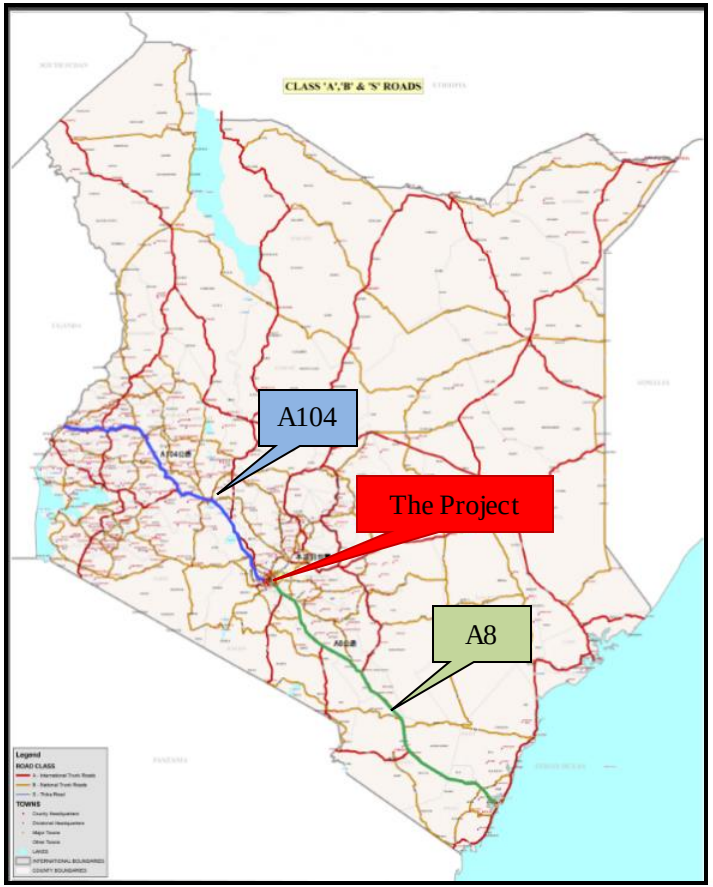
Nairobi JKIA to James Gichuru Rd Expressway Project

Contents

1. Background of the Project

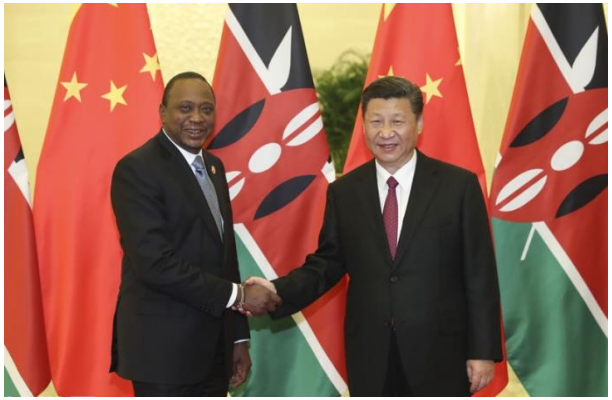
Background of the Project

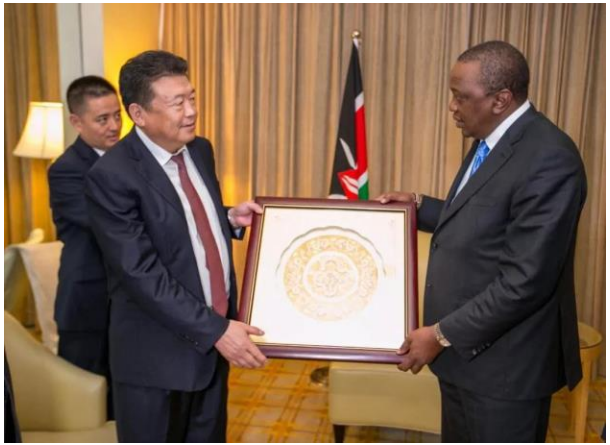
- The Project connects 2 international arteries:
  - A8: Nairobi to Mombasa and Tanzania;
  - A104: Nairobi to Nakuru, Kisumu and Uganda.
- A8 Road passes through the downtown of Nairobi, where serious traffic congestion often occurs, especially between JKIA and James Gichuru Road.



