Ministry of Housing, Utilities & Urban Development
General Organization for Physical Planning
Greater Cairo Region Urban Planning Center

Japan International Cooperation Agency
JICA Study Team

Outcomes of Strategic Urban Development Master Plan and Pre-Feasibility Study

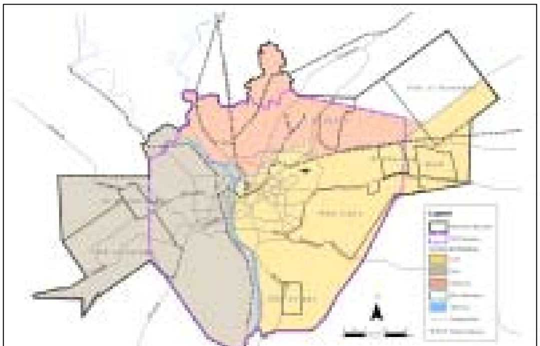
The Strategic Urban Development Master Plan Study for Sustainable Development of the Greater Cairo Region In Arab Republic of Egypt

2nd Seminar
JICA Study Team
June 2008

Phase 1: Outcomes of Strategic Urban Development Master Plan for the Greater Cairo Region

Study Area and Work Flow

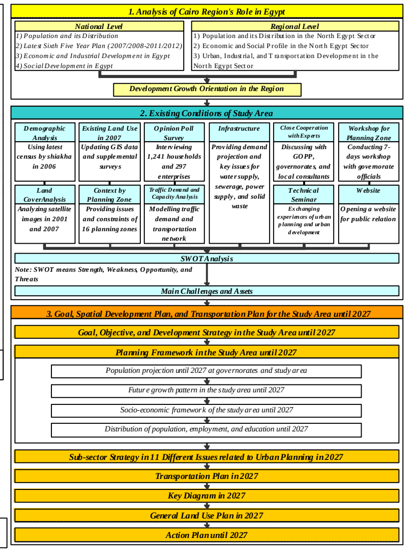
"Study area including Cairo, part of Giza and Qaliobeya, and 10th or Ramadan"



Study Area of Master Plan

Governorate	Admin. Area (km2)	Population (1,000)		Growth Rate in 1996-2006 (% per year)
		1996	2006	
Cairo (%within S.A.)	1,636	6,801 (100.0)	7,787 (100.0)	1.4
Giza (%within S.A.)	1,550	3,876 (81.0)	5,131 (81.8)	2.9
Qaliobeya (%within S.A.)	788	2,207 (66.9)	3,059 (72.2)	3.3
Sub-total (%within S.A.)	3,974	12,884 (86.5)	15,997 (87.3)	2.2
10th of Ramadan	393	48	124	10.0
Total	4,367	13,045	16,101	2.2

Note: In April 2008 after the completion of draft final report, the Presintial Decree declared to divide the Cairo governorate into Cairo and Helwan governorates and the Giza governorate into Giza and 6th of October governorates. This administrative change does not affect the outcomes of the master plan, since the MP was formulated based on the physical condistions of the city, and the administrative changes meet the recommendations



Workflow of Master Plan

Population Projection for Governorates in Cairo Region

"Population estimated at 27million in 2027"

Existing Conditions

-Existing Population of 18million in 2006
-Growth Rate increasing from 1.93% per year in 1986-2006 to 2.08% in 1996-2006

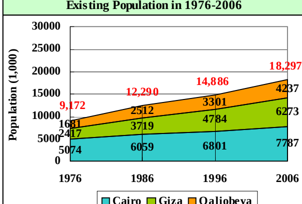
Analysis

-Actual growth rate in 96-06 higher than High-case at 1.95% per year by Cairo Demographic Center
--Share to the total population decreasing to 10.7%

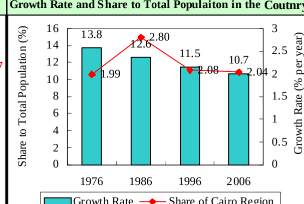
Proposal

-Estimated growth rate slowing down to the level (1.5% per year) estimated by CDC
-Estimated population of 27million in 2027

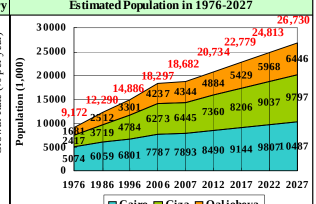
Existing Population in 1976-2006



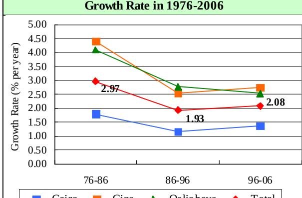
Growth Rate and Share to Total Populaiton in the Coutnry



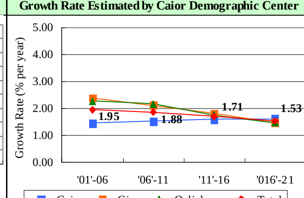
Estimated Population in 1976-2027



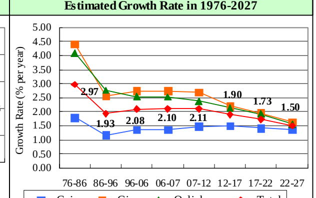
Growth Rate in 1976-2006



Growth Rate Estimated by Caior Demographic Center



Estimated Growth Rate in 1976-2027



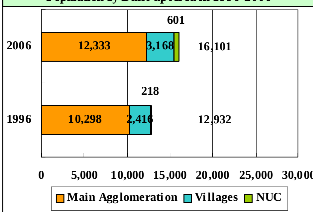
Note: Cairo includes Cairo and Helwan governorates.
Note: GIza includes Giza and 6th of October governorates and a part of Helwan governorate.

Planning Framework for the Study Area

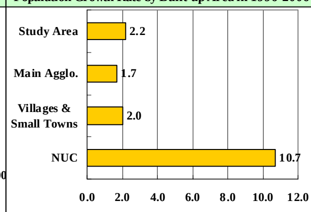
"Population estimated at 24million with 7million workers and 6million students in 2027"

Existing Conditions	Analysis	Proposal
- Existing Population of 16million in 2006 - No. of workers at 4.3million and No. of students at 3.4million in 2006	-High growth rate at 10.7% per year in NUCs in 1996-2006 -Need to improve Employment rate and Enrolment rate for preparatory and higher according to the 6th 5-year plan	-Estimated population at 24million in 2027, of which 4million in NUCs (growth rate at 5.7-14.3% in 2006-2027) -No. of wokers at 7.4million and students at 5.8million in 2027

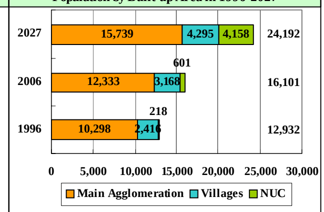
Population by Built-up Area in 1996-2006



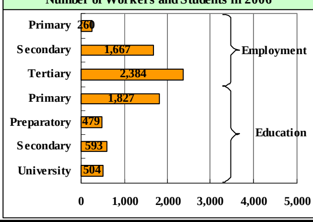
Population Growth Rate by Built-up Area in 1996-2006



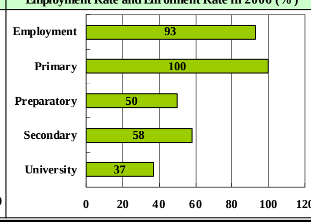
Population by Built-up Area in 1996-2027



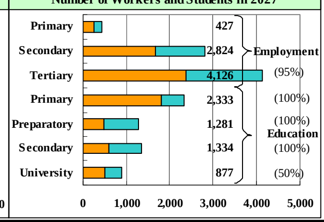
Number of Workers and Students in 2006



Employment Rate and Enrolment Rate in 2006 (%)



Number of Workers and Students in 2027

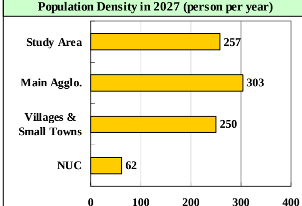


Future Growth Pattern in 2027

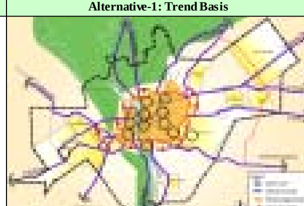
"Selecting Multi-polarized case for the largest population in NUCs"

Existing Conditions	Analysis	Proposal
-Economic activities incl. industries, commerical, and tourisms.concentrating on the main agglomeration with high population density at 303 persons per ha	-Three alternatives formulated for the future growth pattern. Alt. 1 for Trend basis and Alt. 2 for Continuous urbanization in East-West direction	-Alt. 3 for multi-polarized case having the largest populaiton shift to NUCs, selected for future growth pattern

