

4 Presentation (Draft EIA stage)

1) Green Line : Largess Restaurant (Green Line Corridor) on 27th April, 2012

Presentation on Findings from
Draft Report

Environmental Impact Assessment

Karachi Transportation
Improvement Project (KTIP)

Environmental Management Consultants



Objective of Today's Meeting

- To share the main findings from the Draft EIA Study of KTIP – Green Line.
- To get the feedback from all relevant stakeholders
- To get the consent from stakeholders on the study
- Once finalized we shall conduct a joint public hearing for this study



Background

The JICA Study Team consulted with Karachi Mass Transit Cell (KMTC) about the plan to select BRT for the project of the feasibility study based on the result of the master plan study submitted on 30th June 2011. JICA and KMTC after detailed discussion and consultation with stakeholders agreed that the JICA Study Team would conduct the feasibility study for the Green Line and Red Line that are proposed in the master plan.

EIA Study

The services of EMC have been acquired for the preparation of this environmental assessment of the Project, required to meet the regulatory requirements of the country and JICA. This document has been prepared to meet the following key requirements:

- The Environmental Impact Assessment (EIA) as required by the Pakistan Environmental Protection Act 1997 for submission and approval by Sindh Environmental Protection Agency (SEPA).
- The environmental impact assessment (EIA) complying with the environmental and social guidelines of the JICA and World Bank and satisfying the evaluation criteria of the JICA for consideration of financial assistance for project implementation.

BRT Vision

BRT Vision is:

“To have a state of the art public transport system at reasonable cost to the users and yet profitable to the operators using high capacity buses which meet international service standards, environmentally friendly, operating on exclusive lanes, at scheduled travel time”

BRT Mission

The BRT Mission is:

“To provide quality, accessible and affordable mass transport system for the residents of Karachi which will subsequently:

- Elevate the standard of living;
- Remove the constraints to sustainable economic growth; and
- To pioneer a private and public investment partnership in the transport sector in the City of Karachi”.

Concept of BRT

The concept of BRT is based on railway system, i.e. running along exclusive way, high speed, accurate travel time, and high capacity. BRT has been recognized as a cost-efficient mass transit system which can solve urban transport problem in not only developing country but also developed country. Bus Rapid Transit (BRT) is a high quality road service that provides high speed, reliable, and comfortable services compared to traditional bus services.

Objectives of BRT Project in Karachi:

- To provide an alternative mass transit system.
- To contribute to solving the problems due over congestion of roads, ever-increasing volume of traffic, improve air quality and meet the mobility needs, particularly of the less privileged and poor masses of the Karachi Megapolis.

The Project

The proposed Bus Rapid Transit (BRT) project will be implemented on two priority corridors named as “Green Line Corridor” and “Red Line Corridor”. The 21 km long proposed Green Line corridor originates from Surjani Town and Terminates at Regal Chowk Saddar.

This route passes through major roads of Karachi having significant demand of passengers including Sakhi Haasan Round About, Sher Shah Suri Road (Board Office Round About), Nazimabad Chowrangi, Gulbahar/Golimar, Business Record Road (Lasbela), Gurumandir to M.A. Jinnah Road up to Radio Pakistan/Jama Cloth Market. There are 27 stations and one depot proposed on this corridor.

BRT Routes





Study Area

The 'Study Area' refers to the Right of Way (RoW) of proposed corridors where activities related to the construction and operation of the BRT proposed to take place or in which the environmental impact of these activities are likely to occur. 'Study Area' will refer to the area restricted to width of existing road(s) along proposed corridors which include a median, a carriageway and foot path.

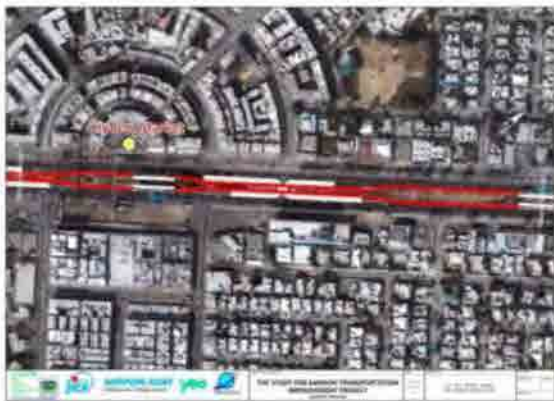
Since the project is being implemented within existing RoW which is the property of Karachi Metropolitan Corporation, no land acquisition would be involved. The structures would be elevated where road congestion exists in order to avoid land acquisition and involuntary physical or economic resettlement.

Green Line













Features of BRT System (BRT)

Segregated Lanes

Buses will run on BRT lanes only. In case of closed BRT, buses are only operated on non-overtaking lanes that are dedicated and controlled by a single operator along the lanes.

Capacity

The maximum Capacity of a standard BRT is 3,000 – 13,000 /hour /direction.

Features of BRT System (BRT)

Speed & Frequency

Since the BRT buses need not run in general traffic roads, advanced vehicle technologies can be used to increase the capacity and speed. In addition, pre-board fare collection reduces dwell time at bus stations.

The average commercial speed of a standard BRT is approximately 20km/h. The commercial speed of BRT depends on the number of stations since the buses need time at each station for boarding and alighting.

Location of Stations

Designing & Spacing Criteria

The criteria for spacing and designing the bus stations is based on optimizing the distance that minimizes the total passenger hours that includes the total travel time which is the sum of walking time, waiting time for a bus, and on-board time. In general, the optimum distance between stations is approximately 500m considering the standard BRT systems the world over

Assuming the proper walking time along the major road is less than 5 minutes and the walking speed is 4km/h, the maximum distance between stations is estimated at 667m.

Location of Station

Criteria for Siting Stations

The two options for siting BRT stations are 1) At the center for right door buses, and 2) Curb-side stations for left-door buses. The preferred alternative is to have the center station for the right door buses. The major reasons for the selection are:

- Approach to stations is needed for pedestrian bridge instead of pedestrian crossing because of heavy traffic of the corridor. Separation of stairs for both side stations will increase the cost.
- Passing lanes are needed at major stations. Center side station is better than curb side station in view of design.
- Center side station needs to be provided in order to manage paid and unpaid passengers.

General Setting of Station



Cross Sections at Stations

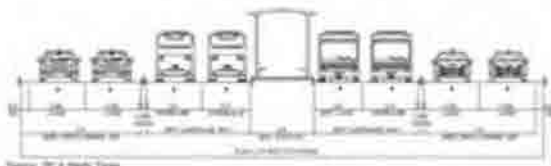
The station is wide enough for both sides boarding and alighting with 4m width. Parking lanes are provided for both sides of carriageways. The road with one-lane for mixed traffic is not recommended as a BRT corridor. Therefore, at least two lanes for one direction are necessary. The road width excluding pedestrian walks is 37m. Only North Nazimabad has enough space to satisfy this width.

Cross Section (1)



Cross Section at Station (37m wide road)

Cross Section (2)



Cross Section at Station (33m wide road)

Cross Section (3)

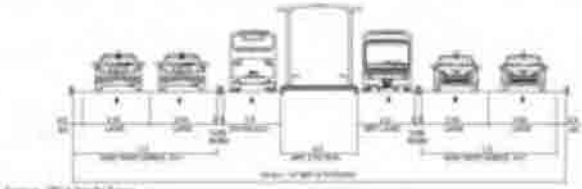
If platforms are provided at different locations by direction, the necessary width can be reduced to 28m. However, the length of a station becomes longer.



Cross Section at Station (28m wide road)

Cross Section (4)

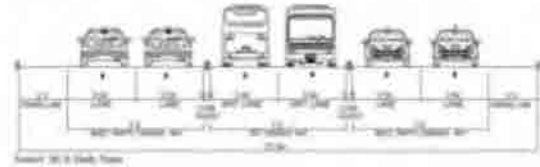
In case that BRT passing lanes are not provided, the width of cross section at BRT station is 26m. However, such siting requirement will be necessary only at and along M.A. Jinnah Road.



Cross Section at Station (Without Passing Lane)

Cross Section (5)

The cross section between stations where parking demand along the road exists. The necessary width is 27m. If parking lanes are not provided, the width can be reduced to 23m.



Cross Section between Stations (With Parking Lanes)

Specification of BRT Bus

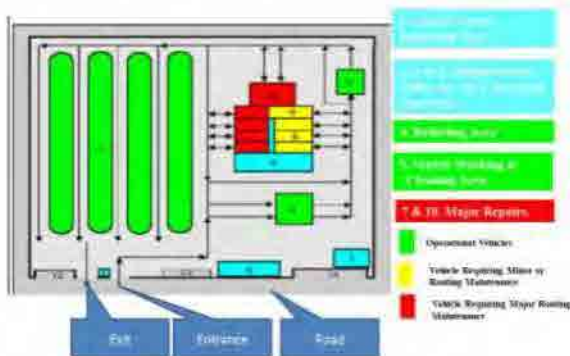
Selected type of the vehicle for Karachi BRT is the standard bus of 12m length, platform-level boarding type of high-floor bus with two doorways on the right hand side. Propulsion system is CNG drive.

BRT Bus Depot

Criteria for Set-up of Bus Depot

Bus depots have to, in order to meet the functional criteria, cater to the needs of parking, re-fuelling; vehicle washing and cleaning; maintenance and repairs; office space and employee facilities. The bus depots will be set-up according to the "Government Order on Road Design Standards in Japan" on 142 m² per vehicle. The total area of parking space will be over 7,000 m² for 50 vehicles.

Layout of the BRT Bus Depot



Selection of Bus Depot for Green Line

In case of Green Line, two areas in North Karachi are being considered: 1) Two Minutes Chowrangi, and 2) The depot area of CNG Bus Project. Both the areas will have to rent a space for the depot and pool, whereby the function of depot will be divided; the CNG bus depot will be used as the main depot area while the other one will be the pool area. The area of the depot can be extended if required to meet different functions and number of vehicles.



Location of Bus Depot

Arrangement for Existing Traffic

(1) U-Turn Traffic in North Nazimabad
 U-turn along Shahr-ae-Shershah Suri Road (North Nazimabad) between KDA Chowrangi and Five Star Chowrangi needs to be retained with modification at the median by reducing the width to 6.0 meter in the u-turn area to accommodate an inside lane for BRT and storage lane for the u-turn.

Arrangement for Existing Traffic

(2) Intersections

Traffic diversion as in vogue will be modified so that the BRT at Gurumandir can pass through the left side portion of the intersection (northwest) by the two way traffic. It will also be necessary to avoid the traffic jam or congestion along this area by modifying the existing island so as to channelize the flow of traffic crossing into the BRT lane.

Arrangement for Existing Traffic

(3) Roundabouts

Existing Roundabouts along Green Line		
#	Location	Improvement Policy
1	Gurumandir	Signalized Intersection
2	KDA Chowrangi	Signalized + BRT lanes through the roundabout
3	Sakhi Hassan Chowrangi	Signalized + BRT lanes through the roundabout
4	Powerhouse Chowrangi	Signalized roundabout
5	Surjani Chowrangi	Signalized Intersection

Source: JICA Study Team

Arrangement for Existing Traffic

(3) Roundabouts

All roundabouts will accommodate the BRT. Modification of the existing roundabouts will be required to provide space for the new BRT lane crossing into the area. Accordingly roundabouts will be converted to standard 4-leg signalized intersections. In case the signalization is constrained by some such structure as the monuments or fountains, Traffic signals should be installed to the roundabout.

Traffic Management

The proposed BRT routes have bottlenecks such as the section of Nawab Siddiq Ali Khan Road between Nazimabad No.1 Chowrangi and Lasbela Chowk & the section of Business Recorder Road between Lasbela Chowk and Gurumandir. Exclusive BRT lanes are difficult to be sited at these locations. To cope with the situation an appropriately designed traffic management system will be introduced.

Operation Plan

(1) Cross Operation

The Green Line will operate up to Jama Cloth Market on M.A. Jinnah Road on Green Line. This will avoid the transfer between two lines near the center of the city.

(2) Round Trip Operation

The required number of buses is different from section to section. At the initial stages of operation it may not be necessary to provide the target capacity along the sections which are at a distance from the center. From the results of the demand forecast, it is proposed to provide eight routes for Green Line.

Operation Plan

Line	Round Route	Center	U-turn point
Green Line	G11	Cloth Market	Board Office
	G12	Cloth Market	Nagan Chowringji
	G13	Cloth Market	New Karachi
	G14	Cloth Market	Surjani
	G21	Regal Chowk	Board Office
	G22	Regal Chowk	Nagan Chowringji
	G23	Regal Chowk	New Karachi
	G24	Regal Chowk	Surjani

Source: JICA Study Team

Operation Plan

Peak Hour Operation

(1) Peak Hours

Approximately two hours in morning i.e. 7:00-9:00 a.m. is peak hour time, while approximately three hours from 18:00-21:00 are the evening peak hours. In total, the peak hour operations will be 5 hours in a day

(2) Off-Peak Hour Operation

The frequency will be reduced according to passenger demand. However, the minimum frequency will be maintained.

Operation Plan

Peak Hour Operation

(3) Schedule of Operation

The target capacity in peak hours is 10,000 passengers per hour per direction. Buses should arrive at station in 20 second interval. From this high frequency, the time table of bus arriving will not be necessary for passengers. BRT will be operated based on time table for efficient operation.

Likewise the boarding and alighting time will be short at stations; this will increase the capacity. The boarding and alighting time at stations will be fixed at 20 seconds to enable the operation of buses at scheduled times. The time of 20 seconds for boarding and alighting at a station is popular time for BRT operations around the world.

Operation Plan

Peak Hour Operation:

(3) Schedule of Operation (Cont...)

Additionally, 10-20 seconds will be allowed for deceleration and acceleration at the stations and rapid deceleration and acceleration will be avoided. The In total, 40 seconds will be necessary for a bus at a station.

(4) Speed

The target speed of 25km/h will be maintained to achieve the objective of providing comfortable and timely operation of BRT.

Operation Plan

Peak Hour Operation:

(5) Frequency

3 buses with carrying capacity of 100 passengers will arrive in a minute (180 buses per hour) during peak hours to achieve the hourly capacity. Since the time of 40 seconds will be necessary for a bus at a station, a stopping slot can deal with 90 buses per hour (3600/40) at 100% of usage of the slot.

Under the random arrival, the saturation rate of 80% is achievable. In this case, the capacity is estimated at 72 buses per hour per direction for a stopping slot (90 * 0.8 = 72). This suggests that 3 stopping slots will be necessary to accommodate 3 buses in a minute at a station.

Operation Plan

Reorganization of Present Bus Network:

Green Line

There are 49 routes which compete with Green Line, in which 18 routes will have to be discontinued because they overlap the Green Line over a large distance. Feeder routes will be provided for the 18 routes outside the Green Line in consultation with the stakeholders especially the bus owners/operators.

Operation Plan

Reorganization of Present Bus Network:

List of Bus Routes Compete with Green Line

2-K	F-16	G-25	W-1	401-GUL
4	X-3	G-27	U-8	Khan
4-J	F-18	W-24	W-22	Niaz
1-D	W-11	C-17	X-10	National
4-L	C-25	P-3	U	Shiraz
2-D	F-21	W-55	G-11	Shama
4-X	G-17	W-25	G-3	UTS-1
5-C	W-18	W-19	U11	Masood
6	Z-A	W-21	Umer-Couch	
8	G-13	W-30	201-CITY	

Source: DCA Study Team based Public Transport Survey in 2010

Operation Plan

Traffic Signal

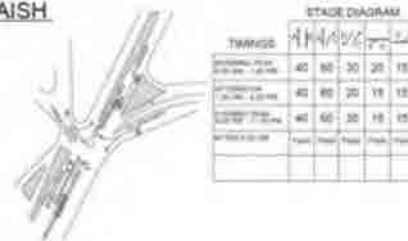
Traffic management at all intersections is overburdened with failures due to both technical and non technical reasons. The following system of signalization is proposed at the critical BRT intersections.



Operation Plan

Traffic Signal

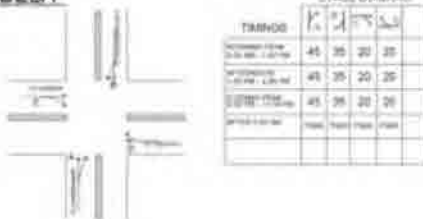
NUMAISH



Operation Plan

Traffic Signal

LASBELA



Operation Plan

Traffic Signal

FIVE STAR





Consultation Process

The first meeting was held on the Green Corridor at Taimuria Library at Five Star Chowrangi on 31st January 2012.



Findings from Stakeholder Meetings

The findings from the responses provided by the participants in the two meetings are as follows:

A huge Majority of the participants (98% from Greenline Corridor and 96% from Redline Corridor) expressed dissatisfaction with the present system of transportation in Karachi. The reasons stated for dissatisfaction with the current transportation system are as follows:

- Sub-standard quality, lack of discipline and lack of awareness of rules and regulations.
- Increase in No. of vehicles is indiscriminate and traffic jam is too frequent.
- Road related accidents taking toll of life of at least 900-1200 persons per year.
- Time delays are uncontrolled, man hour loss is heavy.

Findings from Stakeholder Meetings

- Air and Noise pollution at all intersections aggravated by operation of generators.
- Fares are high, services are poor and undisciplined.
- Lack of security, reliability and congestion
- Buses have more passengers than capacity.
- Violation of traffic rules
- Transport mafia is very influential.
- No security for females.
- No schedule observed for operation of private buses.
- Illegal parking and encroachment on the roads.

Findings from Stakeholder Meetings

68% of the participants from Green Line Corridor and 71% from Redline Corridor were of the opinion that congestion will decrease while the remaining did not think that there will be any alteration in congestion. Perceptions given by participants who believe that congestion would decrease through introduction of BRT were:

- ❑ A single BRT vehicle will carry about 100 passengers and if it is allowed to operate at full capacity it might replace an equivalent of 50 cars or 100 motorcycles or 25 cars and 50 motorcycles. This implies that there will be substantial reduction in the volume of traffic operating on the corridor.

Findings from Stakeholder Meetings

- ❑ BRT would operate on dedicated lanes and would be reducing the traffic jam due to operation of school buses and pick-up services at peak hours and hence will reduce the congestion at the concerned points.
- ❑ BRT will have a dedicated lane to operate on and hence the air pollution as well as noise will be localized into the microenvironment.
- ❑ BRT system would entail substantial reduction in air pollution load and also noise pollution level.
- ❑ BRT is supposed to be providing comfortable and disciplined service if owned by the commuters it will be able to provide the comfortable service that the commuters are looking for.

Findings from Stakeholder Meetings

Participants also think that the space for siting the BRT lane is too insufficient; the required free lane road is not met anywhere and the proposal to elevate the lane may not be cost effective. Moreover there is heavy encroachment at all intersections and also wherever the car dealers are doing their business.

On Green line Corridor 27% of the participants indicated that they travel by car, 18% by Bus, 5% by motorcycles, 7% use both motorcycle and cars. On Redline Corridor 35% of the participants indicated that they travel by car, 45% by Bus, 10% by motorcycles, 8% use both motorcycle and cars,

Findings from Stakeholder Meetings

- ❑ It will save fuel usage
- ❑ It will take care of gender issues.
- ❑ Being on the dedicated lane it will only stop at dedicated stations and hence the present mode of 'stopping at will' will be eliminated. Stoppage at fixed stations will also discourage J-walking on main the corridor.

The remaining 15-18% did not think of using the BRT perhaps because they have to travel only short distances which condition will be fulfilled by using the feeder system. According to them there are constraints to distant traveling. Commuters who have to change buses may not be able to benefit completely from BRT.

Findings from Stakeholder Meetings

- ❑ Public transport may shift towards feeder service and that may reduce congestion and also the air pollution load.

The remaining persons (32% from Green Line Corridor and 29% from Redline Corridor) who did not think of any improvement were of the view that strict implementation of the traffic rules is necessary before it could be thought that there would be any reduction in congestion while other thought that the real reduction in congestion would be possible if the number of vehicles operating on road are reduced simultaneously with the introduction of BRT and all elements for example old buses, hand or animal driven carts and pedestrians are discouraged for impeding the transportation.

Findings from Stakeholder Meetings

The rest 42% (in case of Green Line Only) either did not register any mode of travel perhaps because they were all students who manage to travel by one or the other system which they could not mean or else they were not using the road at all.

85% of the participants from Green Line Corridor were hoping to travel by BRT provided it offers the same facilities of travel as promised. Participants were of the view that they shall prefer BRT if:

- ❑ It is affordable and observes the schedule of time for arrival and departure.
- ❑ Provided the Japanese standards on operating procedures are followed in letter and spirit.

Findings from Stakeholder Meetings

A majority of the participants (96% from Green Line Corridor and 82% from Redline Corridor) believe that BRT system will improve social life, environmental condition and economic activities in city because:

- ❑ It will improve the quality of life by providing less polluted and stress free environment to the commuters and the residential and commercial enterprises on the corridor.
- ❑ It will provide rapid, comfortable and disciplined transportation system which the people on the corridor have been looking for.
- ❑ It will hopefully induce reduction in traffic volume since the present bus service would be oriented towards feeder routes.

Findings from Stakeholder Meetings

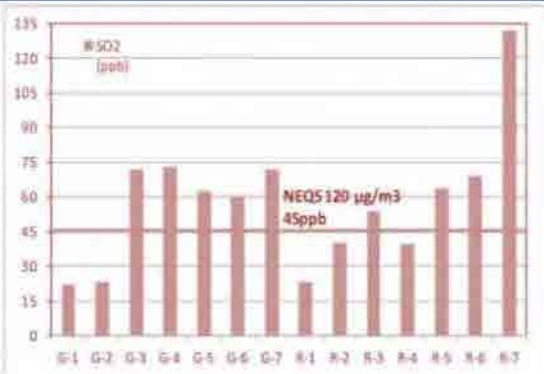
- ❑ BRT will reduce the expenses on fuel and operation of their vehicles.
- 58% of participants from Green Line Corridor are of the opinion that there are technical hurdles and the technical hurdles that they can think of are the congestion which cannot be removed by placing a dedicated lane at the center. They highlighted the following constraints:
- ❑ BRT implementation will require relocation of utilities, removal of trees, removal of existing structures and the like.
 - ❑ Learning from the lessons of the past doubts can be raised if the project will get off at all. It may not have the blessings of the parliamentarians who are agriculturists and not urbanized.

Findings from Stakeholder Meetings

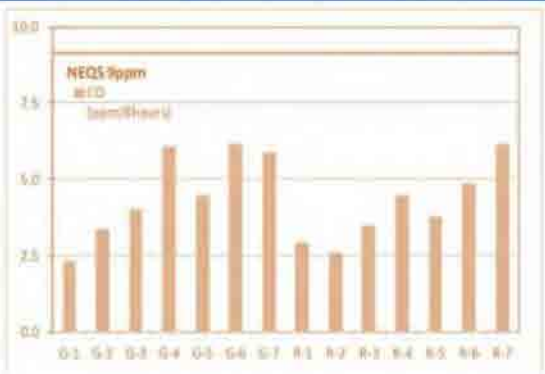
- ❑ Non technical issues such as the role of transport mafia and the political blessings offered to the mafia as well as encroachers will be great impediments in locating the system at the middle of the road.
- ❑ Underpasses, flyovers to make a signal free corridor are already a constraint on the smooth operation of the system. The BRT will be pose constraints of similar nature.

The remaining (42% and 29%) who thought that it is non-technical reasons have the lessons from the past failures of the 5 mass transit systems that could not get the approval of the decision makers,

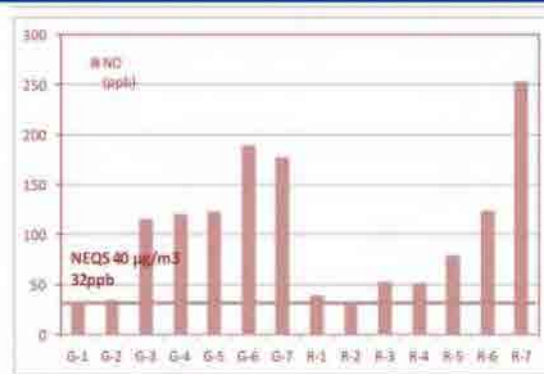
Baseline Data on Air Quality



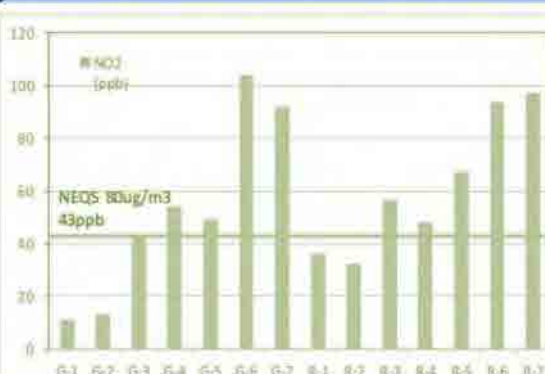
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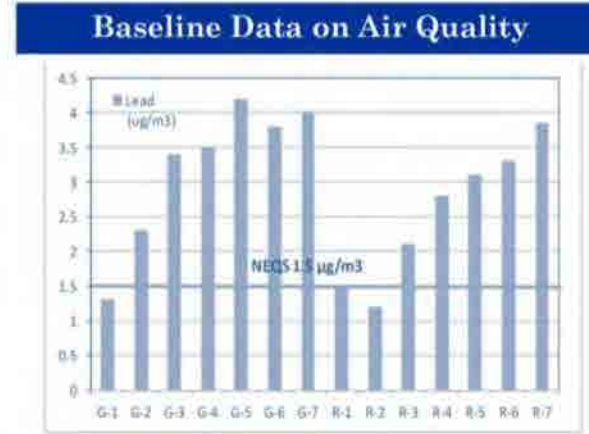
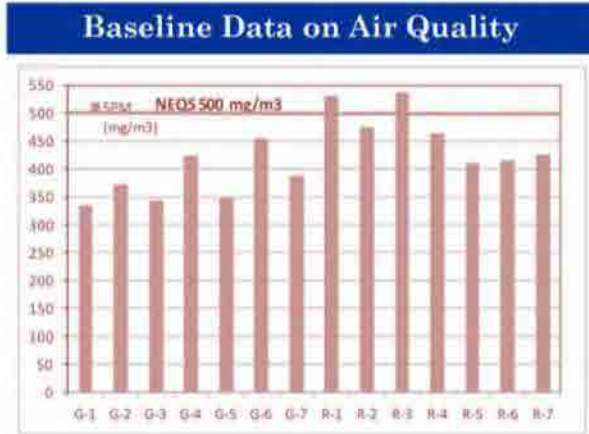


Baseline Data on Air Quality



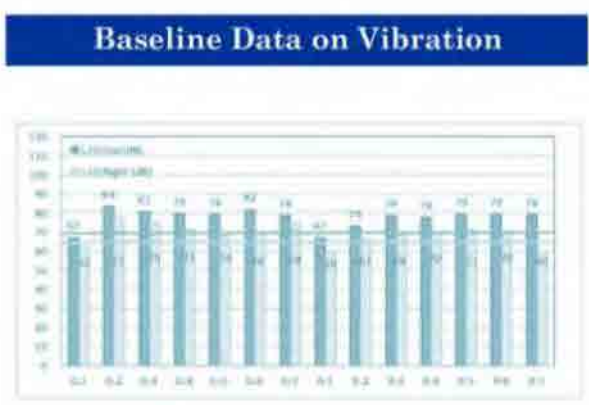
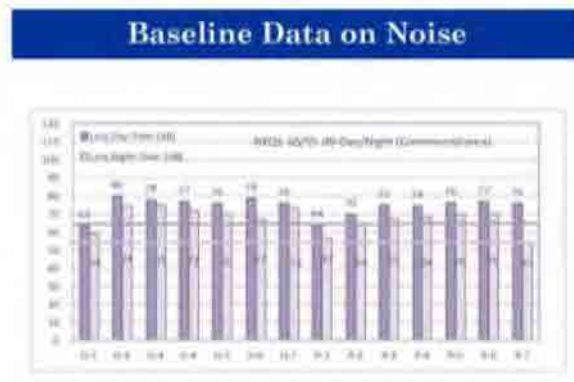
Baseline Data on Air Quality





Baseline Data on Air Quality

According to the report of Vehicular Emission Control Programme (VE COP) by The Sindh Environmental Protection Agency, regular monitoring and inspection was started from January 2010 and during the last 18 months, about 11,384 vehicles of all categories have been inspected and tested for their emission levels. Out of them, about 3,503 did not comply with the National Environmental Quality Standards (NEQS) for vehicles and 1,947 were challenged by the traffic police for violation of the standards.



Environmental Impacts & Proposed Measures

Removal of Vegetation:

There are at least 4200 trees on the Green Line. This number relates to trees that are on the median and the same will have to be removed to yield to BRT-RoW where road width is narrow along the Green Line corridors as well as the station sites. However, a few trees will be removed from the left and right edge of the road to make room for construction of pedestrian bridges at the stations. Removal of trees may also be necessary at points where bored concrete piles will be introduced for elevated structure

Environmental Impacts & Proposed Measures

Removal Vegetation:



Figure 7.5: Example showing the affected segment of road when BRT is at median and location of stations

Environmental Impacts & Proposed Measures

Mitigation Measures:

- After removing the existing trees and top soil (down to 0.5 m), the topsoil shall be retained for use elsewhere on the corridors. The cut wood shall be removed and not burned on site. All stumps and surplus vegetation shall be disposed of at landfill via routes or other destinations as designated and instructed by Horticulture Department of KMC
- International practice suggests that replacement at a minimum rate of 5:1 for trees would be appropriate given possible difficulties with establishing trees and low survival rate of young trees. This rate is acceptable however; the present scenario is that some fast growing variety of trees has been planted all along the two corridors. They are to be designated as only maturing trees and hence EMC proposed that the loss of maturing trees would be compensated by a rate of 3:1 and for mature trees the compensation rate would be 5:1. Countries, where the population has to rely on forestry resources for livelihood (felling for sell in the market and use as fuel) the replacement rate has recently been raised to 25:1. Therefore it will be important to seek cooperation of the KMC Horticulture department for removal as well as replanting

Environmental Impacts & Proposed Measures

Mitigation Measures:



Figure 7.6: The maturing trees on the median of BRT corridor

Environmental Impacts & Proposed Measures

Mitigation Measures:



The mature trees on the median of BRT corridor

Environmental Impacts & Proposed Measures

Siting of Stations:

Keeping in view the current system of undisciplined operation of vehicles and carefree attitude of pedestrians, the stations will be sited at closer distances. The stations will be provided with amenities including a library, bookstall, telephone and internet service, rest rooms, access and emergency ramps, ticketing system, pedestrian bridge and storm water as well as wastewater drainage system.

Environmental aspects identified for siting the stations include: 1) provision of safe drinking water, 2) drainage system for wastewater as well as storm water, 3) ventilation, 4) safety and security.

Environmental Impacts & Proposed Measures

- **Safe Drinking Water:** Such gadgetries for provision of safe drinking water as are currently available in the market will be installed at each station.
- **Drainage System:** Drainage system such as the one shown in the following figure will be installed at each station. The waste water will be treated in a sewage treatment facility to conform to the National Environmental Quality Standards (NEQS) and then discharged into the nearest sewerage line; the storm water will be drained into the Bus Lane Drainage Channel which will carry it to the central storm water drainage system where it will be stored as harvested rainwater and utilized wherever possible for example, in the drip irrigation system.

Environmental Impacts & Proposed Measures

Availability of space for operation of the system:

The Green Line is constrained to operate up to Aurangzeb Park because the section from this section to Merewether Tower is very narrow and does not fulfill the demand of at least 4 lanes for smooth operation of the BRT system. The road width near Tower is approximately 15m for the length of 400m. Moreover there is no provision for a turnaround and hence the BRT will have to terminate at Aurangzeb Park.

Furthermore the Jail Chowrangi to Saddar is a very busy commercial area, which requires parking lanes or emergency shoulder for both sides. Considering the demand of commercial vehicle for loading and unloading, the width of parking lane is required to be 2.5m. This means that even if bus stop is not provided along this section, a minimum road width of 19m plus side-walk is required.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Construction of BRT on the narrow section from Jama Cloth Market to Merewether Tower will not be socially and economically acceptable proposition because it will require Land Acquisition as well as temporary relocation. The system will have to terminate at Aurangzeb Park for which the turnaround will be suitably established.

Environmental Impacts & Proposed Measures

Structure Stability:

The Red Line and Green Line corridors would be sited in the Seismic Zone 2B corresponding to moderate to major earthquake having magnitude between 5.0 and 6.5 on Richter Scale and Intensity between VII and IX on Modified Mercalli Scale. As such the Ground Force in terms of Assumed Approximate Acceleration equivalent of 0.3 g would be adopted to mitigate the seismic impact due to siting the two lines.

Geotechnical study will be undertaken before start of construction to ascertain that the sub-soil stratum has the desired strength for laying the foundation

Environmental Impacts & Proposed Measures

Vehicle Size & Capacity:

The following aspects need to be considered for selection of vehicle type, its size and capacity:

- The vehicle should be cost effective.
- It should be of high quality and high reliability so that the chances of breakdown are minimum.
- Its maintenance should be manageable.
- Parts supply should easily available.

The bus vehicles run on segregated BRT lanes; at the roundabout and intersections, the bus will merge into the general traffic and/or cross into the general traffic. Moreover, at the terminus of the route, the bus will turn into road space. Under such road conditions, maneuverability of the long articulated bus, which has a large turning circle, will be constrained and there would then be interference with movement of vehicular traffic.

Environmental Impacts & Proposed Measures

Recommended Measures:

- Articulated bus and bi-articulated bus if selected to operate on the routes will require large corridor capacity and up gradation and improvement of infrastructures such as the BRT lane, station and intersection. In view of these constraints the standard bus (10.5m-12.0m) will be purchased and operated on the two BRT lanes.
- The hundreds of bus vehicles that will be purchased by KMC should be operated on the Red Line and Green Line by employing local drivers; they will be trained on safe driving practices. To arrange for local drivers training for safe driving such vehicles will be needed that do not require special driving techniques. Standard buses are therefore recommended in preference over the articulated buses.
- Selection of drivers will be on the basis of their qualification, fitness, observation of rules and regulations as well as standard operating procedures for operation as well as maintenance.

Environmental Impacts & Proposed Measures

Engine Design and Emission:

1. The Pakistan Environment Protection Agency (PEPA) has set the limit for respirable particulate matter of 2.5 micron size (PM_{2.5}) at 25 µg/m³ on annual average basis. However the level observed in the atmosphere of Karachi is 41.49 µg/m³ on an annual average from June 2010 to May 2011. This exceeds the yearly average limit set by National Environmental Quality Standards.

Monitoring of the respirable particulate matter level by EMC finds that the 24 hour average level at Red Line is 23.8 µg/m³ and 24.3 µg/m³ on the Green Line.

Environmental Impacts & Proposed Measures

Engine Design and Emission:

2. Clean diesel engine and Hybrid system which can adapt to EURO-V use ultra-low Sulphur diesel oil (15ppm). From the view point of the fuel supply situation in Karachi, Clean diesel engine and Hybrid system have remote chances of conforming to the requirements of EURO-V BRT vehicles.
3. In Pakistan, steps are being taken to adopt EURO-II emission standards. The Ministry of Environment has planned for all diesel cars which will be imported or manufactured on and after July 2012 to conform to EURO-II emissions. Also, it has been planned by the Ministry of Petroleum and Natural Resources to supply low Sulphur diesel oil (500 ppm) which can be adapted to EURO-II on and after January 2012. However, up gradation of the oil refinery facilities do not seem to be preparing to achieve the stated target.

