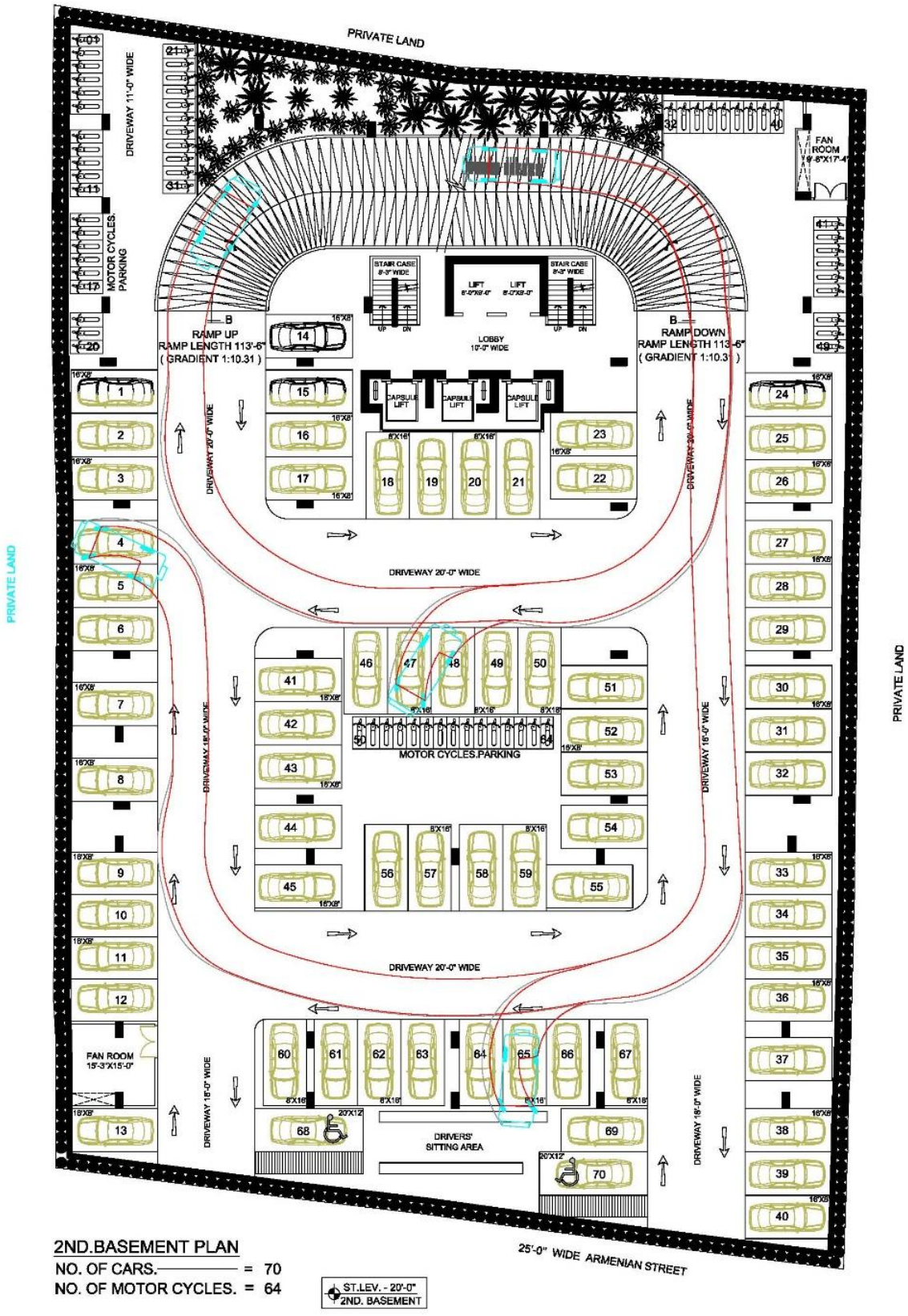


Figure 5-2 Swept path for 2rd Basement

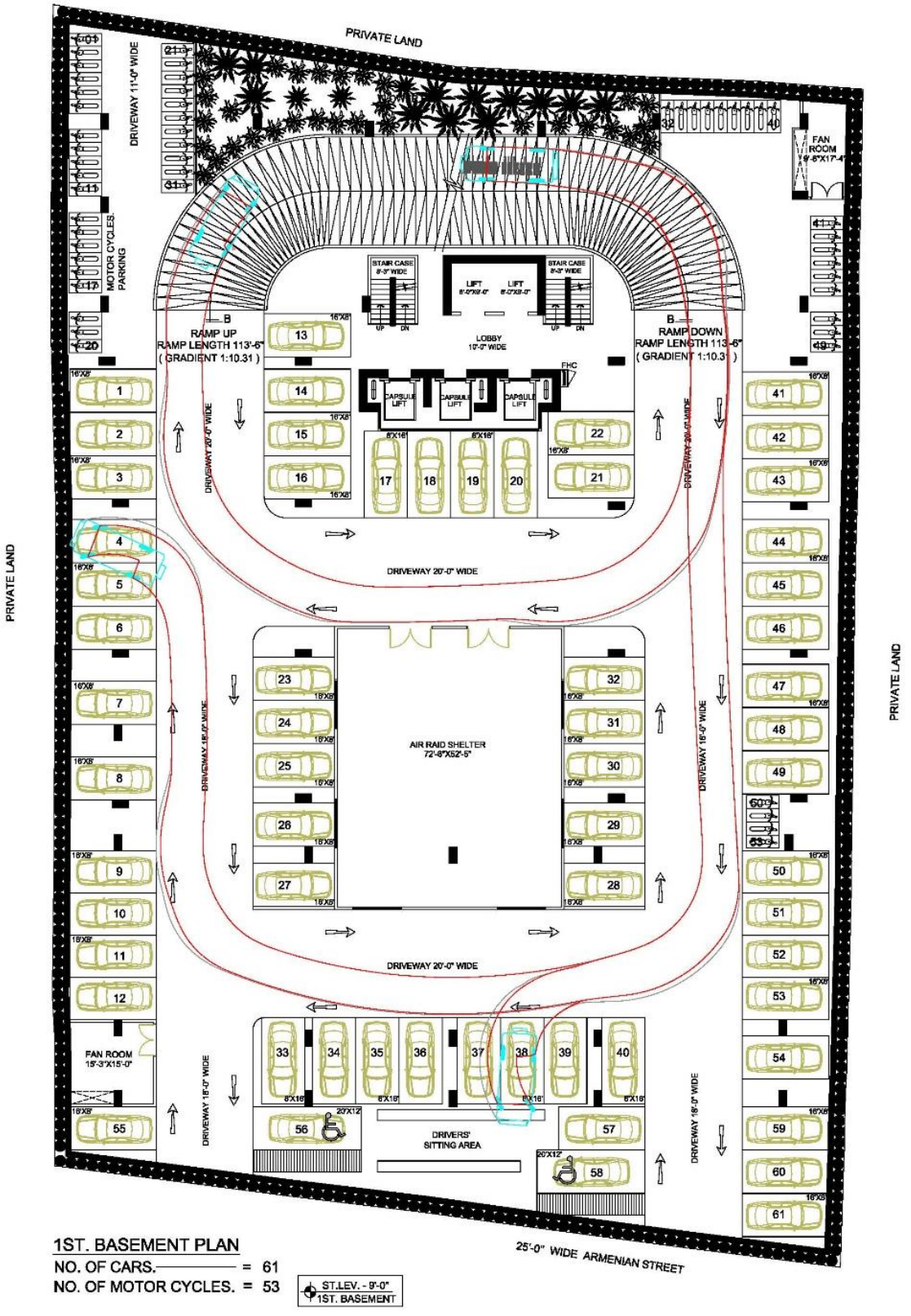


Figure 5-3 Swept path 1st Basement

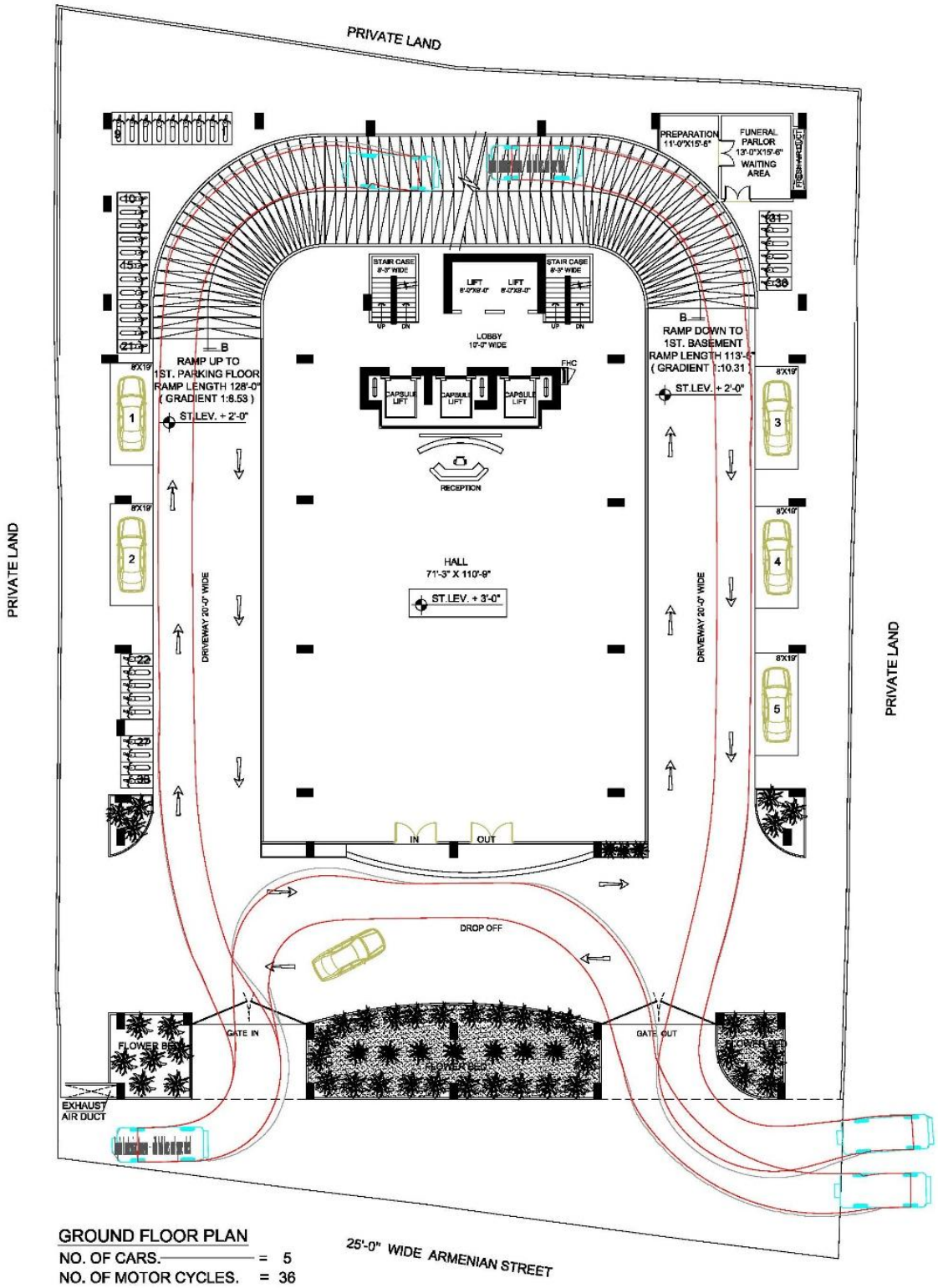


Figure 5-4 Swept path for Ground Floor

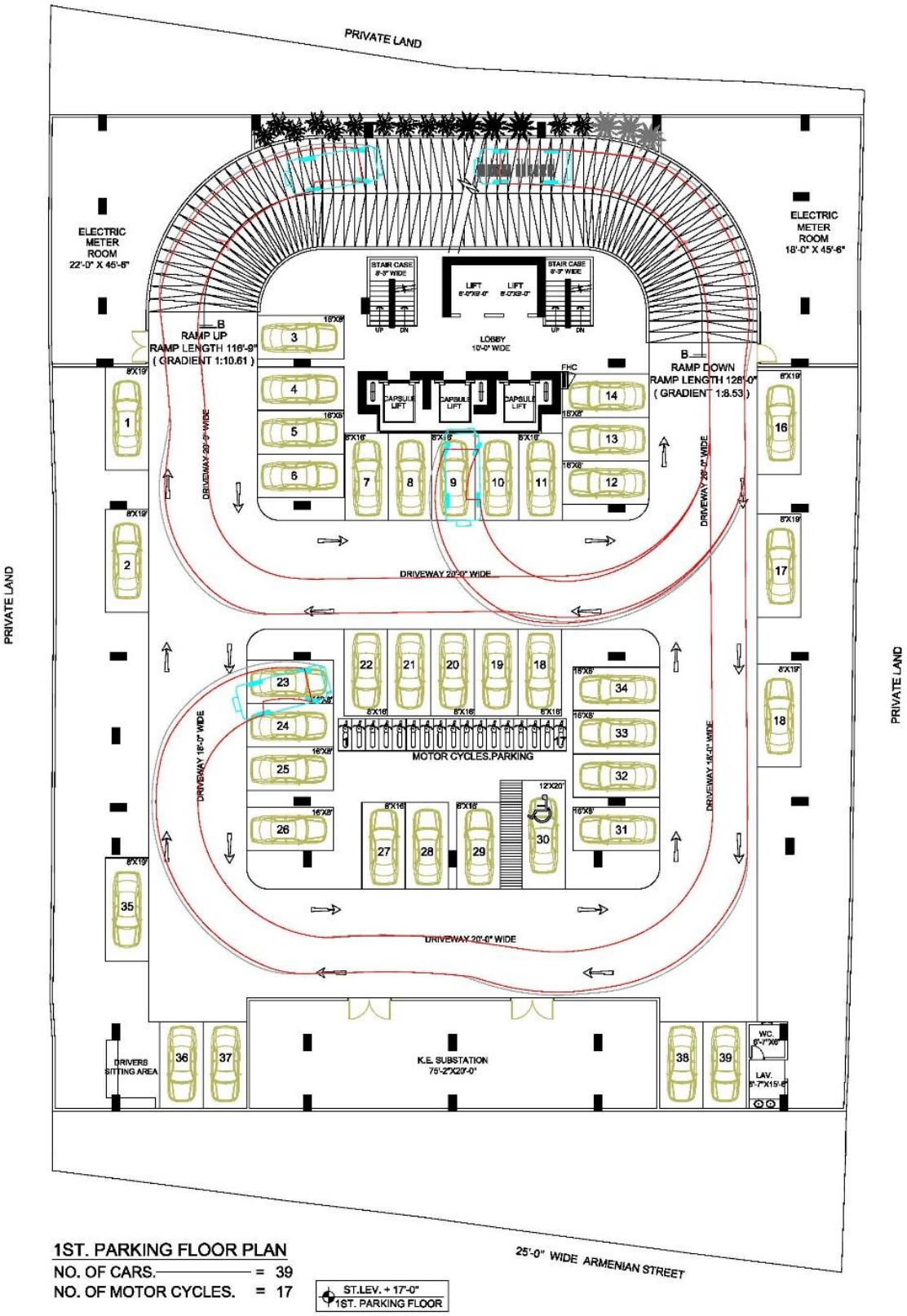


Figure 5-5 Swept path for 1st Floor