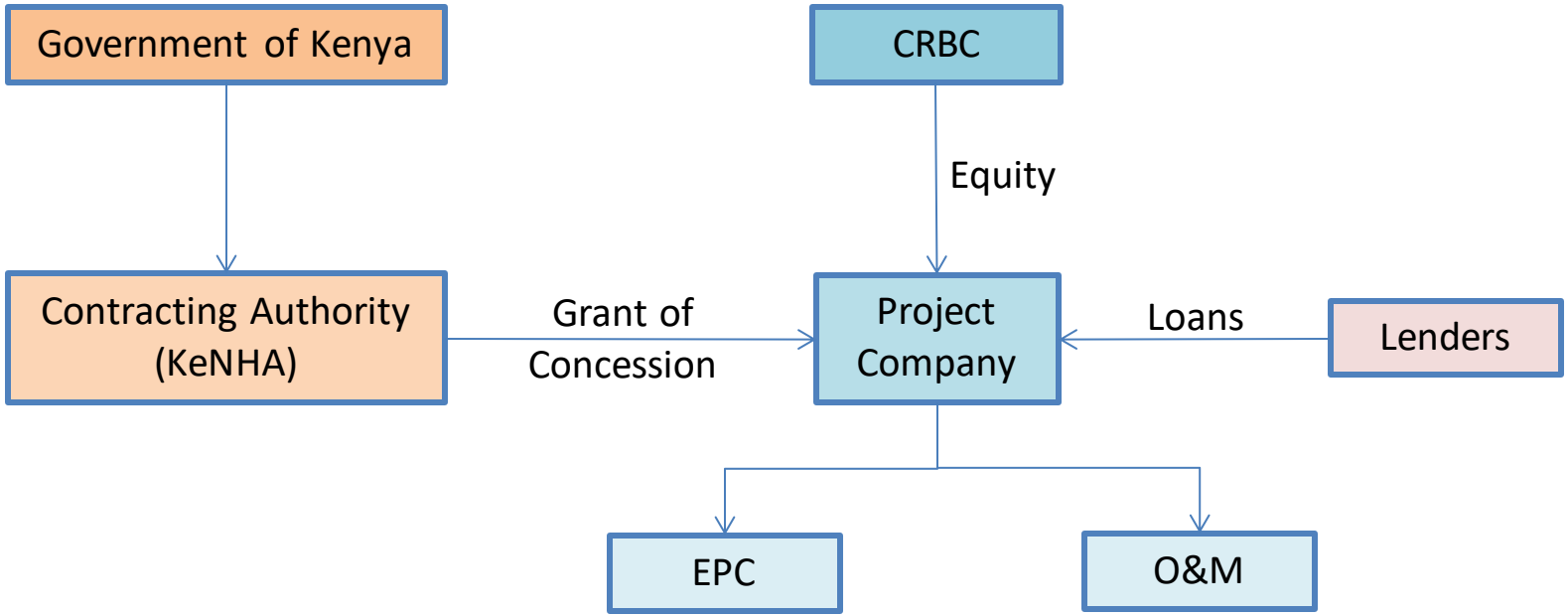
Background of the Project

- **Sep 2018**: Since invited to develop the Project during 2018 Beijing Summit of FOCAC, we promptly established a team to initiate the research and study.
- **Oct 2018**: Traffic and O/D survey; geological investigation;
- **Nov 2018**: Feasibility study;
- **Jan 2019**: Technical Proposal;
- **Mar 2019**: Financial Proposal.





Background of the Project – Proposed BOOT Structure

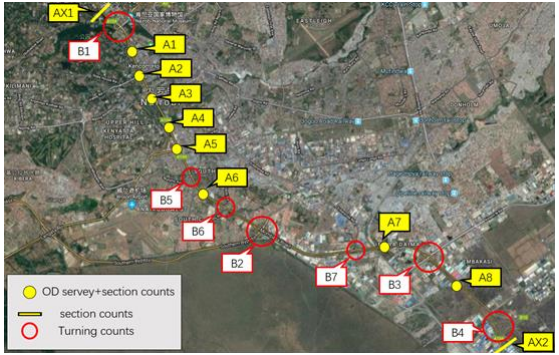


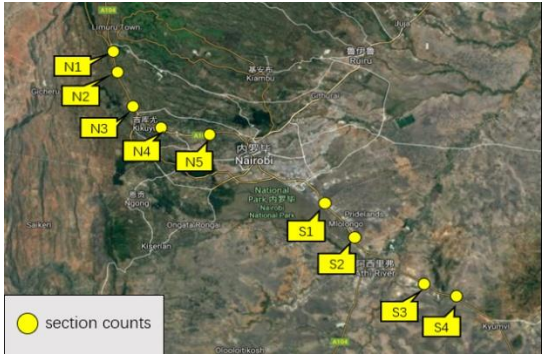
2. Traffic Forecast

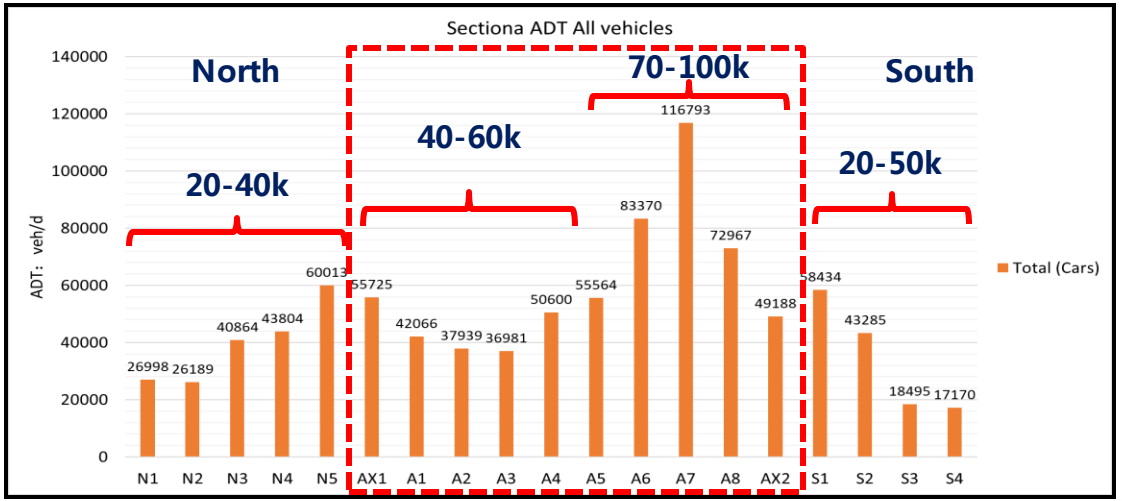
Traffic Forecast

➢ Traffic survey points:

- Part 1: **17** survey points on A8 Road in the urban area, including 8 OD survey and section counts points, 2 section counts points, and 7 survey points of turning counts.
- Part 2: **5** 24-hour section counts points on A8 Road in the north of the urban area, and **4** 24-hour section counts points on A8 and A109 Roads in the south of the urban city.