Environmental Impacts & Proposed Measures

Engine Design and Emission:

4. Use of the diesel oil containing about 0.2 – 0.6% Sulphur will alter the quality of emissions and this time the emissions will contain SO₂ as well as Particulate Matter (Black smoke) and higher amounts of CO (Carbon Monoxide). This will need use of low Sulphur Diesel oil (0.05 % - 0.35%) for efficient operation of EURO II and EURO III engines.
5. According to Pakistan Clean Air programme (PCAP) established by the Ministry of Environment, gradual exclusion of the diesel car from centre of the city is under consideration. In Pakistan, CNG has been introduced as an alternative to reduce the amount of oil import and to control air pollution. CNG engine does not discharge PM and can adapt to EURO-II by installing the oxidation catalyst

Environmental Impacts & Proposed Measures

Engine Design and Emission:

6. Comparison of the fuel cost of CNG bus and diesel bus is shown in the following table. The cost has been calculated using the fuel unit price in Karachi as of April 2012 and the fuel consumption of the CNG bus currently operating by KMC.

Fuel	Unit Price	Fuel Consumption	Fuel Cost	Fuel
CNG	70	2.5kwh/g	Rs. 175	CNG
Diesel	154	2.5litre/ltr	Rs. 385	Diesel

Source: JICA Study Team

Environmental Impacts & Proposed Measures

Mitigation Measures:

- To reduce the particulate matter (PM) and the nitrogen oxide (NOx) emission the mitigation measures are use of engines that have adopted the latest clean diesel technology and also attaching the exhaust post-processing equipment. Moreover, as the alternative system of the diesel engine, there are the low emission vehicles applying CNG (Compressed Natural Gas) drive and hybrid system
- Maintenance of vehicles to conform to emission standards should be legalized as per the requirement of Vehicular Emission Control Program (VE COP) by Sindh EPA. Accordingly all vehicles should be subjected to regular inspection and certification by a competent authority so that the emissions are controlled at source

Environmental Impacts & Proposed Measures

Boarding and Alighting:

The boarding and alighting if not properly designed can cause difficulty for senior citizens and physical disadvantaged people to get benefit of BRT service. This aspect has been identified by stakeholders in two consultation meetings. The height of the station platform, therefore, has to be level with the floor of the vehicle to facilitate easy boarding and alighting for such passengers

Environmental Impacts & Proposed Measures

Mitigation Measures:

- High level platform with 1,000mm height is recommended. In order to account for the gap between station platform and BRT vehicle, a bridge plate may be provided that would be in automatic synchronization with door opening at each doorway of the vehicle. Although at-level boarding with 1,000mm height is a desirable proposition, yet if it would be preferable to have raised floor of the vehicle. In this case, the vehicle floor height and the gradient of a bridge plate shall not exceed 1,100mm and 10 degrees respectively; this is to secure the inside standing height and wheelchair access.
- In addition, the use of high level platform will prevent the illegal ridership which may enter into the station without passing the ticket gate. This will also provide security to the passengers inside the station in case a collision of cars occurs at the station.

Environmental Impacts & Proposed Measures

Designing of Drainage System:

A drainage system will be designed for the Green Line corridor to cater to the runoff from within the corridor right-of-way only. The drainage system will be directed to outlets at the existing channels and drains along or intersecting the corridors.

The 5 years rainfall Average Recurrence Interval (ARI) should be adopted for the computation of the road surface runoff, while Intensity-Duration-Frequency (IDF) Curves for the City of Karachi shall be used for the estimation of rainfall intensity. The Rational Method shall be used to estimate the surface runoff from the Right of Way of BRT corridors.

Environmental Impacts & Proposed Measures

Land Preparation:

The establishment BRT system will require extensive shallow cutting and filling of the ground along most part of the median to make room for the Right of Way. It is envisaged (depending on the mode of construction) that the existing road surfaces will need to be modified (e.g. to remove unstable materials) and fill in the remaining surface for the BRT transit ways. In other places surfacing will proceed straight to BRT standard. At this stage the removal of only the medians that are about 50cm high will require at least 20,000 m³ to be cut.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- A disposal or reuse plan for these materials will need to be identified in the detailed design phase and included in the EMP.
- Cut and fill requirements will have to be balanced to minimize the impacts. Accordingly surplus materials arising from removal of surface material will be used elsewhere on the corridors as fill material.
- The BRT detailed design will carry the estimates on additional materials that will be required.
- Works should be planned and scheduled to facilitate the timely production of rock, gravel and sand materials for construction and to avoid the need for excessive stockpiling and importing from elsewhere in the district.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Materials Management Plan (MMMP) including mitigation measures will be prepared for: (i) a mass haul chart for the rock based materials, aggregate and bitumen materials needed for the construction works, (ii) extraction of materials including mass haul procedure to specify (iii) the construction methodology, (iv) measures to be employed to mitigate nuisances to local residents, and (v) additional measures such as compensatory planting of trees.
- The MMMP will be updated regularly and reported monthly as a contract requirement for each contractor to monitor the production and use of materials. The construction supervising consultant (CSC) shall be held responsible for updating and reporting the cut and fill estimates in the MMMP.

Environmental Impacts & Proposed Measures

Traffic Diversion/Management during Construction

A practical traffic diversion plan will be prepared to ensure minimum inconvenience to road users during the construction stage. The number of the traffic lanes and capacity of diversion should not be reduced in order to minimize traffic congestion, especially during the peak hours. Similarly the existing profile of road, if possible should not be reduced or raised significantly (>0.3m) unless proper diversion is arranged.

A Safety Manager, with working experience in road construction, shall supervise and maintain all traffic diversion and safety matters. The traffic diversion plan shall be maintained and kept in good order at all times (no potholes, good road marking, adequate sign boards, traffic barriers/cones/New Jersey Barriers, blinker light etc.)

Environmental Impacts & Proposed Measures

Traffic Diversion/Management during Construction

A traffic engineer will prepare a traffic diversion plan which can be satisfactorily implemented on site to comply with local statutory requirements and conditions

Environmental Impacts & Proposed Measures

Noise and Vibration

Noise emission sources are expected to be the powered mechanical equipment such as generators, excavators, bulldozers, piling rigs, stabilizers, and drills while stone crushers, graders, vibratory rollers, concrete-mixing plants, and screening plants will generate noise of high level besides vibration. However the noise level and impact of vibration can be controlled at source by regulation of contractual obligation.

The cumulative effects from equipment, machinery and the vehicular traffic can be significant but the same will be limited to the microenvironment of the median of the BRT system

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Sufficient buffer distance may not be available along the corridor between the works and the scores of receptors and hence adverse impact of construction activities in terms of noise, vibration, dust and waste disposal is expected to be significant. The contractor will therefore be mandated to segregate the construction area at the median from the edge of the road. The segregation should be easily erected and substantial enough to minimize noise impacts.
- Background noise levels are likely to be high during nighttime (10 pm to 7 am). Therefore the performance criteria shall be as follows. During nighttime (10 pm to 7 am) the impact of noise measured at the residential and hospital (sensitive receptor) shall not exceed 3dBA over the background noise level. The contractor shall also maintain and service all equipment to minimize noise levels.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Where schools and mosques are nearby, the contractor shall discuss with the CSC and the school principals the agreed time for operating the noisy machines and completely avoid use of machines during school times and near mosques during prayer times.
- Construction activity will be preceded by a round of public consultations at each section of the corridor, where the public would be informed of the construction schedule, alternate traffic routes, if necessary, and the likely impact on the site.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Options to control noise pollution include increasing the use of heavy thick ply-board or corrugated metal sheet to supplement the mass of the hoarding barriers to achieve a mass of greater than 10kg/m². The design of the hoardings and the working plan will include safe passage for the pedestrians.
- Large building components could be prefabricated nearer the concrete batching plants or in controlled dedicated areas away from Sensitive Receptors to minimize impacts along the BRT corridor.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- To minimize impacts the contractors will be mandated by the KMC to:
- Ensure NEQS compliance to the effect that all equipments and machinery to be used during construction are equipped with the necessary air pollution and noise dampening devices to meet statutory requirements.
 - Perform regular maintenance and service all equipment to minimize noise levels.
 - Locate and operate equipment to minimize nuisances; and
 - Install acoustic insulation or use portable noise barriers or install a hoarding where practicable to limit noise at sensitive receivers. Major construction activities will be limited to daylight hours to minimize construction noise. Mufflers will be used on diesel equipment and power generators.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Major construction activities will be limited to daylight hours to minimize construction noise. Mufflers will be used on diesel equipment and power generators.
- Appropriate PPE such as ear muffs shall be provided for the workforce and their usage enforced with sound policies and by setting examples.
- Effective staff awareness campaign on the implications of non-compliance with PPE policy shall be enforced. All workers will be required to make proper use of the protection equipment provided by management and also to observe all rules and regulations pertinent to the use of equipment designed to minimize noise exposure.
- Records of noise-exposure measurement of workers shall be maintained.
- Individual worker's exposure to excessive noise shall therefore be controlled by shift arrangement.
- Acoustic enclosures and silencers shall be used for high capacity diesel generators.

Environmental Impacts & Proposed Measures

Air Pollution

Reports available on air quality on the two corridors suggest that the congested areas at traffic intersections and narrow lanes are heavily polluted but at the center of the road.

Bituminous materials may generally be applied using machines supplied from the asphalt plant but if bituminous compounds are to be applied manually and melted in heaters and mixed on site, the fuel used shall be kerosene, diesel or gas. Fire wood shall not be used for heating bitumen; neither will bitumen be used as fuel. Due to the scale of the works fumes from asphalt chemicals are likely to be noticed by local residents as phenolic compounds in the bitumen have a very low odor threshold and extremely low concentrations can cause nuisances. These are unlikely to accumulate to toxic levels but the plant for the supply of molten bitumen shall be sited at reasonable distance from water bodies and sensitive areas including schools, health clinics and praying places.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- If for some engineering reason the construction of a hoarding is not practicable at some locations it can be substituted with a continuous 3m high tarpaulin sheet suspended on wires and designed to retain dust and provide a temporary dust and visual barrier to the activity area. Where dust is the major consideration the barrier can take the form of tarpaulins strung between two poles mounted on a concrete base. These can be moved along the road as the work proceeds.
- The need for large stockpiles will be minimized by careful planning of the supply of materials from controlled sources. Stockpiles will not be located within 50m of sensitive areas such as schools, hospitals or other public amenities and will be covered with tarpaulins when not in use. If large stockpiles (>25m³) of crushed materials are necessary they will be enclosed within side barriers and also covered when not in use.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Wherever possible, materials should be brought to site on an as needed basis to avoid the need for stockpiling in the restricted work sites that will have to be located in the median of the roads that will form the BRT corridors.
- The interaction of the activities at the construction site with the vehicular traffic at the corridors will have to be controlled by implementing the traffic management rules. This will need transport planning to optimize freight and passenger transport.
- Mobilization of construction trucks and machinery shall be effective after "peak hours". Road dividers or kerbs shall be installed. Road will be properly signed and traffic wardens employed to facilitate smooth vehicle traffic, at all times

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Water sprinkling is the general method to suppress dust emission. Water is available along the corridors but the same may not be available as and when required. It will therefore be advisable to enter into contract with KW&SB or its contractors to ensure the supply through tankers.
- In case sensitive receptors are within 10 m of the activity area, the contractor will install structures / barriers to segregate the works to protect the sensitive receivers and passing traffic. The segregation will be manageable with 3m high hoarding within which all construction works can take place. The hoarding will be moveable from worksite to worksite along the BRT corridor as the work proceeds and as and when the works are completed.
- Hoardings and tarpaulins will be used to retain dust and cover the exposed earthworks, stockpiles and surfaces.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Construction materials (sand, gravel, and crushed stone) and spoil materials will be transported by trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction activity) will comply with the NEQS for emissions and noise and duly monitored by the contractor as well supervision consultant.
- Sites for mixing asphalt shall be located 100m from sensitive receptors and asphalt plant and concrete-batching shall be at least 500m downwind of the nearest sensitive receptors. The surfacing works will be so programmed as to finish the work in time to minimize the nuisances in any given location.
- Bitumen drums will be stored in designated areas, not scattered along the works and any small accidental spills of bitumen or chemicals will be cleaned up immediately. The waste including the top 2 cm of any contaminated soil and disposed of as chemical waste to an approved landfill or approved local authority disposal location.

Environmental Impacts & Proposed Measures

Solid Waste Management

Solid waste will be mainly generated from the construction debris and packaging material besides different activities at the camp site or the working area. The entire solid waste generated at the construction site and camp site is recyclable but for the food waste.

Mitigation Measures:

- The safe disposal of solid waste will be outsourced to a contractor.
- After construction activities, regular maintenance practices including manual road sweeping will be carried out to supplement the flushing of pollutants from the road by natural rainfall events to remove large particle size pollutants.

Environmental Impacts & Proposed Measures

Noise

Noise from local traffic in the towns is generally accepted as a consequence of urban life but concerns have been expressed during the consultation meetings about the congested sections on the Green Lane and Red Lane corridors.

Depending on the eventual traffic flows most road sections near the BRT are expected to carry less but still substantial volume of traffic. This is based on the assumption that the BRT will be instrumental in removing the major source of annoyance including noise emission from buses operating on the BRT routes and transfer of passengers to the BRT system.

Environmental Impacts & Proposed Measures

Noise

It is expected that the traffic noise level is reduced approximately 0.1% to 2.1 % by modal shift of transportation from passenger cars/ buses to the BRT system.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Utilization of vegetation belts on the project corridor and the enforcement of relevant standard and regulation on vehicular emission are the appropriate mitigation measures as the most important influence on the spread of the pollution after its release is the strength of the wind.

Environmental Impacts & Proposed Measures

It is expected that the exhaust pollution gas is reduced approximately 26% by modal shift due to the implementation of BRT.

Table : Reduction Ratio in Air Quality

BRT	Forecast of NOx volume along the BRT line 'Q' (g/day)		Reduction due to the implementation (%)
	With the BRT Project Road Traffic (KCR + Green Lane + Red Lane)	Without the BRT Project Road Traffic (Only KCR)	
Green Lane	4,197	5,293	27.6%
Red Lane	7,644	10,210	25.1%
Total	11,841	16,003	26.0%

Environmental Impacts & Proposed Measures

It is expected that the total emission factor for CO₂ is reduced approximately 12 % in respect of the modal shifting of transportation from passenger cars/ buses to the new transportation system.

BRT	Forecast of CO ₂ volume along the BRT line (g/day)		Reduction rate (%)
	With the BRT Project Road Traffic (KCR + Green Lane + Red Lane)	Without the BRT Project Road Traffic (Only KCR)	
	GHG _{CO₂}	GHG _{CO₂}	(GHG _{CO₂} / GHG _{CO₂})
Green Lane	689,120	892,511	14.1%
Red Lane	270,251	292,469	7.6%
Total	959,370	1,095,000	12.4%

2) Red Line : Hotel Ramada Plaza (Red Line Corridor) on 28th April, 2012

Presentation on Findings from
Draft Report

Environmental Impact Assessment

Karachi Transportation
Improvement Project (KTIP)

Environmental Management Consultants

EIA Study Team

S.#	Name	Position
1.	Mr. Syed Nadeem Arif	Project Director
2.	Mr. Saqub Ejaz Hussain	Project Coordinator & EIA Specialist
3.	Dr. Mirza Arshad Ali Beg	Team Leader/Senior Environmentalist
4.	Dr. Vigar Hussain	Geologist
5.	Dr. Badar Munir Ghausi	Air Quality Assessment Specialist
6.	Dr. Syed Ali Ghalib	Ecologist
7.	Dr. Mansoor A.H Imam	Waste Management Specialist
8.	Mr. Syed Azhar Zaidi	Transportation Engineer
9.	Mr. Khuram Shams Khan	Sociologist
10.	Ms. Noor Fatima	Environmental Scientist

Contents of EIA



Objective of Today's Meeting

- To share the main findings from the Draft EIA Study of KTIP – Red Line.
- To get the feedback from all relevant stakeholders
- To get the consent from stakeholders on the study
- Once finalized we shall conduct a joint public hearing for this study

EIA Methodology



Why EIA ?? Objectives of the Study



Laws / Rules Covered in EIA

a Policies & Plans

b National Laws & Guidelines

c International Laws & Conventions

BRT Vision

BRT Vision is:

“To have a state of the art public transport system at reasonable cost to the users and yet profitable to the operators using high capacity buses which meet international service standards, environmentally friendly, operating on exclusive lanes, at scheduled travel time.”

BRT Mission

The BRT Mission is:

“To provide quality, accessible and affordable mass transport system for the residents of Karachi which will subsequently:

- Elevate the standard of living;
- Remove the constraints to sustainable economic growth; and
- To pioneer a private and public investment partnership in the transport sector in the City of Karachi”.

Objectives of BRT Project in Karachi:

- To provide an alternative mass transit system.
- To contribute to solving the problems due over congestion of roads, ever-increasing volume of traffic, improve air quality and meet the mobility needs, particularly of the less privileged and poor masses of the Karachi Megapolis.

The Project

- The 23 km long proposed Red Line Corridor originates from Model Colony (Tank Chowk) and Passing through Check Post No.6 of Malir Cantt, Safoora Mazar-e-Quaid/People’s Party Secretariat to Preedy Street Extension, Empress Market terminating at Regal Chowk.
- There are 21 stations and two depots proposed on red line corridor.

BRT Routes





Study Area

- 'Study Area' restricted to - width of existing road(s) includes a median, a carriageway and foot path.
- Project is in exiting RoW - property of KMC, no land acquisition would be involved.
- The structures would be elevated where road congestion exists to avoid land acquisition & involuntary resettlement.

Red Line













Features of BRT System (BRT)

Segregated Lanes

Buses will run on BRT lanes only. In case of closed BRT, buses are only operated on non-overtaking lanes that are dedicated and controlled by a single operator along the lanes.

Capacity

The maximum Capacity of a standard BRT is 3,000 – 13,000 /hour /direction.

Features of BRT System (BRT)

Speed & Frequency

The average commercial speed of a standard BRT is approximately 20km/h. The commercial speed of BRT depends on the number of stations since the buses need time at each station for boarding and alighting.

Location of Stations

Designing & Spacing Criteria

Assuming the proper walking time along the major road is less than 5 minutes and the walking speed is 4km/h, the maximum distance between stations is estimated at 667m.

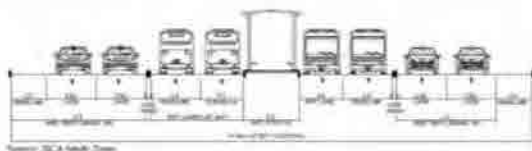
General Setting of Station



Cross Sections at Stations

- The road with one-lane for mixed traffic is not recommended as a BRT corridor.
- Therefore, at least two lanes for one direction are necessary.

Cross Section (1)



Cross Section at Station
(37m wide road)

Cross Section (2)



Cross Section at Station
(33m wide road)

Cross Section (3)

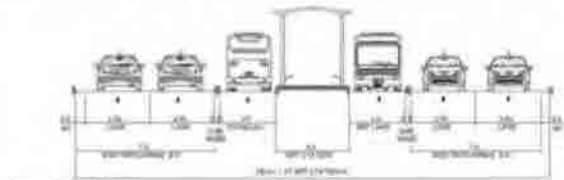
If platforms are provided at different locations by direction, the necessary width can be reduced to 28m. However, the length of a station becomes longer.



Cross Section at Station (28m wide road)

Cross Section (4)

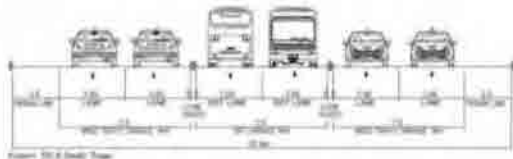
In case that BRT passing lanes are not provided, the width of cross section at BRT station is 26m. However, such siting requirement will be necessary only at and along M.A. Jinnah Road.



Cross Section at Station (Without Passing Lane)

Cross Section (5)

The cross section between stations where parking demand along the road exists. The necessary width is 27m. If parking lanes are not provided, the width can be reduced to 23m.

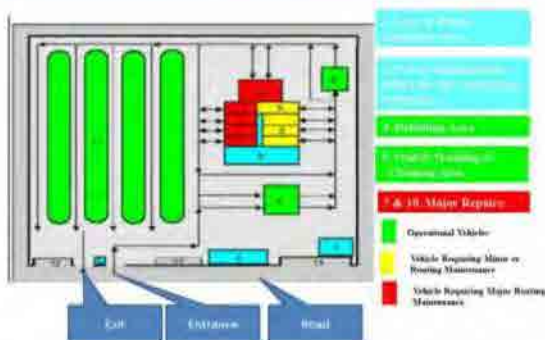


Cross Section between Stations (With Parking Lanes)

Specification of BRT Bus

Selected type of the vehicle for Karachi BRT is the standard bus of 12m length, platform-level boarding type of high-floor bus with two doorways on the right hand side. Propulsion system is CNG drive.

Layout of the BRT Bus Depot



Selection of Bus Depot for Red Line

Depot Location for Red Line			
No	Proposed Red Line Depot	Status	Area
1	Model Colony and Jinnah Airport	Under occupation of Pakistan Rangers	4.32 Acres
2	Gulistan-e-Johar Road and Saifora Chowringi	Ready to Use	2.29 Acres

Source: JICA Study Team.



Arrangement for Existing Traffic

Roundabouts

- There are two roundabouts along Red Line. The roundabout near Mazar e Quaid and Safoora Circle will be improved by signaling and providing BRT lanes through the roundabout.
- Traffic signals will be installed to the roundabout.

Operation Plan

Peak Hour Operation

(1) Peak Hours

Approximately two hours in morning i.e. 7:00-9:00 a.m. is peak hour time, while approximately three hours from 18:00-21:00 are the evening peak hours. In total, the peak hour operations will be 5 hours in a day

(2) Off-Peak Hour Operation

The frequency will be reduced according to passenger demand. However, the minimum frequency will be maintained.

Consultation Process

The meeting was held on the Red Line Corridor at NED University on 09th February, 2012.



Findings from Stakeholder Meetings

A huge Majority of the participants (96%) expressed dissatisfaction with the present system of transportation in Karachi. The reasons stated for dissatisfaction with the current transportation system are as follows:

- Sub standard quality, lack of discipline and lack of awareness of rules and regulations.
- Increase in No. of vehicles is indiscriminate and traffic jam is too frequent.
- Road related accidents taking toll of life of at least 900-1200 persons per year.
- Time delays are uncontrolled, man hour loss is heavy.

Findings from Stakeholder Meetings

- Air and Noise pollution at all intersections aggravated by operation of generators.
- Fares are high, services are poor and undisciplined.
- Lack of security, reliability and congestion.
- Buses have more passengers than capacity.
- Violation of traffic rules
- No security for females.
- No schedule observed for operation of private buses.
- Illegal parking and encroachment on the roads.

Findings from Stakeholder Meetings

- ❑ BRT will have a dedicated lane to operate on and hence the air pollution as well as noise will be localized into the microenvironment.
- ❑ BRT system would entail substantial reduction in air pollution load and also noise pollution level.
- ❑ BRT is supposed to be providing comfortable and disciplined service if owned by the commuters it will be able to provide the comfortable service that the commuters are looking for.

Findings from Stakeholder Meetings

Stakeholders believe that BRT system will improve social life, environmental condition and economic activities in city because:

- ❑ It will improve the quality of life by providing less polluted and stress free environment to the commuters.
- ❑ It will provide rapid, comfortable and disciplined transportation system.
- ❑ It will hopefully induce reduction in traffic volume since the present bus service would be oriented towards feeder routes.

Findings from Stakeholder Meetings

Perceptions given by participants who believe that congestion would decrease through introduction of BRT were:

- ❑ A single BRT vehicle will carry about 100 passengers and if it is allowed to operate at full capacity it might replace an equivalent of 50 cars or 100 motorcycles or 25 cars and 50 motorcycles. This implies that there will be substantial reduction in the volume of traffic operating on the corridor.
- ❑ BRT would operate on dedicated lanes and would be reducing the traffic jam due to operation of school buses and pick-up services at peak hours and hence will reduce the congestion at the concerned points.

Findings from Stakeholder Meetings

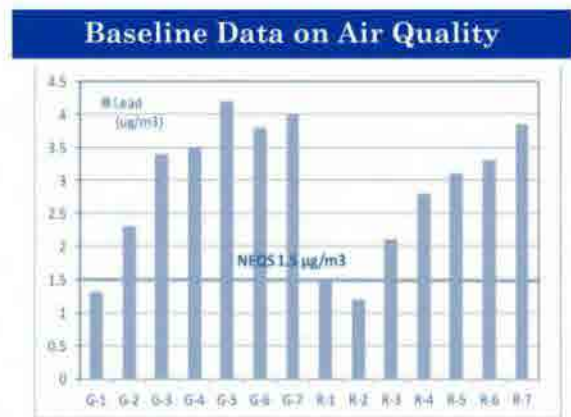
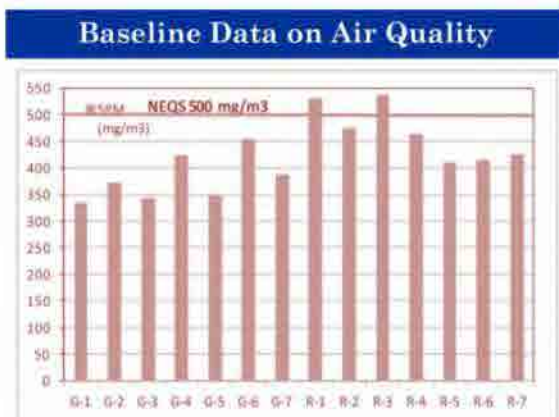
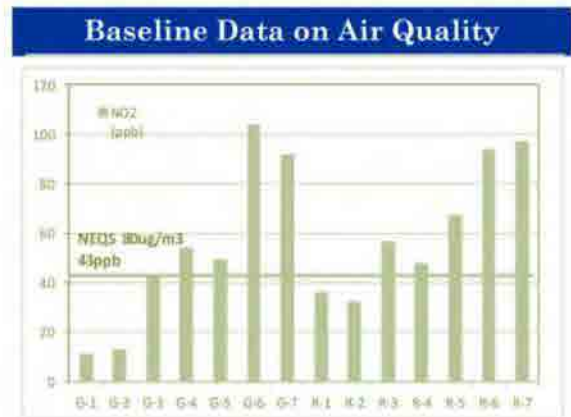
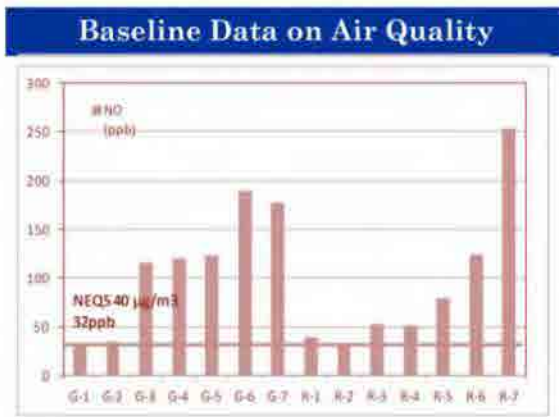
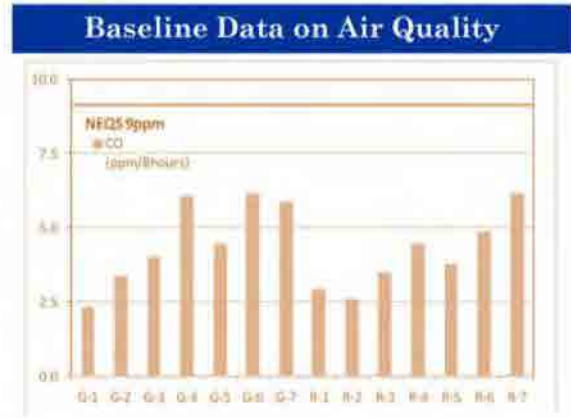
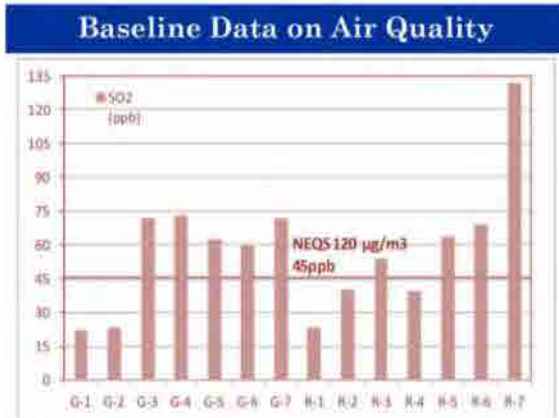
- ❑ Public transport may shift towards feeder service and that may reduce congestion and also the air pollution load.

Participants were of the view that they shall prefer BRT if:

- ❑ It is affordable and observes the schedule of time for arrival and departure.
- ❑ Provided the Japanese standards on operating procedures are followed in letter and spirit.
- ❑ It will save fuel usage
- ❑ It will take care of gender issues.
- ❑ Being on the dedicated lane it will only stop at dedicated stations and hence the present mode of 'stopping at will' will be eliminated.

Findings from Stakeholder Meetings

- ❑ BRT will reduce the expenses on fuel and operation of their vehicles.
- ❑ Being on the dedicated lane it will only stop at dedicated stations and hence the present mode of 'stopping at will' will be eliminated.

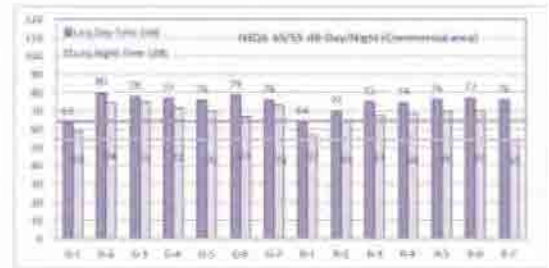


Baseline Data on Air Quality

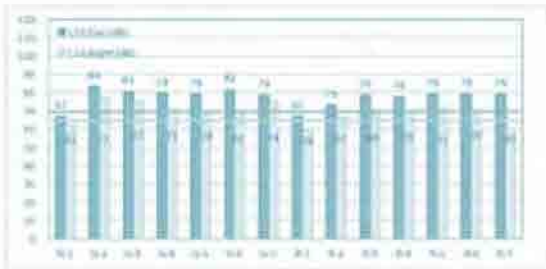
According to the report of Vehicular Emission Control Programme (VECOP) by the Sindh EPA:

- about 11,384 vehicles of all categories have been inspected and tested for their emission levels;
- about 3,503 did not comply with the National Environmental Quality Standards (NEQS) for vehicles
- 1,947 were challenged by the traffic police for violation of the standards.

Baseline Data on Noise



Baseline Data on Vibration



Traffic Count at Major U-Turns

Location	Car/Drop Taxi/Van	Motor cycles & Scooters	Auto Rickshaws	Motorcycle Rickshaws	Pickups	Mini Buses & Coaches	Large Buses	Right Turns & Trucks	Total
BL-1: Sakara T-Junction									
From Karachi University	7,400	5,240	374	830	570	800	80	200	16,014
From KMC Hospital	2,270	1,180	480	110	110	470	5	140	4,625
From South Road	2,710	2,910	280	140	300	120	40	180	7,520
From M Air Cantt	4,140	4,410	480	100	410	520	90	210	10,570
Total	14,520	14,770	1,240	1,180	1,390	1,720	204	530	41,554
BL-2: Intersection of Road from Kameer Changanag (Ghatiya & Jambhal & University)									
From Karachi University	30,290	11,040	1,740	460	970	370	110	150	44,040
From Kameer Changanag	6,770	4,270	460	1,170	770	180	20	110	13,660
From Jambhal Changanag	10,080	17,260	5,540	1,300	1,110	1,770	100	300	38,260
Total	47,140	32,570	7,740	2,930	2,850	3,240	240	560	93,330
BL-3: SIBA Changanag									
From Jambhal Changanag	25,710	25,000	4,540	40	1,480	1,500	140	1,440	54,710
From Civic Centre	20,380	16,490	4,070	1,080	1,210	1,240	180	450	45,000
From Chikhan	11,360	11,180	8,230	420	2,730	2,490	300	1,880	39,810
From Karachi University	13,600	25,140	5,750	360	1,490	1,470	140	880	49,130
Total	53,270	77,810	24,630	1,660	7,970	6,700	660	4,150	141,120
BL-4: U-Turns between Chikhan, Changanag and SIBA Changanag									
From SIBA Changanag	20,770	15,520	7,420	170	1,280	1,270	100	610	47,040
From Chikhan to Changanag	17,440	17,240	6,510	280	1,790	2,040	240	410	46,950
Total	38,210	32,760	13,930	450	3,070	3,310	340	1,020	94,000

Environmental Impacts & Proposed Measures

Removal of Vegetation:

- There are at least 9020 trees on the Red Line. This number relates to trees that are on the median and the same will have to be removed to yield to BRT-RoW where road width is narrow along the Red Line corridors as well as the station sites.
- However, a few trees will be removed from the left and right edge of the road to make room for construction of pedestrian bridges at the stations. Removal of trees may also be necessary at points where bored concrete piles will be introduced for elevated structure.

Environmental Impacts & Proposed Measures

Removal Vegetation:



Environmental Impacts & Proposed Measures

Mitigation Measures:



Environmental Impacts & Proposed Measures

Mitigation Measures:



Environmental Impacts & Proposed Measures

Siting of Stations:

Keeping in view the current system of undisciplined operation of vehicles and carefree attitude of pedestrians, the stations will be sited at closer distances. The stations will be provided with amenities including a library, bookstall, telephone and internet service, rest rooms, access and emergency ramps, ticketing system, pedestrian bridge and storm water as well as wastewater drainage system.

Environmental aspects identified for siting the stations include: 1) provision of safe drinking water, 2) drainage system for wastewater as well as storm water, 3) ventilation, 4) safety and security.

Environmental Impacts & Proposed Measures

- **Safe Drinking Water:** Such gadgetries for provision of safe drinking water as are currently available in the market will be installed at each station.
- **Drainage System:** Proper drainage system will be provided. The waste water will be treated in a sewage treatment facility to conform to the National Environmental Quality Standards (NEQS) and then discharged into the nearest sewerage line; the storm water will be drained into the Bus Lane Drainage Channel which will carry it to the central storm water drainage system where it will be stored as harvested rainwater and utilized wherever possible for example, in the drip irrigation system.

Environmental Impacts & Proposed Measures

Availability of space for operation of the system:

- The standard road width for BRT excluding pedestrian walks is 27m which condition is met all over the Green and Red Line except the area near Empress Market up to Regal Chowk section of Red Line.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Construction of the BRT on the narrow section near Empress Market to Regal Chowk in Saddar on the Red Line is constrained for at-grade design and hence The BRT system will have to be elevated to avoid Land Acquisition.

Environmental Impacts & Proposed Measures

Structure Stability:

The corridors fall in the Seismic Zone 2B corresponding to moderate to major earthquake having magnitude between 5.0 and 6.5 on Richter Scale and Intensity between VII and IX on Modified Mercallis Scale.

Geotechnical study will be undertaken before start of construction to ascertain that the sub-soil stratum has the desired strength for laying the foundation

Environmental Impacts & Proposed Measures

Vehicle Size & Capacity:

The following aspects need to be considered for selection of vehicle type, its size and capacity:

- The vehicle should be cost effective
- It should be of high quality and high reliability so that the chances of breakdown are minimum
- Its maintenance should be manageable
- Parts supply should easily available.

Environmental Impacts & Proposed Measures

Recommended Measures:

- BRT bus vehicles will be operated by employing local drivers; they will be trained on safe driving practices. To arrange for local drivers training for safe driving such vehicles will be needed that do not require special driving techniques. Standard buses are therefore recommended in preference over the articulated buses.
- Selection of drivers will be on the basis of their qualification, fitness, observation of rules and regulations as well as standard operating procedures for operation as well as maintenance.