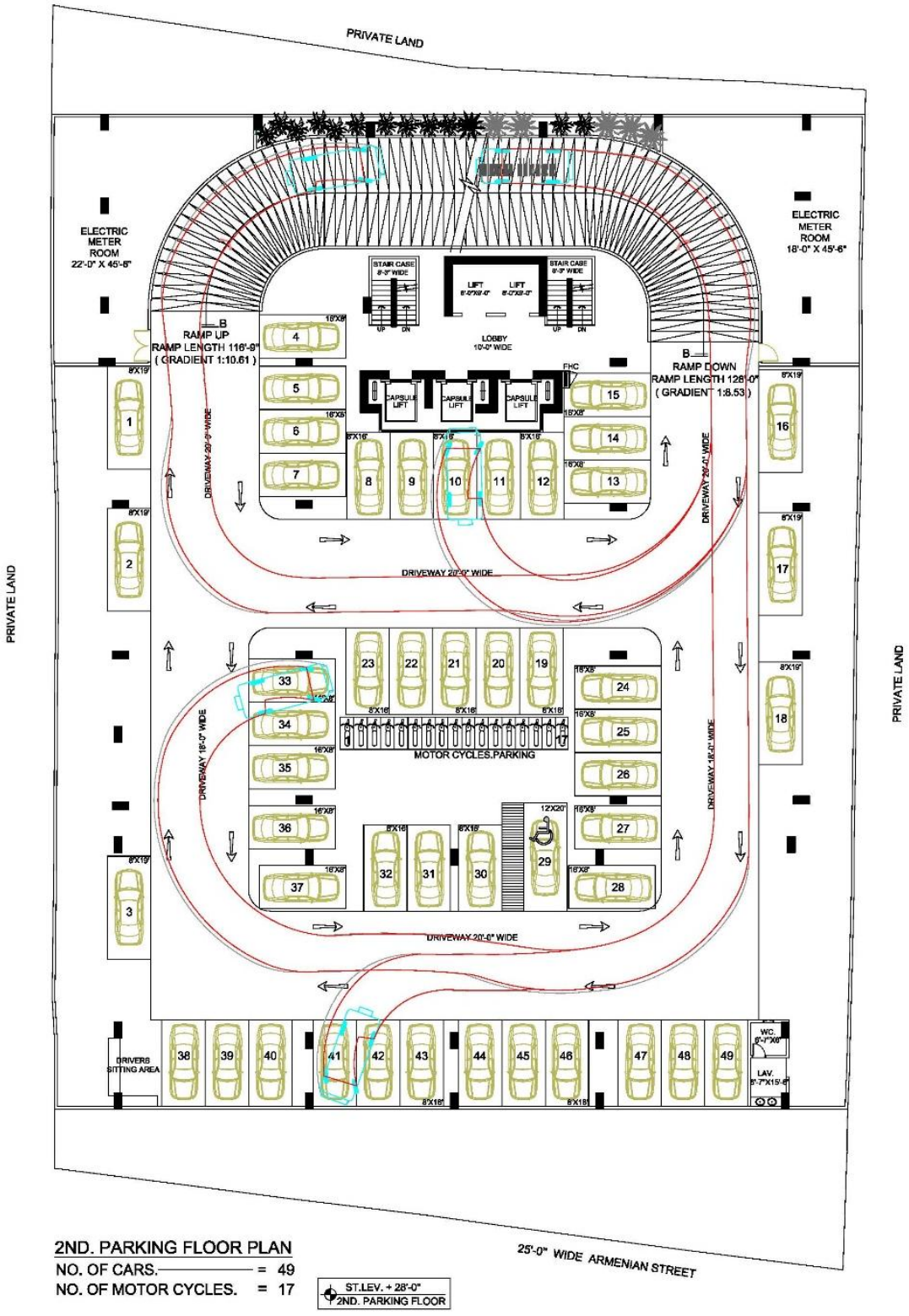


Figure 5-6 Swept path for 2nd Floor

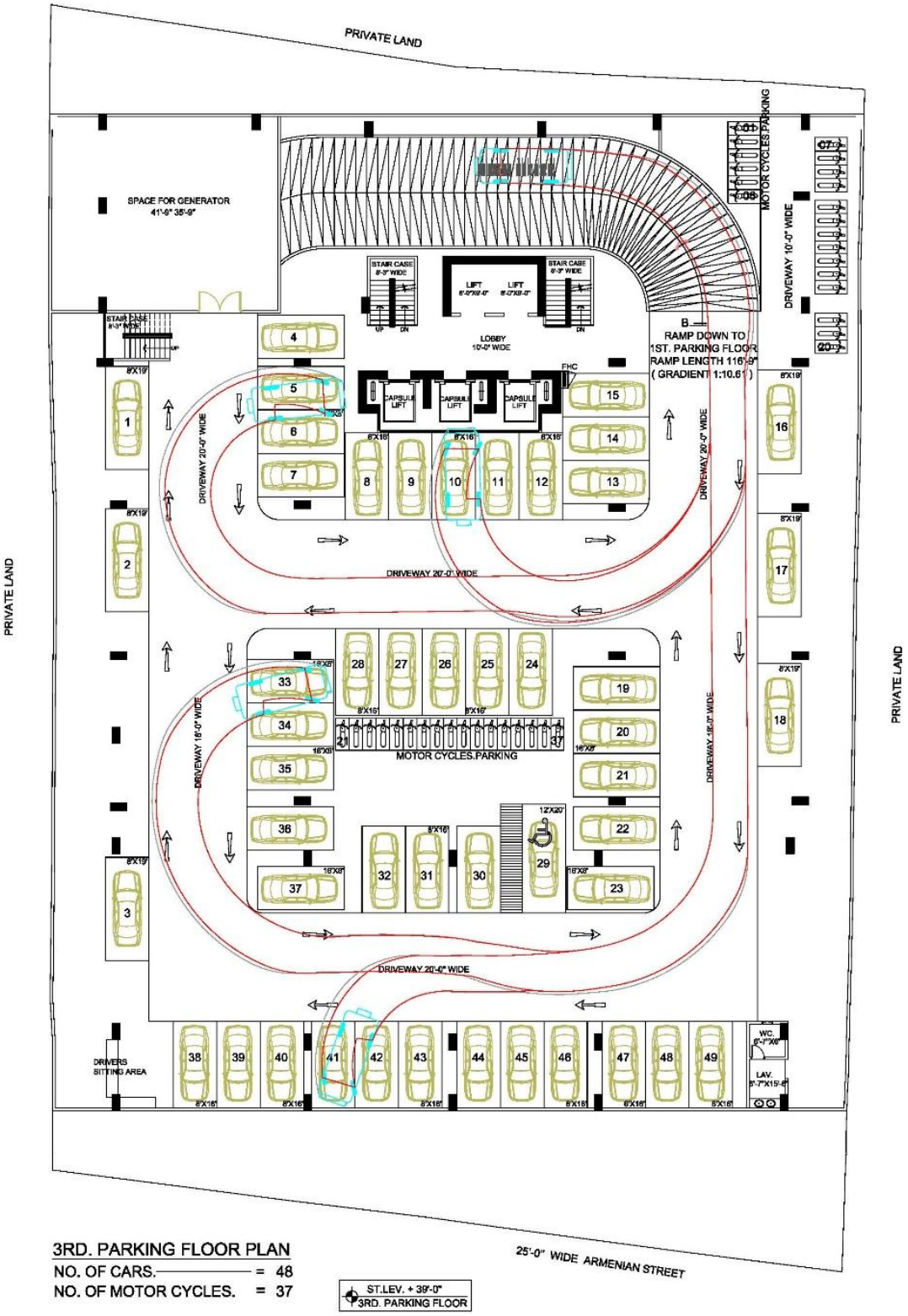


Figure 5-7 Swept path for 3rd Floor

6 SUMMARY

6.1 Summary

The following are the summarising points of the study.

1. Roshan Safa Tower II, Karachi, is a residential building.

2. The allocated site has a plot area of (31794.12 sq. ft.).

3. Turning Movement Counts were performed on two different locations respectively within study area.

4. A total of two Junctions were analysed within the study area, which are unsignalized junctions.

5. The following scenarios were considered to analyse.

Table 6-1 Cases and Scenarios Considered

S. No.	Case	Scenario
1.	Base Case (2026)	Scenario I: AM Peak
2.		Scenario II: PM Peak
3.	Future Case without development (2030)	Scenario III: AM Peak without Development
4.		Scenario IV: PM Peak without Development
5.	Future Case with 50% development (2030)	Scenario V: AM Peak with 30% Development
6.		Scenario VI: PM Peak with 30% Development
7.	Future Case with 85 % development (2035)	Scenario VII: With 85% Development
8.		Scenario VIII: With 85% Development
9.	Future Case with mitigation (2035)	Scenario VII: With Mitigation AM Peak
10.		Scenario VIII: With Mitigation PM Peak

6. There was no significant impact observed within the study area due to development and its traffic during the horizon years.

7. However, in order to improve the overall traffic circulation, signalization at the junction between Mansfield & Castle Street is proposed.