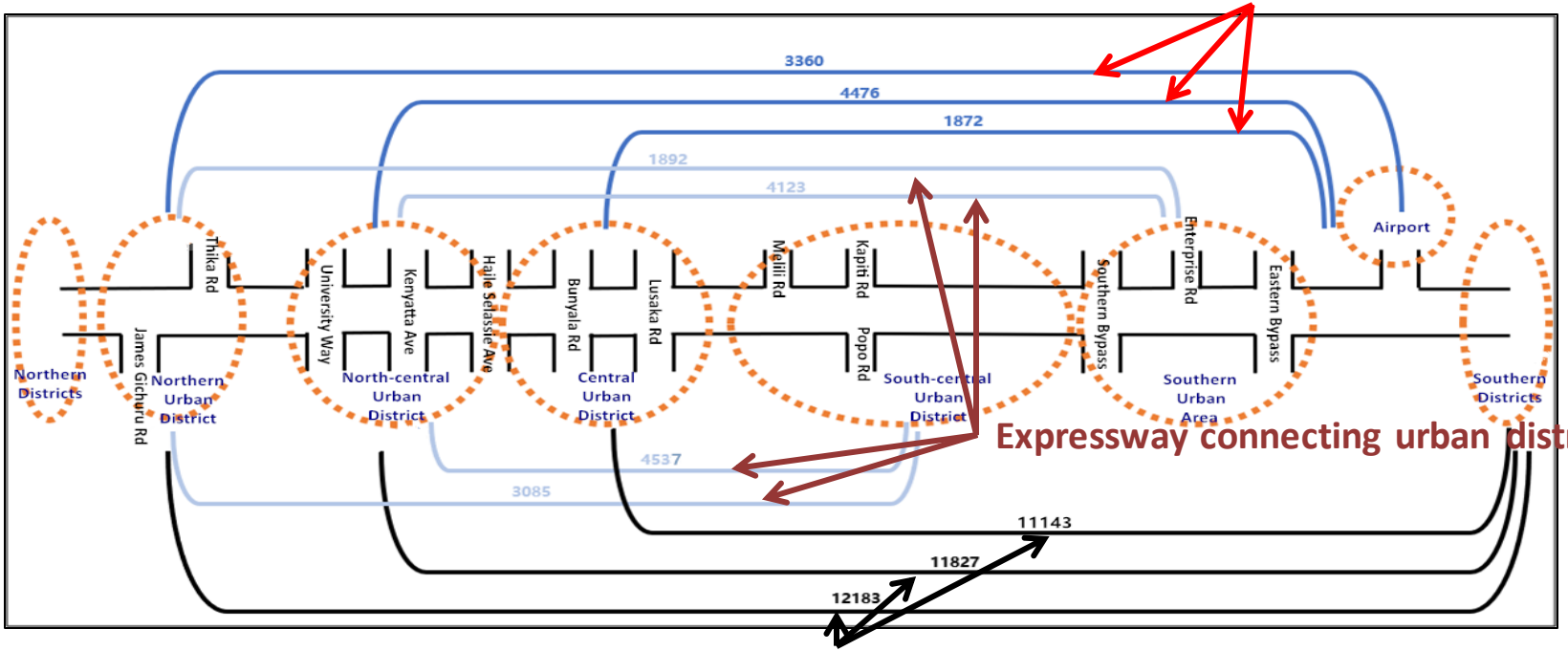






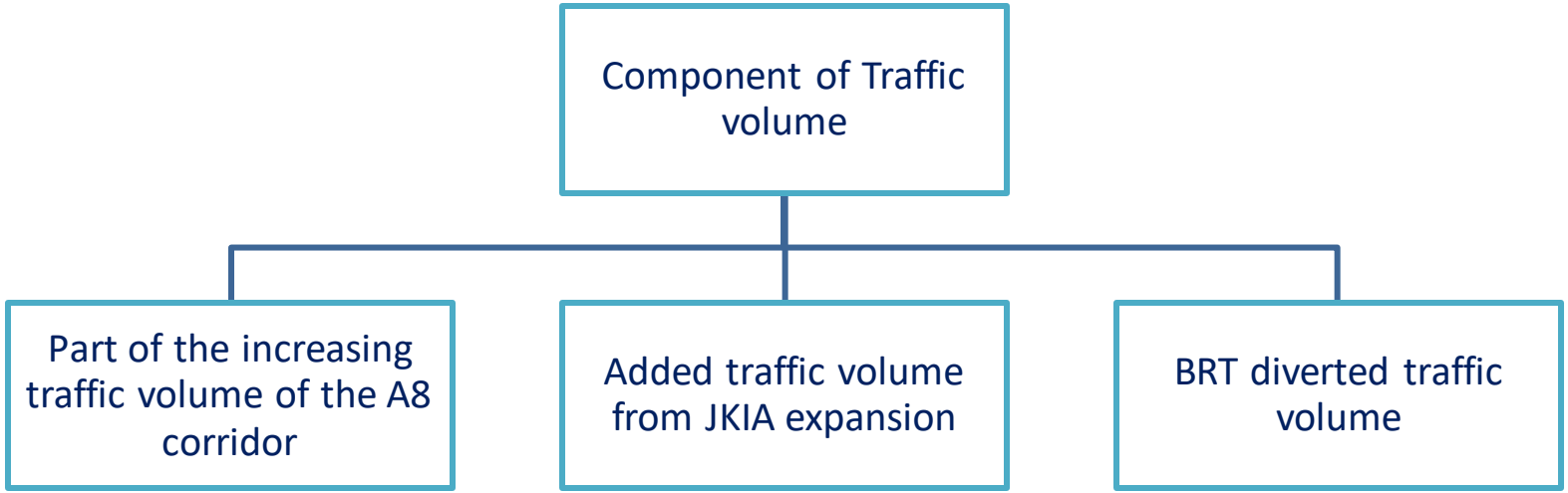
Traffic Forecast

- **Function of the Project**



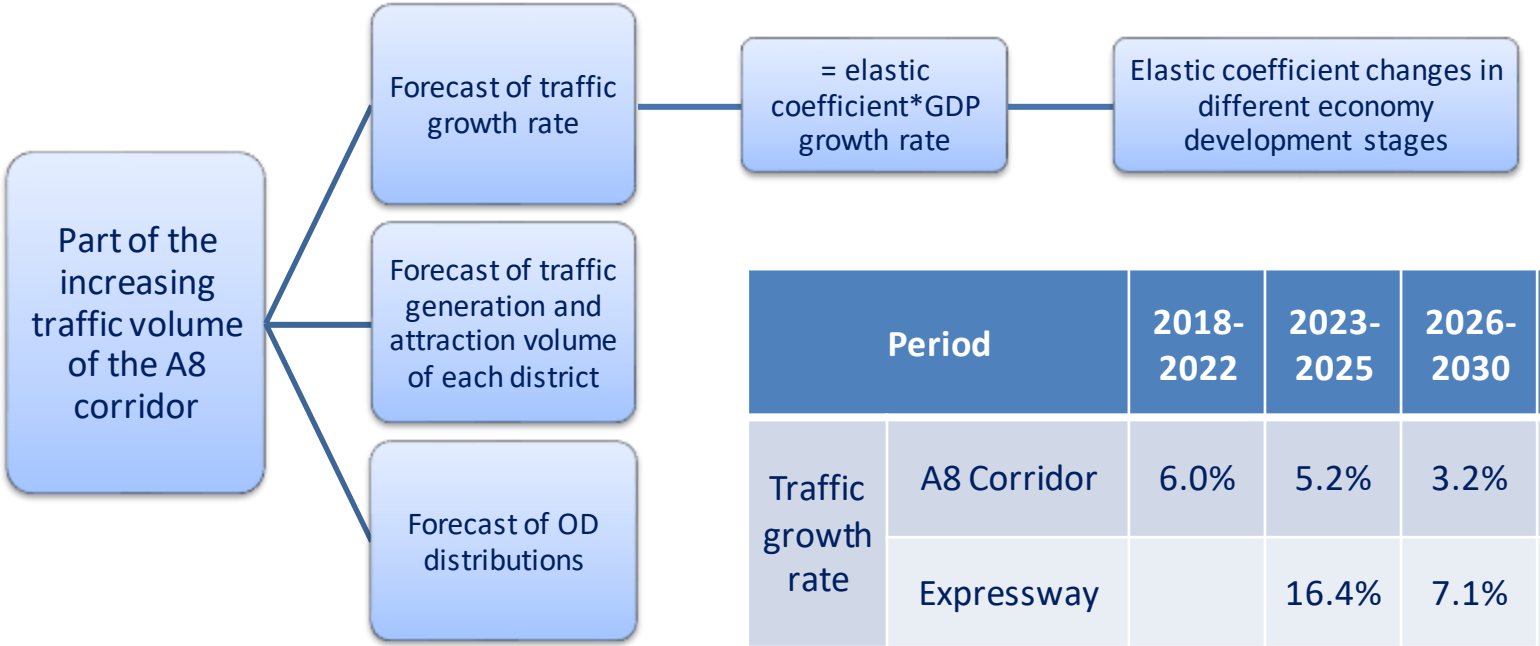
Traffic Forecast

- **Method to forecast the traffic volume**



Traffic Forecast

- **Method to forecast the traffic volume -** Part of the increasing traffic volume of the A8 corridor



Period		2018-2022	2023-2025	2026-2030	2031-2040	2041-2050
Traffic growth rate	A8 Corridor	6.0%	5.2%	3.2%	1.6%	0.2%
	Expressway		16.4%	7.1%	2.4%	0.3%

Traffic Forecast

- **Method to forecast the traffic volume -** Added traffic volume from JKIA expansion

Adjusted estimation of overall passengers after the reconstruction and expansion of JKIA

Forecast of added Passenger Volume

Year	Departing and arriving passengers ('000 person-time/year)			Transit passengers ('000 person-time/year)	
	International	Domestic	Total	Transit	Total
2020	0	0	0	0	0
2021	150	36	186	70	256
2022	304	72	376	142	518
2023	760	181	941	355	1,297
2024	880	209	1,089	411	1,500
2025	949	225	1,174	443	1,617
2030	2,620	622	3,241	1,224	4,465
2035	4,093	971	5,064	1,912	6,976
2040	4,867	1,155	6,022	2,274	8,296
2050	6,613	1,569	8,182	3,090	11,271