Environmental Impacts & Proposed Measures

Engine Design and Emission:

1. The Pakistan Environment Protection Agency (PEPA) has set the limit for respirable particulate matter of 2.5 micron size (PM_{2.5}) at 25 µg/m³ on annual average basis.
2. However the level observed in the atmosphere of Karachi is 41.49 µg/m³ on an annual average from June 2010 to May 2011. This exceeds the yearly average limit set by National Environmental Quality Standards.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- To reduce the particulate matter (PM) and the nitrogen oxide (NO_x) emission the mitigation measures are use of engines that have adopted the latest clean diesel technology and also attaching the exhaust post-processing equipment.
- CNG engine does not discharge PM and can adapt to EURO-II by installing the oxidation catalyst.
- Maintenance of vehicles to conform to emission standards should be legalized as per the requirement of Vehicular Emission Control Program (VE COP) by Sindh EPA. Accordingly all vehicles should be subjected to regular inspection and certification by a competent authority so that the emissions are controlled at source.

Environmental Impacts & Proposed Measures

Boarding and Alighting:

- The boarding and alighting if not properly designed can cause difficulty for senior citizens and physical disadvantaged people to get benefit of BRT service.
- This aspect has been identified by stakeholders in two consultation meetings. The height of the station platform, therefore, has to be level with the floor of the vehicle to facilitate easy boarding and alighting for such passengers.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- High level platform with 1,000mm height is recommended. In order to account for the gap between station platform and BRT vehicle, a bridge plate may be provided that would be in automatic synchronization with door opening at each doorway of the vehicle.
- In addition, the use of high level platform will prevent the illegal ridership which may enter into the station without passing the ticket gate. This will also provide security to the passengers inside the station in case a collision of cars occurs at the station.

Environmental Impacts & Proposed Measures

Designing of Drainage System:

- A drainage system will be designed for the corridor to cater to the runoff from within the corridor right-of-way only. The drainage system will be directed to outlets at the existing channels and drains along or intersecting the corridors.
- The 5 years rainfall Average Recurrence Interval (ARI) should be adopted for the computation of the road surface runoff, while Intensity-Duration-Frequency (IDF) Curves for the City of Karachi shall be used for the estimation of rainfall intensity.

Environmental Impacts & Proposed Measures

Traffic Diversion/Management during Construction

- A practical traffic diversion plan will be prepared to ensure minimum inconvenience to road users during the construction stage.
- A Safety Manager, with working experience in road construction, shall supervise and maintain all traffic diversion and safety matters.

Environmental Impacts & Proposed Measures

Noise and Vibration

- Noise emission sources are expected to be the powered mechanical equipment such as generators, excavators, bulldozers, piling rigs, stabilizers, and drills while stone crushers, graders, vibratory rollers, concrete-mixing plants, and screening plants will generate noise of high level besides vibration.
- However the noise level and impact of vibration can be controlled at source by regulation of contractual obligation.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- The contractor will be mandated to segregate the construction area at the median from the edge of the road. The segregation should be easily erected and substantial enough to minimize noise impacts.
- The contractor shall also maintain and service all equipment to minimize noise levels.
- Construction activity will be preceded by a round of public consultations at each section of the corridor, where the public would be informed of the construction schedule, alternate traffic routes, if necessary, and the likely impact on the site.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Ensure NEQS compliance to the effect that all equipments and machinery to be used during construction are equipped with the necessary air pollution and noise dampening devices to meet statutory requirements;
- Perform regular maintenance and service all equipment to minimize noise levels;
- Locate and operate equipment to minimize nuisances; and
- Install acoustic insulation or use portable noise barriers or install a hoarding where practicable to limit noise at sensitive receivers. Major construction activities will be limited to daylight hours to minimize construction noise. Mufflers will be used on diesel equipment and power generators.

Environmental Impacts & Proposed Measures

Air Pollution

- Reports available on air quality on the two corridors suggest that the congested areas at traffic intersections and narrow lanes are heavily polluted but at the center of the road.
- Bituminous materials may generally be applied using machines supplied from the asphalt plant but if bituminous compounds are to be applied manually and melted in heaters and mixed on site, the fuel used shall be kerosene, diesel or gas.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Water sprinkling is the general method to suppress dust emission.
- In case sensitive receptors are within 10 m of the activity area, the contractor will install structures / barriers to segregate the works to protect the sensitive receivers and passing traffic.
- Hoardings and tarpaulins will be used to retain dust and cover the exposed earthworks, stockpiles and surfaces.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Construction materials (sand, gravel, and crushed stone) and spoil materials will be transported by trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction activity) will comply with the NEQS.
- Sites for mixing asphalt shall be located 100m from sensitive receptors and asphalt plant and concrete batching shall be at least 500m downwind of the nearest sensitive receptors.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- The interaction of the activities at the construction site with the vehicular traffic at the corridors will have to be controlled by implementing the traffic management rules.
- Mobilization of construction trucks and machinery shall be effective after "peak hours". Road dividers or kerbs shall be installed.
- Road will be properly signed and traffic wardens employed to facilitate smooth vehicle traffic, at all times.

Environmental Impacts & Proposed Measures

Removal of Kiosks



Environmental Impacts & Proposed Measures

Noise

It is expected that the traffic noise level is reduced approximately 0.1% to 2.1 % by modal shift of transportation from passenger cars/ buses to the BRT system.

Environmental Impacts & Proposed Measures

Mitigation Measures:

- Utilization of vegetation belts on the project corridor and the enforcement of relevant standard and regulation on vehicular emission are the appropriate mitigation measures as the most important influence on the spread of the pollution after its release is the strength of the wind

Environmental Impacts & Proposed Measures

It is expected that the exhaust pollution gas is reduced approximately 26% by modal shift due to the implementation of BRT.

Table : Reduction Ratio in Air Quality

BRT	Forecast of NOx volume along the BRT line Q (g/day)		Reduction due to the implementation (%)
	With the BRT Project Road Traffic (KCR + Green Line + Red Line)	Without the BRT Project Road Traffic (Only KCR)	
Green Line	4,191	5,793	27.6%
Red Line	7,634	10,210	25.1%
Total	11,841	16,003	26.0%

Environmental Impacts & Proposed Measures

It is expected that the total emission factor for CO₂ is reduced approximately 12 % in respect of the modal shifting of transportation from passenger cars/ buses to the new transportation system.

BRT	Forecast of CO ₂ volume along the BRT line (g/day)		Reduction rate (%)
	With the BRT Project Road Traffic (KCR + Green Line + Red Line)	Without the BRT Project Road Traffic (Only KCR)	
	GHG _{CO₂}	GHG _{CO₂}	(GHG _{CO₂} Without BRT Project) / (GHG _{CO₂} With BRT Project)
Green Line	886,126	1,012,531	11.1%
Red Line	270,251	297,405	7.6%
Total	959,376	1,095,000	12.4%

BRT VIDEO

5 Question and Response

Participant	Observations, Comments and Suggestions	Response
Participant 1 (KW&SB)	<ul style="list-style-type: none"> ➤ The observation was with regard to fate of KCR whether it is being revived or being shelved. ➤ What is the benefit in terms of fare that proposed BRT system will provide over existing transport system? ➤ There was another important observation with regard to accommodation of a certain vehicle for e.g. an ambulance or a police van in case of emergency. 	<ul style="list-style-type: none"> ➤ The KCR proposal is almost streamlined and with the incoming of the Japanese Mission expected in April 2012 it is hoped that the launching of the project would be firmly scheduled. ➤ The fares are not in terms of the operation of BRT but it will include the non tariff aspects as well and therefore the fare would be favorable to the users of the system. ➤ Such is system is under consideration and it will have to be covered by provisions in the legislation.
Participant 2 (Student (Female))	<ul style="list-style-type: none"> ➤ The enquiry was about the status of the BRT vehicles with respect to the capacity, height, volume, safety and security, entry and exit, problems of disabled and senior citizens and noise pollution. 	<ul style="list-style-type: none"> ➤ The floor of the platform will be leveled with the carriage of BRT system. Ramps have been provided for disabled. The carrying capacity of BRT vehicle will be about 100 persons. Noise will be contained within the corridor. With regard to safety and security it is designed to respond to the needs of the system as per international standards.
Participant 3 (Social Worker (Female))	<ul style="list-style-type: none"> ➤ The observation was that the BRT system aims at providing the facility to those who are above poverty line and perhaps does not address the commuters who cannot afford high bus fares. This was the case when the green buses were introduced. The main counters are those who live below the poverty line and not as much as those who have been able to travel despite the ever increasing fares. 	<ul style="list-style-type: none"> ➤ The fares structure is being so designed that it will cater to the needs of both groups of commuters.
Participant 4 (Student (Male))	<ul style="list-style-type: none"> ➤ The question was regarding the sitting arrangement, ridership and operation of competing buses on Greenline route by private owners for e.g. W-11 that operates on this corridor. The W-11 owners operate at least 300 buses and they will be tough competitors for BRT. ➤ What will be the safety and security arrangements on BRT? 	<ul style="list-style-type: none"> ➤ There is a sitting arrangement for 40 passenger & 60 standing travelers. The ridership is being studied and consultation with stakeholders is in progress. There will be 400 vehicles operating at a time on this corridor and their operation will be staggered between peak hours and general requirement. All aspects will be decided in consultation with stakeholders. ➤ A command and control system will be established to operate the security system and CCTV cameras would be installed to monitor the activities on the corridors. Law enforcement agencies will be on

Table 1: Concerns raised by stakeholders in first scoping session at SCOPING STAGE held on 31st Jan 2012 at Taimuria Library - Greenline Corridor		
Participant	Observations, Comments and Suggestions	Response
		ground to manage the security system while community ownership will be an integral part of successful operation of project.
Participant 5 (Resident of area)	<ul style="list-style-type: none"> ➤ The observation was with regard to the consultation with bus owners who are the main stakeholders and whose clout can derail any system. It successfully did so in the case of earlier transport system proposed by CDGK. 	<ul style="list-style-type: none"> ➤ We would not like to appease the present system owned by private operators. The system will be left to the commuters to decide as to which system is offering better service. For them the best alternative would be to accept BRT system as a reality in providing service better than what is being offered by private bus owners and then it will be up to bus operators to decide whether they would continue to operate in competition or operate as planned by the feeder system.
Participant 6 (Student (Male))	<ul style="list-style-type: none"> ➤ The observation was that bus operators is a strong lobby and can manipulate several systems by brute force. I can only pray for the success of the system. ➤ Why not introduce a Double Decker Bus System so that instead of carrying 100 passengers it can carry 200 passengers. 	<ul style="list-style-type: none"> ➤ The point is well taken. ➤ We are alive to situation and that is why we have a law department which will prepare a legal framework for the institutional operation of BRT system. The legal framework will be enacted by the concerned parliament and we hope that the system will operate under legal cover taking due cognizance of the short comings of the past few attempts and the lessons learnt from their failure to achieve the goal.
Participant 7 (IUCN Representative)	<ul style="list-style-type: none"> ➤ The observation was that the feasibility report of JICA if and when it is prepared should become a public document so that all stakeholders can express their opinion for the project. ➤ The presentation made here on project seems short of provision for EMP which should be part of EIA. ➤ IUCN has undertaken a project for sustainable transport system of Country especially Karachi, Lahore, Peshawar and Islamabad and where we would be only too happy to help this project in any respect that they spell out. 	<ul style="list-style-type: none"> ➤ EMP is essential part of EIA which the Consultant (EMC) is preparing in collaboration with JICA study team. We propose to submit an EMP based on ground reality.
Participant 8 (Student (Male))	<ul style="list-style-type: none"> ➤ The observation was that instead of going for the BRT why not remove deficiencies of present system through efficient traffic management and due implementations of the rules of business, while making the bus operators observe the Standard Operating Procedures (SOPs). 	<ul style="list-style-type: none"> ➤ BRT system has proven as most efficient in almost 136 countries of world and we are hoping that it will completely reverse the present situation once it is allowed to operate in letter and spirit. The chances of accidents with any other vehicle are almost negligible since it will operate on

Participant	Observations, Comments and Suggestions	Response
		a dedicated lane, likewise it is hoped that dedicated lane will provide a sufficiently secured system. However an accident with a different vehicle can't be ruled out and that will be duly considered in feasibility study.
Participant 9 (SP (Police Department))	<ul style="list-style-type: none"> ➤ We accept that the project is worth supporting and we will provide any support in terms of implementation and governance of regulations that may be passed by parliament. ➤ The stations to be established at 5 Star intersection and Nazimabad intersection will not pose any problem. However, it is difficult to visualize stations between old Numaish and Aurangzeb Park since the two sides offer very little space. 	<ul style="list-style-type: none"> ➤ The point is well taken. The stations and their establishment is still at design stage but you will be an active participant in the decision making with regard to siting of station.
Participant 10 (EPA Sindh)	<ul style="list-style-type: none"> ➤ The observation was with regard to space requirement. What is the required capacity of the road to accommodate a BRT system? 	<ul style="list-style-type: none"> ➤ It should be at least a 4 lanes roadway to accommodate the BRT lane. In case the road way does not have as much lanes the BRT would be elevated.

Participant	Observations, Comments and Suggestions	Response
Participant 1 (S.P (Police Department))	<ul style="list-style-type: none"> ➤ Segregation of Modes of Traffic ➤ Provision of permanent fencing wall ➤ Interference of smaller vehicles like Motor-cycles and Rickshaws with proposed BRT to protect the dedicated Right of Way from violence/terrorist activities. ➤ Car drivers and bus owners do not respect law and violate traffic rules and regulations. They do not stop ahead of zebra crossing when signal is red. Bus drivers not restricting themselves to bus lanes. ➤ Traffic department of Sindh is introducing a system to improve the flow of traffic in case of heavier volume at peak hours but it is questionable whether the scheme will be followed in letter and spirit particularly because all such schemes have not been successfully implemented in past. ➤ Safety of school children is jeopardized by the parents /drivers by improper parking thereby congesting the heavier volume on 	<ul style="list-style-type: none"> ➤ Concrete Jersey barrier is being proposed along the RoW for protection. Permanent fencing is not possible. ➤ Lack of awareness at highest level including the drivers and parents is the main cause. The parents and their drivers deliberately avoid following the rules. The law enforcing agencies are in many cases helpless because of the pressure they (influential citizens) induce to escape from the grip of the law. The law enforcement has become a weak subject because this is politicized both by parents and school management. If only a few cases of punishment could demonstrate the grip of the law enforcing agency things may start improving. ➤ Much of the problem is because the consumerism being promoted for rapid growth of economy has disturbed the balance between capacity of road and the optimum number of vehicles that should be operating on them. This is being

Participant	Observations, Comments and Suggestions	Response
	<p>road (This is because the school zone has not been properly segregated nor the school buildings have any parking space.</p> <ul style="list-style-type: none"> ➤ Influential people have taken law in their hands and their vehicles at terrible speed which cannot be recorded for imposing any punishment because the devices are rendered impractical / electronic devices are jammed. The punishment in form of fine is too meager and is easily paid right at the scene of incident. ➤ Car dealers on M.A Jinnah Road or Tariq Road or Anywhere have such a strong clout that they resort to strong pressure that includes blocking the road, jamming the traffic and raising slogans if they are restrained from parking on restricted lanes. The management of traffic falls short of implementation because the pressure groups have become stronger than the implementing forces. On the other hand the enforcement machinery (e.g.; car lifters) is not allowed to operate properly. There is a phone call from one or the other source that has an overriding impact on implementation of the law. 	<p>promoted by the banks through their consumer financing schemes. Everybody who may not be able to afford it can have more than one car and the aspiring middle class can have a new motorcycle. No. of vehicles being added to the already large volume of traffic is about 400 per day and this is not being restrained. Contrarily the no. of public transport vehicles is instead of increasing proportionately decreasing.</p> <ul style="list-style-type: none"> ➤ The No. of passenger to vehicle according to KMTC is 1:40 meaning thereby that there is need to have vehicles that are 40 times the present number. This bears out the proposal to have a mass transit system and a better management of traffic to effectively provide a comfortable transportation system.
Participant 2 (Environmentalist)	<ul style="list-style-type: none"> ➤ He questioned the viability of having the red line starting from Malir because according to his assessment there is no ridership. 	<ul style="list-style-type: none"> ➤ The starting point of redline corridor has been selected on the basis of ample availability of space for depot and future demand forecast. It is not true that there is no ridership at the point at the moment because operation of KCR up to Malir Cantt has become non-viable but the ridership (studied previously) at Matapan Station of the circular railway does indicate that soon after the operation of BRT the passengers would opt to switch over from model colony to the BRT. This would be taken care of in the financial model which is under study. The present indicators are that the BRT system would be 10 times lower than LRT and the same time more efficient and would require much lower time to implement.
Participant 3 (KUTC)	<ul style="list-style-type: none"> ➤ The question is that the KCR is at final feasibility stage of preparation while BRT is still being planned. Has due account been taken by the operation of the two systems simultaneously? 	<ul style="list-style-type: none"> ➤ BRT will be complementing the operation of KCR. The two systems are not competing with one another but are working together to provide a solution to the complex problem of traffic. At the

Table 2: Concerns raised by stakeholders in second scoping session at SCOPING STAGE held on 08th Feb 2012 at NED University - Redline Corridor		
Participant	Observations, Comments and Suggestions	Response
		moment i.e. in the first phase, the BRT is being proposed for two corridors, the Redline and Greenline but there are 4 others in future plan that is under consideration. The two systems will be synergistic since the BRT will be providing a feeder system to KCR in quite a few respects. The present estimates are that BRT would be serving 13 thousand commuters per hour per direction.
Participant 4 (Sindh Wildlife Department)	<ul style="list-style-type: none"> ➤ The Question was with regard to interference of Motorcycles and other smaller vehicles that may get into the dedicated BRT lane. ➤ Implementation of the traffic management system for difficult types of commuters e.g. disables and senior citizens. ➤ Protection of Plants and Animals crossing the road. 	<ul style="list-style-type: none"> ➤ This is a dedicated lane in which interference of any kind will not be possible and is being incorporated into design. The laws and regulations will be in place after getting the approval from provincial assembly. ➤ The BRT system will take care of the discipline to be observed in having access, entry/exit to the BRT vehicle and it will be operated at stations that are provided with suitable ticketing system and security system. These stations will be located to cater to the needs of the riders and the difficulties faced by disabled persons and senior citizens. ➤ With regard to flora an inventory is being recorded for the current status of trees and other flora on Right of Way (RoW) as well as on the shoulders. Only such trees will be uprooted that are on the BRT station locations and all efforts will be made to save trees by appropriate measures. ➤ The fauna is not of much significance but care will be taken to identify the stray animals if any and relocating them in a park for e.g. Safari Park that may be posing a traffic problem, however BRT would be on a dedicated lane and stray animals may not have any access to BRT lanes.
Participant 5 (Representative from Labor department)	<ul style="list-style-type: none"> ➤ The question was with regard to the provisions of the labor laws and international standards on occupational health, safety and environment as well as ILO and ISO standards. 	<ul style="list-style-type: none"> ➤ The study being undertaken for the BRT system is an environmental and social impact assessment of which HSE is an integral part and it has a separate section for observing the provisions of HSE management system.
Participant 6 (Environmentalist)	<ul style="list-style-type: none"> ➤ The observation was that there have been several attempts of solving the complex 	<ul style="list-style-type: none"> ➤ The Bus owners have been consulted and taken on board and they will be offered

Participant	Observations, Comments and Suggestions	Response
	<p>traffic problems of Karachi but none of them has been successful. The 'Green Bus' for e.g. has not been able to provide the claimed solution. Somehow other stakeholders have a strong clout and they include the bus owners, the CNG and Chinchu Rickshaw drivers who have their own system to avert the decisions that are planned by the traffic department or the KMTTC. Has due care been taken of the interest of such stakeholders?</p> <p>➤ Have they been taken on board particularly the Bus owners?</p>	<p>to operate on the feeder system that has been separately designed for them. They will not remain a competitor of the system on the other hand their role will be to complement the two mass transit systems.</p> <p>➤ Incidentally Bus owners were against mass transit proposal of 2004 but under the present consultation process they are in favor of operating under a designed feeder service system.</p>
Participant 7 (EPA Sindh)	<p>➤ The question was with regard to having a strategic plan to integrate the present and past system for e.g. the private bus owners, the rickshaw owners, taxies, KCR and BRT and also the lessons learnt from the past efforts to have a mass transit system.</p>	<p>➤ The point is well taken and the point with regard to strategic plan will underscore the need to identify the stated goals and the stakes of the different groups that are involved.</p>
Participant 8 (Social Worker (Female))	<p>➤ The comment was with regard to the criteria of safe driving of the operators. The operators are invariably illiterate and are low paid. There has to be a mechanism to employ qualified and disciplined drivers and this aspect should not be limited to BRT and other mass transit systems but also to the Bus owners and all the operators on the vehicles on road.</p>	<p>➤ The BRT system is being designed by experts who have taken the present operation into consideration and are proposing a public private partnership scheme for the entire traffic system that will include standard operating procedures and employment criteria for operators including the owners and drivers.</p>
Participant 9 (Environmentalist)	<p>➤ The question was with regard to location of fuel supply. Will it be as it exists at present or some other arrangement?</p>	<p>➤ The reply was that the fuel supply will be from the depot of Red and Green lines.</p>

Participant	Observations, Comments and Suggestions	Response
Participant 1 (SP (Traffic Police Department))	<p>➤ The observation was with regard to the width of RoW from Nazimabad to Business Recorder Road. He was of the view that exclusive lanes for BRT in this section of the corridor may disturb the traffic in the mixed lanes because the RoW in these areas is already narrow.</p> <p>➤ Peak hour traffic count survey should be carefully carried out at Numaish and Gurumandir.</p> <p>➤ Pedestrian bridges should be provided at all critical locations along corridor and local populations should be made aware of the</p>	<p>➤ The BRT system is being designed by experts who have taken the present operation into consideration.</p> <p>➤ The suggestions will be looked into by experts.</p> <p>➤ Elevated design may be considered in areas where road width affects the design of BRT.</p>

Table 3: Concerns raised by stakeholders in third consultation session at DRAFT FINAL REPORT DISCLOSURE STAGE held on 27th April at Largess Restaurant - Greenline Corridor		
Participant	Observations, Comments and Suggestions	Response
	<ul style="list-style-type: none"> use of pedestrian bridges to avoid accidents. ➤ Boarding and alighting timings at stations should be carefully studied. ➤ Provision of footpaths should be incorporated in design of BRT system. ➤ Lessons learnt from past failures should be kept in mind during the feasibility stage. 	
Participant 2 (President (Karachi Transport Ittehad))	<ul style="list-style-type: none"> ➤ We shall support the proposed system. 	
Participant 3 (DSP Sadder)	<ul style="list-style-type: none"> ➤ Public awareness campaign about BRT should be accelerated and rules and regulations should be made effective. 	<ul style="list-style-type: none"> ➤ The points are well taken.
Participant 4 (Female participant (representative from North Karachi))	<ul style="list-style-type: none"> ➤ The road width should be carefully studied along the corridor and BRT design should be made accordingly to avoid disturbance to the residential and commercial areas. 	<ul style="list-style-type: none"> ➤ The point is well taken. The involuntary resettlement will be avoided as much as possible.
Participant 5 (Suparco)	<ul style="list-style-type: none"> ➤ Engines should be well designed and equipped with such technologies that may control emissions. ➤ Standard operating procedures should be devised 	<ul style="list-style-type: none"> ➤ The points are well taken. Technologies like catalytic conversion or some such alternative system shall be used to control emissions from engine exhaust. Japanese experts are working on this aspect in their feasibility study. ➤ Standards Operating Procedures (SOPs) and plans will be made adopted.
Participant 6 (NGO representative)	<ul style="list-style-type: none"> ➤ What are the benefits for females in BRT system? ➤ What security measures have been incorporated into proposed BRT system for females? 	<ul style="list-style-type: none"> ➤ The BRT system will provide a respectable transport system especially for females. ➤ Security arrangements have been provided at stations and BRT buses.
Participant 7 (Urban Resource Centre – NGO)	<ul style="list-style-type: none"> ➤ The observation was with regard to the boarding and alighting facility for old age people. ➤ He also enquired about the fare system because people will prefer BRT if it is affordable. 	<ul style="list-style-type: none"> ➤ The height of the station platform has been leveled with the floor of the vehicle to facilitate easy boarding and alighting for such passengers. ➤ The fare system will be such that it will be affordable by people from all areas of Karachi.

Table 4: Concerns raised by stakeholders in fourth consultation session at DRAFT FINAL REPORT DISCLOSURE STAGE held on 28th April at Hotel Ramada Plaza – Red line Corridor		
Participant	Observations, Comments and Suggestions	Response
Participant 1 (Urban Resource Centre – NGO)	<p>The suggestions included:</p> <ul style="list-style-type: none"> ➤ Public Toilets should be provided at all stations. ➤ Separate compartments should be provided for women. 	<ul style="list-style-type: none"> ➤ The suggestions are well taken
Participant 2	<ul style="list-style-type: none"> ➤ What will be the qualification criteria for 	<ul style="list-style-type: none"> ➤ The operators will be qualified and

Table 4: Concerns raised by stakeholders in fourth consultation session at DRAFT FINAL REPORT DISCLOSURE STAGE held on 28th April at Hotel Ramada Plaza – Red line Corridor		
Participant	Observations, Comments and Suggestions	Response
(Resident of Model Colony)	<p>operators?</p> <p>➤ What will be done in case of sudden incident like a tyre burst or some such situation?</p>	<p>trained in safe driving practice. All operators will be selected on merit and without any external influence.</p> <p>➤ Emergency situation are being considered in feasibility study.</p>
Participant 2 (resident of area)	Prepaid card system may be introduced for passengers using BRT.	➤ The point is well taken and may be considered.
Participant 3 (Labor Dept)	➤ The question was with regard to the provisions of the labor laws and international standards on occupational health, safety and environment as well as ILO and ISO standards.	➤ All such systems will be implemented in letter and spirit.
Participant 4 (KW&SB)	➤ What is the project implementation period?	➤ It is about 03years

6 List of Participants of Stakeholder Consultation Meeting

List- I

Green Line Scoping Meeting (31st January 2012 – Taimuriya Library)

S.NO	ORGANIZATION/FIRM
1	EMC
2	ABAMET ENVIR. TECH
3	-
4	IUCN
5	BUFFERZONE
6	GARDEN EAST
7	SSP SOUTH TRAFFIC
8	KARACHI ELECTRIC SUPPLY COMPANY LIMITED
9	UNIVERSITY OF KARACHI
10	UNIVERSITY OF KARACHI
11	DMC (SOUTH)
12	IUCNP
13	KMC (DIRECTOR-1)
14	KMTC, KMC
15	KUTC
16	KMTC
17	XEN (M&E) DML MALIR
18	NED UNIVERSITY
19	NED UNIVERSITY
20	NED UNIVERSITY
21	WMC PVT LTD
22	NATIONAL HIGHWAY AUTHORITY
23	-
24	-
25	SSUET
26	KMTC
27	UNIVERSITY OF KARACHI
28	-
29	IUCN
30	UNIVERSITY OF KARACHI
31	UNIVERSITY OF KARACHI
32	UNIVERSITY OF KARACHI
33	NORTH NAZIMABAD
34	SADDAR SOUTH
35	EA CONSULTING PVT LTD
36	NED UNIVERSITY
37	NED UNIVERSITY
38	NEDUNIVERSITY
39	SILK BANK
40	EPA SINDH
41	BARBER
42	SHINING STAR
43	HANDS
44	EMC
45	JPMC
46	GOVT COLLEGE FOR MEN
47	JINNAH UNIVERSITY FOR WOMEN

S.NO	ORGANIZATION/FIRM
48	REPRESENTATIVE OF DMC (WEST)
49	UNIVERSITY OF KARACHI
50	UNIVERSITY OF KARACHI
51	HALCROW PAKISTAN
52	XEN B&R N.K. ZONE
53	IQRA UNIVERSITY
54	KMTC
55	NEDUNIVERSITY
56	NEDUNIVERSITY
57	JICA
58	DOW MEDICAL COLLEGE
59	ACCA
60	NEDUNIVERSITY
61	NEDUNIVERSITY
62	TAIMURIA LIBRARY
63	R/O GULSHAN IQBAL
64	ABAD
65	JOURNALIST
66	KARACHI ELECTRIC SUPPLY COMPANY
67	LIAQUAT NATIONAL HOSPITAL
68	T MD BIN QASIM TOWN
69	UNIVERSITY OF KARACHI
70	UNIVERSITY OF KARACHI
71	EMC
72	XEN. B/R DMC SOUTH
73	NEDUNIVERSITY
74	KARACHI WATER & SEWERAGE BOARD
75	NATIONAL HIGHWAY AUTHORITY
76	KARACHI WATER & SEWERAGE BOARD
77	GATEWAY
78	WOMEN CARE TRUST
79	WOMEN CARE TRUST
80	MBBS STUDENT
81	WOODLAND SECONDARY SCHOOL, NORTH KARACHI
82	JABRIAL WELFAER TRUST
83	PPP UNIT, FINANCE DEPARTMENT, GOVT OF SIINDH
84	UNITED CONSTRUCTION COMPANY
85	KARACHI ELECTRIC SUPPLY COMPANY LTD
86	EDB - KARACHI
87	UNIVERSITY OF KARACHI
88	KDA, MPGO
89	SHEHRI: CBE
90	LDA
91	IOBM
92	CILT
93	DG (KMTC)
94	DMC (MAIN) SE
95	URC
96	TCD, KMC
97	CANTONMENT BOARD, KORANGI CANTT
98	SE TP _s KARACHI WATER & SEWERAGE BOARD

S.NO	ORGANIZATION/FIRM
99	NEDUNIVERSITY
100	EPA SINDH
101	ICAP
102	DMC
103	FEDERAL URDU UNIVERSITY, KARACHI
104	NORTH KARACHI
105	NEDUNIVERSITY
106	KDA WING, CDGK
107	KDA WING, CDGK
108	KOHINOOR SOAP & DETERGENT PVT LTD
109	NORTH KARACHI

List – II**Red Line Scoping Meeting (8th February 2012 – Ned University)**

S.NO	ORGANIZATION/FIRM
1	NED UNIVERSITY
2	UNIVERSITY OF KARACHI
3	KUTC
4	UNIVERSITY OF KARACHI
5	GEMS
6	WARLD BANK
7	-
8	TRAFFIC
9	TRAFFIC
10	KMTC
11	KARACHI XRAY ULTRASOUND HOSPITAL (PVT)LTD
12	AL-MADNI ENGR WORKS
13	MS-TRANSPOTATION ENGG MUSLIM AILL PAKISTAN
14	STUDENT
15	STUDENT
16	DEPUTY DIRECTOR NILAT
17	NESPAK
18	NED UNIVERSITY
19	XBH.DMC SOUTH
20	AC GULSHAN IQBAL
21	NED UNIVERSITY
22	KRN
23	NESPAIC
24	EXPONENT ENGINEERS
25	WOMEN CARE TRUST
26	WOMEN CARE TRUST
27	NED UNIVERSITY
28	IQRA UNIVERSITY
29	NED UNIVERSITY
30	UNIVERSITY OF KARACHI (SOCIAL WORK)
31	FAISAL CANTONMENT
32	-
33	GULSHAN IQBAL
34	CANTOMAT BOARD KORANGI

S.NO	ORGANIZATION/FIRM
35	UNIVERSITY OF KARACHI
36	EMC
37	NED UNIVERSITY (CIVIL DEPT)
38	NED UNIVERSITY (MECHANICAL DEPT)
39	STUDENT (TEXTILE)
40	FUOAST
41	FUOAST
42	KRN
43	STUDENT
44	KTDMC (GOVT OF PAK)
45	EMC
46	UNIVERSITY ROAD
47	CISCO (PVT) LTD
48	CISCO (PVT) LTD
49	FOTCO
50	STUDENT
51	NED UNIVERSITY
52	NED UNIVERSITY
53	NED UNIVERSITY
54	NED UNIVERSITY
55	NORTH KARACHI
56	GULSHSAN
57	STUDENT
58	UNIVERSITY OF KARACHI
59	UNIVERSITY OF KARACHI
60	NEC COSULTANTS
61	PRIVATE FIRM
62	INSTITUTE OF (IBA)
63	MMP KARACHI
64	MM PAK LTD
65	PRIVATE FIRM (SHARA E FAISAL)
66	A.M. AUTO MOBILE KARACHI
67	INDUS COLLAGE
68	ASHRAF CHUDRY ASSOCIATE
69	STUDENT
70	STUDENT
71	PROF
72	NED UNIVERSITY
73	KUTC
74	NED UNIVERSITY
75	PECHS
76	WOMEN CARE TRUST
77	BUSSINESS
78	NED UNIVERSITY
79	MALIR CANT
80	NED UNIVERSITY
81	VATUAL UNIVERSITY
82	KARACHI UNIVERSITY
83	BEHERIA UNIVERSITY
84	NED UNIVERSITY
85	EPA SINDH

S.NO	ORGANIZATION/FIRM
86	WOMEN CARE TRUST
87	GULISTAN E JOHER
88	GULSHAN IQBAL
89	PIBT
90	PIBT

List – III**Green Line Scoping Meeting (27th April 2012 – Largees)**

S.NO	ORGANIZATION/FIRM	RES. AREA
1	D.M.C WEST	ORANGI
2	I.U.C.N	GULSHAN-E-IQBAL
3	DSP SADDER	GULSHAN-E-IQBAL
4	DR. AUSAF CLINIC	NORTH NAZIMABAD
5	KARACHI UNIVERSITY	NORTH NAZIMABAD
6	SINDH WILD LIFE DEPT	LANDHI
7	HAMDARD UNIVERSITY	MALIR HALT
8	AL-KHIDMAT	NORTH NAZIMABAD
9	KARACHI UNIVERSITY	NORTH NAZIMABAD
10	DARGHA HAZRATBAL	NORTH NAZIMABAD
11	IUCN	BATH ILAND
12	RESIDENT OF AREA	CLIFTON KARACHI
13	RESIDENT OF AREA	KEAMARI
14	RESIDENT OF AREA	GULITAN-E-JOUHER BLOCK 17
15	RESIDENT OF AREA	SHAH FAISAL COLONY
16	RESIDENT OF AREA	SHRAH-E-FAISAL
17	RESIDENT OF AREA	WATER PUMP
18	RESIDENT OF AREA	NORTH KARACHI
19	KDA/KMC	LIAQATABAD
20	HAMDERD UNIVERSITY	WATER PUMP
21	-	SHADMAN TOWN
22	WOMAN CARE TRUST	NORTH NAZIMABAD
23	WOMAN CARE TRUST	NORTH NAZIMABAD
24	-	NAZIMABAD
25	-	GULSHAN-E-IQBAL
26	FAISAL CANTT	NAZIMABAD
27	KMTC, KMC	CIVIC CENTRE
28	KUTC	BAHADERABAD
29	-	AISHA MANZIL
30	-	AISHA MANZIL
31	-	GULSHAN-E-IQBAL
32	-	FB.AREA
33	-	4-K CHOWRANGI
34	TAIMURIA LIBRARY	2 MINUTE CHOWRANGI
35	TAIMURIA LIBRARY	LIAQUATABAD
36	NADEEM CLINIC	NORTH KARACHI
37	URC	NORTH NAZIMABAD
38	EPA SINDH	NORTH KARACHI
39	EAMC (CONSULTANTS)	FEDERAL B AREA
40	SUPARCO	LANDHI
41	D.M.C WEST	GULSHAN-E-IQBAL