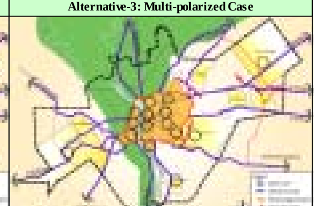
Population Density in 2027 (person per year)



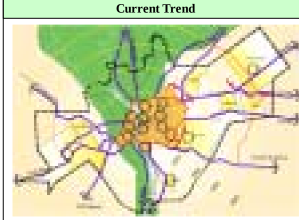
Alternative-1: Trend Basis



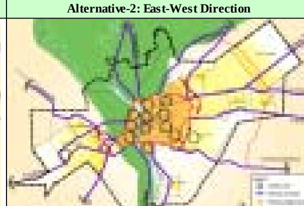
Alternative-3: Multi-polarized Case



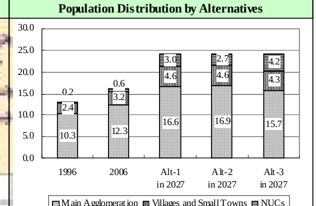
Current Trend



Alternative-2: East-West Direction



Population Distribution by Alternatives

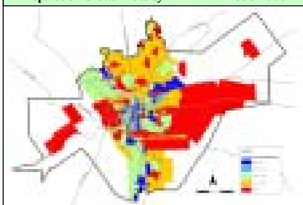


Future Urban Area in 2027

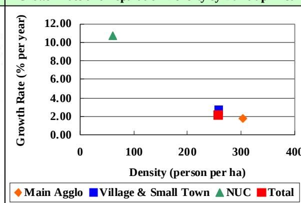
"Encroachment on agricultural lands slowing down in 2001-2007"
"Enhance the urban growth boundary to secure the preservation areas and the efficient investment"

Existing Conditions	Analysis	Proposal
-Negative population growth in main agglomeratoin, while relatively high rates around main agglomerattion and in NUCs	-Encroachment on agricultural lands slowing down in 2001-2007, which population increasing in NUCs and Villages & small towns	-Enhance urban growth boundary to (i) Preserve the natural, archeological and agricultural lands from urbanization and (ii) Provide land for for 24million people

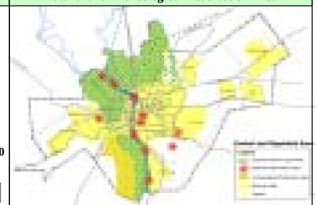
Population Growth Rate by *Shiakha* in 1996-2006



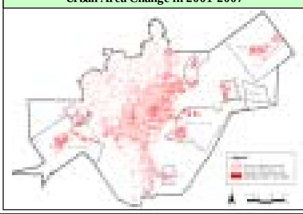
Growth Rate and Population Density by Built-up Area



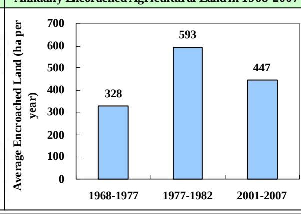
Natural and Archeological Reservation Area



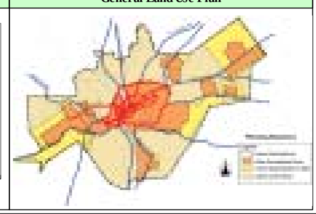
Urban Area Change in 2001-2007



Annually Encorached Agricultural Land in 1968-2007



General Land Use Plan

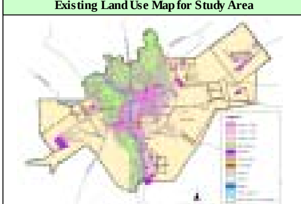


General Land Use Plan

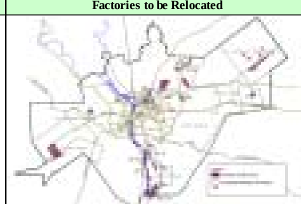
"Misuses including Insufficient green areas and Environmentally-affected industrial areas
"Land use plan for efficient and environmental city

Existing Conditions	Analysis	Proposal
-Existing land use for the study area and 16 planning zones formulated to recogniza existing conditions	-Misuses incl. (i) Insufficient green areas in main agglomeration, (ii) Industrial uses in residential areas, (iii) insufficient lands for new urban centers	-Key diagram for new urban centers to alter the urban structure. General land use to create Efficient and environmental city based on the proposed goals

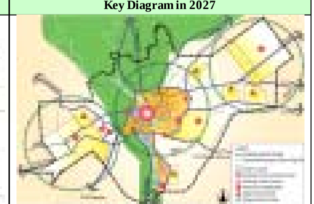
Existing Land Use Map for Study Area



Factories to be Relocated

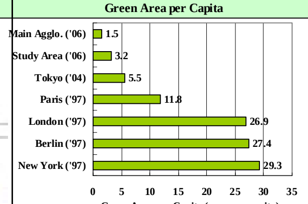


Key Diagram in 2027



Existing Land Use Map for Planning Zone 1

Green Area per Capita



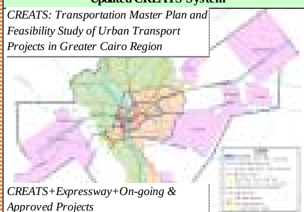
General Land Use Plan in 2027

Transportation Plan

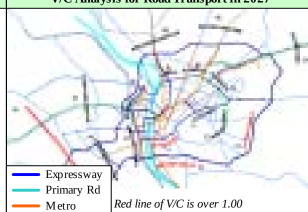
"Assessment based on the planning framework in 2027 and the updated CREATS system"

Existing Conditions	Analysis	Proposal
-Assessment based on conditions; i) Updated CREATS system ii) Trip demand following the planning framework in 2027	-Volume/Capacity analysis identifying cross-sections, which will be saturated in 2027 and need improvement	-Modification on Updated CREATS system to meet the traffic demand in 2027 in the east side by Extention of Metro Line 3 and Expressway (E12)

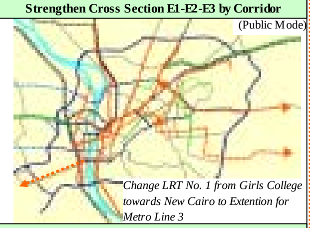
Updated CREATS System



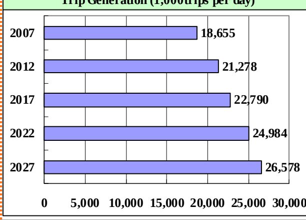
V/C Analysis for Road Transport in 2027



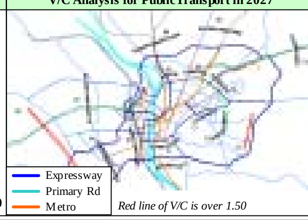
Strengthen Cross Section E1-E2-E3 by Corridor



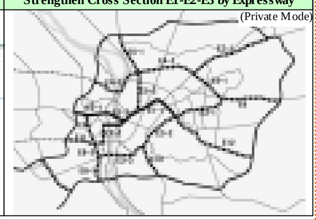
Trip Generation (1,000trips per day)



V/C Analysis for Public Transport in 2027



Strengthen Cross Section E1-E2-E3 by Expressway



Infrastructure

"Capacity analysis and efficient issues for water supply, wastewater, solid waste management, and power supply""

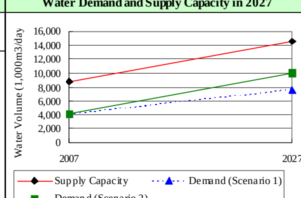
Existing Conditions	Analysis	Proposal
-Existing capacity for purification and treatment sufficient for water demand and wastewater generation	-Sufficient capacity for purification and treatment to meet water demand and wastewater generatoin in 2027 after completion of on-going and planned projects	-Restructuing the water distribution system and service areas for water supply and waste water, even in sufficient total capacity. Needs to improve the service quality.

Water Demand and Supply Capacity in 2007

Water Demand in 2007: 4,119,000m3/day 〈 Supply Capacity in 2007: 8,742,000m3/day

18 Water Purification Plant in the Study Area

Water Demand and Supply Capacity in 2027



Efficient Issues

[Review of water distribution]

Six NUCs of 10 of Ramadan, Al Obour, Badr, 15th of May and Al Shorouk will have shortage of water supply, though the total supply capacity is adequate for the total demand.in 2027. Water distribution will need to be reviewed.