Basic data resource: *National Airports System Plan—Jomo Kenyatta International Airport Master Plan*

Traffic Forecast

➢ **Method to forecast the traffic volume -** BRT diverted traffic volume

Year	BRT					Average actual load rate of cars (persons/ vehicle)	Average actual load rate of buses (persons/ vehicle)	Diverted traffic volume of cars (Vehicles/ day)	Diverted traffic volume of buses (Vehicles/ day)
	Full load of one vehicle (persons)	Average departure interval (min)	Daily service time (hours)	Carrying capacity (persons/ day)	Actual load rate				
2023	80	5.0	15	28,800	85%	1.3	15	**1,318**	**1,518**
2025	80	5.0	15	28,800	88%	1.3	15	**1,365**	**1,571**
2030	80	5.0	15	28,800	88%	1.3	15	**1,365**	**1,571**
2042	80	5.0	15	28,800	92%	1.3	15	**1,427**	**1,643**
2049	80	5.0	15	28,800	94%	1.3	15	**1,458**	**1,678**

Traffic Forecast

Year	2023	2025	2030	2040	2049
K9 exit	1,493	2,196	3,049	4,099	4,201
K9 entrance	1,454	2,297	3,184	4,276	4,383
K4 exit	883	1,382	1,943	2,254	2,311
K4 entrance	929	1,448	2,032	2,357	2,417
K0 airport exit	3,046	3,890	4,837	5,905	6,052
K0 airport entrance	2,805	3,402	4,470	5,459	5,595
K0 Exit (to Athi)	5,697	7,626	11,290	14,584	14,946
K0 Entrance (from Athi)	5,870	7,785	11,566	14,962	15,332
Total of K9 section of the Project	**22,176**	**30,026**	**42,371**	**53,897**	**55,236**
Remaining of K9 section of A8 Road	80,752	82,826	88,354	97,891	98,968
Total of K9 section of the corridor	106,841	118,151	138,202	161,298	163,952
Percentage of the Project	20.7%	25.4%	30.7%	33.4%	33.7%

Key Issues – Number of Lanes

Calculation and recommendation of number of lanes

Chainage		Predicted traffic volume in 2032 (Vehicles/ day)	Single-way design hourly traffic volume (Vehicles/ hour)	Maximum service traffic volume (pcu/d)	Calculated number of lanes	Recommended number of lanes
Starting	K0	24,086	1,084	1,500	0.72	1
K0	K4	33,784	1,521	1,500	1.01	2
K4	K9	37,887	1,705	1,500	1.14	2
K9	K10.5	44,509	2,003	1,500	1.34	2
K10.5	K13	23,490	1,057	1,500	0.70	1
K13	K16	14,309	644	1,500	0.43	1
K16	K18	8,004	360	1,500	0.24	1
K18	Ending	4,953	223	1,500	0.15	1

Key Issues – Service Level

Peak Hour Service Level by Sections in 2030 and 2049

Year		2032		2049	
Traffic		44,509		55,236	
Sections		Peak Hour Saturability	Service level	Peak Hour Saturability	Service level
Starting	K0	0.29	B	0.36	B
K0	K4	0.41	B	0.51	C
K4	K9	0.45	C	0.56	C
K9	K10.5	0.54	C	0.66	D
K10.5	K13	0.28	A	0.35	B
K13	K16	0.17	A	0.21	A
K16	K18	0.09	A	0.12	A
K18	Ending	0.06	A	0.08	A

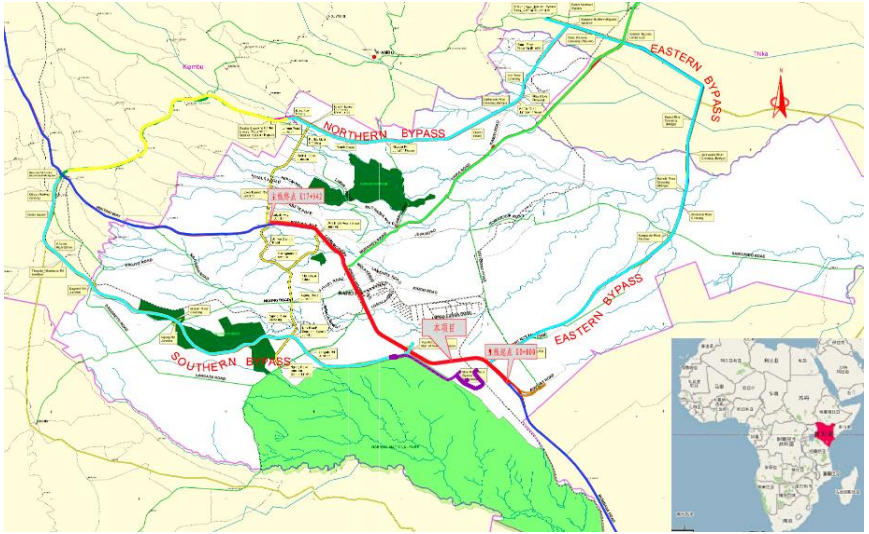
Indexes of Service Levels

Service level	Operation conditions	Saturability
A	Free traffic flow (smooth)	≤0.28
B	Stable traffic flow (slightly delay)	≤0.44
C	Stable traffic flow (acceptable delay)	≤0.64
D	Nearly unstable traffic flow (tolerable delay)	≤0.85
E	Unstable traffic flow (crowded and intolerable delay)	≤1.00
F	Forced traffic flow (jam)	Meaningless