S.NO	ORGANIZATION/FIRM	RES. AREA
42	KARACHI UNIVERSITY	NORTH NAZIMABAD
43	FEDERAL UNIVERSITY	SHADMAN TOWN
44	DIRETOR(TECHNICAL) KMTC,KMC	GULSHAN-E-IQBAL
45	AL-KHIDMAT MEDICAL CENTRE	NORTH KARACHI
46	UNIVERSITY	LIAQATABAD
47	DARGHA HAZRATBAL	NORTH NAZIMABAD
48	LYARI DEVELOPMENT AUTHORITY	KDA OFFICERS SOCIETY
49	RESIDENT OF AREA	METROVILL S.I.T.E
50	RESIDENT OF AREA	MALIR
51	RESIDENT OF AREA	MALIR
52	RESIDENT OF AREA	LANDHI AREA
53	RESIDENT OF AREA	QAIDABAD
54	RESIDENT OF AREA	NORTH KARACHI
55	ASHAR MEDICAL CENTRE	NORTH KARACHI
56	KARACHI UNIVERSITY	NORTH NAZIMABAD
57	FRIENDS TEXTILE	GURU MANDIR
58	RESIDENT OF AREA	NORTH NAZIMABAD
59	RESIDENT OF AREA	NORTH NAZIMABAD
60	MALIK MILK CENTRE	4-K CHOWRANGI
61	KMC	DHA
62	WOODLAND SECONDARY SCHOOL	NORTH KARACHI
63	STUDENT	NORTH KARACHI
64	PRIVATE JOB	NORTH KARACHI
65	STUDENT	NORTH KARACHI
66	BYCO/ENGINEER	P.E.C.H.S
67	MEDIA	GULSHAN-E-IQBAL
68	SUPARCO	GULSHAN IQBAL
69	K-U GEOLOGY	BALDIA TOWN
70	K-U GEOLOGY	TARIQ ROAD
71	K-U GEOLOGY	METROVILL IIIRD
72	TRAFFIC POLICE SP TRAFFIC CENTRAL	GARDEN POLICE H.Q
73	D.M.C SOUTH X.E.N	NORTH NAZIMABAD
74	L.D.A	GULISTAN-E-JOUHER
75	RESIDENT OF AREA	NORTH. KARACHI
76	RESIDENT OF AREA	GULSHAN-IQBAL
77	K.T.I	F.B AREA
78	RESIDENT OF AREA	LIYARI
79	RESIDENT OF AREA	N. NAZIMABAD
80	RESIDENT OF AREA	GIZRI
81	RESIDENT OF AREA	G.E.J
82	RESIDENT OF AREA	NORTH KARACHI
83	RESIDENT OF AREA	GULISTAN-E-JOUHER
84	RESIDENT OF AREA	NORTH NAZIMABAD
85	RESIDENT OF AREA	LANDHI
86	RESIDENT OF AREA	NORTH NAZIMABAD
87	RESIDENT OF AREA	NAZIMABAD

List– IV
Red Line Scoping Meeting (28th April 2012 – Ramada Plaza)

S.NO	ORGANIZATION/FIRM	RES. AREA
1	IQRA UNIVERSITY	PECHS
2	ESSA'S LABORATORY	JAUHAR
3	ESSA'S LABORATORY	NAZIMABAD
4	CONSULTANT	FEDERAL B AREA
5	LAW DEPARTMENT	JAUHAR
6	RESIDENT OF AREA	KARACHI UNIVERSITY
7	RESIDENT OF AREA	KARACHI UNIVERSITY
8	RESIDENT OF AREA	KARACHI UNIVERSITY
9	RESIDENT OF AREA	KARACHI UNIVERSITY
10	RESIDENT OF AREA	NORTH KARACHI
11	KARACHI UNIVERSITY	GULSHAN
12	KARACHI UNIVERSITY	GULSHAN
13	SOCIAL ACTIVIST KARACHI	F.B AREA
14	ICI PAKISTAN	MALIR
15	ICI PAKISTAN	AIR PORT
16	TJ MEMORIAL WELFARE TRUST (REGD.)	MODEL COLONY KARACHI
17	VISIT	GULSHAN
18	DMC	GULSHAN
19	RESIDENT OF AREA	N. NAZIMABAD
20	RESIDENT OF AREA	STADIUM ROAD
21	WOMEN CARE TRUST	PECHS KARACHI
22	WOMEN CARE TRUST	PECHS KARACHI
23	RESIDENT OF AREA	GULBERG
24	RESIDENT OF AREA	GULBERG
25	RESIDENT OF AREA	NORTH KARACHI
26	RESIDENT OF AREA	GULBERG
27	K.W. & .S.B	GULSHAN
28	S.B.C.A	CIVIC CENTRE
29	AL-RAUF BUILDER	NORTH NAZIMABAD
30	DOLY CONSULTANT	GULSHAN
31	-	NORTH KARACHI
32	POPULATION CENSUS	GULSHAN E IQBAL
33	HAMDARD UNIVERSITY	MALIR
34	JAMIA ALDARASAT	GULSHAN-E-IQBAL
35	JAMIA ALDARASAT	GUSHAN-E-IQBAL
36	KARACHI UNIVERSITY	MALIR
37	KMTC, KMC /DIRECTOR (TECH)	GULSHAN -E- IQBAL
38	RESIDENT OF AREA	STUDENT
39	RESIDENT OF AREA	STUDENT
40	SHEHRI	GARDENT EAST
41	-	MODEL COLONY
42	TCS	AIR PORT
43	STUDENT	MODEL COLONY
44	STUDENT IOBM	GULSAH-E-IQBAL
45	STUDENT /S.S UET	GULSHAN-E-IQBAL
46	STUDENT	NORTH KARACHI
47	STUDENT	N. NAZIMABAD
48	JICA (GEOLOGIST)	AIR PORT
49	IUCN	GULSHAN-E- IQBAL
50	NGEC	12/58 MODEL COLONY
51	NILAT	GULSHAN-E- IQBAL

S.NO	ORGANIZATION/FIRM	RES. AREA
52	-	NAZIMABAD
53	-	-
54	-	NORTH KARACHI
55	-	DEFENCE VIEW
56	-	RAFHAM SOCIETY MALIR HALT
57	UCL	PUBLIC TRANSPOR
58	NED UNIVERSITY	F.B. AREA
59	RESIDENT OF AREA	MALIR
60	RESIDENT OF AREA	F.B.AREA
61	EPA	S.F.C
62	EPA	NAZIMABAD
63	BASTEEL EXPORT	CLIFTON
64	FAISAL CANTT BOARD	FAISAL CANTT
65	BOUTIQUE CARBON	DHA
66	EA CONSULTANT	MODEL COLONY
67	TCS PVT. LTD.	AIR PORT
68	RESIDENT OF AREA	NAZIMABAD
69	RESIDENT OF AREA	MALIR
70	RESIDENT OF AREA	KARSAZ
71	BAHRIA UNIVERSITY	GULSHAN-E- JAMAL
72	TCD, CDGK	DEFENCE
73	PIBT	G-E-JAUHAR
74	SIR SYED UET	G-E-JAUHAR
75	DEPUTY DIRECTOR NILAT	KARACHI
76	RESIDENT OF AREA	KORANGI KARACHI
77	RESIDENT OF AREA	JOHAR KARACHI
78	RESIDENT OF AREA	JOHAR KARACHI
79	RESIDENT OF AREA	SHAH FAISAL COLONY
80	RESIDENT OF AREA	SHAH FAISAL COLONY
81	ECIL	KARACHI UNIVERSITY
82	URC	-
83	RESIDENT OF AREA	ORANGI TOWN
84	DMC (CENTRAL)	BUFFER ZONE
85	K.W. & S.B	N. NAZIMABAD
86	RESIDENT OF AREA	MODEL COLONY
87	TCS PAKISTAN	SULTANABAD
88	TCS PAKISTAN	AISHA MANZIL
89	-	DHA
90	KARACHI X-RAY	NUMAISH
91	-	LYARI
92		GULBERG
93	D.D.O. TCD	N.N.
94	BUSINESS	MODEL COLONY
95	BROKER	MODEL COLONY
96	FEDRAL URDU UNIVERSITY	SHADMAN-N-KAR
97	RESIDENT OF AREA	N. NAZIMABAD
98	WOMEN CARE TRUST	PECHS SOCIETY
99	PIBT	F.B. AREA
100	P.I.A	N. KARACHI
101	DIONETICS DISASTER ASSIST TEAM	F.B. AREA
102	ECIL/ CIVIL ENGINEER	-

7 Photos



Consultation meeting at Taimuria Library (Green Line Corridor), 31st January 2012



Consultation meeting at NED University (Red Line Corridor), 8th February 2012



Consultation meeting at Largess Restaurant (Green Line Corridor), 27th April 2012



Consultation meeting at Hotel Ramada Plaza (Red Line Corridor), 28th April 2012

Appendix - 3

**THE STUDY
FOR
KARACHI TRANSPORTATION
IMPROVEMENT PROJECT**

BUSINESS PLAN (DRAFT)

December, 2012

**Nippon Koei Co., Ltd.
Yachiyo Engineering Co., Ltd.
Oriental Consultants Co., Ltd.**

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Chapter 1 Introduction

1-1 Background of the Project

The plan of Karachi Mass Transit Corridors is the official mass transit master plan notified by the Government of Pakistan in 1995. The plan was based on Karachi Mass Transit Study in 1990 in which elevated and at-grade bus corridors were proposed. Bus corridors were designed so that they can be converted to Light Rail Transit System.

There had been several attempts to implement the plan but these corridors were not implemented. The original concept of busway was changed to the railway system and the concession on Corridor-1 as BOT basis was given private investors, but all projects have failed.

Meanwhile, Bus Rapid Transit (BRT) system was proposed in “Private-Public based environmental friendly public transport system for Karachi (2006)”. This study has introduced the modern style BRT system to Karachi and BRT became popular among transport authorities and planners in Karachi. The proposed system consisted of 16 BRT corridors, 21 secondary routes, and feeder routes.

Asian Development Bank (ADB) took over the BRT projects as a part of Megacity Project and identified 3 priority corridors. However, ADB withdrew the BRT project in 2007.

Karachi Transportation Improvement Project (KTIP) was conducted by Japan International Cooperation Agency (JICA) in collaboration with Karachi Mass Transit Cell (KMTCC), CDGK from April 2010 to June 2012. KTIP consisted of the master plan stage and feasibility study stage. In the master plan study, the JICA Study Team proposed KCR, 2 railway systems, and 6 BRT corridors. Each corridor has been given a name of color so that the corridors can be easily understood. After the master plan stage, JICA selected 2 BRT corridors, namely Green Line and Red Line for the projects of the feasibility study.

The feasibility study on Green Line and Red Line was conducted from July 2011 to June 2012. It was proposed to construct dedicated bus lanes in the median of road along Green Line (M.A. Jinnah Road – Gurmandir – Lasbela – A.O. Clock – Surjani) and Red Line (Regal Chowk – People’s Roundabout – University Road – Model Colony) with 57 stations.

1-2 Present Situation of Public Transport in Karachi

Presently, public transport system in Karachi is very poor. The number of bus passengers is approximately 5.6 million per day, accounting for 40% of motorized travel modes. Since the number of registered buses and minibuses is approximately 21,800, a bus carries 257 passengers per day. The average speed of buses is as slow as 17km/h. Since buses are operated by individual operators who want to maximize the fare revenue, overloading including roof top seating, waiting for passengers at a bus stop for a long time, non-stop at bus stops where the number of passengers is small, and low frequency in off-peak hours are commonly observed in Karachi.

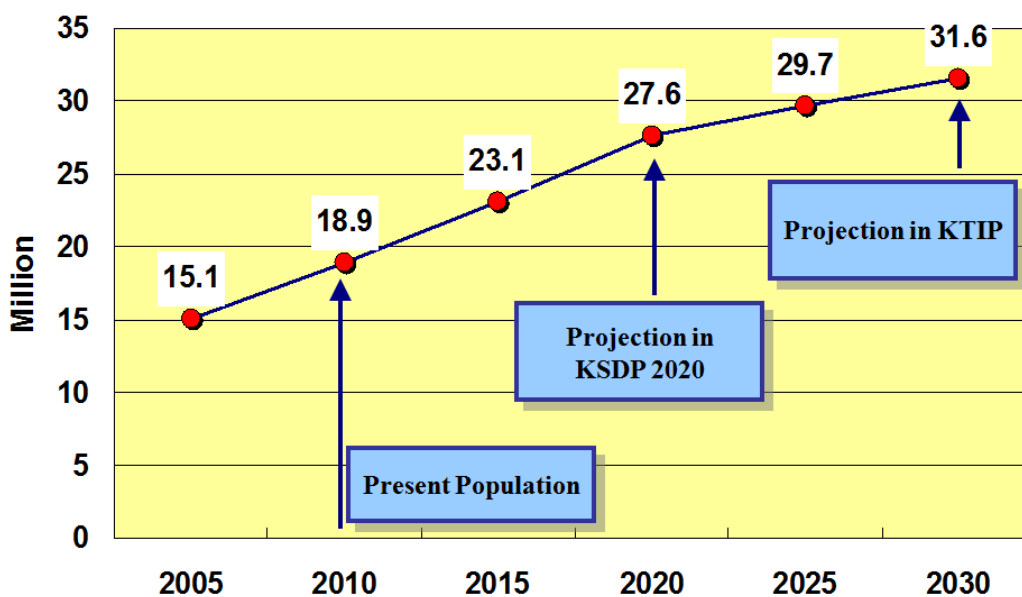
Bus services are unpredictable, unstable and uncomfortable. People who can use other transport modes prefer motorcycle, rickshaw and taxi rather than using buses.



Photo: The Study for KTIP

1-3 Future Urban Growth in Karachi

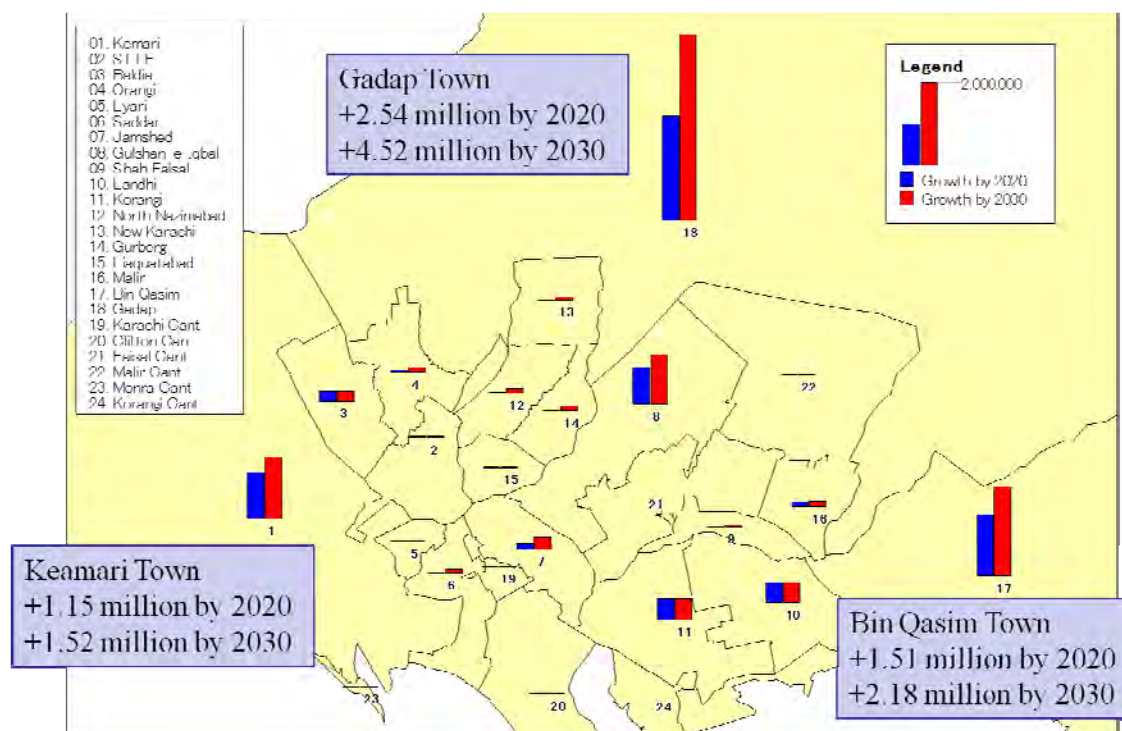
It was estimated that Karachi had a population of 18.9 million in 2010. The present population would be approximately 20 million considering the population growth. The population will increase to 27.6 million in 2020 and 31.6 million in 2030. This means that more than 10 million people will be added to Karachi city in next 20 years.



Source: The Study for KTIP

Figure 1-1 Future Population

The basic concept of the future land use plan is to expand the city in the suburban area such as Gadap, Keamari, and Bin Qasim. In Gadap Town, it is estimated that the increase in the population would be 2.54 million by 2020 and 4.52 million by 2030. Increase in the population in Bin Qasim is also as large as 1.51 million by 2020 and 2.18 million by 2030.



Source: The Study for KTIP

Figure 1-2 Population Increase by Town

1-4 Necessity of the Project

For the public transport system in Karachi, BRT system does not necessarily the best solution because of its disadvantages such as lower capacity than railway system and consumption of existing road space. However, investment cost on a railway system is too expensive to realize in Karachi, and only Karachi Circular Railway (KCR) shows a progress with the financial support of JICA. The growing city cannot wait mass transit system until the economic level of the city is high enough to introduce expensive system. To improve the public transport system in Karachi, BRT is the best system on the project corridors considering the cost-efficiency and available resources.

1-5 Vision

The vision of the Karachi BRT Project is:

Moving in Karachi will be no more stressful activity because of the reliable, comfortable, and sustainable public transport system.

1-6 Mission

Missions are:

- To introduce a Bus Rapid Transit (BRT) system
- To provide frequent, fast, reasonable, and comfortable bus services
- To ensure financial stability for continuous service

Chapter 2 Bus Rapid Transit (BRT) Scenario in Karachi

2-1 What is BRT?

2-1-1 World Trend

Bus Rapid Transit (BRT) is a high quality bus system providing high speed, reliable, and comfortable services compared to traditional bus services. The concept of BRT is based on the railway system – running along exclusive way, high speed, accurate travel time, and high capacity.

Curitiba (Brazil) introduced a high quality bus service system in 1974, which is now recognized as the first successful case of BRT in the world although some advanced bus transit services such as busway and bus exclusive lanes had been introduced in some cities. In 2000, Bogota (Columbia) opened innovative BRT system (TransMillenio) which made a significant impact on transit planners and decision makers in the world, showing that the BRT can achieve high capacity transport service similar to railway systems.



Curitiba
Photo: Toshiyuki Okamura



Bogota
Photo: Toshiyuki Okamura

In the 2000s, a number of capital cities in the world introduced BRT. These cities are: Taipei (2001), Seoul (2004), Jakarta (2004), Beijing (2005), New Delhi (2008), Istanbul (2008), Lima (2010), and Bangkok (2010).

BRT has been recognized as a cost-efficient mass transit system which can solve urban transport problem in not only developing countries but also developed countries.

2-1-2 Major Feature of BRT

There are many variations of BRT systems in the world. Articulated buses are popular but standard type larger buses are also used in many cities. The major characteristics of successful BRT systems are:

- Dedicated bus lanes in the middle of the road (at-grade)
- Stations with the platform for convenient boarding and alighting
- Frequent and rapid operation
- Pre-boarding fare collection (segregation of paid and unpaid areas in a station)
- Low cost compared to other mass transit systems



Photo: Nippon Koei Co., Ltd.

2-1-3 BRT Capacity

The Bogota BRT (TransMillenio) shows that BRT system can provide transport capacity as high as railway system, by achieving the capacity of 43,000 passengers per hour per direction. From this, BRT has been proposed in many cities as an alternative of rail-base mass transit system.

However, TransMillenio is the exceptional case, and no other BRT has achieved such a high traffic throughput. The success of TransMillenio brought about misunderstanding of BRT capacity as if BRT can be an alternative of the railway system in terms of capacity.

The maximum capacity of a standard BRT is approximately 13,000 passengers per hour per direction.

BRT capacity depends on the service frequency and vehicle capacity as same as railway system. The service frequency depends on dwell time and clearance time. In case that dwell time and clearance time are 20 and 20 seconds, respectively, the frequency is calculated at 1.5 buses per minutes (60/(20+20)), meaning 90 buses per hour (1.5*60). If articulated buses having the capacity of 150 passengers are used, the capacity is calculated at 13,500. This is the case when the stopping bay is fully used by vehicles all the times. The percentage of time that a stopping bay is used by vehicles (saturation level) affects the vehicle speed. It is recommend that saturation level is less than 0.4 to ensure the proper operating speed¹. If the saturation level of 40% is applied, the above calculated capacity becomes 5,400 passengers per hour per direction.

Additional stopping bays can increase the capacity. The following is the formula to calculate the system capacity of BRT.

$$Ca[\text{pax/hour}] = \sum_{i=1}^{Nsp} X_i \times \frac{3600[\text{sec/hour}]}{Tsb[\text{sec/bus}] \times (1 - Dir_i) + To[\text{sec/bus}]} \times Cp[\text{Pax/bus}]$$

Where,

¹ Bus Rapid Transit Planning Guide, June 2007

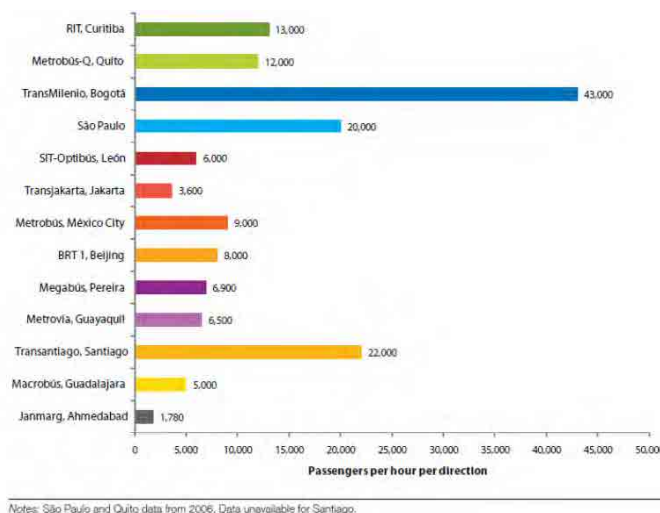
Ca [pax/hour]	System capacity (Passengers per hour per direction)
Nsp	Number of stopping bays
Tsb [sec/bus]	Passenger boarding and alighting time per bus (Dwell time)
To [sec/bus]	Minimum interval between buses (Clearance time)
Diri	Ratio of passing buses
Cp [pax/bus]	Bus capacity (passengers capacity per bus)
Xi	Saturation level

Source: EMBARQ (translated from the original in Spanish)

If a station has three stopping bays, the above calculated capacity (5,400) increases to 16,200. The ratio of passing buses (express operation) is also an important factor to increase the transport capacity.

Note that the addition of stopping bays requires passing lane at station.

Figure below shows examples of passenger volume per hour per direction in the world. Only Bogota's BRT achieves the capacity of 43,000, followed by Sao Paulo and Santiago at the capacity of approximately 20,000. The throughput of Curitiba and Quito is approximately 12,000 – 13,000. Other cities show the passenger volume of 3,600 – 9,000.



Source: EMBARQ

Figure 2-1 Comparison of Hourly Passenger Volume per Direction

The capacity of BRT is similar to Light Rail Transit (LRT) of at-grade type.

2-1-4 Speed

The world experiences show that BRT is not necessarily high speed system. The average commercial speed of a standard BRT is approximately 20km/h, ranging from 15 to 25km/h, while Transmilenio achieves approximately 30km/h. It is expected that a standard BRT can achieve a commercial speed of 25-30km/h. The commercial speed depends on the distance between stations, the density of intersections to be crossed, and necessary time at stations. Due to the delay at intersections, the maximum speed of a BRT without stopping at stations would be approximately 30-40km/h depending on the signaling phasing given to BRT lanes. With the stopping at stations, the speed would reduce to 20-30km/h.

Since the average speed of existing minibuses in Karachi is approximately 17km/h, the speed of 20km/h will produce very small benefit from travel time saving. Therefore, it is necessary to achieve higher commercial speed than minibuses.

2-1-5 Why BRT System is proposed for Karachi

BRT System has been proposed as a mass transit system for Karachi in past studies because it is cost effective system compared to railway systems. BRT System is proposed on two corridors because of:

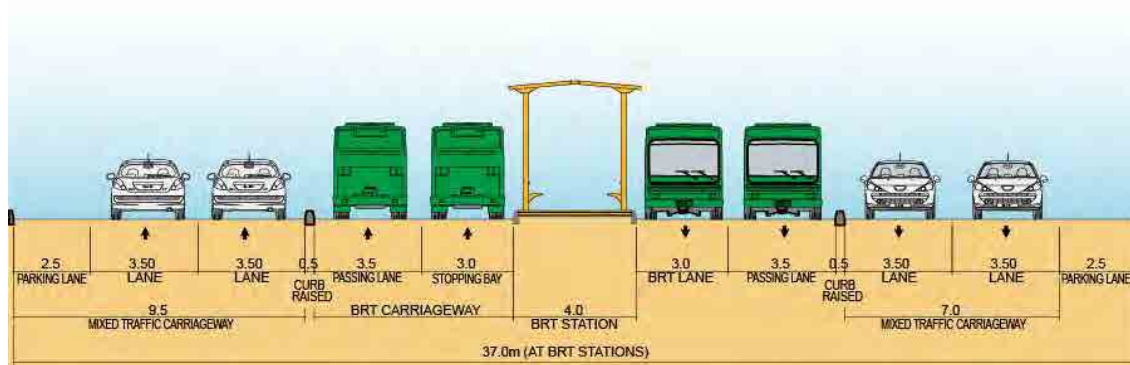
- Predictable travel time
- Faster than buses
- Constant interval
- Visual message of priority on public transit
- Lower investment cost
- Local technology

2-2 Challenges for BRT Introduction to Karachi Road System

2-2-1 Road Space

(1) Required Road Width for Full Scale BRT

A full scale BRT needs passing lanes at a station to achieve high capacity. In case of 2-lanes with a parking lane is provided for mixed traffic, the width of 37m road is necessary.



Source: The Study for KTIP

Figure 2-2 Necessary width of Road at BRT Stations

(2) Road Width of the Corridors

There are narrow sections whose width is less than 37m along the corridor. Most sections of Red Line have road width less than 37m. The road width of the south sections of North Nazimabad along Green Line is mostly less than 37m. Therefore, construction of stations with passing lanes will not be possible.

2-2-2 Bottleneck

There are three bottleneck sections along the corridor.

- Nawab Sadiq Ali Khan Rd (Sanitary Market), Green Line
- Business Recorder Road (Rickshaw Market), Green Line
- New M.A. Jinnah Road (Car dealer Market), Red Line

Construction of dedicated lanes along these bottleneck sections is not possible unless illegal parking and encroachment are cleared from the roadsides.

2-2-3 CBD

(1) M.A. Jinnah Road

In view of public transport network, mass transit system should be introduced along M.A. Jinnah Road between Tower and Gurumandir. However, the section between Tower and Cloth Market is too narrow to accommodate a BRT system. In addition, roadside parking along M.A. Jinnah Road cannot be prohibited because of the high commercial activity along this corridor.



Source: The Study for KTIP

Figure 2-3 Road Width along M.A. Jinnah Road



Photo: The Study for KTIP

(2) Saddar Area

Although traffic demand is very high, introduction of BRT system is very difficult in Saddar Area.

2-2-4 Demand

The present bus traffic is not high enough to justify the BRT system. On the other hand, the increase in traffic demand along the corridor is very high. According to the demand forecast in Karachi Transportation Improvement Project, the necessary capacity of a mass transit system along the corridor will be more than 10,000 passengers per hour per direction.

2-2-5 Traffic

(1) Signal Free Corridor and BRT

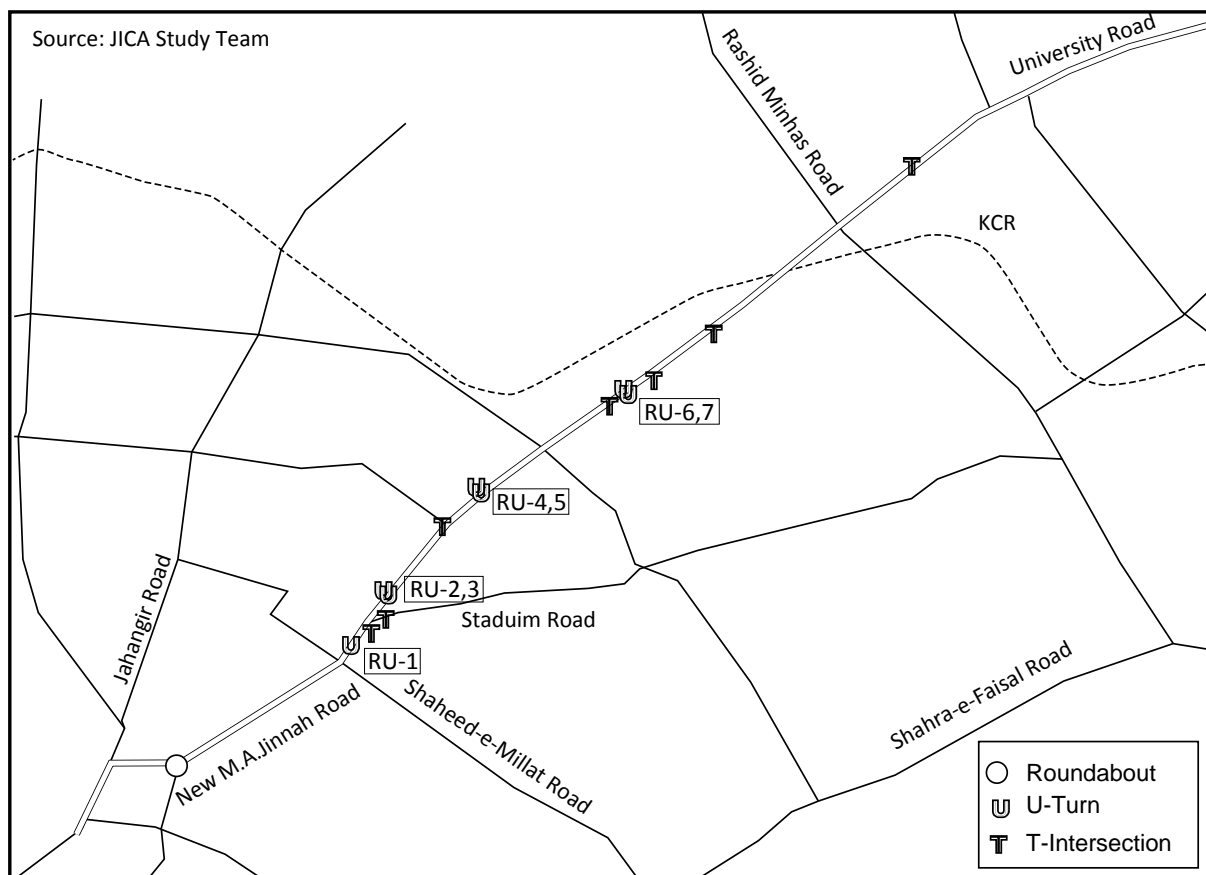
The Signal Free Corridor project is implemented by CDGK. A signal free corridor is a highway corridor where traffic is not interrupted by traffic signal with flyovers, underpasses, U-turns, and pedestrian bridges. Signals are removed from Signal Free Corridors. In October 2009, CDGK approved 29 Corridors (Notification NO.DCO/CDGK/PS/373/09). So far, Signal Free Corridors 1, 2, and 3 have been completed. Corridor-3 corresponds to Red Line.

There is a collision between Signal Free Corridors and BRT corridors.

Median breaks for U-turn traffic are the essential parts of a signal free corridor to provide a way for right turn traffic without signals. Since BRT lanes will be provided in the center of roads, U-turn traffic will conflict with BRT traffic. In order to avoid the conflict, intersections along BRT corridors should be signalized, which is incompatible with the policy of Signal Free Corridor.

(2) U-Turn Traffic (Red Line)

Figure 2-4 shows the locations of U-turns along University Road. There are four median breaks for U-turn traffic between Shaheed-e-Millat Road and Rashid Minhas Road.



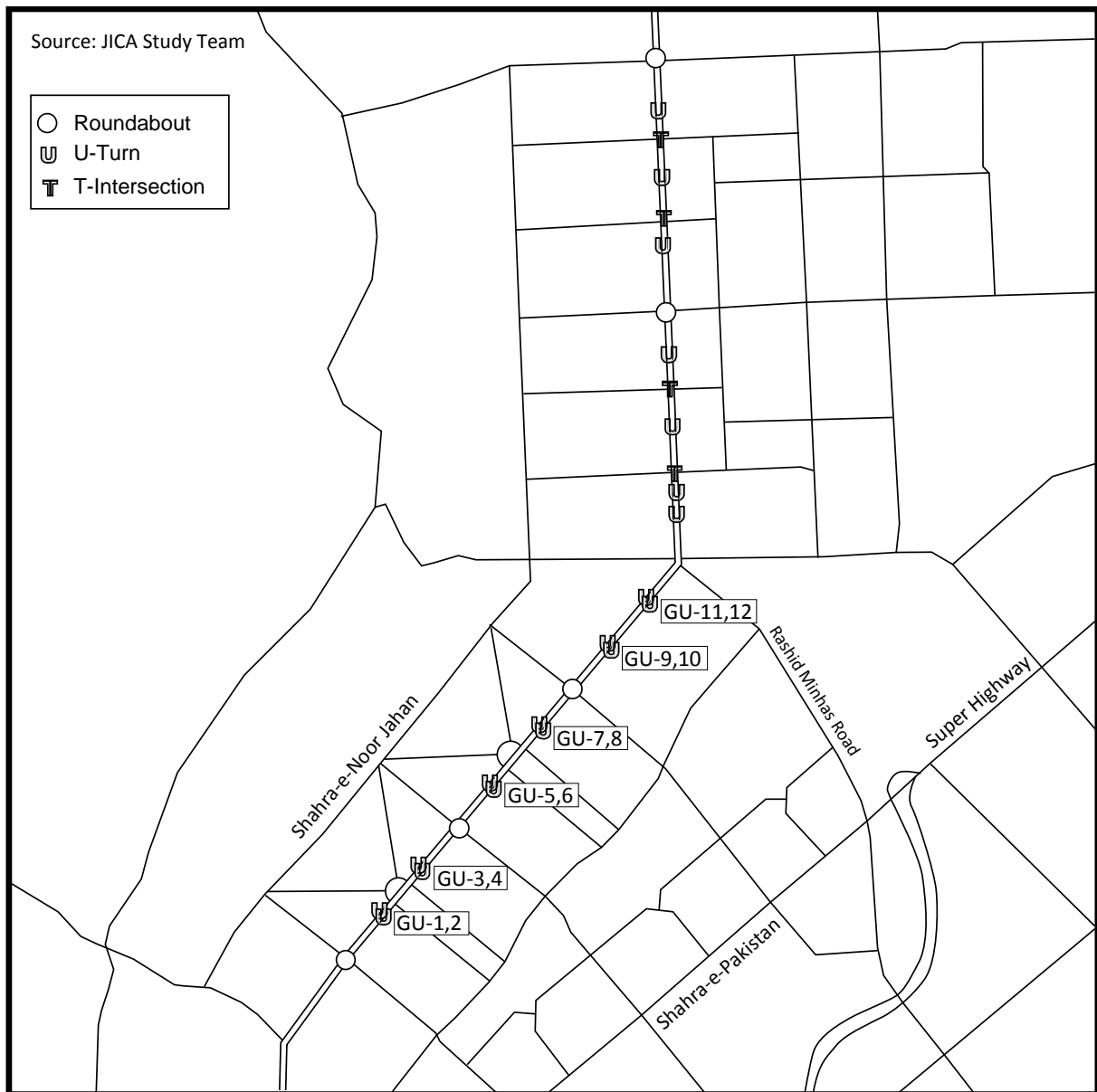
Source: The Study for KTIP

Figure 2-4 U-Turn Locations along Red Line

(3) U-Turn Traffic (Green Line)

Figure 2-5 shows U-turn locations along Green Line. There are six median breaks for U-turn traffic in North Nazimabad and seven U-turns in New Karachi. If intersections are signalized, U-turns can be closed in New Karachi because the U-turns are provided for right-turn traffic at intersections in New Karachi.