[Improvement for quality of water supply]

Studies will be necessary to;

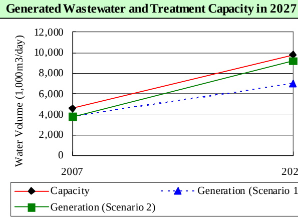
1) Review the water leakage, water tariff, and improper water uses for better operation.
2) Monitor the groundwater used in Villages & Small Towns.

Generated Wastewater and Treatment Capacity in 2007

Generated Wastewater in 2007: 3,790,000m3/day 〈 Treatment Capacity in 2007: 4,557,000m3/day

13 Watewater Treatment Plant in the Study Area

Generated Wastewater and Treatment Capacity in 2027



Efficient Issues

[Review of service area by treatment plant]

Three NUCs of 10 of Ramadan, 15th of May and Badr will have shortage of treatment capacity, though the total capacity is enough for the total generated volume .in 2027. Collection and treatment system will need to be reviewed.

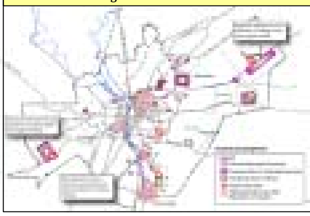
[Improvements of quality of wastewater treatment]

1) Provide secondary treatment step of Abu Rawash WWTP
2) Conduct studies for the Treatment system in Villages & Small Towns, Reuse of treated water and Better treatment for industrial effluents.

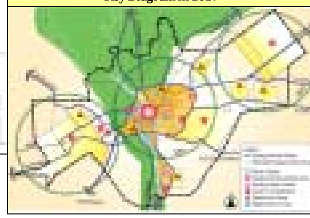
Development Corridor in 2027

"Needs to strengthen transport systems and urban centers in NUCs"

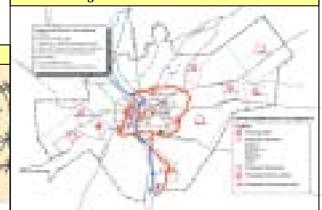
Promoting Industrial and R&D Area



Key Diagram in 2027

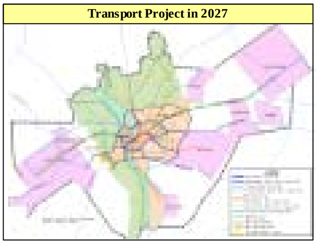


Promoting New Business and Commercial Area



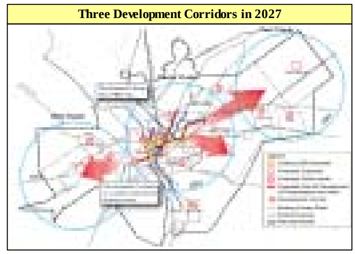
Needs to reform the urban structure by enhancing the urban centers in NUCs

Transport Project in 2027



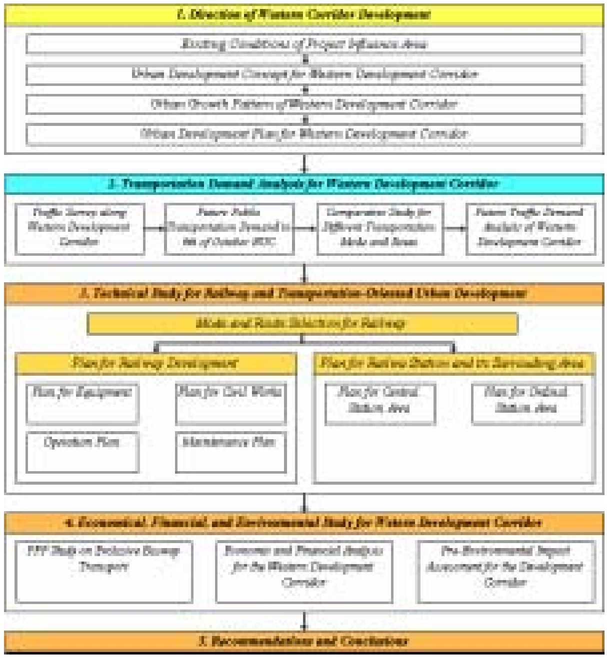
Needs to strengthen the transport in east and west direction

Three Development Corridors in 2027



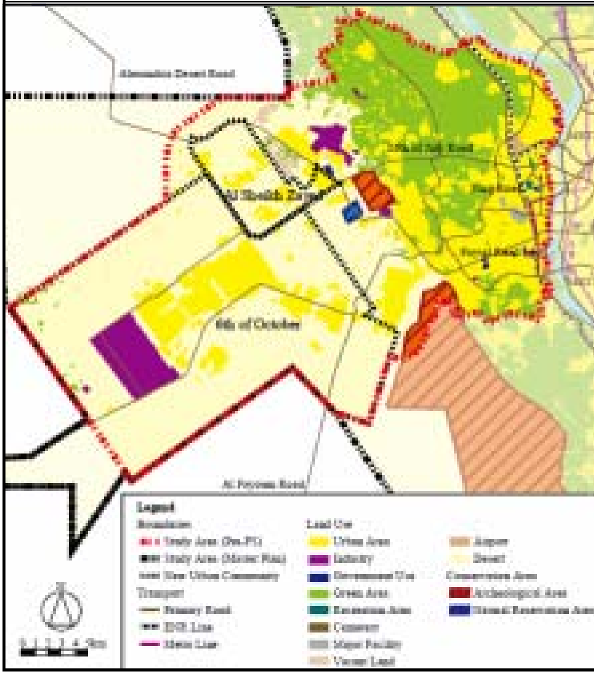
Phase 2:
Outcomes of Pre-Feasibility Study for Western Development Corridor

Work Flow of Pre-Feasibility Study



1. Urban Planning for Western Development Corridor

Study Area for Pre-FS



Item	Unit	Q'ty
Land Area	km^2	843
Population in 2006	1000	4,058

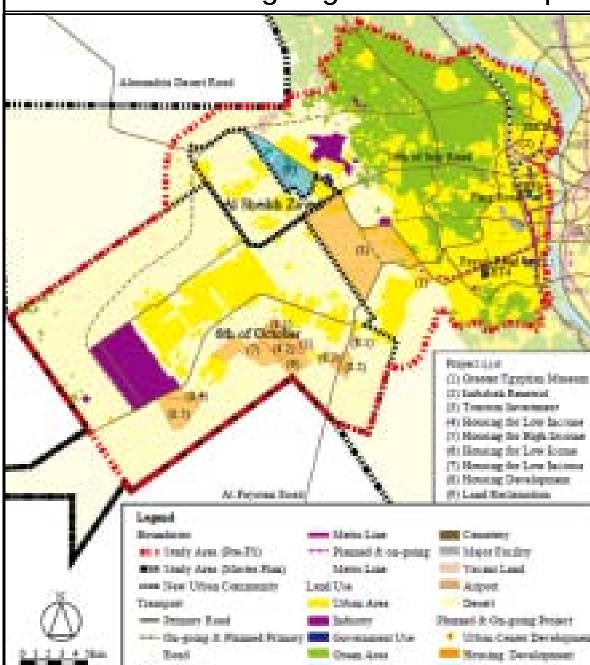
✓ The study area including the existing main agglomeration in Giza and 6th of October/ Shiekh Zayed NUCs.