3. Scheme of the Project

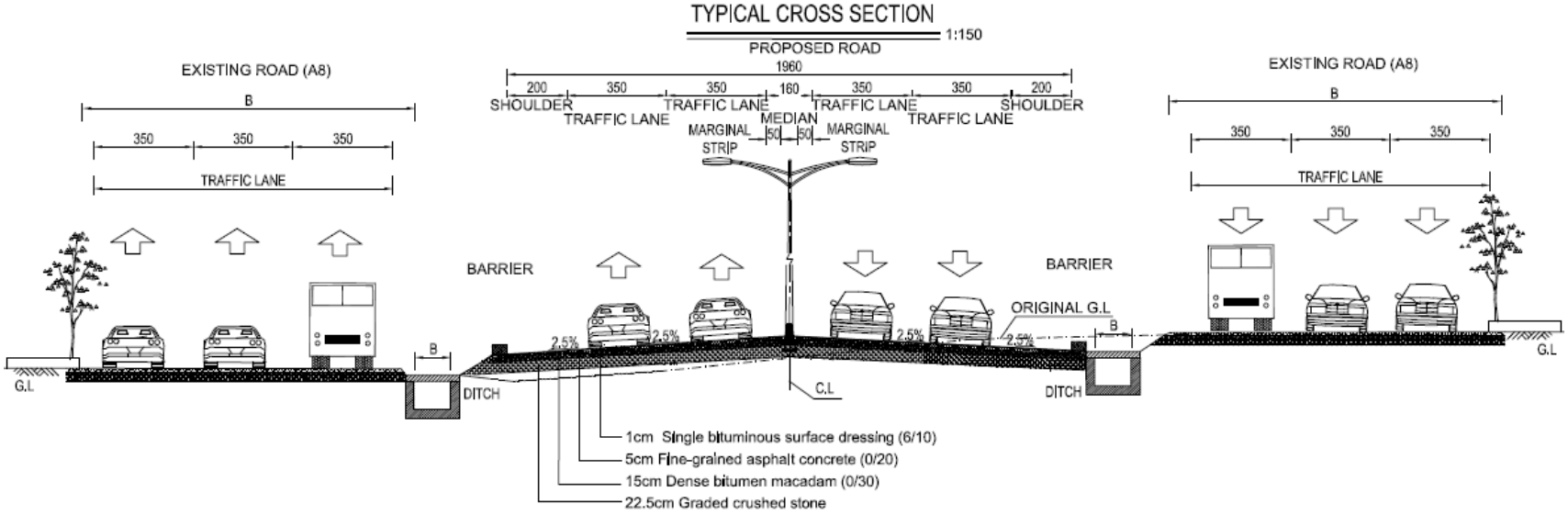
Scheme of the Project

- **Starting point**: JKIA.
- **Ending point**: James Gichuru Road.
- **Alignment**: along the median strip of A8 Road.
- **Length**: 18.586 km.
- **Design standard**: Class A, two-way four-lane.
- **Design speed**: 80 km/h.
- K0 - K7+370: roadbed and pavement.
- K7+370 – K18+586: viaduct.



Scheme of the Project – Standard Cross Section

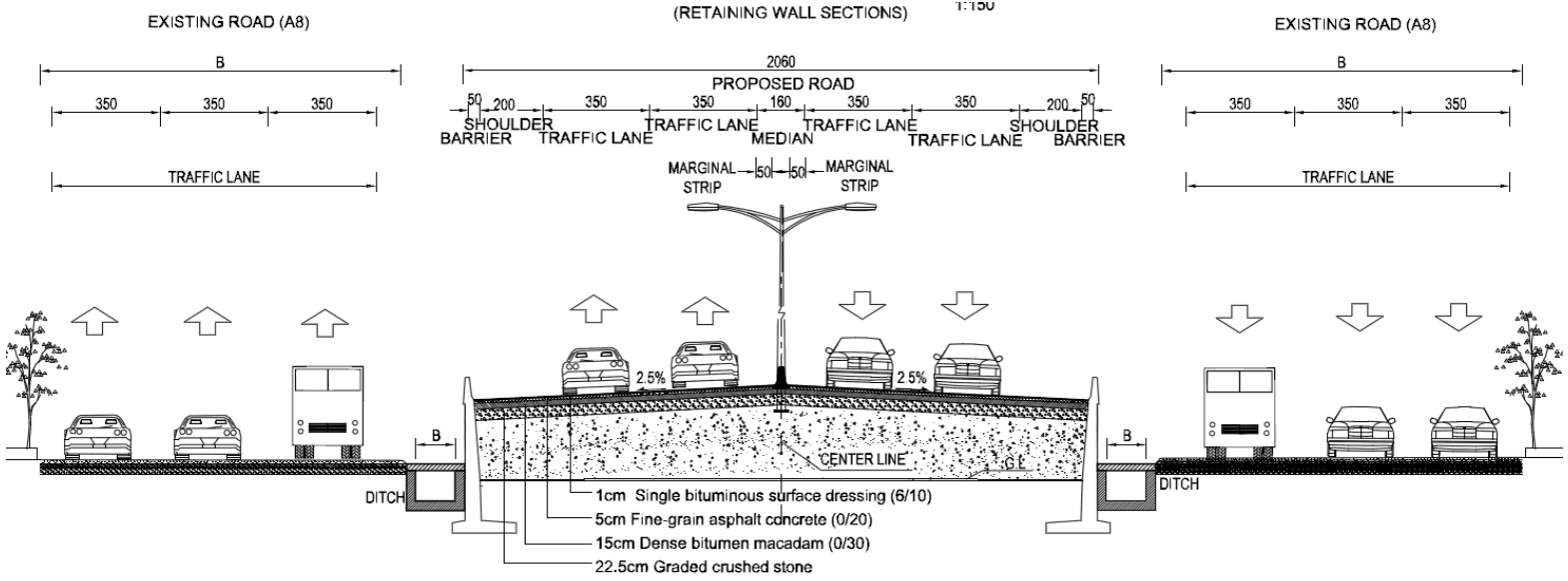
- Standard Cross Section (19.6m) of Roadbed of General Section