On the other hand, it will be difficult to close U-turns in North Nazimabad because signalization of intersection is not proper along the corridor in North Nazimabad.



Source: The Study for KTIP

Figure 2-5 U-Turn Locations along Green Line



U-turn: Red Line
Source: The Study for KTIP



U-turn: Green Line

(4) Roundabout Traffic

A roundabout is one of the difficult road elements for a BRT operation. There are roundabouts without traffic signals along Green Line. There are some examples of BRT systems in the world that are operated along roads having roundabouts. For example, there are roundabouts along the major route of TransJakarta (Jakarta). BRT systems in Quito (Equador) and Cali (Colombia) also have roundabout intersections. In case that a roundabout is heavily congested, the roundabout should be signalized so that BRT buses are not delayed by the congestion. So far, roundabouts in North Nazimabad and New Karachi are not so saturated that the delay of BRT buses at roundabouts would not be a problem.

2-3 Proposed BRT System for Karachi

2-3-1 Routes and Stations

(1) Green Line Route

The terminal points of Green Line are Municipal Park (Aurangzeb Park) in the center side and Surjani Town Sector 7. Since the section between Tower and Cloth Market is too narrow and busy to introduce a BRT system, a small park is used for the terminal point of the route. Vehicles make U-turn at the point. The other end point is the BRT depot.

The route is: M.A. Jinnah Road – Jahangir Road – Business Recorder Road – Nawab Sadiq Ali Khan Road – Khayaban-e-Sher Shah Suri – Shahrah-e-Usman – Chaudry Fazal Ellahi Road – Rd 5000. The total length is 21.1 km.

(2) Red Line Route

The terminal points of Red Line are Regal Chowk in the center side and Model Colony Graveyard. The terminal point of Regal Chowk is elevated because the road is too narrow to accommodate bus lanes. The other terminal point is also U-turn point at the intersection of Jinnah Avenue and Airport Road.

The route is: Pready Street – New M.A. Jinnah Road – University Road – Malir Cantonment Road – Jinnah Avenue. The total length is 24.4 km.

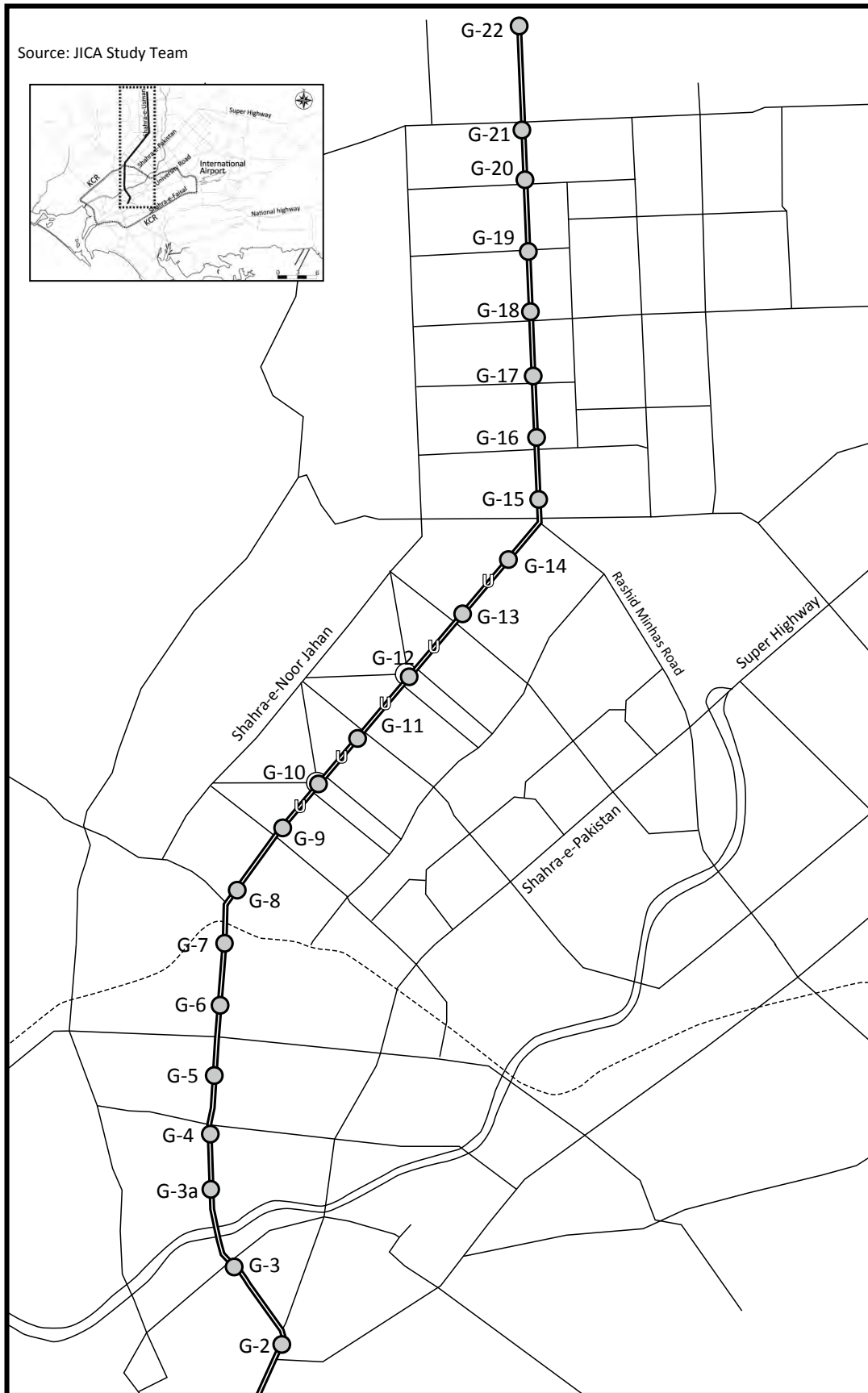
(3) Station Location (Green Line)

There are 29 stations along Green Line as shown in Table 2-1. The location map is shown in Figure 2-5 and Figure 2-8.

Table 2-1 Station Location of Green Line

No.	Location	Chainage	Distance between station	Remark	Possible Station Type
M1	Municipal Park	00+050		Start point (or end point) of Green Line/ Without passing lanes/ Access by pedestrian	Island, Both-sided
M2	Radio Pakistan	00+614	564	A transfer terminal is proposed in the vacant area near Garden Square/ Without passing	Island, Both-sided
M3	Garden Square	01+036	422	Without passing lanes/ Access by pedestrian crossing	Island, Both-sided
M4	Taj Medical Complex	01+760	724	Without passing lanes/ Access by pedestrian bridge	Island, Both-sided
M5	KGA ground	02+241	481		Island, Both-sided
G01	West of Quaid-e-Azam	02+682	441	The same station as Red Line/ Access by Pedestrian Bridge	Island, Both-sided
G02	Gurmandir	03+192	510	Between Gurmandir and G01	Island, Both-sided
G03	Lasbela Chowk	04+309	1117	North side of Lasbela Chowk	Island, Both-sided
G03a	sanitary market	05+316	1007		Island, Both-sided
G04	No. 1 Chowrangi	05+937	621	South side of No.1 Chowrangi	Island, Both-sided
G05	Model Park	06+506	569	Additional proposal in KTIP	Island, Both-sided
G06	Baqai Hospital	07+533	1027	Access by a pedestrian bridge	Island, Both-sided
G07	Public Park near Bridge	08+047	514	At Nazimabad No. 7 intersection	Island, Both-sided
G08	Board Office	08+840	793	Access by a pedestrian bridge	split type
G09	KAD Chowrangi	09+720	880	Additional proposal in KTIP	split type
G10	Hydri Market	10+394	674	Access by a pedestrian bridge	split type
G11	Five Star Chowrangi	10+948	554	Both sides of the intersection	split type
G12	Jummah Bazaar	11+967	1019	Access by a pedestrian bridge	split type
G13	Sakhi Hassan Chowrangi	12+935	968	Both sides of the roundabout	Island, Both-sided
G14	Erum Shopping Emporium	13+800	865	Between Nagan Chowrangi and Sakhi Hassan Chowrangi	Island, Both-sided
G15	Nagan Chowrangi	14+524	724	Between the first and second pylon in front of Haji Qadir Pakwan Sheermal House	Landscape
G16	U.P. Mohr intersection	15+260	736	South of roundabout	Landscape
G17	Rd 2400	15+992	732	Signalizing T-intersection	Landscape
G18	Power House Chowrangi	16+767	775	South of the roundabout	Landscape
G19	Rd 4200	17+446	679	Signalizing T-intersection	Landscape
G20	2 minutes Chowrangi	18+186	740	North of the pylon outside Sultan Plaza Complex	Landscape
G21	Surujani Chowrangi	18+790	604	The north of the roundabout	Landscape
G22	KDA Chowrangi Surjani Town	20+322	1532	Outside CDGK site office on the southern side of 5000 Road	Landscape
G23	KESC Power House	22+180	1858	Terminal station (depot)	

Source: The Study for KTIP



Source: The Study for KTIP

Figure 2-6 Station Locations along Green Line

(4) Station Location (Red Line)

There are 28 stations along Green Line as shown in Table 2-2. The location map is shown in Figure 2-6 – 2-8.

Table 2-2 Station List of Green Line

No.	Location	Chainage	Distance between station	Remark	Possible Station Type
P1	Regal Chowk	00+120		Elevated Station (U-turn point)	Elevated, Single Sided (Long)
P1a	Empress Market	00+610	490	Elevated	Elevated, Both Sided
			472		
P2	CDGK Parking Plaza	01+082	718	Transfer terminal proposed	Island Both-sided
P3	Shah Ahmad Noorani Chowrangi	01+800	480	Reservation for future development	Island Both-sided
P3a	Near numaish underpass	02+280	860		Island Both-sided
R01	West of Quaid-e-Azam	-	-	Same station as Green Line	-
R02	North of Quaid-e-Azam	-	-	Middle of intersections	-
R03	People's Roundabout	00+790	720	Between roundabout and Jail road	Island Both-sided
R03a	Car dealer shop	01+510	743		Island Both-sided
			489		
R04	Center Jail	02+253	613	Near flyover	Island Both-sided
R04a	u-turn stadium road	02+742	537		Island Both-sided
R05	Askari Park	03+355	570	Both sides of T-intersection	Island Both-sided
R05a	Near u-turn Gulsan Iqbal	03+892	596		Island Both-sided
R06	Civic Center	04+462	667	Between Askari Park and Flyover	Island Both-sided
R07	PIA Planetarium	05+058	729	Transfer to Jilani KCR Station	Island Both-sided
R07a	Hakeem Sayeed Family Ground	05+725	1321		Island Both-sided
R08	Urudu University	06+454	735	Before flyover	Island Both-sided
R09	National Institute Management (N.I.M)	07+775	645	After flyover	Island Both-sided
R09a	near elevated u-turn	08+510	993		Island Both-sided
R10	Safari Park	09+155	1429	Near interchange	Island Both-sided
R11	NED	10+148	869	After flyover	Island Both-sided
R12	University of Karachi	11+577	896	Near Shaikh-Zaid Islamic Center	Island Both-sided
R13	City Towers	12+446	712	Before T-intersection at Rabia Villas	Island Both-sided
R14	Near blue mt CNG station	13+342	2193	Near Ranger Office (proposed depot)	Island Both-sided
R15	Safura Circle	14+054	2953	Before Safura Circle	Island Both-sided
R16	Malir Cant Check Post	16+247	1260	Near PSO Petrol Pump	Island Both-sided
R17	Kazimabad	19+200		Jinnah Ave. Intersection	Island Both-sided
R17a	Model Colony	20+460		near end point	Island Both-sided

Source: The Study for KTIP

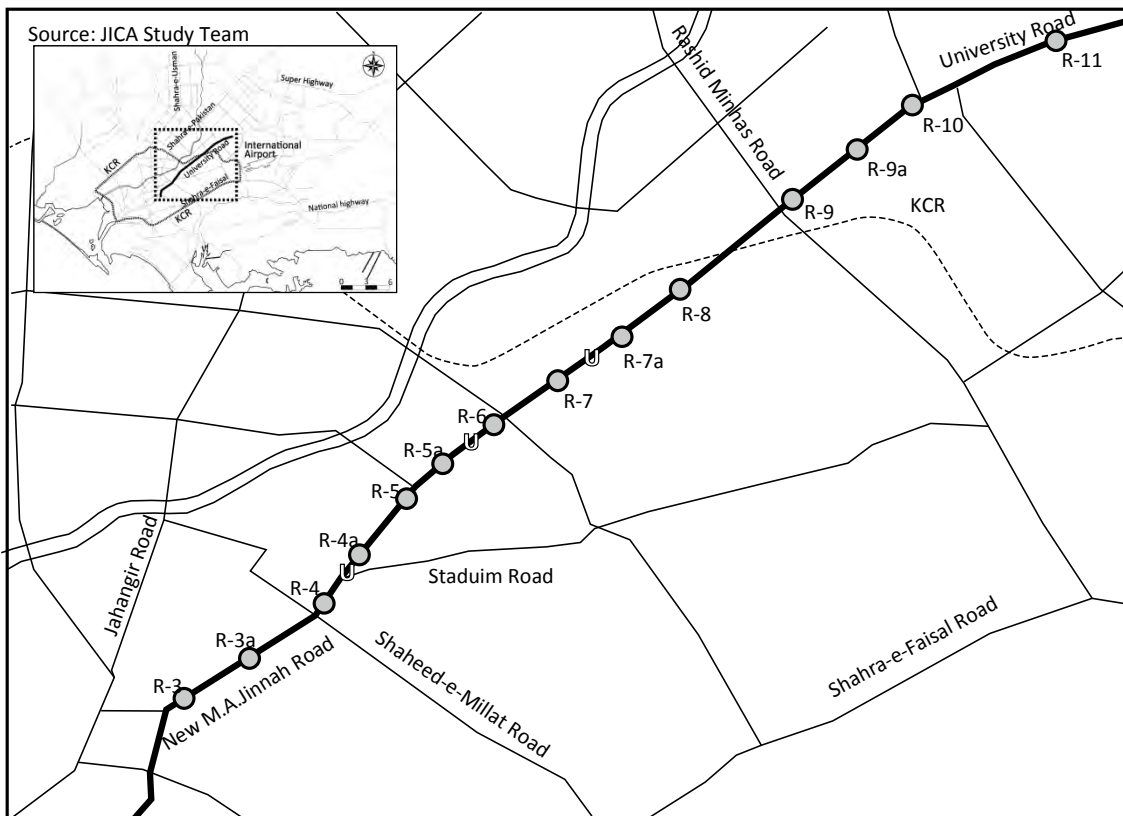


Figure 2-7 Station Locations along Red Line (1)

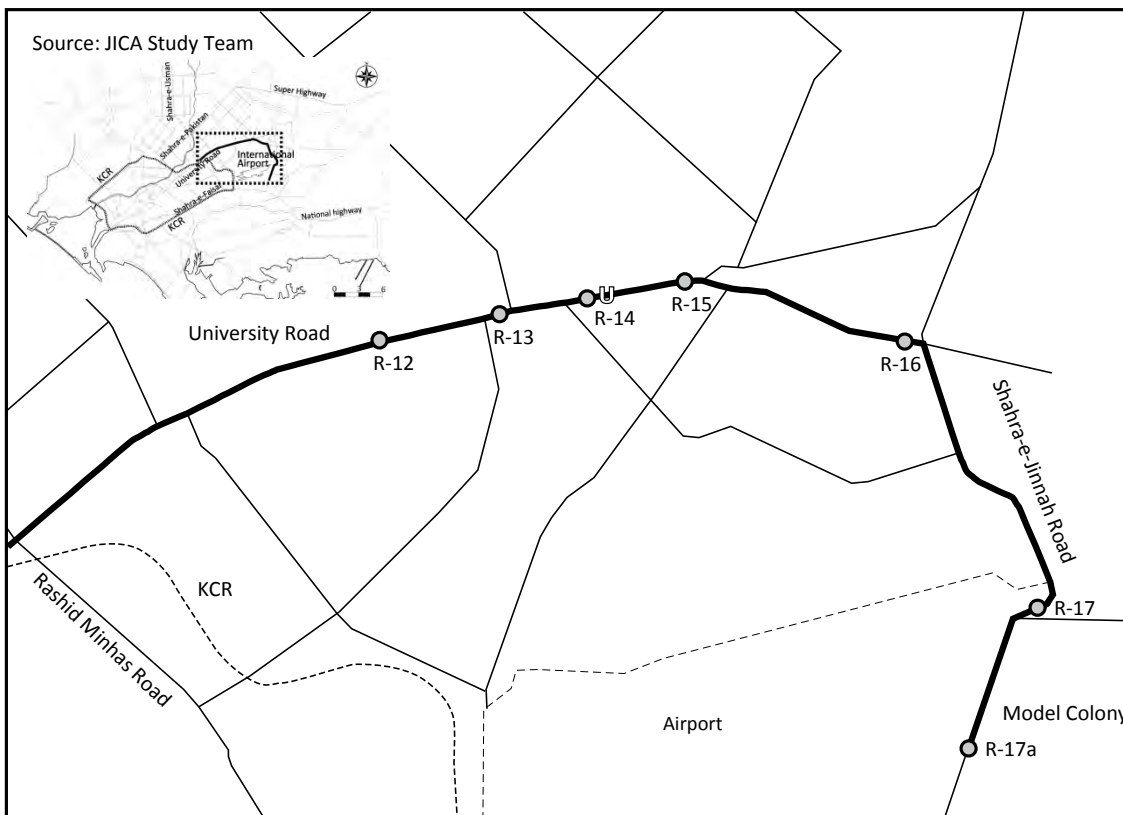


Figure 2-8 Station Locations along Red Line (2)

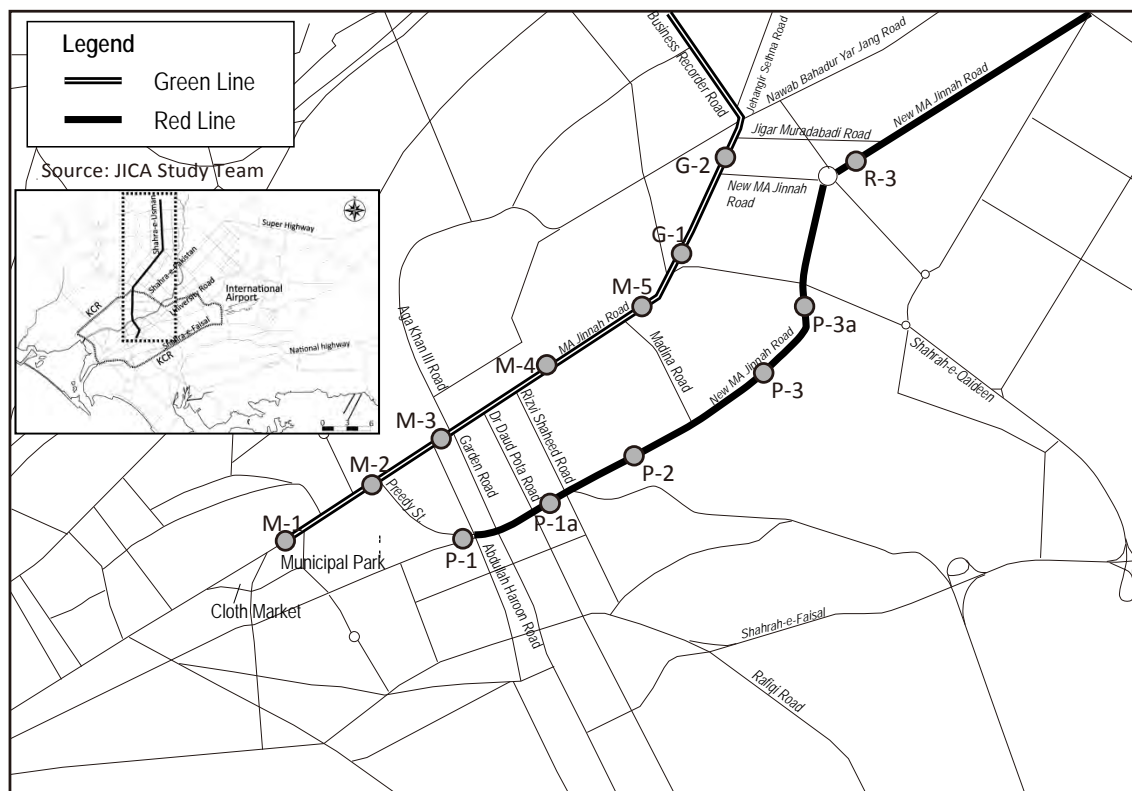


Figure 2-9 Station Locations along Red Line and Green Line in CBD

2-3-2 Fare Collection

In the Karachi BRT system, passenger fare will be collected before the boarding to buses. There are two reasons. Since the space at stations is very limited as described in the previous section, reduction in boarding and alighting time is a very important matter. Passing lanes cannot be provided, and the length of platforms cannot be long. Under this condition, payment inside buses will cause serious decrease in the capacity. The pre boarding fare collection can increase the capacity by reducing the stopping time at stations.

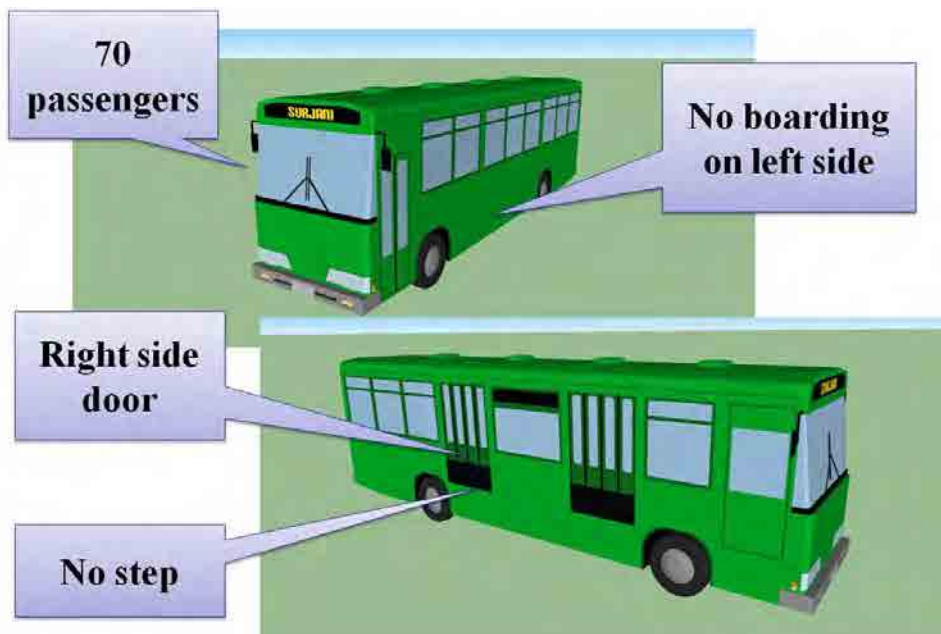
The other reason is that transparency of fare collection and the application of a popular business model in many cities where BRT system is successfully introduced. In the business model, passenger fare will be collected by a fare collection company, and operators will be paid based on the performance. Operators concentrate on providing the transport service that is guided by the project implementation agency.

2-3-3 Vehicle

Due to the limited U-turn space at terminal points and cost efficiency of vehicle type, 12m long standard buses are selected as the BRT buses. The turning radius of modern articulated buses is as same as the standard buses, but they require larger space than standard buses. The major characteristics of the BRT bus are:

- Right side door (opposite side of normal buses)
- No step (direct access to platform)
- Bridge equipment to connect bus floor and station platform
- Separation of male seats and female seats
- Capacity of 70 passengers
- Local production

The BRT buses cannot be operated in mixed traffic lane because of the location of doors.

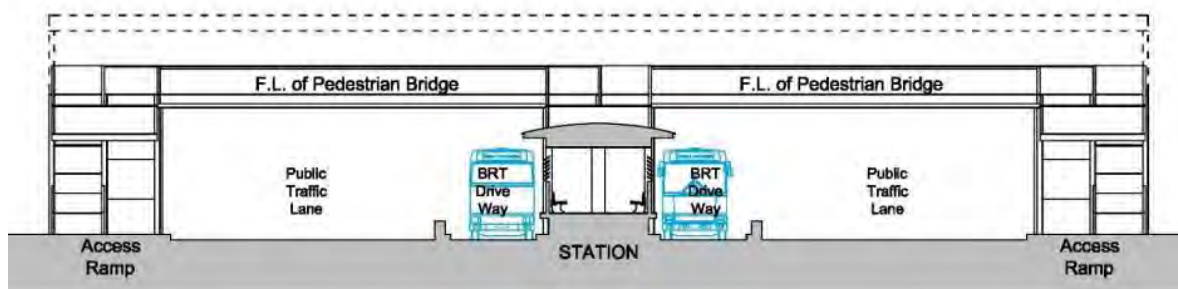


Source: The Study for KTIP

Figure 2-10 Image of BRT vehicle

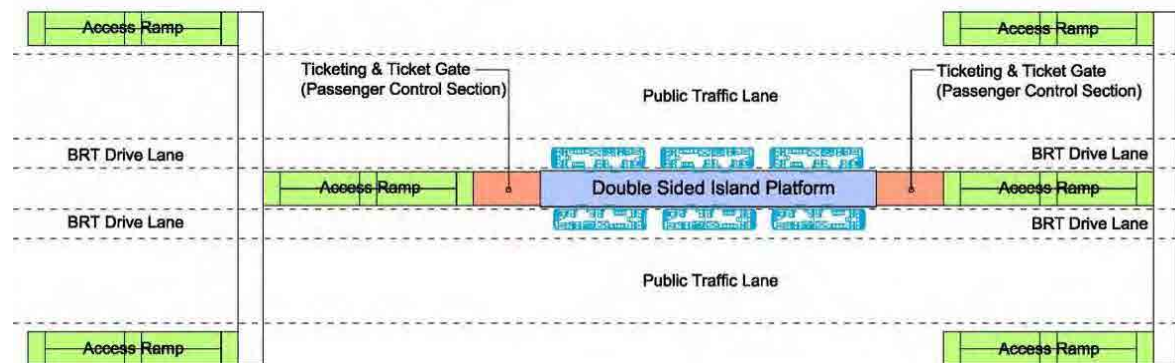
2-3-4 Station Facility

Stations are located in the median of the corridors. Due to limited road space, passing lanes are not provided. The typical width of a station platform is 4m. This is enough for most stations because of high frequency operation. The height of the platform is as same as the level of bus floor. There are three bus stopping areas in row. The length of a station is approximately 70m.



Source: The Study for KTIP

Figure 2-11 Cross Section at Stations

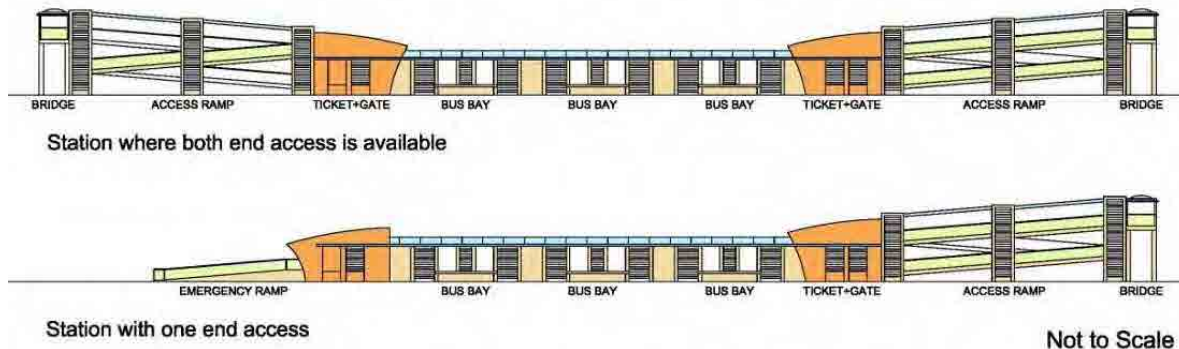


Source: The Study for KTIP

Figure 2-12 Plan of Station

A station on the platform consists of paid area and unpaid area. Ticketing area is located on the platform level in the unpaid area.

Pedestrian bridges provide access to the station platform. Access ramp with 1:12 slope enables the access by wheelchair. The access ramp need 4m width in the walkway.



Source: The Study for KTIP

Figure 2-13 Elevation of Station



Source: The Study for KTIP

Figure 2-14 Access to Station (Image)

2-4 Target Year

According to the transportation master plan in Karachi prepared by JICA, Green and Red Lines will have been completed by 2020. Although the traffic demand in New Karachi is low at present, it will increase rapidly up to 2020 due to the expected urban development in the north New Karachi up to Northern Bypass. Therefore, Green Line should be developed by 2020, but there is enough time. The condition of Red Line is the same.

Chapter 3 Demand Forecast and Revenue

3-1-1 Present Traffic

The number of passengers along major corridors was estimated in detail in “Confirmatory Green Routes Study for Karachi, March 2010”. Table 3-1 shows the passenger volume per direction per hour along Green Line, Red Line, and M.A. Jinnah Road taken from the result of the estimation in the study.

Table 3-1 Present Passenger Volume in a Peak Hour

Corridor	Code	Motorcycle	Bus	Total	Period
Green Line	MB-C39	3,743	4,337	12,913	19:00-20:00
	MB-C70	5,343	9,076	20,156	19:00-20:00
	MB-28	6,720	7,616	24,194	18:00-19:00
	MB-C27	8,174	10,277	23,827	09:00-10:00
	MB-56	4,319	7,011	19,865	08:00-09:00
Red Line	MB-77	429	1,976	2,823	12:00-13:00
	MB-79	2,231	5,021	13,524	18:00-19:00
	MB-80	3,479	15,042	32,262	08:00-09:00
	MB-C78	2,780	14,573	23,376	21:00-22:00
M.A. Jinnah Road	MB-10	7,542	21,340	34,171	19:00-20:00
	MB-C8	4,040	8,445	17,802	18:00-19:00
	MB-C2	1,563	3,599	6,686	18:00-19:00
	MB-C7	1,985	10,982	17,287	09:00-10:00

Source: Confirmatory Green Routes Study for Karachi, March 2010

Bus passenger volume in the peak hour is approximately 10,000 passengers per hour per direction (PHPDT) along Green Line, while the volume is as low as 4,337 in New Karachi (MB-C39). Total passenger volume (the sum of all mode traffic) is approximately 24,000 PHPDT along Green Line. This means that a standard BRT is enough along Green Line at present.

Bus passenger volume along University Road is as large as 15,000 PHPDT between Rashid Minhas Road and Shaheed-e-Millat Road. However, the volume decreases to 5,000 PHPDT near NED and drops to 2,000 PHPDT after universities. Bus passenger demand slightly exceeds the capacity of a standard BRT. If motorcycle demand is added to public transport, the passenger volume becomes 18,000, which is nearly the capacity of a saturated BRT. Total passenger volume is approximately 32,000 PHPDT at peak section along Red Line. If public transport needs to satisfy traffic demand of all modes along Red Line, a standard BRT is not enough although this case needs not to be considered.

Bus passenger volume is as large as 21,000 PHPDT along M.A.Jinnah Road in front of Quaid-e-Azam, which exceed the capacity of most BRT systems except for TransMillenio in Bogota. However, boarding and alighting demand is not so high at this point, and the passenger volume is the sum of traffics toward Surujani, Super Highway, and University Road. In other words, passing demand is the majority of these passengers and a standard BRT will be capable of this demand.

On the other hand, bus passenger demand drops to 8,500 PHPDT near Garden Square and 3,600 near Cloth Market. This is not the result of the demand. Rather, this is the result of constraints from the heavy congestion along M.A. Jinnah Road. Bus passenger volume is 11,000 in the one-way section of M.A. Jinnah Road between Tower and City Park.

Not all bus passengers will shift to BRT. Some passengers will remain in mixed traffic using feeder services. From this, a standard BRT system is enough for public transport under the present traffic demand.

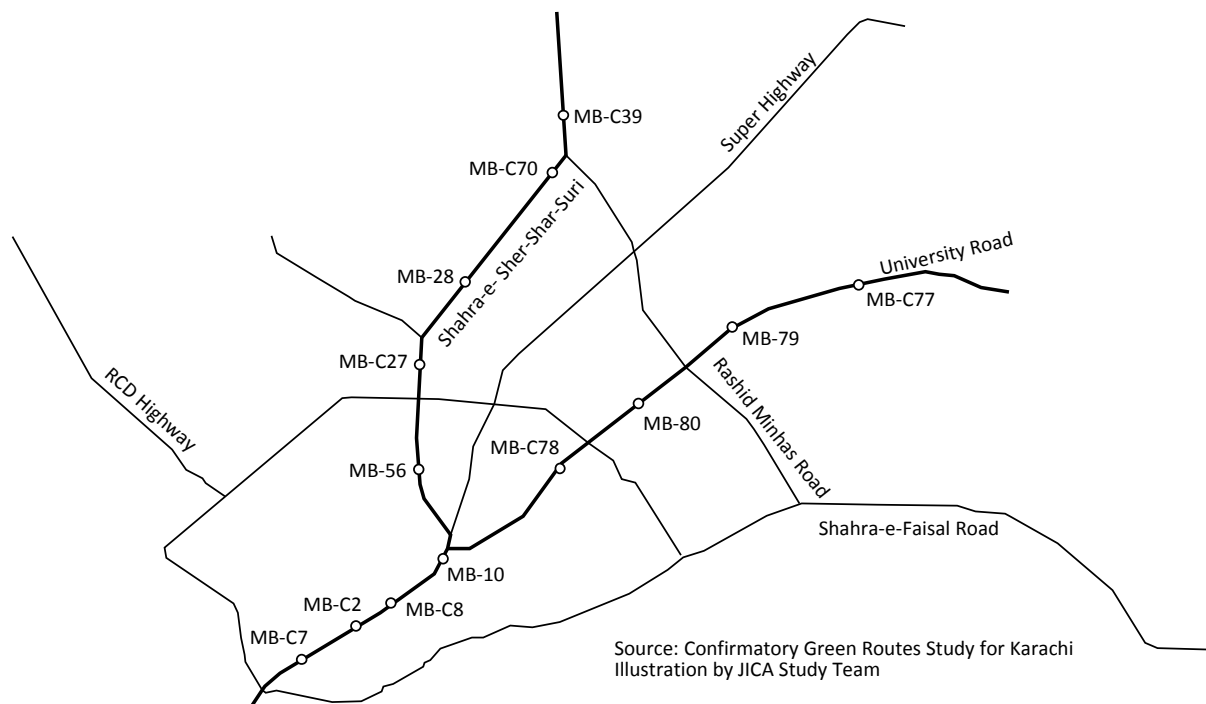


Figure 3-1 Survey Locations in Confirmatory Green Routes Study for Karachi

3-1-2 Demand Forecast Method

(1) Urban Growth

As described in Chapter 1, Karachi will have a population of additional 10 million in the next 20 years, and the population will be more than 30 million in 2030. Gadap, Keamari, and Bin Qasim Town are expected to accept the large part of the population growth.

(2) OD Matrix

The traditional four-step method was applied for the demand forecast. Karachi was divided into 216 traffic zones. The future OD matrix was developed in Karachi Transportation Improvement Project.

(3) Traffic Assignment

Transport network data were prepared for different scenarios. A network data consists of links, nodes, and zone centroids. A zone centroid represents the center of each traffic zone. The OD matrix was assigned to the transport network to estimate the traffic volume. It was assumed that motorcycle and car users would not use feeder buses but use BRT only if origin and destination were connected to the zone centroids. The fare of BRT was set as Rs. 20 while that of existing buses was Rs. 15. The capacity of BRT was limited to 12,000 passengers per hour per direction.

(4) Network Scenario

The traffic assignment network was prepared for five network scenarios.