✓ Continuous urban areas in southern part of Giza up to Pyramids

✓ Two archeological and one natural (geological) protectorates

Existing Land Use Map in the Study Area

On-going Urban Development Projects

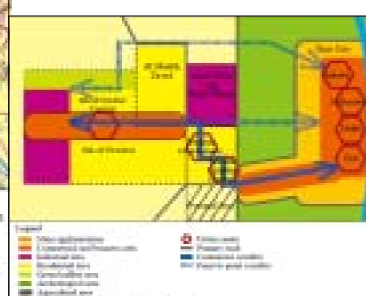


On-going urban development between NUCs and main agglomeration including;

✓Grand Egyptian Museum

✓Large tourism investment zone

✓Smart village and Abu Rawash industrial area



Future Growth Pattern of Western Development Corridor in 2027

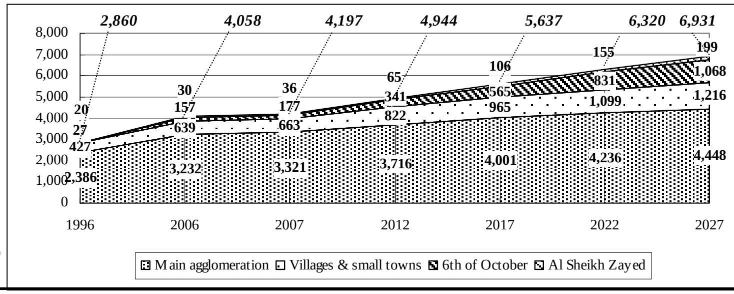
On-going Project in the Study Area

Planning Framework for Western Development Corridor in 2027

Population, Workers, Students in 2006-2027 in the Study Area for Pre-FS

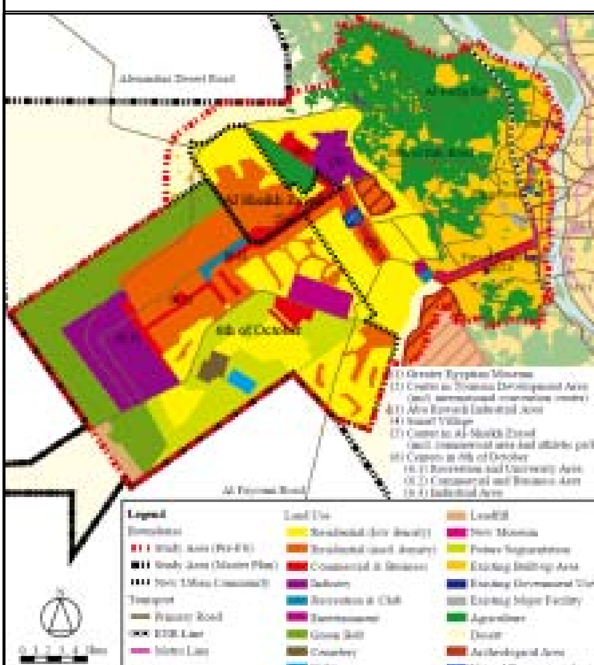
Category		Unit	2006	2007	2012	2017	2022	2027
Population		1,000	4,058	4,197	4,944	5,637	6,320	6,931
No. of Workers	Primary	1,000	42	43	48	53	60	64
	Secondary	1,000	335	343	388	440	505	539
	Tertiary	1,000	587	601	678	758	849	907
	Total	1,000	964	987	1,114	1,251	1,413	1,510
No. of Student	Pri., Pre., and Sec.	1,000	674	669	865	1,091	1,337	1,647
	University	1,000	255	262	277	300	330	386
	Total	1,000	928	931	1,142	1,391	1,667	2,033

✓Framework based on the master plan for the GCR in the 1st phase

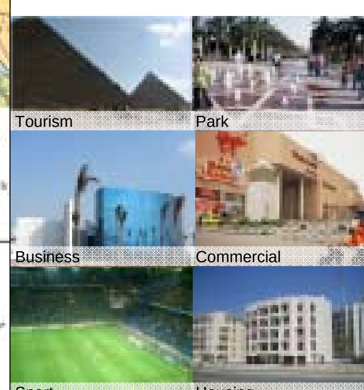


Population by built-up area in 2027

General Land Use Plan of the Study Area in 2027



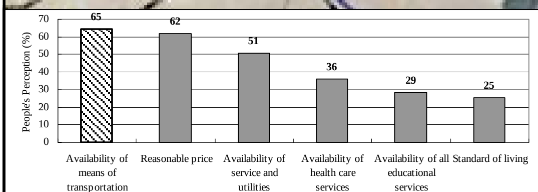
✓Continuous urban areas unserved by public transport in south Giza up to Pyramids
✓New development taking place in areas between NUC and main agglomeration
✓Active development near Sheikh Zayed along Alex. Desert Road and 26th July road
✓Mid/high density area along the existing and new urban centers



General Land Use Plan in the Study Area

Candidate Routes for Pre-Feasibility Study

Eight Options of Transport Route



People's Perception for Conditions to Move to NUC

Description of Eight Options

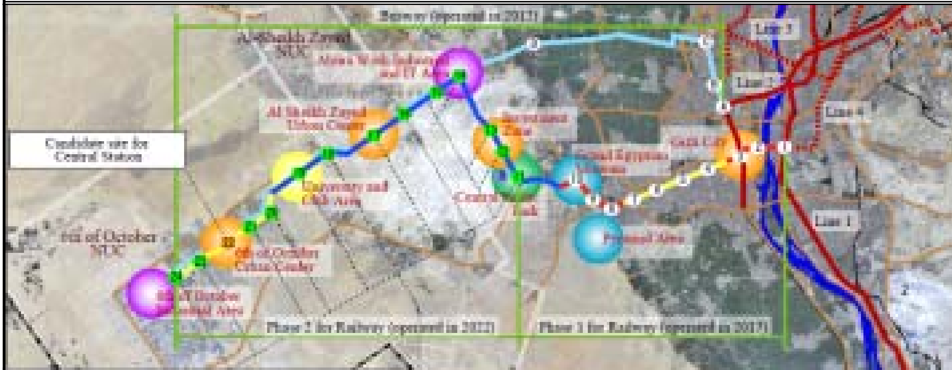
	Name of Option	Length (km)	Mode
1	Bus Plan	35.9	Bus
2	Railway Plan on the Same Track of Option 1	35.9	Rail
3	Bus Plan	40.73	Bus
4	Railway Plan on the Same Track of Option 3	40.73	Rail
5	Extension of Metro 4 to 6th of October	35.19	Rail
6	Extension of Metro 4 to 6th of October	32.31	Rail
7	Railway Plan on Extension Road of North Expressway	39.99	Rail
8	Utilization of Egypt Railway Plan	66.39	Rail

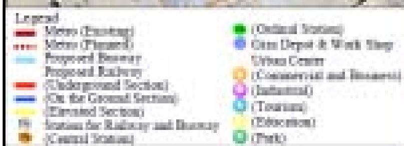
Comparative Analysis for Alternative Routes

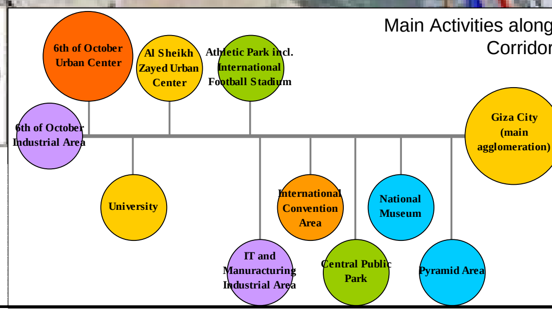
	Name of Option	Magnitude of Traffic Demand in 2027 ('000)	Urban Develop-ment Direction	Construc-tion cost (US$ mil.)	Socio-Environ-mental aspect	Invest ment per pass. (US$/Pa.)	Overall Evaluation
1	Busway Plan on 26th of July Road	324	Point to point	545	A little	2,330	Not recommended
2	Railway Plan on 26th of July Road	620	Point to point	977	Some	1,330	Not recommended
3	Busway Plan on Saft El Laban Axes and 26th of July Road	318	Point to point	578	Little	2,510	Recommended as short term plan
4	Railway Plan on Saft-El Laban Axes and 26th of July Road	660	Point to point	969	Many	1,240	Not recommended
5	Extension of Metro No 4 to 6th of October Road	666	Corridor dev.	1,605	A little	2,030	Recommended as medium & long term
6	Extension of Metro No 4 to 6th of October Road	594	Corridor dev.	1,606	A little	2,270	Alt. Option to Option 5
7	Road and Railway Plan on Extension of North Expressway	324	Point to point	1,004	Some	2,600	Considered Necessary as a point-to-point road
8	Utilization of Egypt Railway Plan	74	Point to point	633	Little	7,190	Not recommended

✓Option 3 and Option 5 selected for the transport route of development corridor

Routes and Stations (Railway and Busway)







✓The western development corridor will interlink CBD of main agglomeration, urban centers of NUCs, industrial areas, public parks and a new national museum (Greater Egyptian Museum), and a new international convention area, and so on.