2.0m paved shoulder + 3.5m×2 carriageways + 0.5m marginal strip + 0.6m guardrail + 0.5m marginal strip + 3.5m×2 carriageways + 2.0m paved shoulder

Scheme of the Project – Standard Cross Section

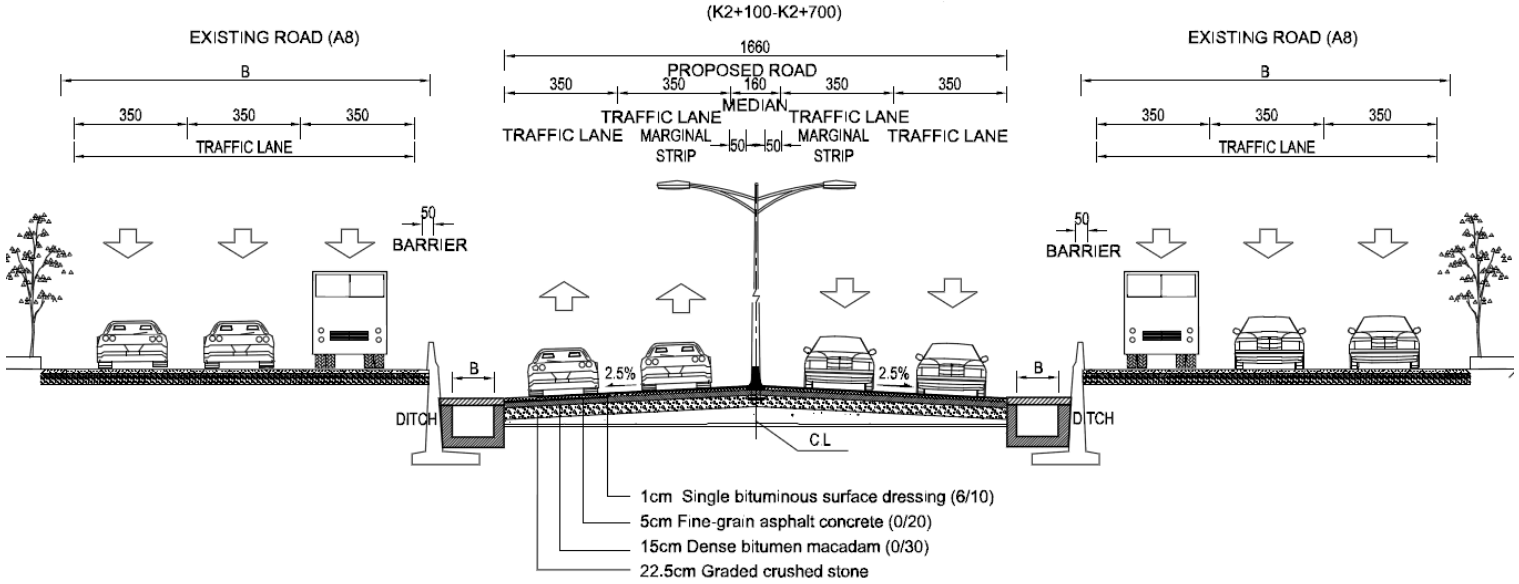
- Standard Cross Section (20.6m) of Roadbed of Section with Retaining Wall



0.5m guardrail + 2.0m paved shoulder + 3.5m×2 carriageways + 0.5m marginal strip + 0.6m guardrail + 0.5m marginal strip + 3.5m×2 carriageways + 2.0m paved shoulder + 0.5m guardrail

Scheme of the Project – Standard Cross Section

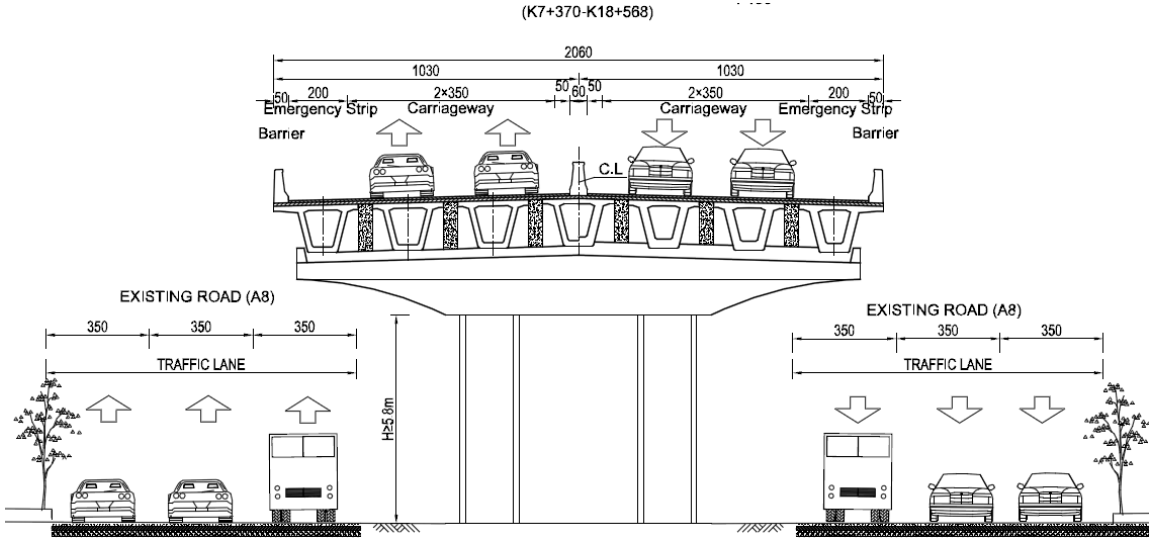
- Standard Cross Section (16.6m) of Roadbed from K2+100 to K2+700 Section (Eastern Bypass)