- (A) Green & Red Lines on the present road network (2010)
- (B) Master Plan (M/P) network (2020).
- (C) M/P network (2020) without KCR
- (D) M/P network (2030)
- (E) Green & Red Lines + KCR on the 2030 road network

Road network is assumed to be developed as proposed in the M/P as shown in Table 3-2. Road capacity was reduced from the M/P along BRT routes assuming that two lanes (one lane each) are removed.

Table 3-2 Arterial Road Length in Master Plan

Year	Expressway	Highway	Principal Highway	Minor Arterial	Total
2010	25.6	173.2	157.2	527.9	884
2020	35.8	173.2	199.8	547.7	956.5
2030	76.9	257.2	229.1	609.2	1,172.4

Source: The Study for KTIP

In the M/P network, KCR is included in 2020 network while Blue Line and Brown Line are included in 2030 network as railway system. For the network in 2020, “Without KCR” scenario was prepared (C). This is the case when only Green & Red Line are developed as mass transit system by 2020. The scenario (E) is the case when no mass transit system is implemented after Green & Red Lines and KCR by 2030.

(5) Without Green Line and Red Line

Figure 3-2 shows the projected number of bus passengers of the corridor of Green Line in 2020 without the BRT project, while Figure 3-3 shows that of the corridor of Red Line in the same conditions.

The figure illustrates the number of bus passengers per hour per direction in the peak hour. The demand exceeds the capacity of standard BRT systems (10,000 PHPDT) at some links along Green Line.

Bus passenger demand exceeds 15,000 PHPDT in most sections along University Road. The demand characteristics along Red Line is quite different from the present situation in which traffic demand rapidly becomes low in the east of universities. In 2020, the demand becomes high in the east of the corridor near Model Colony.

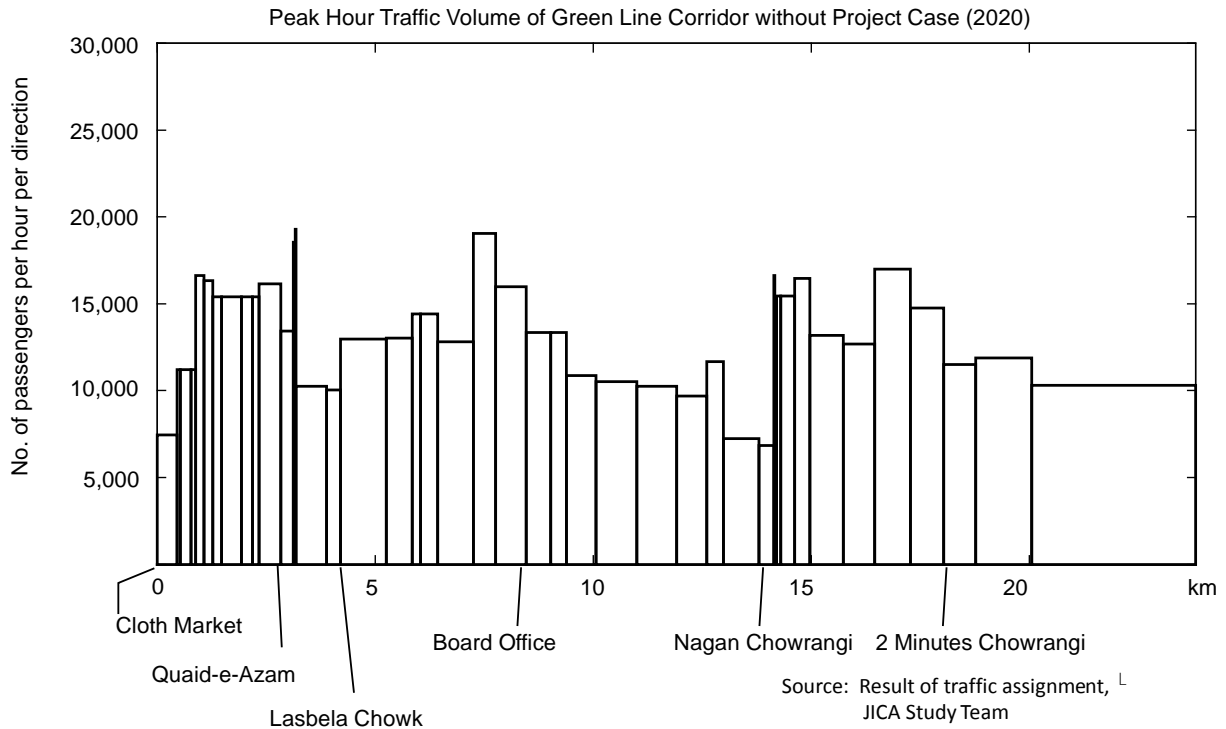


Figure 3-2 Bus Passenger Demand along Green Line (2020), without Project Case

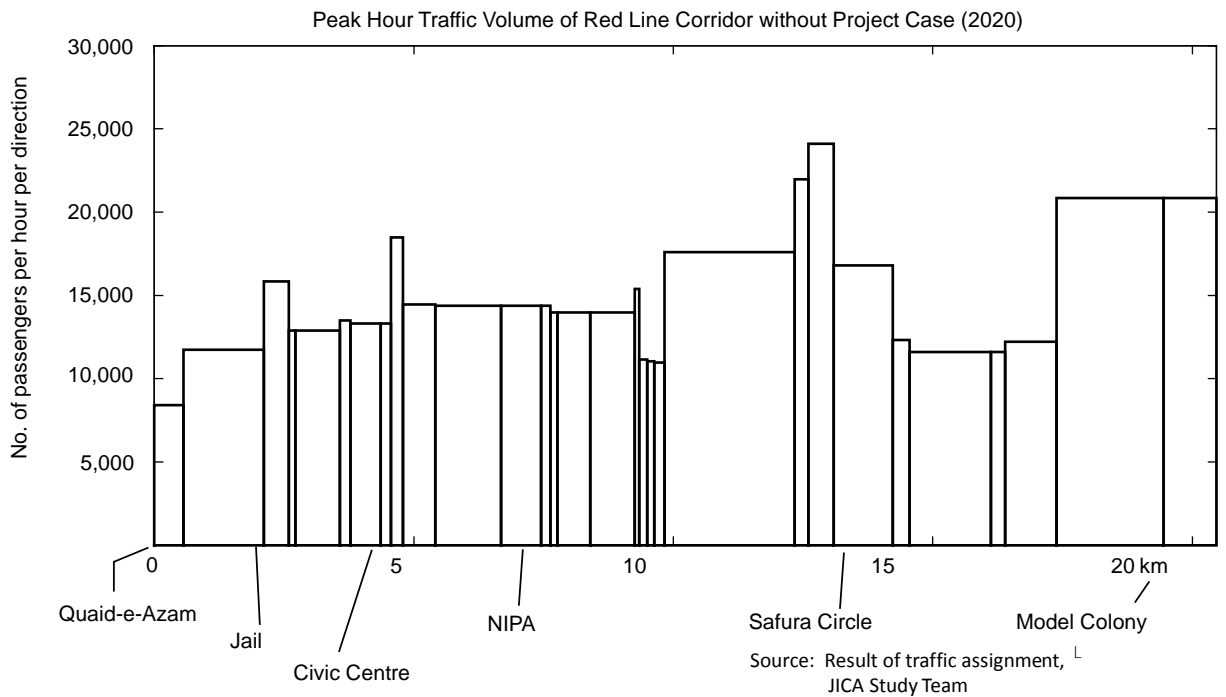


Figure 3-3 Bus Passenger Demand along Red Line (2020), without Project Case

(6) Traffic Volume Data of the Demand Forecast

Table 3-3 shows the result of the demand forecast of the daily passenger volume (both directions) of Green Line and Red Line for the five scenarios. This is computed by traffic assignment using daily OD matrices. The codes in the section column represent station codes.

Table 3-4 shows the peak hour passenger volume per direction. This was calculated from the daily traffic volume assuming the peak hour rate of 7.5% per direction.

Table 3-5 shows the result of the demand forecast of the number of passenger boarding at stations. The total number of passenger boarding is 370,000 in 2010, 733,000 in 2020, and 1.26 million in 2030. The number of daily passenger boarding was used for revenue calculation.

Table 3-6 shows the passenger boarding and alighting at stations in peak hour. The peak hour rate of 7.5% was used to calculate the volume.

Table 3-3 Daily Passenger Volume (Both Directions)

Section	2010	2020		2030		
	Green&Red	Green&Red +KCR	Green&Red only	M/P Network	Green&Red +KCR	
Green Line						
M1 - M2	27,331	108,576	111,176	68,591	137,886	
M2 - M3	50,652	163,869	159,635	98,152	181,132	
M3 - M4	60,626	219,570	213,086	116,576	216,460	
M4 - M5	64,356	227,498	219,097	127,526	223,614	
M5 - G01	64,356	227,498	219,097	324,218	224,376	
G01 - G02	99,988	351,322	329,634	341,679	331,913	
G02 - G03	92,630	351,803	329,187	332,852	330,689	
G03 - G04	105,650	349,676	328,967	329,743	331,430	
G04 - G05	107,604	342,338	332,130	322,007	326,906	
G05 - G06	111,780	337,996	331,825	319,421	329,414	
G06 - G07	116,056	331,097	329,879	323,692	326,072	
G07 - G08	113,491	325,385	331,569	314,107	323,818	
G08 - G09	118,665	321,376	269,543	274,452	333,970	
G09 - G10	119,608	317,880	262,673	269,905	331,772	
G10 - G11	117,519	307,462	255,031	262,488	322,763	
G11 - G12	112,723	300,958	250,234	259,553	323,357	
G12 - G13	112,371	294,944	246,776	257,933	323,765	
G13 - G14	98,061	280,266	234,292	249,359	318,555	
G14 - G15	96,659	273,816	233,175	311,136	317,481	
G15 - G16	92,053	255,923	221,088	302,777	308,643	
G16 - G17	89,519	243,757	212,219	293,032	298,653	
G17 - G18	79,153	218,931	193,416	279,485	276,881	
G18 - G19	64,177	202,752	180,420	265,497	261,234	
G19 - G20	43,622	183,059	163,954	227,668	242,607	
G20 - G21	24,514	142,839	130,044	193,148	199,210	
G21 - G22	15,966	125,190	116,540	165,327	181,014	
Red Line						
P1 - P2	16,383	73,929	76,406	131,002	126,860	
P2 - P3	35,335	144,188	152,647	170,098	183,761	
P3 - R02	39,290	156,145	161,530	180,026	198,487	
R01 - R02	91,495	305,943	312,655	186,971	285,196	
R02 - R03	88,770	319,558	343,745	259,949	326,565	
R03 - R04	94,971	330,721	354,953	272,817	334,848	
R04 - R05	94,941	332,169	360,123	272,954	332,411	
R05 - R06	91,392	334,209	363,184	278,360	333,044	
R06 - R07	90,064	339,391	387,292	286,537	338,479	
R07 - R08	85,549	338,727	382,556	280,030	334,805	
R08 - R09	78,424	333,843	373,503	268,320	327,285	
R09 - R10	66,424	335,472	380,595	261,901	323,547	
R10 - R11	61,339	336,729	378,565	259,313	321,120	
R11 - R12	61,339	336,546	378,184	259,125	320,938	
R12 - R13	26,327	315,611	359,950	236,960	305,918	
R13 - R14	26,193	317,730	357,840	235,219	303,462	
R14 - R15	15,629	311,832	351,940	225,203	295,250	
R15 - R16	11,716	267,839	308,345	174,579	248,537	
R16 - R17	11,412	221,604	267,932	53,359	98,408	
R17 - R18	11,412	221,604	267,932	53,359	98,408	

Source: The Study for KTIP

Table 3-4 Peak Hour Passenger Volume per Direction

Section	2010	2020		2030		
	Green&Red	Green&Red +KCR	Green&Red only	M/P Network	Green&Red +KCR	
Green Line						
M1 - M2	1,025	4,072	4,169	2,572	5,171	
M2 - M3	1,899	6,145	5,986	3,681	6,792	
M3 - M4	2,273	8,234	7,991	4,372	8,117	
M4 - M5	2,413	8,531	8,216	4,782	8,386	
M5 - G01	2,413	8,531	8,216	12,158	8,414	
G01 - G02	3,750	13,175	12,361	12,813	12,447	
G02 - G03	3,474	13,193	12,345	12,482	12,401	
G03 - G04	3,962	13,113	12,336	12,365	12,429	
G04 - G05	4,035	12,838	12,455	12,075	12,259	
G05 - G06	4,192	12,675	12,443	11,978	12,353	
G06 - G07	4,352	12,416	12,370	12,138	12,228	
G07 - G08	4,256	12,202	12,434	11,779	12,143	
G08 - G09	4,450	12,052	10,108	10,292	12,524	
G09 - G10	4,485	11,921	9,850	10,121	12,441	
G10 - G11	4,407	11,530	9,564	9,843	12,104	
G11 - G12	4,227	11,286	9,384	9,733	12,126	
G12 - G13	4,214	11,060	9,254	9,672	12,141	
G13 - G14	3,677	10,510	8,786	9,351	11,946	
G14 - G15	3,625	10,268	8,744	11,668	11,906	
G15 - G16	3,452	9,597	8,291	11,354	11,574	
G16 - G17	3,357	9,141	7,958	10,989	11,199	
G17 - G18	2,968	8,210	7,253	10,481	10,383	
G18 - G19	2,407	7,603	6,766	9,956	9,796	
G19 - G20	1,636	6,865	6,148	8,538	9,098	
G20 - G21	919	5,356	4,877	7,243	7,470	
G21 - G22	599	4,695	4,370	6,200	6,788	
Red Line						
P1 - P2	614	2,772	2,865	4,913	4,757	
P2 - P3	1,325	5,407	5,724	6,379	6,891	
P3 - R02	1,473	5,855	6,057	6,751	7,443	
R01 - R02	3,431	11,473	11,725	7,011	10,695	
R02 - R03	3,329	11,983	12,890	9,748	12,246	
R03 - R04	3,561	12,402	13,311	10,231	12,557	
R04 - R05	3,560	12,456	13,505	10,236	12,465	
R05 - R06	3,427	12,533	13,619	10,439	12,489	
R06 - R07	3,377	12,727	14,523	10,745	12,693	
R07 - R08	3,208	12,702	14,346	10,501	12,555	
R08 - R09	2,941	12,519	14,006	10,062	12,273	
R09 - R10	2,491	12,580	14,272	9,821	12,133	
R10 - R11	2,300	12,627	14,196	9,724	12,042	
R11 - R12	2,300	12,620	14,182	9,717	12,035	
R12 - R13	987	11,835	13,498	8,886	11,472	
R13 - R14	982	11,915	13,419	8,821	11,380	
R14 - R15	586	11,694	13,198	8,445	11,072	
R15 - R16	439	10,044	11,563	6,547	9,320	
R16 - R17	428	8,310	10,047	2,001	3,690	
R17 - R18	428	8,310	10,047	2,001	3,690	

Source: The Study for KTIP

Table 3-5 Daily Passenger Volume of Boarding Only

Code	Station	2010	2020		2030	
		Green&Red	Green&Red +KCR	Green&Red only	M/P Network	Green&Red +KCR
	Green Line					
R0-01	M1	19,518	32,934	36,436	27,105	68,943
R0-02	M2	17,288	27,648	24,232	28,256	21,624
R0-03	M3	11,225	27,857	26,731	14,415	17,664
R0-05	M4	4,781	3,988	3,030	9,248	4,062
R1-01	G01	10,212	9,470	10,778	25,049	10,974
R1-02	G02	15,400	11,098	7,850	21,324	11,353
R1-03	G03	33,583	19,667	15,069	45,422	23,611
R1-04	G04	14,861	7,137	26,770	22,964	8,549
R1-05	G05	18,129	8,791	10,108	21,829	12,745
R1-06	G06	19,185	11,136	9,318	30,406	13,665
R1-07	G07	13,369	4,709	6,133	13,559	4,893
R1-08	G08	17,284	17,982	35,071	17,350	17,556
R1-09	G09	24,927	3,452	4,910	10,126	4,397
R1-10	G10	9,850	6,504	5,117	17,438	6,944
R1-11	G11	13,940	4,195	3,551	8,611	6,920
R1-12	G12	7,967	4,184	2,911	8,351	5,749
R1-13	G13	15,879	8,642	7,710	13,224	13,926
R1-14	G14	9,354	5,127	5,550	6,600	7,394
R1-15	G15	14,374	10,062	7,159	15,460	12,737
R1-16	G16	11,802	6,677	5,029	16,444	6,831
R1-17	G17	12,275	14,225	11,047	16,989	15,903
R1-18	G18	16,610	8,659	7,068	22,876	9,951
R1-19	G19	25,273	10,845	9,231	39,806	14,408
R1-20	G20	21,126	21,434	18,651	31,897	25,033
R1-21	G21	10,630	9,136	7,646	28,116	11,278
R1-22	G22	15,870	62,595	58,270	127,903	90,507
	Red Line					
RZ-00	P1	16,057	36,965	38,203	157,630	63,430
RZ-01	P2	22,301	35,289	29,498	31,978	28,670
RZ-02	P3	9,021	6,091	4,570	12,488	7,586
R3-02	R02	5,241	3,005	2,688	4	4,147
R3-03	R03	13,611	10,731	9,441	21,573	12,614
R3-04	R04	78	4,524	6,094	1,498	5,262
R3-05	R05	39,307	14,635	10,603	32,719	16,485
R3-06	R06	11,611	14,244	20,865	34,585	16,998
R3-07	R07	34,874	17,318	16,146	48,042	18,207
R3-08	R08	29,869	12,282	12,126	31,727	13,484
R3-09	R09	15,248	11,909	12,128	17,647	10,652
R3-10	R10	6,489	5,274	5,240	5,659	2,454
R3-11	R11	0	91	190	96	91
R3-12	R12	35,171	22,938	18,046	61,360	28,961
R3-13	R13	139	5,366	2,551	988	2,981
R3-14	R14	10,004	6,511	5,454	17,328	6,372
R3-15	R15	3,913	31,412	40,990	26,914	26,187
R3-16	R16	304	25,663	23,005	60,636	88,494
R3-17	R17	0	0	0	0	0
R3-18	R18	11,373	110,802	133,966	59,347	49,204

Source: The Study for KTIP

Table 3-6 Peak Hour Boarding and Alighting

Code	Station	2010	2020		2030	
		Green&Red	Green&Red +KCR	Green&Red only	M/P Network	Green&Red +KCR
Green Line						
R0-01	M1	2,928	4,940	5,465	4,066	10,341
R0-02	M2	2,593	4,147	3,635	4,238	3,244
R0-03	M3	1,684	4,178	4,010	2,162	2,650
R0-05	M4	717	598	455	1,387	609
R1-01	G01	1,532	1,420	1,617	3,757	1,646
R1-02	G02	2,310	1,665	1,177	3,199	1,703
R1-03	G03	5,037	2,950	2,260	6,813	3,542
R1-04	G04	2,229	1,071	4,016	3,445	1,282
R1-05	G05	2,719	1,319	1,516	3,274	1,912
R1-06	G06	2,878	1,670	1,398	4,561	2,050
R1-07	G07	2,005	706	920	2,034	734
R1-08	G08	2,593	2,697	5,261	2,602	2,633
R1-09	G09	3,739	518	736	1,519	659
R1-10	G10	1,478	976	767	2,616	1,042
R1-11	G11	2,091	629	533	1,292	1,038
R1-12	G12	1,195	628	437	1,253	862
R1-13	G13	2,382	1,296	1,157	1,984	2,089
R1-14	G14	1,403	769	832	990	1,109
R1-15	G15	2,156	1,509	1,074	2,319	1,911
R1-16	G16	1,770	1,002	754	2,467	1,025
R1-17	G17	1,841	2,134	1,657	2,548	2,385
R1-18	G18	2,491	1,299	1,060	3,431	1,493
R1-19	G19	3,791	1,627	1,385	5,971	2,161
R1-20	G20	3,169	3,215	2,798	4,784	3,755
R1-21	G21	1,594	1,370	1,147	4,217	1,692
Red Line						
RZ-00	P1	2,409	5,545	5,730	23,645	9,515
RZ-01	P2	3,345	5,293	4,425	4,797	4,301
RZ-02	P3	1,353	914	686	1,873	1,138
R3-02	R02	786	451	403	1	622
R3-03	R03	2,042	1,610	1,416	3,236	1,892
R3-04	R04	12	679	914	225	789
R3-05	R05	5,896	2,195	1,590	4,908	2,473
R3-06	R06	1,742	2,137	3,130	5,188	2,550
R3-07	R07	5,231	2,598	2,422	7,206	2,731
R3-08	R08	4,480	1,842	1,819	4,759	2,023
R3-09	R09	2,287	1,786	1,819	2,647	1,598
R3-10	R10	973	791	786	849	368
R3-11	R11	0	14	29	14	14
R3-13	R13	21	805	383	148	447
R3-14	R14	1,501	977	818	2,599	956
R3-15	R15	587	4,712	6,149	4,037	3,928
R3-16	R16	46	3,849	3,451	9,095	13,274
R3-17	R17	0	0	0	0	0
R3-18	R18	1,706	16,620	20,095	8,902	7,381

Source: The Study for KTIP

Chapter 4 Capital Costs

To ensure fairness of procurement process as well as project implementation, information should not be disclosed for a fixed period.

Chapter 5 Operation and Maintenance Costs

To ensure fairness of procurement process as well as project implementation, information should not be disclosed for a fixed period.

Chapter 6 Business Model

6-1 Introduction

The popular business model applied by successful BRT systems in the world is “competition for the market but monopoly in the market”. The major future of the popular business model is:

- A public entity is responsible for the implementation of the project.
- Infrastructure, including busway, stations, depot, and pedestrian bridges, is developed by public sector using public budget.
- The system is operated by private sector under the contract between the operator and the public entity.
- The private operators are selected by competitive bidding.
- Passenger fare is collected by another private company than the operator. The public entity receives the passenger revenue.
- The operators receive a contract amount from the revenue based on the vehicle-kilometers (not the number of passengers).
- The private operators are responsible for purchase and maintenance of vehicles as well as operating costs such as fuel and drives.

The basic structure of the Karachi BRT project is as same as the business model mentioned above – the public entity gives an exclusive concession to a few operators and pays the contract amount to them based on performance. The exception is vehicle ownership. In the Karachi BRT, it is proposed that the public sector owns the necessary vehicles.

6-2 Contract Type

6-2-1 Net cost model and gross cost model

There are two types of contract in terms of revenue risk: net-cost contracts and gross-cost contracts. In a net-cost contract, private operators receive the passenger revenue, while the payment from public sector based on the performance such as vehicle-kilometers travelled is the revenue for private operators in a gross-cost contract. In other words, private sector takes revenue risk in a net-cost contract while public sector takes the risk in a gross-cost contract.

The Karachi BRT project will employ the gross-cost contract because it can ensure the quality of the bus services. In case of net-cost contract, the major incentive of bus operators is to collect as many passengers as possible. This will cause overstay at a station, overloading, low frequency in off-peak hours, and non-stop at stations of few passengers, which are the same situation as the present minibus services.

6-2-2 Vehicle Ownership

In popular BRT systems in the world, vehicles are purchased and owned by private operators under the condition that the vehicles should satisfy the specification set by the implementation agency. The Karachi BRT project will require 425 buses and the total cost is estimated as Rs. 5.1 billion. Table 6-1 shows FIRR calculation with its sensitivity analysis for operators under the conditions that they need to purchase

vehicles and can receive the revenue after O&M cost of the fare collecting company and the implementation agency is deducted. The result shows that FIRR is higher than the market interest rate of approximately 14%. However the sensitivity analysis shows that the FIRR will become 10.3% in case of 10% increase in O&M cost and 10% decrease in revenue. The profitability is not attractive for private sector considering the interest payment for the vehicle investment of Rs. 5.1 billion.

Table 6-1 FIRR Analysis for Operators (Vehicle Own Case)

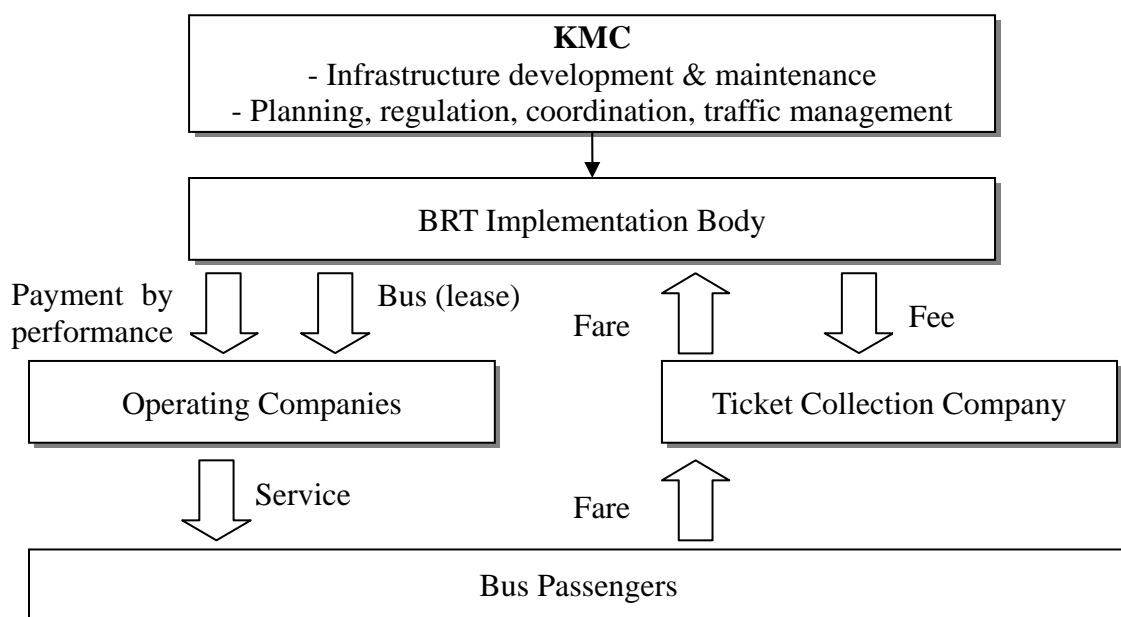
	Base Case	Case-1	Case-2	Case-3
O&M	0%	+10%	0%	+10%
Revenue	0%	0%	-10%	-10%
FIRR	20.4%	17.3%	14.0%	10.3%

Source: The Study for KTIP

Since public sector can receive long-term loans with low interest rate and grace period, the implementation body will purchase all vehicles and lease them to private operators.

6-2-3 Contract Structure

The contract structure is shown in Figure 6-1. BRT implementation body will take the revenue risk while operating companies will take operation cost risk such as fuel price increase. KMC is responsible infrastructure development and maintenance, while BRT implementation body is responsible for system and rolling stock. Traffic control at signalized intersections is done by KMC.



Source: The Study for KTIP

Figure 6-1 Contract Structure

6-2-4 Implementation Body

(1) Establishment of the Implementation Body

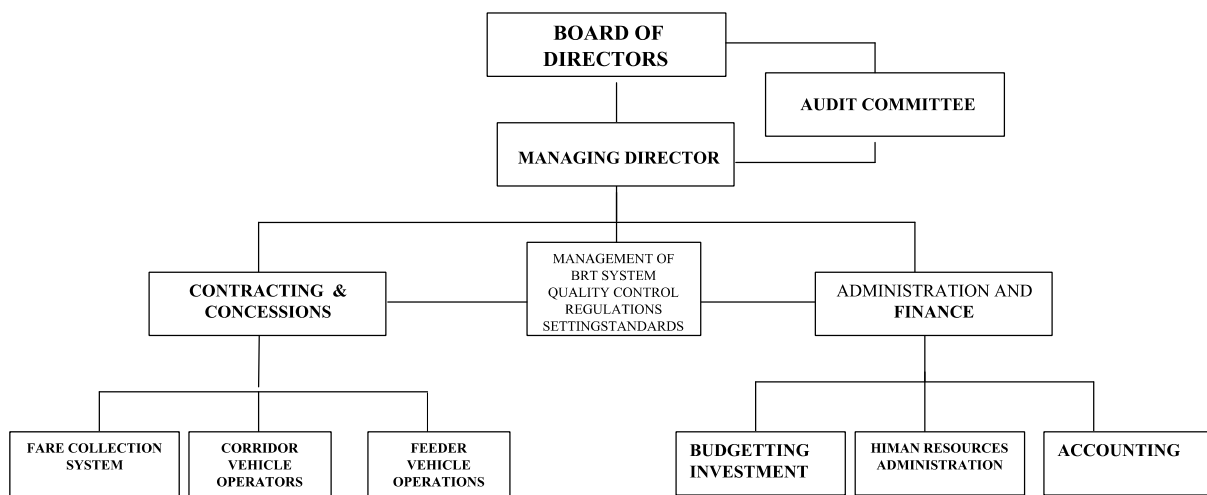
After the careful analysis of institutional set up of mass transit administration in Karachi and in consultation with various public and private organizations including, Karachi Mass Transit Cell (KMTC), Transport and Communication Department (TCD), Works and Services Department of CDGK and Public-Private Partnerships (PPP), a unit of Finance Department, GOS, a concept for the new institution was developed.

The new institution shall be a public corporation and its stakeholders will be public sector (51%), and private sector (49%). The new institution will be tentatively called as the “Karachi Bus Rapid Transit Corporation (KBRTC)”. In order to create a new institution for a mass transit system from scratch it is the first thing to make it sure that there is a political will and financial and human resources to set up and operate the institution. Operations of public transportation system either by public or private sector or both are usually running in deficit requiring government subsidies in a large scale. The BRT system’s sustainability is likely depend as much on the system’s “software” (the regulatory, and business structure) as it is on the: hardware” (vehicles, stations, terminus, and other infrastructure). The new institution must operate as a commercial and business entity. It is designed to secure long-term investments from public and private sector and leverage local, provincial, central government funds as well as private funds, maximize the level of private sector investment over the long terms in Karachi BRT system. The KBRTC’s initial institutional structure is a public company but it is a dynamic form of “corporatization” which is a final form of institution in the privatization process. KBRTC is designed to be 100% private within next several years. Meanwhile, the new institution must create an environment to utilize the efficiencies, innovativeness, flexibility and speed of the private sector to provide better infrastructure and service at an optimal cost. In other words, attempting to plan an institutional structure it is necessary to maximize private sector participation in the BRT operations and infrastructure development within a Public-Private Partnerships framework (e.g. private sector finances vehicles and fare collection equipment).

As mentioned earlier there are other institutional options available including: a transportation authority and SPC (special purpose company- a ppp company), etc. A transportation authority is usually an organization with wide oversight on all public transport activities. A state or city owned monopoly is low cost-effective due to confused corporate objectives (services or profits?), low, sporadic or inappropriate investment resulting in poor services and large subsidy requirement. What is needed for the implementation and management of Karachi BRT is a focused business-oriented organization that is able to perform a balancing act of corporate objectives. The SPC is a PPP company created to engage in the financing, development, operation and maintenance of BRT system under a concession agreement. Under the current domestic and international market conditions it is unlikely that a private company or consortium is capable to implement and manage the BRT system alone.

(2) Organization of KBRTC

Based on the institutional, regulatory and business principles KBRTC will be established as an overall lead body invested with the legal powers for establishing and implementing BRT policy. It will be the implementation agency for Karachi BRT system. KBRTC will be a public company, registered with Securities Exchange Commission of Pakistan (SECP) with the following shareholders: CDGK (41%), Government of Sindh (10%) and Private Sector (49%). It will serve as a regulatory authority for the planning, implementing and managing BRT system of Karachi. The company’s Board of Directors has the following structure: Administrator/Mayor (Nazim) Karachi, Chairman, Secretary of Finance, GOS(Member) and two members from CDGK viz EDO Transport & Communications and Director Genera, Karachi Mass Transit Cell (KMTC). The Board will also have two (2) members from the public traffic and transport control agencies, three (3) members from NGO and Managing Director, KBRTC as Secretary to the Board. KBRTC reports to the Chairman through its board of directors. The management of KBRTC is consisting of Managing Director who is supported by three (3) Deputies.



Source: The Study for KTIP

Figure 6-2 Organizational Structure of KBRTC

6-2-5 Transit Authority

Presently, Karachi Mass Transit Cell (KMTC), Karachi Municipal Corporation (KMC) is responsible for planning and regulation of mass transit development in Karachi. However, the present organization does not have enough power, human resources, and budget. Since the Karachi BRT is only a part of corridors, it is necessary to strengthen the organizational structure. For this, Establishment of Karachi Mass Transit Authority is proposed as well as a new law namely, Mass Transit Authority Act. Laws and regulations relating to mass transit development will be compiled into the act and legal power and responsibilities will be given to the new authority. The authority will have the power to establish public corporations for public transport services such as BRT and MRT.

Chapter 7 Financial Analysis

To ensure fairness of procurement process as well as project implementation, information should not be disclosed for a fixed period.

Chapter 8 Economic Analysis

To ensure fairness of procurement process as well as project implementation, information should not be disclosed for a fixed period.

Chapter 9 Implementation Schedule

9-1 Environmental Impact Assessment (EIA)

The EIA of this project was conducted by the JICA Study Team for Karachi Transportation Improvement Project from January 2012 to May 2012 including 4 stakeholder meetings. The draft EIA report was submitted to KMTC in the end of May 2012. The draft EIA report will be finalized by KMTC for the submission to Environment Protection Agency (EPA). The report will be disclosed to public for 30 days and public hearing meetings will be held. EPA will approve the EIA report and issue Non Objection Certificate (NOC).

9-2 PC-I Approval

The draft PC-I was prepared by the JICA Study Team based on the Draft Final Report of the project. The draft PC-I document will be reviewed by local consultants and key staff in KMTC for the approval by the administrator of Karachi Municipal Corporation.

The PC-I document will be submitted to Planning Commission.

9-3 Institutional Setup

Karachi Mass Transit Authority (KMTA) will be established by creating a new law, Mass Transit Authority Act. KMTA will finalize the business model and coordinate related organizations. KMTA will be the responsible agency which receive soft loan from international organizations.

KMTC will establish Karachi BRT Corporation (KBRTC), the public corporation to deal with the project as a “business”.

9-4 Financial Arrangement

The financial model of this project is based on the condition of using the soft loan by JICA. KMTA will keep close relation with JICA and discuss the financial arrangement. So far JICA shows an interest on this project.

9-5 Schedule

The schedule is planned as follows at present.

Year	Activities
2012-13	PC-1 & EIA Approval
2013-14	Loan Agreement and E/S Consultant Selection
2014-15	Engineering Services & T/A
2016	S/V Consultant & Contractor Selection
2017-19	Construction
2020	Operation

APPENDIX-4 PC-I (DRAFT) FOR THE CONSTRUCTION PROJECT OF BUS RAPID TRANSIT IN KARACHI CITY

To ensure fairness of procurement process as well as project implementation, information should not be disclosed for a fixed period.

APPENDIX-5

(DRAFT) KARACHI METROPOLITAN TRANSPORT AUTHORITY ACT, 2012

Preamble

As suggested by World Bank Study 1990 and Japan International Cooperation Agency (JICA) Study on Karachi Transportation Improvement Project 2012 including Karachi Urban Transport Master Plan (2030 vision) to create a lead body as Karachi Metropolitan Transport Authority to have due legal powers to frame transport policies and programs besides ensuring their implementation. Therefore, an act to provide for the establishment of Karachi Metropolitan Transport Authority with a view to ensure safe, comfortable, efficient, affordable and sustainable transport system based on a comprehensive, modern and integrated mass transit program to ease the travel of city's commuters and to make provisions for matters connected therewith or incidental thereto.

Chapter-1: Preliminary

1- Short Title extent and commencement:-

1. Short Title extent and commencement:-

- (1) This act may be called Karachi Metropolitan Transport Authority Act, 2012.
- (2) It extends to the territorial limits of Karachi Division or as directed by the Provincial Government.
- (3) It shall come into force at once.