2. Traffic Demand

Travel Mode, Travel Destination and Travel Time

Location of Traffic Count Survey

Share by "Origin to" and "Destination from" 6th of October

To 6th of October					
Area	Giza	Imbaba	El Ahram	Khalifah	Dokki
Share	36.3%	21.2%	19.8%	4.1%	2.4%
From 6th of October					
Area	Giza	El Ahram	Maadi	Shubra	Dokki
Share	39.7%	39.7%	7.9%	3.2%	1.6%

Share by Transport Mode

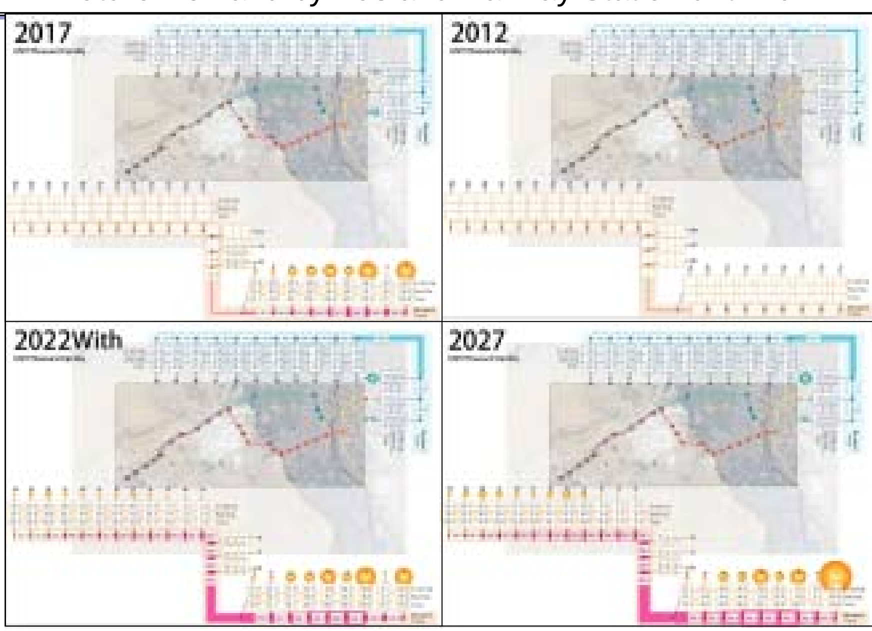
Transport Mode	Share (%)
Shared Taxi	88.0
Taxi	3.4
Minibus	2.8
Passenger Car	2.2
Bus	0.8

Travel Time and Fare of 6th of October Residents

Item	First Mode	Linked Trip	Last Mode
Walking Time to/from Mode (min.)	5.0		3.1
Waiting Time		13.2	
Walking Time for Transfer		2.1	
Waiting Time for Transfer		7.6	
Vehicle Time		73.8	
Fare		3.0 LE	

- ✓High rate of shared taxis (88%) for trips
- ✓Very limited use of cars.
- ✓Main destinations of 80% to Giza (36%), Pyramids area (20-40%) and Imbaba (20%),
- ✓Very long travel time of 104 minutes (incl. 74minutes for vehicle trip)

Future Demand by Bus and Railway Station until 2027



✓Traffic demands are estimated for each station based on the traffic model of SDMP as updated with the surveys and socio economic/population framework

Public Transport Network Improvement

Summary of Demands of Railway and Busway

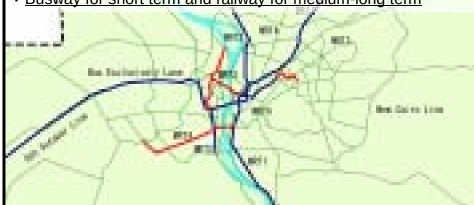
	Passengers	Max. through-Pax
6th of October Line		
2017	425,800	144,800
2022 w/o 6th of October Line	439,050	151,500
2022 with 6th of October Line	679,900	201,400
Year 2027	795,800	221,000
Bus Exclusive Lane Operation		
Year 2012	100,800	40,400
2017	157,450	61,700
2022 w/o 6th of October Line	**313,800**	120,700
2022 with 6th of October Line	209,250	72,800
2027	229,650	80,700

Improvement in 2008-2012

✓Short term: Busway along 26th of July and Metro 3

Improvement in 2013-2017

✓Demand for busway exceeding capacity of 300,000 in 2022.
✓Railway starting serve until 2022.
✓Busway for short term and railway for medium-long term



✓Medium term: Metro 4 up to Pyramids and Metro Line 3 westward to Imbaba and eastward

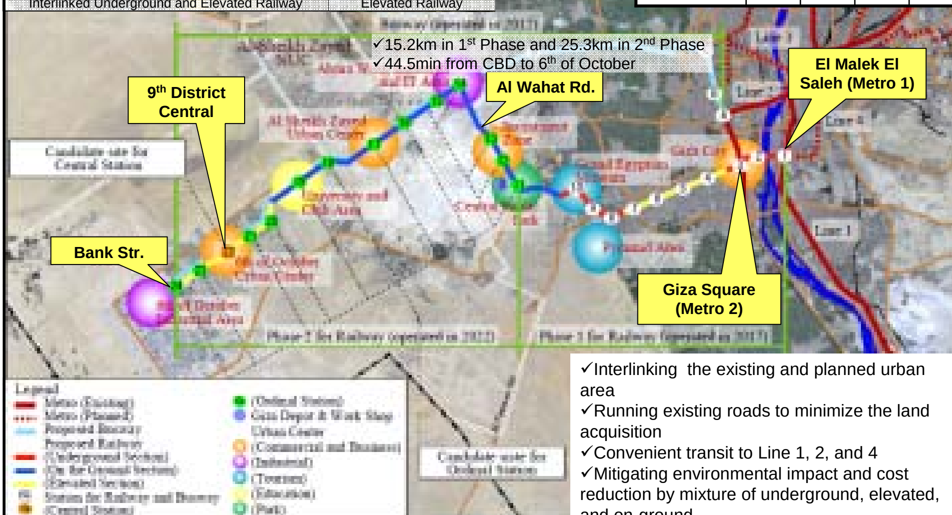
Improvement in 2018-2022

✓Long term: 6th October Line from Pyramids to 6th October, and Metro 3 eastwards and East Wing

3. Railway Plan

Routes and Stations (Railway)

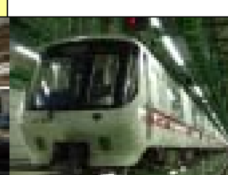
Type	Ph. 1	Ph. 2	Total	%
Underground	7.5	0.0	7.5	19
Elevated	6.2	7.6	13.8	34
At-Grade	1.5	17.7	19.2	47
Total	15.2	25.3	40.5	100



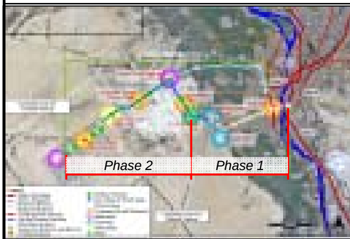
- ✓Interlinking the existing and planned urban area
- ✓Running existing roads to minimize the land acquisition
- ✓Convenient transit to Line 1, 2, and 4
- ✓Mitigating environmental impact and cost reduction by mixture of underground, elevated, and on-ground.
- ✓1st Phase (15.2km) and 2nd Phase (25.3km)

Evaluation of Suitable Railway System

Comparison by Three Railway Systems

Evaluation Item	**Heavy Rail**	Linear Motor	Monorail
Compatibility with Route Condition	**Good for any alignment**	Good for elevated /underground	Good for elevated
Transportation Capacity	**Large**	Smaller than Heavy Rail	Smaller than Heavy Rail
Easiness of Viaduct Construction	**Girder type mitigates traffics**	Girder type mitigates traffics	Easy construction
Travel Distance	**within 100km**	within 40km	within 30km
Noise, Vibration and Scenery	**Noisy (protection measure required)**	Smaller noise due to no traction gear	Smallest because rubber tire use
Overall Evaluation	**Most appropriate to 6th Oct Line**	Less than Heavy Rail (Difficult to maintain at-grade for most part.)	Less than Heavy Rail (not so favorable for at-grade section as it shall require a girder.)
Example			

Train Operation Condition and Construction Standard



Phase 1 and Phase 2 of Railway ✓15.2km in 1st Phase and 25.3km in 2nd Phase
✓44.5min from CBD to 6th of October

Basic Construction Standard

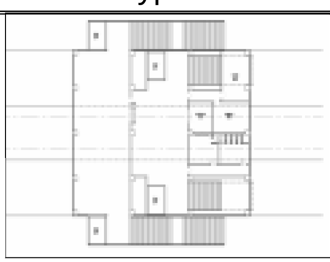
Item	Specification
Track Gauge	1,435mm
Design Max Speed	120km/h
Operation Max S.	110km/h
Min Radius Of Curve	
Main Line	R=600 m
Platform	R=400 m
Side Track, Depot	R=100 m
Max Gradient	35 ‰
Car Depot	Level
Min Vertic. Radius of C.	3,000 m
Main Line Viaduct	Slab Track
Main Line Ground	Ballast Track
Platform Length	170 m
Feeding Line Volt.	DC 1,500 V
Power Collection S.	Overhead Catenary

Basic Operation Conditions for Railway

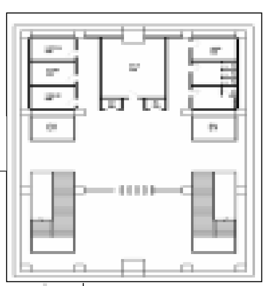
Item	Unit	Phase I (2017)	Phase II (2027)
Max Traffic Volume	pax/hr/way	20,272	30,940
Transport Capacity	pax/hr/way	20,300	31,000
Traveling Time	min.	24.5	**44.5** (Express) 61.0 (Ordinary)
Scheduled Speed	km/h	37.2	54.6 (Express) 39.8 (Ordinary)
Trains per Day	train/day/direction	153	159
Train Headway (peak hr)	min.	5	4.5
Cars per Train (Nominal pax. per car)	car/train (pax./car)	6 (942)	8 (1,266)
Required Train Set (excl. reserved)	set (set)	14 (2)	26 (3)
Required No. of Car	car	84	208

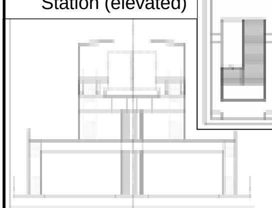
Typical Plan for Station and Depot

Typical Layout of Station (at ground)

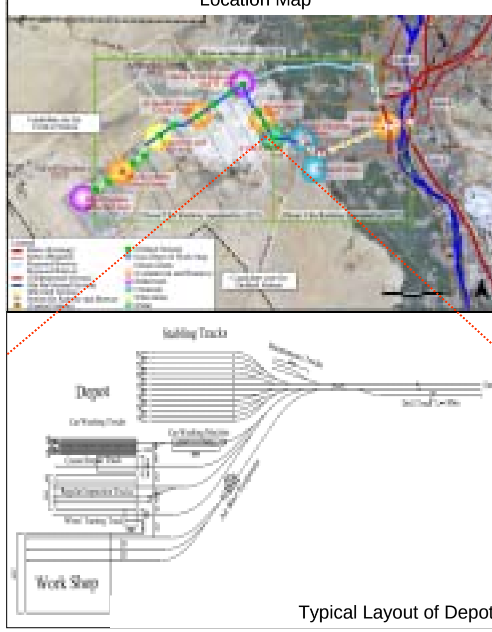


Typical Layout of Station (elevated)





Location Map



Typical Layout of Depot

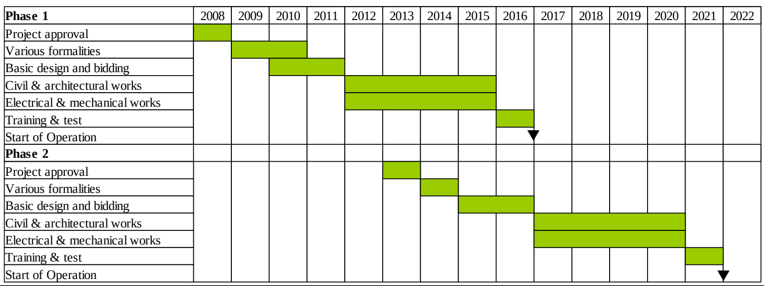
Preliminary Cost Estimate and Construction Schedule

Preliminary Cost Estimate

Item	Requirement	Cost (mil. USD)
Construction Costs (Phase I)	15.2 km	721.8
Construction Costs (Phase II)	25.3 km	270.3
Cars Costs (Phase I)	84 cars	134.4
Cars Costs (Phase II)	124 cars	198.4
Power Station/Distribution	Whole line	146.0
Signaling and Telecommunication	Whole line	98.0
Car Depot	Whole line	36.0
Contingency and Management		304.9
Custom Duties (Total to the above)		191.0
Total Costs		**2,100.8**

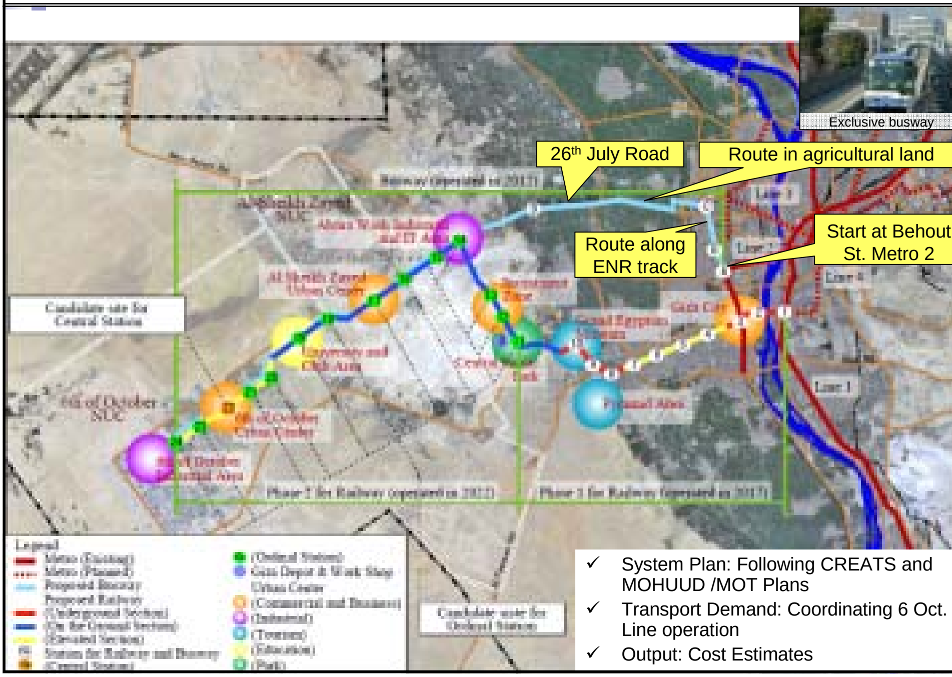
✓Opened in 2017 (1st Phase) and 2022 (2nd Phase)
✓Investment amounted 2,101million LE

Construction Schedule



4. Preliminary Study on 26th of July Busway

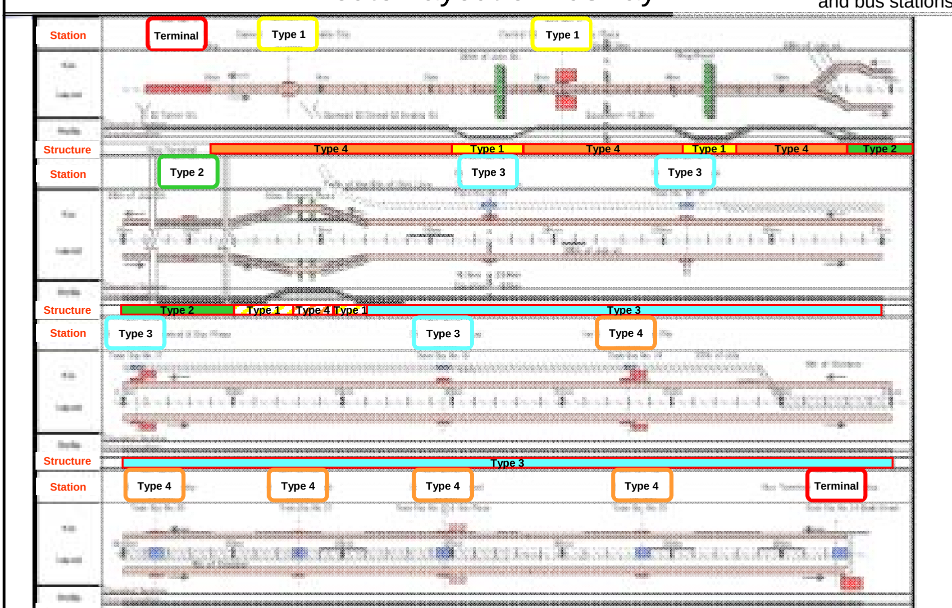
Routes and Stations (Busway)



- ✓ System Plan: Following CREATS and MOHUUD /MOT Plans
- ✓ Transport Demand: Coordinating 6 Oct. Line operation
- ✓ Output: Cost Estimates