2- Overriding effect:

2. Overriding effect:

This act shall have effect notwithstanding anything contained in any other law for the time being in force.

3- Definitions

3. Definitions

- (i) In this act, unless there is anything repugnant in the subject or context;
 - (a) "Authority" means the Karachi Metropolitan Transport Authority
 - (b) "BRTS" means Bus Rapid Transit System wherein dedicated lanes on main roads are used for specialized buses.

- (c) “BRTS Corridors/lines” means the roads and the routes approved by the Authority for the purpose of plying BRT buses.
- (d) “BRT lanes” means the dedicated portion of a BRTS Corridor/line to be exclusively used by BRT buses.
- (e) “Chairman” means the chairman of the governing body.
- (f) “constituent body” means any one of the following namely:-
 - (i) The Karachi Metropolitan Corporation;
 - (ii) The Karachi Port Trust
 - (iii) The Ministry of Defence;
 - (iv) The Cantonment Boards;
 - (v) Pakistan Railway;
 - (vi) Civil Aviation Authority
 - (vii) The Sindh Industrial and Trading Estate
 - (viii) The Sind and Landhi Industrial Trading Estates, and
 - (ix) Any such local authority or Department of Government as the Central Government may, by notification in the Official Gazette, declare to be a constituent body, and constituent bodies shall be construed accordingly;
- (g) “Concessional rights” means rights of various revenue, returns and benefits expected to be accrued from a project given to a contractor against the investment made by the contractor and for the risks taken by him for the project.
- (h) “Contract” means any kind of agreement, undertaking written, expressed or implied for the development, construction, operations and maintenance of transportation including mass-transit schemes and the facilities thereon for the supply of materials or for the performance of any service in connection therewith.
- (i) “Contractor” means a person, syndicate, consortium or a firm responsible for carrying out a contract.
- (j) “Corporation” means Karachi Metropolitan Corporation
- (k) “Developer” means the contractor to whom the contract is awarded by the Authority for the development of mass-transit scheme.
- (l) “Fares” means the amount prescribed or agreed for a journey(s) of a mode of transport through mandatory ticketing system or e-ticketing system.
- (m) “Feeder Services” means transport service through various modes integrated with the mass transit systems to enhance the ridership besides facilitating the commuters.
- (n) “Fund” means Karachi Metropolitan Transport Authority Fund.
- (o) “Government” means Government of Sindh.
- (p) “Governing Body” means governing body of the Authority
- (q) “Internal Controls” mean systems & procedures to control or mitigate the risks associated with an activity.
- (r) “KCR” means Karachi Circular Railway operating under special purpose company i.e. Karachi Urban Transport Corporation (KUTC).
- (s) “KMTC” means the Karachi Mass Transit Cell presently working under the Corporation.
- (t) “KSDP 2020” means Karachi Strategic Development Plan 2020.
- (u) “KTIP 2030” means Karachi Transport Improvement Plan 2030.
- (v) “LRT” means Light Rail Transit System.
- (w) “Managing Director” means the Chief Executive Officer of the Authority appointed under this act.

- (x) “Mass Transit” means all types of mass transit including rail and road-based mass transit facilities i.e. circular railway, BRT, LRT, MRT, monorail, other bus service including shuttle service and various para-transit modes.
- (y) “Member” means member of the governing body.
- (z) “Mono rail” means
- (aa) “MRT” means Mass Rapid Transit.....
- (bb) “Operator” means the private party or parties entrusted with the function of operations of the mass-transit scheme including ticketing, maintenance, janitorial services and/or other facilities.
- (cc) “Parking” means keeping a vehicle stationary for any reason other than the need to avoid interference with another road user or collision with and obstruction or to comply with traffic laws, or for picking up or setting down persons or goods;
- (dd) “Performance based contracts” means contracts wherein the price to be paid to the contractor is based upon the agreed level of performance.
- (ee) “Prescribed” means prescribed by rules or regulations made under this act.
- (ff) “Project” means construction, development, implementation, operation and maintenance of a mass transit project.
- (gg) “Public-Private-Partnership Projects (PPPP)” means the projects as defined under Sindh Public Procurement Act, 2009, Sindh Public Procurement Rules, 2010 and Sindh Public Private Partnership Act, 2010
- (hh) “Secretary” means the Secretary of the Authority.
- (ii) “Regulations” means regulations made under this act
- (jj) “Right of way” means the land already reserved for road, transit-way or the land acquired for the purpose of construction of transit-way or any other road or any mass transit scheme of the Authority.
- (kk) “Road” means a road including land within the right-of-way and all works such as carriage-ways, cart-ways, footpaths, berms, side-drains, culverts, bridges, tunnels and works of every description built on, under or across any road which has been constructed or are maintained by the Government or any local Authority and are designated and intended for, or used by general public for the passage of vehicles and pedestrians.
- (ll) “road markings” means a marking which point out restrictions with reference to traffic on a road, and the lines of tracks, points and stones drawn on the surface of a road.
- (mm) “Rules” means rules made under this act.
- (nn) “Scheme” means mass transit scheme.
- (oo) “Secretary” means secretary of the governing body
- (pp) “sustainable development” means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs.
- (qq) “transit-way” means and include right-of-way, a road, a grade separated structure or land to be used for development of mass transit system;
- (rr) “vehicle” means any wheeled conveyance drawn, propelled or driven by any kind of power, including human and animal power.

Chapter- 2: Establishment and management of Authority

4- Establishment of Authority:

4. Establishment of Authority:

- (1) As soon as may be after the commencement of this act, the Government shall, by notification in the official Gazette, establish an authority to be known as the Karachi Metropolitan Transport Authority for carrying out the purposes of this act.
- (2) The Authority shall be a body corporate having perpetual succession and a common seal with power to acquire, hold, use and dispose of properties and may by its name sue and be sued.
- (3) The headquarters of the Authority shall be at Karachi.
- (4) The Authority shall frame its own rules of procedure and regulations.
- (5) The Authority shall hold meetings as and when necessary but not less than one meeting in a quarter shall be held.
- (6) The Authority may constitute one or more committees for performing such functions as may be assigned to them under this act. The recommendations of the committees shall be submitted to the Board for its approval.
- (7) The Authority or any of its committees may invite any technical expert from private sector or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

5- Purposes and objectives of the Authority:

5. Purposes and objectives of the Authority: The purposes and objectives of the Authority shall be to formulate and implement a sound transport policy and to plan, promote, organize and implement schemes and programs for construction, development, operation, repairs and maintenance of an integrated, dynamic and comprehensive Karachi transport system and other allied works.

6- Authority to be local authority

6. Authority to be local authority:

The Authority shall be deemed to be a local authority having powers of a local authority as defined under the Sind Local Government Ordinance, 1979.

7- Transfer of rights, assets and liabilities

7. Transfer of rights, assets and liabilities:

- (1) As from the commencement of this Act all assets and liabilities and all rights and obligations of the Karachi Mass Transit Cell (KMTC) shall stand transferred to the Authority.
- (2) All contracts made by the Karachi Mass Transit Cell shall be deemed to be contracts made by the Authority.
- (3) All employees working under Karachi Mass Transit Cell will stand transferred to the Authority.
- (4) The office space being currently used by Karachi Mass Transit Cell will be used by the Authority and can be moved later on.

8- Management of affairs of the Authority:

8. Management of affairs of the Authority:

- (1) The general direction and administration of the Authority and its affairs shall vest with the governing body which may exercise all powers and do all acts and things which may be exercised, performed or done by the Authority.
- (2) The governing body in discharging its functions shall act on sound principles to achieve objectives of this Act and shall be guided by the best practices related to various functions.
- (3) If any question arises as to the interpretation of anything contained in this act the decision of the Government shall be final.

9- Constitution of the Governing Body of the Authority:

9. Constitution of the Governing Body of the Authority:

- (1) The Governing Body shall consist of:
 - (a) The Secretary Local Government, Government of Sindh - Chairman
 - (b) The Secretary Finance Government of Sindh- Member
 - (c) The Secretary Law- Government of Sindh- Member
 - (d) The Secretary Transport Department Government of Sindh- Member
 - (e) The Special Secretary (Technical) Planning & Development Department Government of Sindh- Member
 - (f) The Administrator KMC – Member
 - (g) The Commissioner, Karachi- Member
 - (h) The Managing Director of the Authority- Member
 - (i) The Deputy Inspector General of Police- (Traffic & Highway)- Sindh- Member
 - (j) The Director Military Lands & Cantonment- Member
 - (k) A Representative of Civil Aviation Authority
 - (l) A Representative of Core Commander- Karachi
 - (m) A Representative of Defence Housing Authority
 - (n) A Representative of Sindh Building Control Authority- Member
 - (o) A Representative of Ministry of Railways- Member
 - (p) A Representative of Karachi Port Trust- Member

- (q) A Representative of Port Qasim Authority
 - (r) A Representative of Karachi Chamber of Commerce & Industry
 - (s) A Representative of Sindh Environmental Protection Agency- Member
 - (t) A Representative of citizens of Karachi (nominated by the Government)- Member
 - (u) A Representative of Citizen Police Liaison Committee (CPLC)- Member
 - (v) A Representative of Chartered Institute of Transport and Logistics (CILT), Pakistan.- Member
 - (w) Two representatives of private transporters' association.
- (2) A non-official member unless he resigns or is removed earlier, shall hold office for a period of three years from the date of appointment.
 - (3) Any person appointed in casual vacancy of a non-official member, shall hold office for unexpired portion of the term of such vacancy.
 - (4) The Governing Body may co-opt any person as its member for a particular purpose in specified period i.e. in matters requiring specialized skills and knowledge, but such member shall have no right of voting.
 - (5) No act or proceedings of the governing body shall be invalid merely on the grounds of existence of a vacancy or any defect in the constitution thereof.

10-Secretary of the Authority

10. Secretary of the Authority:-

- (1) Soon after formation of the Governing Body a Secretary of the Authority will be appointed by the Governing Body as Secretary of the Authority.
- (2) The functions and duties of the Secretary will be to:
 - (i) Issue notices for meeting
 - (ii) Taking minutes
 - (iii) Matters relating to annual returns and reporting
 - (iv) Any other matter as directed by the Governing Body.

11-Meeting of the Governing Body:

11. Meeting of the Governing Body:

- (1) The meeting of the governing body shall be held at such time and place and in such manner as may be prescribed by regulations.

Provided that until regulations are made the meeting shall be held as and when convened by the Secretary at the headquarters of the Authority under the advice of the Chairman or in his absence the nominee of the Chairman but at least once in a month.

- (2) At least 7 days agenda will be circulated to the members before the meeting.
- (3) An urgent meeting may be called if the requirement of notice is waived by the members.

- (4) Due record of the minutes and resolutions passed by the Governing Body in its meeting will be maintained.
- (5) The decisions of the Governing Body will be duly communicated to all concerned by the Secretary of the Authority.

12-Powers and Functions of the Authority:

12. Powers and Functions of the Authority:

- (1) Subject to the general directions and control of government, the Authority shall take such measures and discharge such powers as may be necessary for carrying out the purposes of this Act.
- (2) Without prejudice to the generality of the provisions under sub-section (1) the Authority shall;
 - (i) Advise government on matters relating to transport policy, transit scheme and transit-ways etc.
 - (ii) Examine the conceptual plans for all projects (primarily related to infrastructure but not limited to) initiated by any department or authority as to ensure their suitability and sustainability by issuing NOC for the same in accordance with KSDP 2020 and KTIP 2030.
 - (iii) Work out details including updating the design, configuration and cost of the transport master-plan and take all necessary measures for its effective and economical implementation.
 - (iv) Cause studies, surveys, experiments and technical researches to be made or contribute towards the cost of such studies, surveys, experiments or technical researches made by any other agency.
 - (v) Plan, amend and implement various transport routes, structures/ alignments and may take such steps as may be necessary or useful in the construction and reconstruction, repair, maintenance and operation of the transport or transit system.
 - (vi) Help the concerned agencies to ensure traffic disciplines for all the vehicles as it may consider necessary.
 - (vii) Coordinate between various means of transport.
 - (viii) Rationalize the existing routes of public transport and connectivity through feeder routes.
 - (ix) Devise and implement policies aimed at ensuring that vehicle used for public and other transport systems meet the safety standards.
 - (x) Seek and obtain advice and assistance from government or any agencies within or outside the province for the preparation and execution of any plan, program or project, connected with its function and purposes.
 - (xi) frame and implement schemes for all or any of the following matters, namely;
 - (a) construction, expansion, operation and development of the transport network including the mass transit systems, feeder services and allied / ancillary works;
 - (b) research and development in the field of transportation;
 - (c) training of the Authority's employees and other related personnel;

-
- (d) general awareness of the public;
- (xii) Enter into and perform all such contracts including agreements with any public or private utility communication system or transport system for the joint use of their respective facilities and installation and properties.
 - (xiii) Exercise power to award negotiated contracts for projects connected with its function and purposes to be undertaken through private sector financing program including build operate transfer, build own operate transfer scheme or execute such projects in collaboration with any public or private agency.
 - (xiv) Coordinate, manage, control and develop transport/ mass transit system.
 - (xv) Procure plants, machinery, instruments, equipments, and material required for its use.
 - (xvi) Determine a building line along with the roads and transit ways, between which it shall not be lawful without the consent of the Authority to construct or maintain any structure or make any excavation.
 - (xvii) License facilities on transit ways right of way or roads under its control on such terms it deems fit.
 - (xviii) Make security arrangements through private security or through its own agency to protect the property of the Authority and control and maintain security discipline on the transit ways network in such manner and on such condition as may be prescribed by such regulations.
 - (xix) Ask government to depute Police including Traffic Police to maintain traffic on mass-transit corridors.
 - (xx) Acquire, hold, lease, dedicate a portion thereof or dispose of any movable and immovable property or interest therein.
 - (xxi) Acquire any land in accordance with legal procedure and obtain and dispose of moveable and immovable property of interests therein
 - (xxii) Levy, collect or cause to be collected charge, relevant to its functions.
 - (xxiii) Regulate the fare structures and enhance or reduce fares wherever and whenever required.
 - (xxiv) Raise funds within or outside the province with the approval of government through borrowing, floating of bonds, sharing or leasing of assets or any other means.
 - (xxv) To approve the annual budget.
 - (xxvi) Incur any expenditure for carrying out the purposes of this act.
 - (xxvii) Carrying out any other work assigned to it by government in consonance with the functions of the Authority.
 - (xxviii) Provide adequate transport facilities for all segments of the population.
 - (xxix) Perform any other functions, supplemental, incidental or consequential concerning the Authority.
- (3) The advice given or recommendations made by the Authority in respect of any matter specified in sub-section(2) shall as far as possible be acted upon or implemented by the concerned agency;
- (4) If any advice or recommendation of the Authority is disputed the concerned agency may require the Authority to reconsider the advice or recommendations and if on reconsideration, difference still persists, the matter shall be referred to the Government for decision, which shall be final and binding;

13-Think Tank

13. Think Tank:

- (1) A Think Tank shall be established by the Governing Body.
- (2) The role of Think Tank will be to facilitate the Governing Body in various technical matters as and when required besides it would support and guide various departments of the Authority.
- (3) The Think Tank will be advisory only and will not take any executive decisions.
- (4) The Think Tank will comprise of 5 to 10 members. The members would be selected by the Governing Body ensuring level-playing field, transparency and merit.
- (5) The Governing Body as and when required will instruct the Secretary to call a meeting of the Think Tank.
- (6) The Secretary of the Authority will also be the secretary of the Think Tank.
- (7) The Secretary of the Authority will prepare minutes and comments of the Think Tank.
- (8) The Think Tank will submit its minutes within 7 days of its meeting.
- (9) The Governing Body will decide honorarium of the members of the Think Tank as appropriate.

Chapter-3: Development, Operations & Maintenance of the Projects

14-Schemes to be deemed to be for public purpose

14. Schemes to be deemed to be for public purpose: - All mass transit schemes framed under this Act and operated by the Authority or by an organization sponsored by the Authority shall be deemed to be schemes for a public purpose.

15-Matters to be provided for by improvement schemes:

15. Matters to be provided for by improvement schemes: - A scheme may provide for all or any of the following matters, namely:-

- (1) the development of land for transport/mass-transit schemes
- (2) the clearance or improvement of congested areas;
- (3) nature and location of scheme or schemes
- (4) total estimated cost
- (5) sources of finances
- (6) date of commencement
- (7) date of completion
- (8) manner of execution

- (9) benefits, tangible or intangible to accrue
- (10) the acquisition by purchase, exchange or otherwise of any property or interest therein necessary for on affected by the execution of the scheme:
- (11) the sale, lease, exchange, or disposal in any other manner of any property vested in or acquired by the Authority;
- (12) the construction and alteration of streets (including bridges, causeways and culverts) and back lanes, and the provision of footpaths and sidewalks;
- (13) the leveling, paving, metalling, flagging, channeling, sewerage, and draining of the streets so constructed or altered, and the provision therein for lighting and sanitary facilities;
- (14) means of access and communication;
- (15) the raising, lowering, leveling or reclamation of any land comprised in the scheme;
- (16) the recovery of a betterment fee from owners of properties improved by the scheme;
- (17) any other matter for which, in the opinion of the Authority, it is expedient to make provision with a view to the improvement of any area comprised in the scheme or of any adjoining area for the general efficiency of the scheme.

16-Determination of the Project

16. Determination of the Project:-

- (1) Under the Scheme prepared and duly approved by the Authority for mass-transit projects specific projects will be identified for development and implementation as decided by the Authority.
- (2) The concept paper and the proposed plan for the project will be submitted to the Governing Body for its deliberation and approval.
- (3) After approval of the specific project Request for Proposals will be invited from the interested parties.
- (4) The Request for Proposals will be submitted to the Governing Body for its deliberation and determination of the terms of Tender.
- (5) After approval of the terms of Tender, tenders will be called from the pre-qualified contractors as per the procedure given in Sindh Public Procurement Act, 2009, Sindh Public Procurement Rules, 2010 and Sindh Public Private Partnership Act, 2010.

17-Public Notice

17. Public notice- Before awarding of the contract a public notice will be given under this Act or the rules or regulations made there under shall be in writing and shall be made known to the locality to be affected thereby in the following three ways:-

- (1) by affixing copies thereof conspicuously in public places within the said locality.

- (2) By advertisement in newspapers having circulation in the locality and
- (3) by any other means, if the Chairman thinks fit.

18-Award of contracts:-

18. Award of contracts:-

- (1) The contracts by the Authority for carrying out any research, development, operations and maintenance of the project will be awarded through competitive bidding following the principles enumerated in Sindh Public Procurement Act, 2009 and Sindh Public Procurement Rules, 2010 with respect to procurement of works, services, supply of goods etc.
- (2) The following fundamental principles are laid down for the guidance of the Authority to enter into contracts or agreements:
 - (i) The terms of a contract must be precise and definite and there must be no room for ambiguity or misconstruction therein.
 - (ii) As far as possible contracts in standardized forms prescribed by the Authority shall be drawn up.
 - (iii) Contracts shall, where possible, be executed on one or other of the standard forms but they may be modified to suit the requirement of any particular case.
 - (iv) Provisions must be made in contracts for safeguarding the Authority's fund and the property entrusted to a contractor.
 - (v) Provision shall be made in every contract to enable the Authority to cancel it with due notice and without excessive cost.
 - (vi) Estimate for works shall not be split up to avoid the necessity for obtaining the sanction of higher authority.

19-Land acquisition

19. Land acquisition

The acquisition of any land or any interest in land for the Authority or for any project under this Act shall be deemed to be acquisition for a public purpose within the meaning of the Land Acquisition Act, 1894 and the provisions thereof shall apply accordingly.

20-Transfer to the Authority for purposes of improvement scheme of building or land vested in the Corporation or any other authority, etc.

20. Transfer to the Authority for purposes of improvement scheme of building or land vested in the Corporation or any other corporation or authority, etc. –

- (1) Whenever any building, or any street, open space, or other land, or any part thereof, which is situated along a mass-transit corridor is vested in a constituent body, the Corporation, the Karachi Port Trust, the Karachi Cantonment Board, or any other local authority is within the area of any improvement scheme and is required for the purposes of such scheme, the Authority shall give notice accordingly to the Chief Officer of the constituent body, the Corporation, the Chairman of the Port Trust or the President of the Cantonment Board or local Authority as the case may be, and such building, street, open space, other land or part thereof shall thereupon vest in the Authority.
- (2) Whereas any land situated along a mass-transit corridor vests in the Authority under clause (1) and the Authority makes a declaration that such land shall be restrained by the Authority only until it re-vests in the constituent body, the Corporation, Port Trust, Cantonment Board or other local authority as part of a street or an open space, no compensation shall be payable by the Authority to the constituent body, the Corporation Port Trust or Cantonment Board in respect of that land.
- (3) Where any land or building vests in the Authority under clause (1) and no declaration is made under clause (2) in respect of the land, the Authority shall pay to the constituent body, the Corporation, Port Trust, Cantonment Board or local authority, as the case may be, as compensation a sum equal to the market value of such land or building on the date of the transfer, and where any building situated on land in respect of which a declaration is made by the Authority under clause (2) is vested in the Authority under clause (1), like compensation shall be payable in respect of such building by the Authority.
- (4) If the Authority, having made a declaration in respect of any land under clause (2), retains or disposes of the land under clause (2), retains or disposes of the land contrary to the terms of the declaration so that the land does not vest in the constituent body, the Corporation, Port Trust or Cantonment Board, or local Authority, the Authority shall pay to the Corporation, Port Trust, Cantonment Board or local authority compensation in respect of such land in accordance with the provisions of clause (3).
- (5) If any question of dispute arises-
 - (a) whether compensation is payable under clause (3) or clause (4), or
 - (b) as to the amount of the compensation paid or proposed to be paid under clause (3) or clause (4), or
 - (c) whether any building or street, or open space or other land, or any part thereof is required for the purposes of the scheme, the matter shall be referred to the Government whose decision shall be final.

21-Transfer of private street or open space to the Authority for purpose of improvement scheme

20. Transfer of private street or open space to the Authority for purpose of improvement scheme –

- (1) Whenever any street or open space or part thereof which is not vested in the Authority or in the constituent body, the Corporation, Port Trust, Cantonment

Board or local authority is needed for executing any improvement scheme, the Authority shall cause to be affixed in a conspicuous place in or near such street, open space or part a notice signed by the Chairman or someone authorized by him and –

(a) stating the purpose for which the street, open space or part is needed, and
(b) declaring that the Authority will, on or after a date to be specified in the notice, take over charge of such street, open space or part from the owner thereof, and shall simultaneously send a copy of such notice to the owner at his last known address.

(2) After considering any objection received in writing before the date specified under sub-clause (b) of clause (1), the property may thereupon vest in the Authority.

(3) When the Authority alters or closes any street or open space or part thereof which has vested in it under clause (2), it shall pay reasonable compensation to the owner for the loss of his rights therein as per law.

(4) If the alteration or closing of any street, open space or part causes damage or substantial inconvenience to anyone having property right therein the Authority-

(i) shall forthwith provide some other reasonable means of access for the use of such persons, and

(ii) if the, provision of such means of access does not sufficiently compensate him for such damage or inconvenience, shall also pay him reasonable compensation in money.

22-Power to enter

22. Power to enter

Subject to any regulations made in this behalf any person generally or specially authorized by the Authority in this behalf may, whenever it is necessary so to do for any of the purposes of this Act and at all reasonable times enter upon land or premises and –

- (1) make any inspection survey, measurement, valuation or inquiry.
- (2) take levels;
- (3) dig or bore into subsoil;
- (4) set out boundaries and intended lines of work.

23. Power to eject unauthorized occupants

23. Power to eject unauthorized occupants:-

- (1) The Authority shall subject to rules have the powers to summarily eject unauthorized occupants of the transit-way, roads or any other property vesting in the Authority and demolish and remove any structure thereon and to use

such force including police force as may be necessary for the purpose and to recover the cost thereof from the person responsible for such occupation.

- (2) If approved by the Governing Body appropriate compensation may be given to the persons ejected as determined by the Governing Body including relocation of the dispossessed persons.

24. General power of the Authority to pay compensation.-

24. General power of the Authority to pay compensation.- In any case not otherwise expressly provided for in this Order the Authority may pay reasonable compensations to any person who sustains damage by reason of any exercise of the powers vested by or under the Order in the Authority or the Chairman, or any officer or servant of the Authority.

Chapter-4: Control And Regulation Of Traffic And Transport Facilities

25. Transfer of control of any road:

- 25 Transfer of control of any road: The Government may, by notification, transfer control of any road or portion of a road from itself, constituent body, the Corporation, the Karachi Port Trust, the Karachi Cantonment Board, or any other local authority or from any other agency to the Authority in regard to such matters dealt with by this Act and on such conditions, as may be specified in the notification.

26 Levy of fee:

26. Levy of fee:

- (1) The developer or operator concerned with the construction and maintenance of or having control over a mass-transit scheme may with the advice of the Authority and having due regard to the safety and convenience of the traffic on a road and subject to such conditions as the Authority may impose, permit any person on payment of such fees as it may deem appropriate:
 - (a) to place a movable structure on any mass-transit scheme in front of any building;
 - (b) to make a movable structure over hanging a mass-transit scheme;
 - (c) to deposit or cause to be deposited building materials, goods for sale or other article on any a mass-transit scheme; and
 - (d) to set up a stall or scaffolding on any a mass-transit scheme.

- (2) Any person who does any of the acts enumerated in sub-section (1) or set up any fence or hedge without the written permission of the Authority shall be punished with fine as defined by rules and the Authority may, after giving reasonable notice to the offender requiring him to remove the offending structure, fence, hedge, deposit, goods, articles, stall or scaffolding, and upon his failure to comply with such notice, may remove the same at the cost of the offender;
- (3) The offending material referred to in sub-section (2) shall be disposed of in such manner as may be prescribed by rules.

27 Permission for various works:

27. Permission for various works:

- (1) Notwithstanding anything contained in any other law for the time being in force, no person or agency shall, without the consent of the Authority do any of the following acts, namely;
 - (a) open or break up the surface of mass-transit scheme; or
 - (b) construct or carry repair or alter any cable, wire, pipe, drain, sewer or channel of any kind, through across, under or over such mass-transit scheme; or
- (2) In giving its consent under sub-section (1) the Authority may impose such conditions as it may deem necessary.
- (3) If without the consent of the Authority any person does any act enumerated in sub-section (2), he shall be punished with fine as may be prescribed by Rules.

28 Notice of closure for work

28. Notice of closure for work:

- (1) The concerned agency, developer or operator intending to permanently close a road or any portion of a road for the purposes of mass-transit scheme shall obtain approval of the Authority and give notice through one or more newspapers to general public of its intentions.
- (2) The notice shall invite objections to the proposed closure within a period of not less than a fortnight from the date of publication.

29 Restricted usage of the roads:

29. Restricted usage of the roads: The concerned agency may in consultation with the Authority prohibit or restrict either permanently or temporarily, the taking of any class of vehicles or animals or the movement of pedestrians over a road or any part thereof, if such prohibition or restriction is, in its opinion necessary for the public safety or convenience, or for any other sufficient reasons.

30 Penalty/ damages to be paid by offenders for damage caused by them.**30. Penalty/ Damages to be paid by offenders for damage caused by them:-**

- (1) If, on account of any act or omission any person has been convicted of any offence against this Act or any rule or regulation made thereunder has been caused to any property of the Authority, compensation shall be paid by the said persons for the said damage notwithstanding any punishment to which he may have been sentenced for the said offence.
- (2) Any dispute as to be amount of such compensation shall be determined by a Magistrate of the First Class.
- (3) If the amount of any compensation payable under this Article be not paid, the same shall be recovered under a warrant issued by a Magistrate, of the First Class as if it were to a fine imposed by him on the said person.

Chapter- 5: Organizational Set-up**31 Appointment of Managing Director:****31. Appointment of Managing Director:**

- (1) The Governing Body shall appoint a person as Managing Director from private sector who shall' posses such qualifications on such terms and conditions (including disciplinary proceedings) as may be determined by it.
- (2) The Managing Director shall be the Chief Executive of the Authority and shall exercise effective control over and make all decisions necessary for the smooth functioning of the day-to-day affairs of the Authority under the general supervision of the Governing Body.
- (3) In particular and without prejudice to the generality of the foregoing powers, the Managing Director shall:
 - (i) be responsible for and have the authority necessary for overseeing and implementing in an expeditious and efficient manner, the decisions taken or schemes approved by the Authority;
 - (ii) have the power to exercise administrative control over the personnel of the Authority, and exercise such administrative and financial powers as may be entrusted by Governing Body;
 - (iii) submit the annual financial and capital budget proposal to the Governing Body for approval;
 - (iv) submit the manpower budget including hiring of advisers, consultants etc. to the Governing Body for approval.
 - (v) prepare annual report of the Authority for submission to the Government;
 - (vi) exercise such powers of the Governing Body as it may delegate to him;
 - (vii) act on behalf of the Authority in any emergency, subject to the obligation to report, such action to the Governing Body at its next meeting and to seek its ratification of any action so taken.

32 Establishment of Departments:-

32. Establishment of Departments:- The Authority shall establish various departments in order to achieve the objectives of this Act and in line with the Organization Structure.

33 Appointment of officers and servants etc.

33. Appointment of officers and servants etc.:-

- (1) The Authority may, from time to time, employ such officers including the Deputy Managing Directors, Secretary and such experts, technical, ministerial, or secretarial qualifications and experience on such terms and conditions as may be prescribed by regulations which shall also make provision for disciplinary proceedings against such officers and staff;
- (2) Notwithstanding anything contained in any law, contract or the conditions of service every person serving in any capacity in the Traffic Engineering Bureau and Karachi Mass Transit Cell immediately before the coming into force of this Act, including a person on deputation to any Government Department or Agency or any other Organization but not being a person on deputation to the Traffic Engineering Bureau or Karachi Mass Transit Cell shall be transferred to the Authority on such terms and conditions as may be determined by it:

Provided that such terms and conditions shall not be less favorable than those admissible to such persons immediately before their transfer to the Authority.

- (3) Any authority or organization responsible for payment of salary, pension and gratuity in respect of the Traffic Engineering Bureau or Karachi Mass Transit Cell immediately before the coming into force of this Act shall pay to the Authority salary, pension, charges and gratuity (if admissible) in such manner and to such extent as Government may determine and transfer provident fund accumulations, if any, of such persons.
- (4) The services rendered by such persons in the Traffic Engineering Bureau or Karachi Mass Transit Cell shall be deemed to be the service rendered in the Authority.
- (5) Every person holding a post under the Authority not being a person who is on deputation to the Authority shall be deemed to be a civil servant for the purposes of the Sindh Service Tribunals Act, 1973.

34 Delegation of powers to chairman etc.

34. Delegation of powers to chairman etc.:-

The Authority may, by general or special orders and subject to such conditions as it may impose, delegate to the Chairman, Managing Director, Member or any other officer of the Authority, such of its powers and functions as it may consider appropriate.

Chapter 6: Finance

35 Fund

35. Fund:

- (1) There shall be constituted a fund vesting in the Authority known as the Karachi Metropolitan Transport Authority Fund.
- (2) The fund shall consist of -
 - (a) Grants/contribution made by the Federal Government, the Provincial Government, Corporation, any local authority, associations, trusts, constituent bodies or organization;
 - (b) Share from the increased revenue in the shape of various fees or charges due to increase in land utilization as per the formula decided by the Government.
 - (c) Betterment fee from the residents of the areas due to increase or change in land utilization including commercialization and increase in property value due to the implementation of mass transit scheme.
 - (d) Loans obtained from the Federal Government, the Provincial Government, a bank or any other body;
 - (e) Foreign aid and loans obtained by the Authority with the sanction of and on such terms and conditions as may be approved by Government;
 - (f) Proceeds of all charges, advertisement including display of advertisement on various modes of transport along with charges for right-of-way, income from sale of its assets, floating of bonds, all other avenues including property, development, service charges and recovery made under this Act; and
 - (g) Share from motor vehicle tax as determined by the Government.
 - (h) Contribution by the private sector organizations under Corporate Social Responsibility (CSR) in the greater interest of the city and the public.
 - (i) All other sums as may be received by the Authority.
- (3) The Corporation or any other body, Authority or Organization shall contribute to the Authority every year such amount by such date as may be prescribed by the Government.
- (4) The funds shall be administered by the Authority and shall be utilized for meeting expenses necessary for carrying out the purposes of this Act including the payment of:
 - (a) Charges in connection with the survey, research or lay out construction, reconstruction or repair of roads or execution of a scheme prepared under this Act.

- (b) Loan and interest thereon;
 - (c) Salaries and other remuneration to the members of staff, officers, Director General, Deputy Managing Director, including the experts, technical advisers, consultants, firms employed for any work under this Act and other employees of the Authority.
- (5) All money credited in the fund shall be deposited with a Scheduled Bank approved by Government.
- (6) The Authority may invest its surplus fund in any one of the Government approved securities or in the fixed deposit with the Government approved bank.

36 Budget:

36. Budget:

- (1) Every year the Budget of the Authority shall be prepared using zero-base budgeting approach by taking input from various quarters.
- (2) In the month of May every year, the Authority shall submit to government for approval a statement of the estimated receipts and expenditure in respect of the next financial year.
- (3) Government shall within thirty days of the receipt of the statement approve it with or without modification and if the approval is not conveyed within 30 days the statement shall be deemed to have been approved without any modification.

37- Valuation of financial state of affairs of the Authority

37. Valuation of financial state of affairs of the Authority

The Authority shall arrange actuarial valuation of its financial state of affairs after every five years.

38- Forecasts and Revisions:-

38. Forecasts and Revisions:-

- (1) The budgets will be reviewed on quarterly basis and revised based upon the forecast considering the changing circumstances.
- (2) The revised forecast will be submitted by the Authority to the Government for its approval.

39- Cash Flow Projections:-

39. Cash Flow Projections:-

- (1) Besides the budgets and forecast the Authority will also prepare the annual cash flow projections along with the budget to identify the funding requirement for the projects.
- (2) The Cash Flow projection to be reviewed on a quarterly basis along with the forecast.

40- Powers to borrow money –

40. Powers to borrow money:-

The Authority may, from time to time, with the previous sanction of the Government, and on such terms and conditions as may be approved by the Government, borrow moneys necessary for the purpose of defraying any cost, charges or expenses, incurred or to be incurred-

- (1) for the execution of any work authorized by or under this Act, or
- (2) for the payment of compensation for any land acquired for the purposes of this Act, or
- (3) for the repayment of a loan raised under this Act, or
- (4) for any other purpose within the intendment of this Act.

41- Justification for borrowing:-

41. Justification for borrowing:- Before borrowing an amount the Authority shall prepare detailed cash flow projections to identify the cost-benefit analysis resulting from borrowing in order to ensure that the borrowing cost including the interest-rate risk are duly hedged from either from the increased revenues or reduction in cost as well as to ensure repayment of the amount borrowed.

42- Accounts of the Authority

42. Accounts of the Authority

- (1) The Authority shall maintain complete and accurate accounts and other related records in such form and in such manner as may be prescribed by rules in consultation with the Auditor General of Pakistan.
- (2) The accounts of the Authority shall be audited every year by the Auditor appointed by Government in consultation with the Auditor General of Pakistan on payment of such remuneration as may be determined by the Authority.

- (3) As soon as may be after the receipt of audit report, the Authority shall submit the same alongwith its comments to the Government and the Authority shall comply with any directive issued by the Government for rectification of an audit objection.

43- Submission of yearly reports, returns etc.

43. Submission of yearly reports, returns etc.:

- (1) The Authority shall submit to Government as soon as possible after the end of every financial year, a report on the conduct of its affairs for that year.
- (2) Government may require the Authority to furnish to it returns statements, estimates, statistics or other information regarding any matter of any subject with which the Authority.