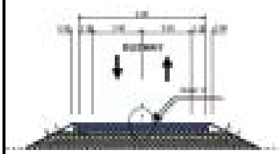
Route Layout of Busway

✓Five types of cross sections and bus stations



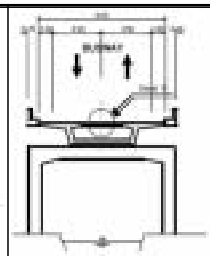
Type 1 Cross section (Type 1 for at-grade)
Type 1 Cross section (Type 1b for at-grade)
Type 2 Cross section (Type 2 for 26th of July)
Type 3 Cross section (Type 3 for 26th of July-6th of Oct.)
Type 4 Cross section (Type 4 for Elevated)
Type 4 Cross section (Type 4b for Elevated)
Bus terminal station
Bus station (Type 1 for elevated)
Bus station (Type 2 for median)
Bus station (Type 3 for roadside along railway)
Bus station (Type 4 for roadside with railway at median)

Typical Cross Section of Busway

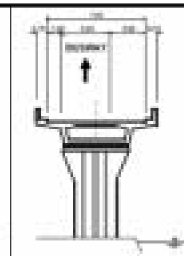


Type 1 at-grade level

Type 1b at-grade level

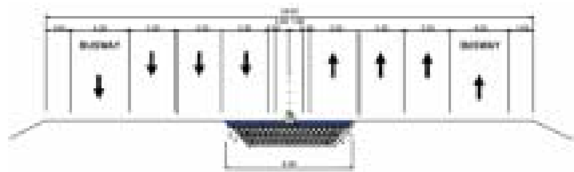


Type 4 for Elevated Section

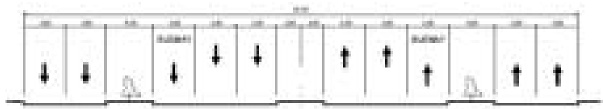


Type 4b for Elevated Section

Type 2 for 26th of July

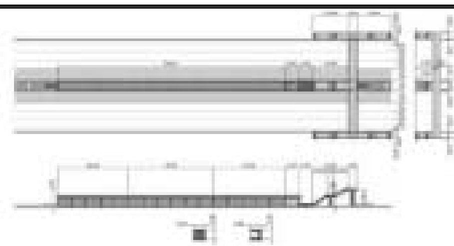


Type 3 for 26th of July-6th of October

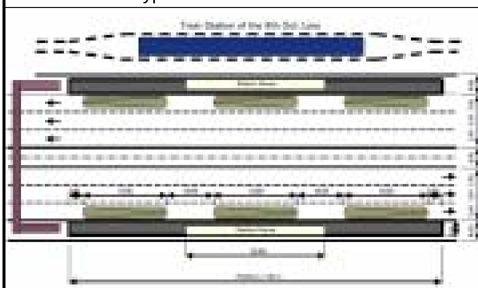


Typical Plan for Bus Stations

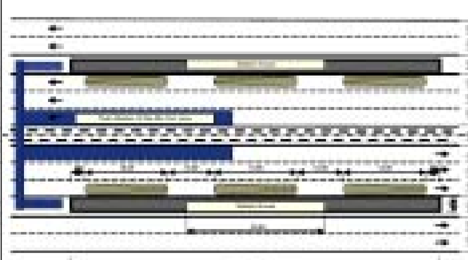
Type 1 for Elevated Station



Type 2 for Median Station

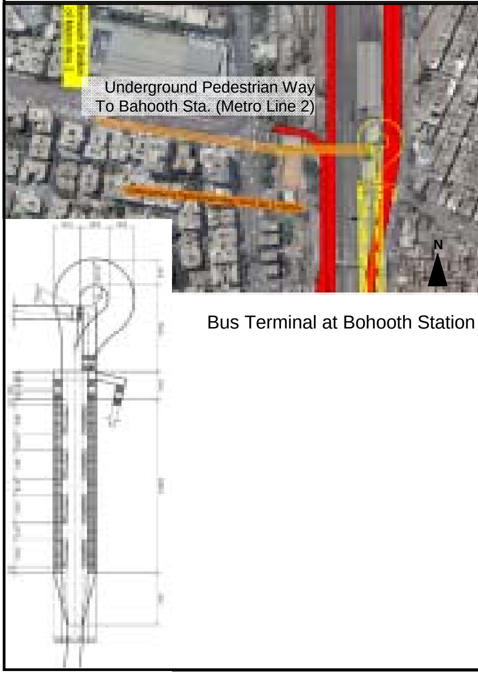


Type 3 for Roadside Station along Railway Station

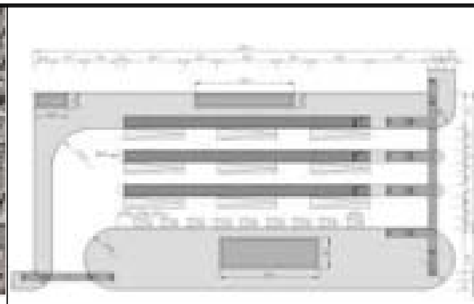


Type 4 for Roadside Station with Railway Station at Median

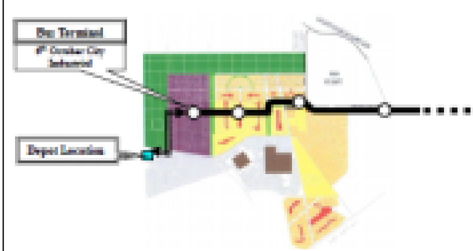
Typical Plan for Bus Terminals and Depot



Bus Terminal at Bohooth Station



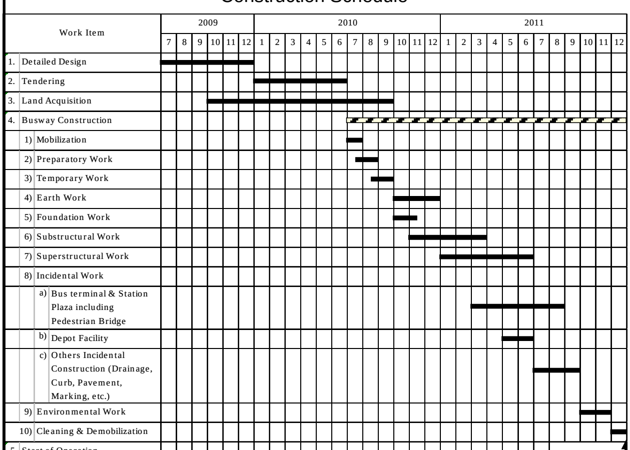
Bus Terminal in 6th of October



Proposed Site for Depot in 6th of October

Preliminary Cost Estimate and Construction Schedule for Busway

Construction Schedule



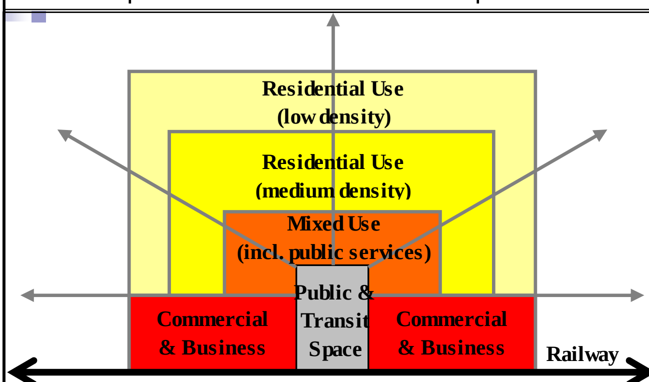
✓Opened in 2012
✓Investment amounted to 1,654.12million LE (incl. busway, buses, and stations)

Preliminary Cost Estimate

Item	Cost (mil. LE)
Busway	328.72
Stations (At Grade & Elevated)	67.83
Intermediate Station	5.77
Station Plaza	47.71
Bus Terminal	130.11
Depot and Workshop	46.85
Bus	908.00
Engineering and Const. Management, Local Admin, and Contingency	119.13
Sales Tax	78.12
Total	**1,654.12**

5. Urban Development Plan for Major Stations

Concept of Land Use Plan for Transport-Oriented Development at Station



Land Use Pattern around Station

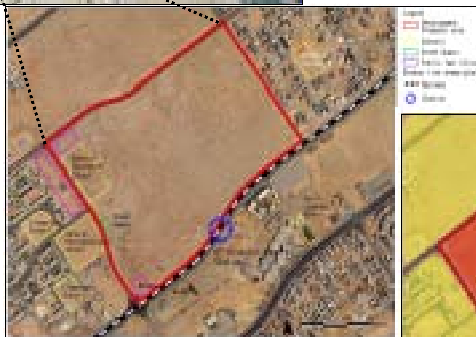
Station Square and Urban Development in its Surrounding Area