Chapter-7: Internal Controls

44- Internal Controls:

44. Internal Controls:-

- (1) The Authority shall ensure establishment of proper system of Internal controls comprising of the policies and procedures adopted by the Authority to assist in achieving objectives of this Act of ensuring, as far as practicable, the orderly and efficient conduct of its activities, including adherence to the policies, the safeguarding of assets, the prevention and detection of fraud and error, the accuracy and completeness of the accounting records, and the timely preparation of reliable financial information.
- (2) It shall also be a mandatory requirement to establish adequate and appropriate systems of internal controls by the Operators also in order to timely identify the risks and to take appropriate measures in development, implementation, operations and maintenance of mass-transit schemes.

45- Accounting, Information and Communication System:

45. Accounting, Information and Communication System:

- (1) The Authority shall establish adequate and appropriate Accounting system in order to main audit trail of all the decisions, actions taken, transactions, activities etc.

- (2) The Authority shall establish an adequate and appropriate Information system so that the required information pertaining to the mass-transit schemes is timely received by the Authority.
- (3) The Authority shall establish an adequate and appropriate Communication System within the organization so that there are no bottlenecks in communication from top to down and vice versa.
- (4) The Authority shall ensure that appropriate and adequate Accounting, Information and Communication systems are also established in the mass-transit projects.

46- Organization Structure:

46. Organization Structure:

- (1) An effective and appropriate Organization Chart of the Authority will be developed clearly defining lines of responsibilities and accountabilities.
- (2) The Organization Chart to be reviewed on an yearly basis to improve the same by merging or splitting various divisions and departments in order to create synergy and efficiency without compromising upon the risks by following principles of internal controls i.e. coverage to all activities, segregation of duties at various levels, clearly defined authorization and approval powers, periodic review and reconciliation, existence of physical controls and continuous training and supervision of staff.

47- Functional Setup

47. Functional Set-up: The Authority shall have its Head Office at Karachi. There are eight Wings/Sections namely Planning Wing, Operation Wing, Finance Wing, Administration Wing, Secretary Section, Public Relation Section, Internal Audit Section and Vigilance Section.

48- Decision Making:-

48. Decision Making:- All significant issues shall be placed for the information, consideration and decision of the Authority i.e. the Authority is required to consider the following matters:
- (1) establishment of efficient and effective internal control system across the organization.
 - (2) justification for establishment of a department/section by defining its objective.
 - (3) annual business plans, cash flow projections, forecasts and long term plans
 - (4) budgets including capital, manpower and overhead budgets, along with variance analysis

- (5) quarterly operating results as a whole and in terms of its operating divisions or business segments
- (6) internal audit reports, including cases of fraud or irregularities of a material nature
- (7) details of joint venture or collaboration agreements or agreements with distributors, agents etc.
- (8) promulgation or amendment of a law, rule or regulation, enforcement of an accounting standard and such other matters as may affect the listed company
- (9) status and implications of any law suit or proceedings of material nature, filed by or against the listed company
- (10) any show cause, demand or prosecution notice received from revenue or regulatory authorities, which may be material
- (11) default in payment of principal and/or interest, including penalties on late payments and other dues, to a creditor, bank or financial institution or default in payment of deposit
- (12) failure to recover material amounts of loans, advances and deposits, including trade debts and inter-corporate finances
- (13) any significant accidents, dangerous occurrences and instances of pollution and environmental problems

49- Job descriptions:

49. Job descriptions:-

The Authority shall define Job Descriptions of staffs at different levels to ensure that all the objectives of the Act have been duly cascaded down the work station to align the whole organization with the provisions of this Act.

50- Guidelines:

50. Guidelines:-

The Authority as deem appropriate from time to time will issue guidelines for elaboration of various matters.

51- Training & capacity building:

51. Training & capacity building:-

- (1) The Authority shall ensure appropriate training for its staff as well as the staff of the developer or operator for the proper communication of the expectations at various levels.
- (2) The developer and operator will pay the fee for such training to the Authority as may be appropriately prescribed by the Authority.

52- Use of Information Technology

52. Use of Information Technology:-

- (1) The Authority as well as any Special Purpose Company established to carry out the development, operations and maintenance of a mass transit project shall use support of Information Technology (I.T) to carry out its activities efficiently and effectively.
- (2) The I.T Applications will be integrated having a common data pool.
- (3) The I.T Applications will be developed by an independent professional software house.
- (4) Global Positioning System (GPS) will be used to track the movement of the vehicles.

53- Management Information System (M.I.S):

53. Management Information System (M.I.S):-

- (1) The Authority shall establish an efficient and effective M.I.S to monitor the activities, for timely identification of red flags keeping in view the Key-Risk-Indicators (KRIs) and Key-Performance-Indicators (KPIs), to assist in decision making as well as to take appropriate measures timely.
- (2) Efforts will be made to establish EDP based M.I.S.

54- Internal Audit:-

54. Internal Audit Department:-

- (1) The Authority shall establish an Internal Audit Department (IAD) to assist in establishment and improvement of effective and efficient internal control systems and procedures.
- (2) All departmental or functional heads shall be responsible for the design, development, implementation, monitoring and supervision of an effective internal controls within their areas.
- (3) The IAD's function will be of review and guidance to review that the departmental internal controls are in cohesion with the overall objectives of the organization.
- (4) The function of the Internal Audit shall be post-facto i.e. review of transactions, activities etc. in line with the provisions of this Act, rules and regulations and IAD will not involve in execution of the transaction.

- (5) The Internal Audit will focus upon improvement of systems and procedures by giving suggestions for the same.
- (6) The IAD shall submit a quarterly report on internal controls along with the observations and recommendations for improvement of the systems and procedures to mitigate the risks to the Governing Body.
- (7) The Head of IAD shall be appointed by the Governing Body as well as his pay, perks, allowances, leave and other facilities and will directly report to the chairman of the Governing Body.

Chapter-8: Complaints and appeals

55- Complaints:

55. Complaints:

- (1) Any person aggrieved from a mass transit project can file a complaint to the Authority addressed to the Secretary along with all supporting documents and evidences through courier or by hand deliver.
- (2) The Authority will call for comments from the concerned officers to the complaint lodged.
- (3) The Authority will form a committee comprising of for hearing of the Complaint.
- (4) The Authority shall make every effort to dispose of a complaint or other proceedings within 30 days of its filing. Provided that a decision of the Authority shall not be rendered invalid by reason of any delay in its delivery.
- (5) The decision of the Authority shall be given after providing opportunity of hearing to the aggrieved party and after taking into account the contentions of the respective officers.

56- Appeal:

56. Appeal: A person aggrieved from the decision of the Authority can file appeal with the High Court of Sindh within 30 days of the decision made by the Authority.

57- Notice of suit against the Authority, etc.

57. Notice of suit against the Authority, etc. –

- (1) No suit shall be instituted against the Authority or any member or any person associated with the Authority or against any servant of the Authority or against any person or persons acting under the direction or authority of the Chairman or of any officer or servant of the Authority, in respect of any Act purporting to be done under this Order or the rules or regulations made thereunder until the expiration of one month from the delivery of a written notice at the Authority office or the place of adobe of such member, officer, servant or person, stating the cause of action, the name and place of the intending plaintiff, and the nature of the relief sought.
- (2) In every such suit the complaint shall contain a statement that such notice has been delivered.
- (3) Notwithstanding anything in the Limitation Act, 1908 (IX of 1908), no such suit as is described in clause (1) shall, unless it is a suit for the recovery of immovable property or for a declaration of a title thereto, be commenced otherwise than within six months next after the accrual of the cause of action.

Chapter-9: Miscellaneous

58- Cooperation

58. Cooperation:-

- (1) All constituent bodies as well as all government departments, ministries, offices will extend full cooperation to the Authority for the development and implementation of transport/mass-transit schemes by giving due No-objection-certificates, approvals, permissions, reply etc.
- (2) For any planning and development projects coming in the alignment of the proposed transport plan of the Authority an N.O.C is required to be obtained from the Authority by any department, authority or any person.
- (3) The existing Transport Authorities will follow the instructions given by the Authority.
- (4) In case of any dispute or objection raised by any constituent body or any government office the decision of the Government will be final and binding.

59- Recoveries of dues

59. Recoveries of dues:-

Any sum due to the Authority shall be recoverable as arrears of land revenue.

60- Authentication of orders and other instruments of the Authority

60. Authentication of orders and other instruments of the Authority:

All orders, decisions and other instruments of the Authority shall be authenticated by the signature of the Chairman and any other Member or any officer of the Authority authorized by it in this behalf.

61- Liabilities of members

61. Liabilities of members:

No member shall be personally liable for any contract made or expenditure incurred by or on behalf of the Authority.

62- Officers to be public servants

62. Officers to be public servants:

The Chairman, Managing Director, Members, Secretary, Officers and Members of Staff of the Authority shall, when acting or purporting to act under this Act, be deemed to be public servants within the meaning of section 21 of the Pakistan Penal Code.

63- Power to make rules

63. Power to make Rules:

- (1) The Authority subject to the approval by the Government may, by notification in the official Gazette, make rules for carrying out the purpose of this Act.
- (2) The Authority shall develop adequate and appropriate rules in light of the provisions of this Act i.e. how an activity will be carried out, so that risk/reward trade-off may be created.
- (3) Following rules shall be developed by the Authority for its internal management. These rules are also required to be developed by the Special Purpose Company for the development, operations and maintenance of the project.
 - (i) Development and Implementation of a mass-transit scheme
 - (ii) Procurement of goods & services
 - (iii) Risk Management
 - (iv) Human Resource Management including preparation of a succession plan
 - (v) Determination of terms of credits
 - (vi) Write-off of bad/doubtful debts, advances and receivables

- (vii) Investments
- (viii) Acquisition/ disposal of fixed assets
- (ix) Borrowing of money and the amount in excess of which borrowings shall be sanctioned/ ratified by a general meeting of shareholders
- (x) Determination & delegation of financial powers
- (xi) Health, safety and environment
- (xii) Terms of Reference of consultants, advisers, think-tank members etc.
- (xiii) For any other function as entrusted to the Authority under this Act.

64- Power to make Regulations

64. Power to make Regulations:

- (1) The Authority may make regulations, not inconsistent with the rules, for carrying out the purposes of this Act by notification in the official gazette with respect to the powers and functions of the Authority.
- (2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for:-
 - (b) preparation of plan, budget and scheme for a mass transit project.
 - (c) development, operations and maintenance of a mass transit project.
 - (d) Appointment of officers, advisers, experts, consultants and employees
 - (e) Awarding of contracts with respect to the projects.
 - (f) Levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented.
 - (g) Categorization of the mass projects.
 - (h) Providing procedures for managing traffic operations on mass transit corridors.
 - (i) Procurement of I.T software.
 - (j) Installation of devices, equipments etc. on mass transit corridors, stops, parking spaces etc.

65- Removal of difficulties

65. Removal of difficulties:

If any difficulty arises in giving effect to any of the provisions of this Act, Government may make such order, not inconsistent with the provision of this Act, as may appear to it to be necessary for the purpose of removing the difficulty.

Provided that no such order shall be made after the expiry of one year from the commencement of this Act.

66- Indemnity**66. Indemnity:**

No suit, prosecution or other legal proceedings shall lie against the Authority, Chairman, Managing Director or any officer, member of Staff or other persons appointed by the Authority in respect of anything done or intended to be done in good faith under this Act.

67- Repeal, savings and succession:-**67. Repeal, savings and succession:-**

- (1) The Karachi Metropolitan Transport Authority Ordinance, 1999 (..... Of 1999) is hereby repealed.
- (2) On the establishment of the Authority under this Act, all properties, assets and liabilities pertaining to Karachi Mass Transit Cell shall vest in and be the properties, assets and liabilities, as the case may be, of the Authority established under this Act.

APPENDIX-6 COMMENTS ON DRAFT FINAL REPORT BY KMTC

Comments on Volume I

S No.	Para / Page/ Tab / Fig	Comment	Answer
1	fig 2-4-8 Pg 2-16	[Avg. Trip Length] Same figure is pasted twice despite of new figures	Left figure and right figure are different charts. Right chart was replaced because some numbers referred in the corresponding sentence are not the same in the numbers in the figure.
2	3.4.6 pg # 3-53	[Finding & Recommendation] Very Important matter should be addressed in Executive summary	The summary of the contents of was added in Executive Summary.
3	Table 5-2-3 Pg 5-25	[No. of Trips by Mode] Which scenario is considered for future Modal Split? If do nothing or Highway, share of Motor bikes decreasing in total Trips is unrealistic	The same modal split was used for all scenarios due to the method of 4-step demand forecast model. Although the percentage of motorcycle was estimated to decrease, the number was estimated to increase.
4	Table 5-2-4 Pg 5-28	[Result of Traffic Assignment] Only 3 scenarios are analyzed, further more scenarios for different combination of projects should also be analyzed, The Existing condition case should also be analyzed, Different Individual MRT projects with KCR should be analyzed for point Rating in Project selection, Only Highway Improvement shows avg. V/C = 0.82 which is nearly acceptable LOS for compact Urban Transport Design, However in reality Traffic always remain Congested without proper Public transport i.e. v/c > 1 for mega cities like Karachi	Chapter 5 focuses on the demand forecast modeling. Several scenarios are analyzed in Chapter 6. The urbanized area of Karachi will expand in Gadap, Bin Qasim, and Keamari. High improvement by road network development is the result of the divergence of traffic demand in suburban area. Since mass transit network cannot cover such large area with limited budget, it was concluded that highway construction is more important. Mass transit is proposed only along the major corridors.
5	6.2.7 Pg 6-29	[Traffic Management] Karachi has widest roads in the world & if proper Traffic Management techniques applied many Traffic problems will be solved. This one page is not enough for Traffic Management, CDGK expect much from JST to propose in this regard from JST like proposing ITS technologies, Signal Coordination, etc	Roads in Karachi are wide, but they are narrow in the central area. ITS technology itself is not a traffic management technique; it is just a tool for various types of traffic management. There are many traffic management measures as summarized in Table 6-2-9. However, applicable measures are limited. JST considered that the measures proposed in KSDP 2020 was proper, and similar measures were proposed in the report. Signal coordination would be necessary for BRT operation, so it was added in Chapter 6, Volume I.
6	fig 6.3.7 Pg 6-38	[Location of Access Ramps & Intersections] This Drawing is not clear, Submit this drawing with Satellite image on A0 size paper to KMTC for review	The figure with satellite image was submitted. It is recommended to use the submitted GIS data to browse the exact locations in which Figure 6-3-7 is included. The file in ArcGIS format is under /GIS/Highway folder (Fig6-3-7_Location of Access Ramps and Intersections .mxd).
7	Pg # 6-50	[(3) Proposed Network & Fig#6-4-6 M/P Network] The Network in figure 6-4-6 is different from transit network used in Transit Assignment Scenario 3. If this is the case, Ridership Estimation for Green/ Yellow line are changed & Ridership for Aqua, Purple & Orange line are not included in the Scenario 3. Wether these Riderships are assumed because no detail about Transit Assignment of these lines are given in the report	The demand forecast in Chapter 5 shows the evaluation of three different scenarios. In Chapter 6, the transit network was reviewed from various aspects, and there are some differences between the final network in Chapter 6 and the scenario network in Chapter 5.
8	General comments	People of New karachi Town and North Nazimabad Town have to interchange Twice wether going towards Shara-e-Faisal or M.A.	Trip distribution from the HIS shows the strong connection between New Karachi and Shara-e-Faisal along M. Rashid Road, where a

		Jinnah Road, which is not a good practice to shift people from Private vehicle towards Public Transport.	MRT is proposed. Direct connection to M.A. Jinnah Road is also important. However, the corridor from M.A.Jinnah Road to Super Highway is more important, and the direct connection is proposed along this corridor instead of the direction of North Nazimabad and New Karachi. Although Master Plan does not give detail about the connection, the proposed BRT line will provide direct connection between New Karachi and M.A. Jinnah Road.
9	General comments	Signal Free Corridor 1, Shaheed Millat Road & Shara-e-Quaideen are very important roads, There should be some sort of transport system proposed on these Roads .	BRT lines are proposed in the report, although the proposal is not emphasized. A Signal Free Corridor is a kind of freeways. Exclusive lanes are not possible along such corridor.
10	General comments	There are no Feeder routes in the Master plan, Some Feeder Routes wer prposed in the Progress report 2, the issue on these routes was raised by ex D.G. KMTC after 2nd JSC meeting and but JST didn't discuss about these routes and omit these routes from the Master Plan	The feeder routes proposed in the Progress Report 2 was disagreed by KMTC. JST reviewed the public transport network and modified it based on the demand forecast analysis. Feeder routes are shown in Chapter 6 as the secondary network system.
11	General comments	The Brown line which is third Rail based line in KTIP and suggested to be implented in MidTerm Plan has Significant Land Acquisition in Shah Faisal Colony area, Wether this Land Acquisition possibility is Analysed in SOSE?, The buildings which have to be Demolished should be identified and discussed with CDGK and concerned Department before approval of this corridor	The land acquisition possibility in Shah Faisal Colony area was identified on an approximate alignment of the master plan study stage only, by using satellite images. And the result of Brown line was described as corridor-2 in SOSE.
12	pg # 6-55	[Noth Naz. Station] Direction is towards Golimar/ Nazimabad not Sohrab goth, Dedicated flyover from Nazimabad side is not understandable if BRT has to end at KCR, If the length for vertical clearance is not achieveable then why BRT flyover on existing KCR is proposed	This comment is based on the 1 st Draft Final Report, and we have received the same comment from KMTC in May, 2012. The plan that is mentioned in the comment does not exist in the 2 nd Draft Final Report.
13	9.2.1(4) Pg 9-2	[Economic Saving Benefits] For Benefits, value of Time Taken Bus and Motor Cycle Passangers is Rs. 50/hr which is quite high nad the reason is avg. monthly working time is taken as 150 hours which is normally around 250 hours per month reulting in over estimation of benefits. Same case is for car users	Applying the working hours of 250 hours per month means very low labour productivity. KCR study also used 150 hours per month. The passenger interview survey to motorcycle users also shows the similar value (Rs. 44/hr).
14	9.2.2(5) Pg 9-4	[Revenue] Whether Fare of BRT & MRT are integrated with KCR, This condition is not described in the master plan because with and w/o integration fare of Mass Transit with KCR will heavily effect the viability of both	The fare of BRT should be integrated with KCR and MRT network as is described in Chapter 6.
15	Page 9-4	[Selection of Project for Feasibility Study] Any BRT (line or Network) without entering CBD or connected with KCR will not attract the passengers resulting in Failure due to no revenue as well as reducing road capacity but not reducing road Traffic Volume	Introduction of transit system in CBD will reduce traffic capacity unless it is constructed as underground type. Karachi's roads are narrow in CBD while they are wide in suburban area. During F/S, JST and KMTC discussed this issue many times and concluded that the BRT line should be extended to the park near Cloth Market.
16	Page 9-4	According to the Report, the CBD portion of Blue line is staged in Long Term Plan i.e. operation start in 2030, Which means that all the KTIP depend upon the KCR and if KCR delayed or fail to implement due to any reason, common people depending on Public Transport would have nothing from this project before 2030. There are many sensitive issues in KCR (Land	Development of KCR Line is precondition in this project because PC-1 of KCR has already been approved by GOP. The conclusion through meetings with KMTC was to select BRT route of Green line and Red line as highest priority projects in feasibility study based on the policy about Japanese ODA to Pakistan in consultation with JICA.

		Acquisition, Availability of Depot. Land)	JST cannot propose another plan in which KCR is not implemented under the present status.
17	Page 9-4 General comments	What Mechanism JST suggest for the stability of urban Traffic pattern on these proposed Corridors? Eg: previous LRT-2 loses its significance and priority as no significant Transport Facility was provided on the corridors. For maintaining smooth Traffic Flow CDGK has to Construct few more Flyovers on the proposed corridors so there will be no more space for MRT after 10-15 years.	The previous drawing of LRT-2 shows that the line needs to go through Karachi Zoo. The corridor is too narrow, and construction of an elevated system is not possible. Underground type is also difficult because there is no room for the transition section between underground to elevated section.
18	Page 5-19	[Future Transport Network] The traffic assignment for year 2030 has been performed assuming that Layari Expressway & Its Extensions, Malir Expressway, Northern Bypass's westwards extension, Northern Bypass eastern extension and 6 Public transport transport corridors proposed by JST would be built. however this seems a lot ambitious and JST must also perform analysis on various permutations if any of these projects are not being implemented.	This is the estimation of the full development case of the master plan. Since the number of projects is large, the number of combinations of scenarios in case some of them exist and others doesn't. It is not practical to carry out these combinations.
19	Table 5-2-3 Pg 5-25	[Number of Trip Modes] It is assumed that modal share of Bus & Cars would increase from 2010 - 2030 however the percent modal share of Walk & Motorcycle would reduce in the same period. What is the basis of estimation for future modal share is not being discussed in the report.	The figure in the table is the modal share projection in case of mass transit development (full network case). The modal share of motorcycle & walk in 2030 is small due to increase in the share of public (Bus) transport. The remarks were added to the table.
20	Table 5-2-5 Pg 5-29	[Evaluation of network Performance] The Table analyses 3 cases. For each case the average V/C ratio is above 1. Referring to the statement in Para 3.6.3 page 3-58 the statement that road capacity is not a problem in the city becomes null and void.	Para 3.6.3 describes the present condition while this chapter show the analysis in the future.
21	Page 6-3	[Road Development + KCR Scenario] The statement that "KCR is a committed Project" is a big statement from JST. Does this ensure loan guarantee from Japanese Government?	The following statement is "by the government of Pakistan". This statement does not mention anything about the loan from JICA.
22	Table 6-1-2 Pg 6-7	[Comparison of Market Segment of Mass transit] The Table highlights income groups & tries to perform analysis for mass transit market Analysis based on this. The table should clearly show value ranges of Income groups considered by JST based on results of HIS Survey or other credible dataset. Otherwise the table seems to be generic and not focused on situation in Karachi.	This is an analysis of target passengers for mass transit system from the general view point. It is difficult to show the range of income group as salary per month from HIS or other sources because the classification is general and mode choice depends on various factors.
23	Table 6-1-2 Pg 6-7	[Comparison of Market Segment of Mass transit] The table considers Private Car users in High Income Group Only? Is this also revealed by HIS Dataset also?	As mentioned above, this is a general classification. Middle income group also use private cars if adequate transit service does not exist.
24	Table 6-1-2 Pg 6-7	[Comparison of Market Segment of Mass transit] In identifying Risk the table shows Low Income Group to be resisting Mass Transit, High Income Group to have small demand & the Mid income group to have a vague demand? If this is so, where actually is the potential riders? The outcome of the table is not very clear.	This table is one of the materials to set the policy of mass transit development. The conclusion is summarized in 6.1.7.

Comments on Volume II

No	Report	Comments from KMTC	Reply from JICA Study Team (JST)
1	Fig 1-1-1 Pg 1-3	[Work Schedule] To be updated as current status	The work schedule is the original plan. We replaced it with the new one.
2	Table 3-2-1 & 3-2-2 Pg 3-4 & 3-8	[List of BRT Stations] Provide additional column for distance between the station.	Distance column was added. Distances between stations of both routes were described in Table 6-3-1, 6-3-2.
3	4.1(1) U-turn(N.Naz imabad) Pg 4-1	[U-Turn Traffic] closing of median is possible also. Since BRT is high frequency Fig. 4-1-1 is quite unsafe and not seems to be possible for example 4-1-2, signal case exclusive U-turn lane with solid divider of appropriate length will be required or Dog leg u-turn may be provided.	JST emphasizes that BRT traffic as public transportation should take precedence of mixed traffic. In addition JST proposes that adoption of traffic signal at u-turn location is essential countermeasure.
4	U-turn Red Line Pg 4-1	[U-Turn Traffic] for red line u-turn under Jail Flyover will be closed, old sabzi mandi u-turn will be replaced by signal at new town police station. Similarly shahzob hotel u-turn will be replaced by signal for BRT.	Signalization of intersections is essential for BRT introduction. The impact of closure of U-turn is considered as a negative impact in the economic analysis. From this reason, stakeholder consultation is necessary for the implementation of the BRT project.
5	4.2.4 Existing Bus Service Pg 4-10	[Reorganization of Bus Network] since BRT will not be affordable to poor people therefore CDGK will not cancel the permit of any existing route and also to avoid any social or political conflict unless an operator himself requests to change his route. The existing buses parallel to BRT will automatically reduce their frequency due to reduction in demand.	Many routes overlap the BRT corridor. This chapter just point out which routes are duplicated with the BRT corridor and only recommends discontinuing these routes. Discontinue of these routes might be done by regulation, or by market mechanism. JST do not insist to stop these routes by government power.
6	Table 5.3.3 Page 5-7	[Cost of Bus] The mentioned cost of buses i.e. 12 million seems to be on a higher side, as Hino Pak has submitted a proposal to KMTC with the cost of 9 million per bus. Further it can be estimated that this cost would be dropped down through negotiations / bargaining based on bulk quantity order placement.	The cost can be reduced by international competition. However, it is not possible to estimate the final price after the bidding.
7	Page 6-9 6.3.2 (8)	[Multi Model Transit Integrated Plan] Detailed analysis of Intermodal Transit Integration Program is expected from JST, rather than a 3.5 lines paragraph. Green & Red Line bisects KCR and Red Line bisects Brown Line at NIPA, how passengers shifting can be facilitated and how ticketing can be integrated at these locations?	JICA Study Team has already described the facility planning between KCR and BRT in fine detail on Chap 6.6.2 "Transferred from BRT to KCR" of Draft Final Report. According to this section, the outlines of them are explained as follows. 1. Connection with KCR and Green Line JICA Study Team has proposed that the dedicated walkway from BRT to KCR will be installed through use of the open space along the railway pier. In addition, the commercial deployment under the open space of railway pier would be taken in terms of creation the life of the street. This enables the passenger not to feel the distance between BRT and KCR. 2. Connection with KCR and Red Line JICA Study Team has proposed that the entrance/exit of pedestrian deck will be installed in the near distance between KCR and station and this facility. It is desired that the pedestrian deck is directly joined to KCR Station. Otherwise, there is no space to construct this intermodal transfer facility. 3. Ticketing The system of flat fee or discount fare is adopted when the passenger changes at BRT station of Red line for Brown Line. In this case, it is possible to use the shared ticketing way, which is for example direct connection with both lines. The case example of BRT Operation in JAKARTA city is described on our report.

			There are different fare structure between KCR and BRT. This showed that it is difficult to adopt the shared ticketing system between KCR and BRT Operation.
8	Page 6-34	[U-Turn along Shara-e-Usman road] If all U-turns along Shahra-e-Usman would be closed for BRTS operations, how vehicles would be able to cross roads? Has the u-turn traffic in this section being analyzed? Only saying that 'these u-turns would be closed' doesn't sound rational. Instead can be reduce no. of u-turns and install vehicle actuated signals?	There are two main characteristics along Shahra-e-Usman Road, existing power pylon tower in the median and intermediate T-type intersection. Due to construction of BRT dedicate lane and above mentioned characteristics, u-turn facility would be forced to close. Instead of closing median along the route, JST recommended that intermediate T-intersections should be converted to 4-leg signalized intersection to provide access to both sides of the road each other.
9	General comments	Preliminary design of storage capacity on these u-turns should be provided because there is heavy traffic flowing on this road.	Traffic capacity of u-turn facility should be studied in the detailed design stage, considering not only BRT operation plan but also signaling plan based on analysis of traffic volume including turning movement traffic survey at u-turn location.
10	Page 6-40 Figure 6.5-5	[Depot General Building Layout] It is always better to provide angular parking especially for large vehicles for easy maneuverability. Although it requires some extra space but parking / unparking mechanism becomes much easier.	In terms of economic efficiency, safety/smooth operation in the Depot area and difficulty of site acquisition, JICA Study Team has re-proposed that the tandemly-arranged parking space is installed inside the Depot area. 1) Economic efficiency If the angle-parking is adopted, it is necessary to take an additional acquisition of land for depot space. The extra expenses for land acquisition will be occurred, and it is not efficient for project implementation. 2) Safety/Smooth Operation in the Depot Area It is necessary for the driver of BRT to look behind check before back up. This enhances the probability of having a collision against another bus, and wasting time in totally parking. It is not good in terms of safety and Smooth Operation in the Depot Area. 3) Difficulty of site acquisition The planned depot area on this project will be installed in the urban area. There is the limitation of depot area. In case of Red Line, it is impossible to expand more area. The other, Green Line, is that it is possible to expand the Depot area. Otherwise, in future operation of Brown Line, there is possibilities to use as shared depot operation between Green Line and Brown Line. From this, it needs to keep the extra space of this land.
11	8.4.5 (1) Pg 8-9	[Value of Time] As it has already been communicated that value of time i.e. Rs. 50 is on a higher side.	This is the same comment in Master Plan (No. 13).
12	Table 9.1.1 Page 9-1	[Monthly personal cost of BRT system] No. of drivers and mechanics associated for bus operations is on a very higher side. It is said that for 353 buses, 945 drivers and 260 mechanics would be required. This reveals that there would be 2.7 drivers and almost 1 mechanic per bus be allocated.	No. of drivers and no. of mechanics were estimated by assuming 2.0 and 0.5 per one vehicle basically. In addition to these, a conversion factor of 1.34 was applied, which represents working days per year and spare ratio of the staffs to secure 365-day operation and preparing for unscheduled absence of drivers. The calculations were based on the following formulas. No. of drivers = 2.0 (per vehicle) * 386 (operating vehicles) * (365/300) * 1.1 No. of mechanics = 0.5 (per vehicle) * 425 (total vehicles) * (365/300) * 1.1 Number of drivers of and mechanics per vehicles

			are 2.20 and 0.48 in case of CDGK. Therefore, the estimated numbers of drivers and mechanics in this Study are considered within a range of reasonable numbers.
13	Table 9.1.2 Page 9-2	[Roles and duties of Staff] Vehicle Operating Cost seems to be on a lower side. Please attach reference document of HinoPak Motors.	The document cannot be disclosed. We have already submitted the reference document during the study period.
14	9.1.4 Page 9-3	[Summary of O&M Cost] Details of cost over run reasons should be mentioned in the report. Also measures that would be required to minimize the cost over runs should be mentioned in order to make the project remain financially viable.	The objective of the sensitivity analysis is to clarify potential effects to the financial situations to the entity by future uncertainty. Major causes of the cost overrun are considered as delayed construction schedule and inadequate Scope of Work in the construction stage. The key to avoid such causes is considered to contract with reliable supervision consultants. In the operation stage, traffic accidents cost and inappropriate loss of BRT vehicles are considered the major causes of the cost overrun. Traffic accidents could be prevented through safe BRT operation by drivers with well-maintained vehicles. Maintenance staffs are also important to reduce broken vehicles and loss of vehicles. Education to drivers and maintenance mechanics, in particular, is considered very effective to avoid the causes of the cost overrun. Reliable operation is expected to keep the BRT passengers at the expected level, which is the indispensable factor of the BRT operation.
15	Appendix 1-5 & 1-6 Fig A1-3-4 & A1-3-6	On Appendix 1-5 & 1-6 JST has proposed that the Blue Line (Super Highway - Tower) can be operational on the edges of the corridor. This seems to be rather difficult as there are many streets connecting to Shakra-e-Pakistan which cannot be closed. And if signals would be provided on all connecting roads than the rest of the traffic would be badly hurt and if signals will not be provided then the BRT will not be able to serve it purpose.	The purpose of this study for tentative BRT operation of Blue line was to prepare alternative plan before construction commencement of LRT Blue line. JST presumed early adoption of public transportation along Blue Line route will be essential for countermeasure against heavy traffic congestion taking into account the growth in population and rapidly motorization in Karachi, even if Blue Line will be constructed according to schedule. In case of necessity for urgent plan JST recommended temporary BRT operation along Blue Line route considering priority of public transportation.

General Comments

No	General Comments	JST Comment
1	Chingqui (three wheelers motorcycle Rickshaw) operations have been increased drastically in the last one year in the city of Karachi. Almost 50,000 Chingquis have been added into the city's network on about 67 locations, but the effects of them have not been incorporated in this study which may be a major sat back for the planning process in the years to come. As this service is progressing into leaps and bounds so some mitigation measures to deal with them shall be provided in the report such as: Chingqui service should be registered under motor vehicle registration department and route permit should be given to the operators by regional transport authority in order to bring them into the tax net. As right now they are not paying any sort of tax to the ex-chequer and they are operating illegally. Since this report targets the master plan for the year 2030, so till then this service would be a mess for the entire city. In order to channelize the service step wise methodology shall be provided in the report.	Qingqi rickshaw was very minor in the beginning of this study, but it has increased rapidly in the last one - two years. This mode provides short distance service. In developed countries, people use their bicycles for such short distance trip, but movement by private bicycle in Karachi is still risky. It is better to accept this local service because people need this kind of system.

2	Population projections that have been carried out in the study seem to be unrealistic in case of Karachi. The reason being a latest report published by 'National Sustainable Development Strategy' on the topic of 'Pathway to a sustainable Pakistan – May 2012' suggests that almost 60% of the population of Pakistan is below 30 years. This leads to the fact that all these people would get married in near future and would give birth to a new generation and hence the population would be significantly increased. Now comparing the trend of population increase in Karachi with Japan is unrealistic as the major chunk of population of Japan is above 60% and hence there are more chances of the fact that the increase would get stagnant by the year 2030, however in case of Karachi this approach could be unrealistic.	This issue has been discussed between JST and KMTC many times during the study period. JST explained the method of the population projection which was worked out by our experts from Yachiyo Engineering Co., LTD. Since the present population is also the estimation based on the last Census conducted in 1998, discussion on more accurate estimation of the future population will not contribute the planning. It is recommended that the future population should be reviewed after the new Census. We will insert the KMTC's comment into the report as a special remark.
3	Potential Non-fare revenue resources in the transport sector especially in the mass transit networks have also not been incorporated in the study which contributes majorly in the revenue generation of mass transit systems. Dubai Metro Rail claims that almost 40% of their revenues are being generated through non-fare revenues.	Non fare revenue (revenue from advertisement) was considered in the financial analysis in F/S. Non fare revenue cannot be the major revenue source of mass transit systems unless the transit development is done by a private company for the purpose of its real estate business.
	Following recommendations should be incorporated in the final report:	
1	Karachi Metropolitan Transport Authority (KMTA) should be implemented at the earliest to take care of the projects that are in consideration in the city of Karachi in totality. An Act has already been prepared by JICA legal experts in collaboration with Karachi Mass Transit Cell (KMTC). This exercise should be reflected in the report so that further progress in this direction would be streamlined.	The draft law was added as an appendix.
2	It is very important to mention that the Karachi Mass Transit Implementation Program should be executed within the next 5 years in order to achieve the real benefits of the study and to provide facilitations to the city commuters to meet their high travel demand. If the implementation would be delayed the study would lose its essence, and hence would be shelved as many previous studies.	It can be said that the implementation of KCR is one of the outcomes of the study. Although the master plan also includes some road projects, the most important project is the mass transit development. However, the JST estimated the necessary period for the project implementation at more than five years because of the financial arrangement and the necessity of establishment of proper institutional system. The Origin-destination matrix is useful information which is expected to be utilized in the transport planning in Karachi for next 10 years.
3	JICA funding for the implementation of 2 Mass Transit BRT Corridors should be geared up.	JST finalized the schedule considering the necessary actions for the loan arrangement. Although the investment cost of BRT is smaller than that of railway systems, the necessary time for the loan arrangement to a BRT project is as same as other projects.
4	A documented ticketing system in the existing buses should be developed in order to bring them into the tax net so that the government could earn some revenues from it which can be used for the investment purposes in transport sector.	This issue has not been raised during the study period. It is not practical to issue tickets to passengers in crowded minibuses. Description about the document ticketing system was added in Chapter 3, Volume I.