Development of the railway station and its surrounding areas aims at;
✓Providing efficient transit of the different transportation modes
✓Creating a focal point in the urban areas around to generate passengers

Existing Condition for Central Station Area

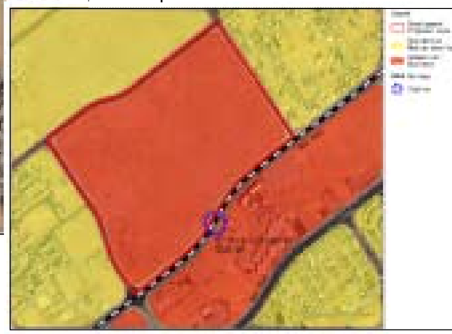
Location Map

✓In 6th of October, the 9th District was provisionally selected for central station location in consultation with NUCA



Existing Conditions (Vacant Land)
(Satellite Imagery in 2008)

✓According to NUCA land use plan, this area is planned for commercial area

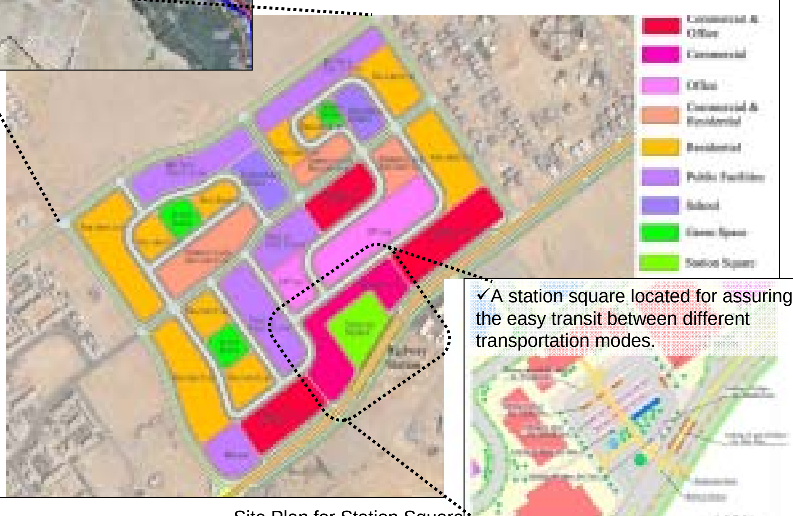


Designated Land Use

Land Use Plan for Central Station Area

Location Map

The central station area will provide an ideal site for
✓Business headquarters, branches,
✓Services, commercial, finances
✓High-rise residential
✓Public services, etc.



Land Use Plan for Central Station Area

✓A station square located for assuring the easy transit between different transportation modes.

Site Plan for Station Square

Planning Parameters and Development Image

✓BCR and FAR as the basic tools for building control.
✓Higher density for areas near the station, lower with the distance
✓Red: about 15 floors
✓Orange: about 10 floors

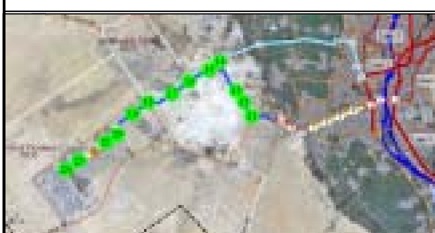
Building Coverage and Floor Area Ratios

Area by Land Use Category

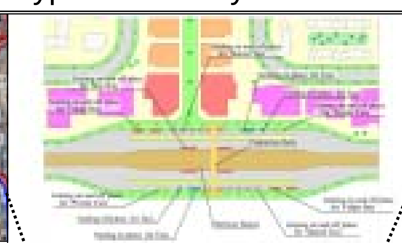
Land Use Category		Land Area (m^2)	Share (%)
Public Facility	Road	103,500	18.5
	Station Square	13,000	2.3
	Park	18,000	3.2
	Sub-total	134,500	24.0
Urban Development		425,500	76.0
Total		560,000	100.0

Development Image

Land Use Plan for Typical Ordinary Station



Location Map

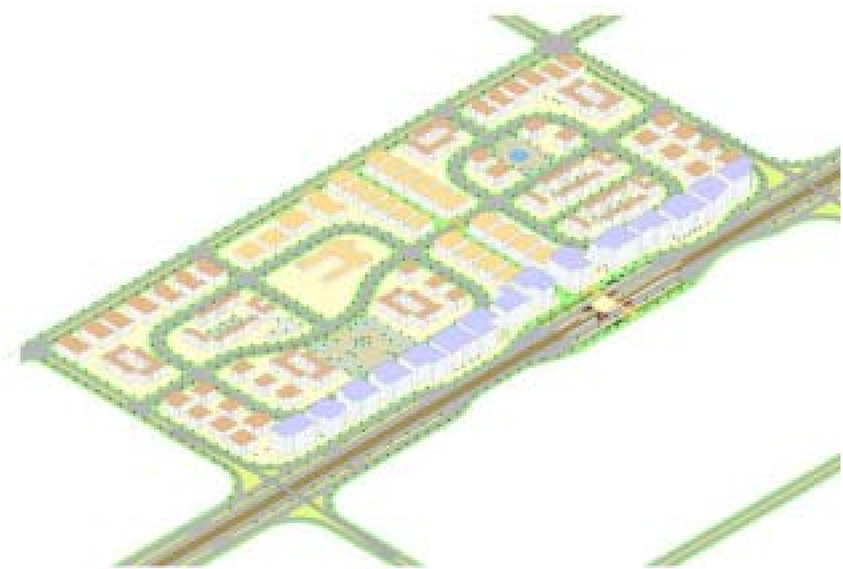


Site Plan for Station Square

Other ordinary station area will provide at smaller scale
✓Residential
✓Neighborhood shopping and services
✓Public services

Land Use Plan
(to be adjusted with Existing Conditions)

6. Economic Analysis and Environmental Consideration



Pre-Environmental Impact Analysis

	Busway	Railway
Initial Environmental Evaluation (IEE)		
Purpose	Screen in accordance with Egyptian and JICA social-enviornmental guidelines; 1) the potential impacts and 2) the necessity of environmental impact assessment according	
Outcome	1)Definitely environmental benefits on ambient air, taffict conditions, and greenhouse gas (GHG) emissions 2) Local adverse impacts should be studied in Pre-EIA	
Pre-Environmental Impact Assessment (pre-EIA)		
Purpose	Identify (i) environmental issues and (ii) recommendations for EIA in the implemenatation stage.	
Adverse Impact	1) Impacts largely related to construction phase and to be mitigated to some extent 2) Relocation in the limited areas	1) Impacts largely related to construction phase and to be mitigated to some extent 2) No possibility of mitigation for Change in landscape and the living environment typically along Pyramids Rd.
Conclusion	1) Local adverse impacts as Relocation of few activities and Change in the landscape 2) Social and environmetal benefit on air pollution, mobility, energy saving, and GHG emissions	
Recommendations for EIA		
Needs for Futher Study	1) Soil survey of the ENR workshops of El Bohouth 2) Social survey in sensitive areas of El Bohouth, Pyramids Road, and El Bashtir residential zones 3) Mitigation and compensation measures for the adverse impacts	

Economic and Financial Analysis

Economic Analysis

	Busway	Railway	Urban Development	Overall
Benefit	Cost saving by travel time and vehicle operation		Increase value added by industry	Increase value added by industry + Cost saving
EIRR	21.3%	14.1%	17.5%	16.5%
NPV	LE1,017 million	LE1,360 million	LE2,285 million	LE3,057 million
Conclu-sion	Economically feasible			

Financial Analysis

	Busway		Railway		
Case	Case 1	Case 2	Case 1	Case 2	Case 3
Subcidy to Const. Cost	0%	100%	0%	57%	100%
FIRR	18.46%	35.7%	8.04%	12.03%	n.a.
Fare	Distance-based Fare (due to long travel distance) 0.6LE/time+0.03LE/km in 2008 (5% increase per year similar to actual fare chane in 2000-2006)				
NPV	LE186 million	LE438 million	LE(968)million	LE5 million	LE1,300 million
Conclu-sion	Feasible in any case *with* and *without* subcidy for construction cost installed.		Marginally feasible, if more than 57% of infurastructure cost is borne by the purbli sector		

Conclusion

1) Economically preferable to implement the projects as a whole
2) Busway is commercially feasible, if part of the invetment cost is borne by the public sector
3) Subsidy or low interest rated fund required for railway for sound business model

Thank you!