0.5m marginal strip + 3.5×2 carriageways + 0.5m marginal strip + 0.6m guardrail + 0.5m marginal strip + 3.5×2 carriageways + 0.5m marginal strip

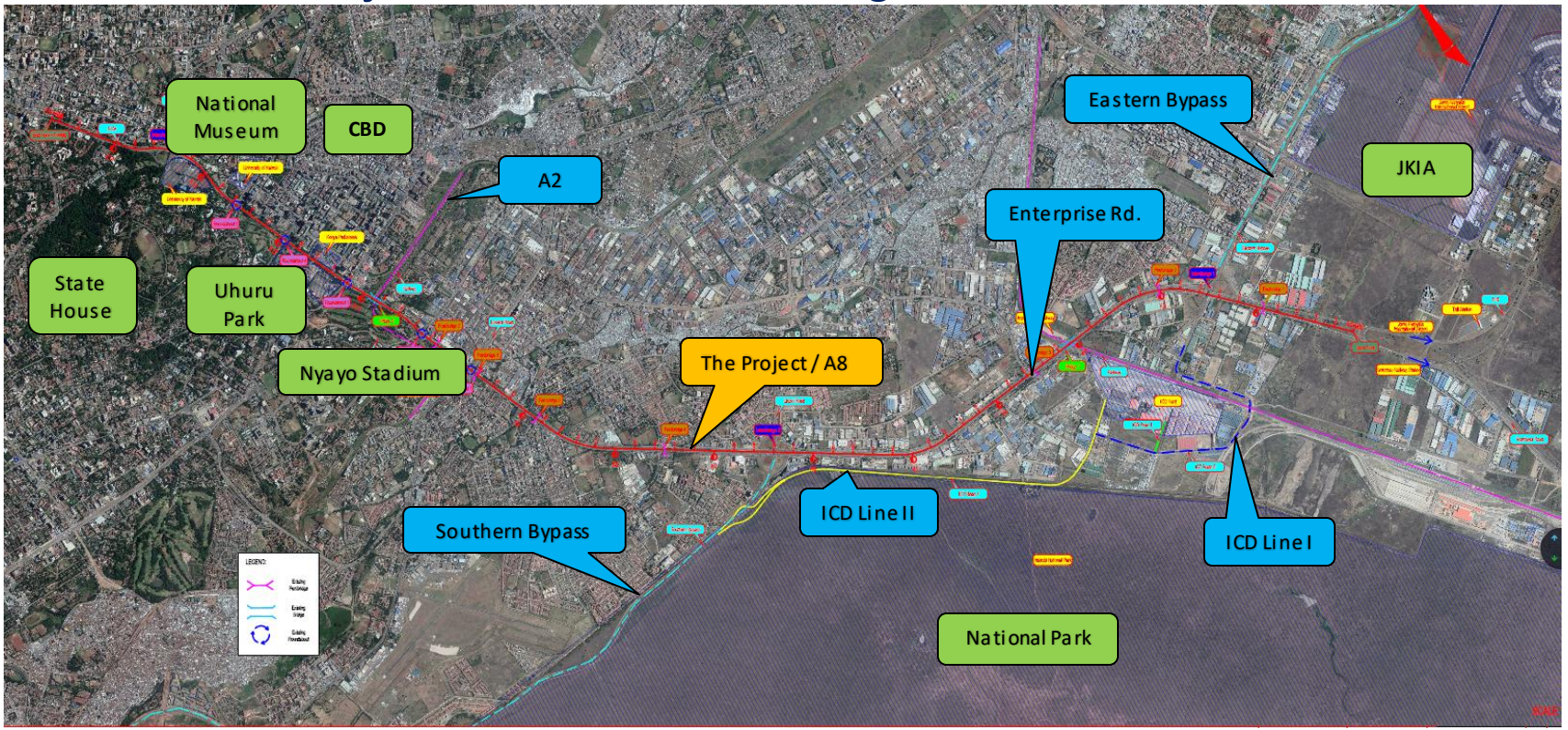
Scheme of the Project – Standard Cross Section

- Standard Cross Section (20.6m) of Bridge from K7+370 to K18+586



0.5m guardrail + 2.0m paved shoulder + 3.5m×2 carriageways + 0.5m marginal strip + 0.6m guardrail + 0.5m marginal strip + 3.5m×2 carriageways + 2.0m paved shoulder + 0.5m guardrail

Scheme of the Project – Location of Interchanges

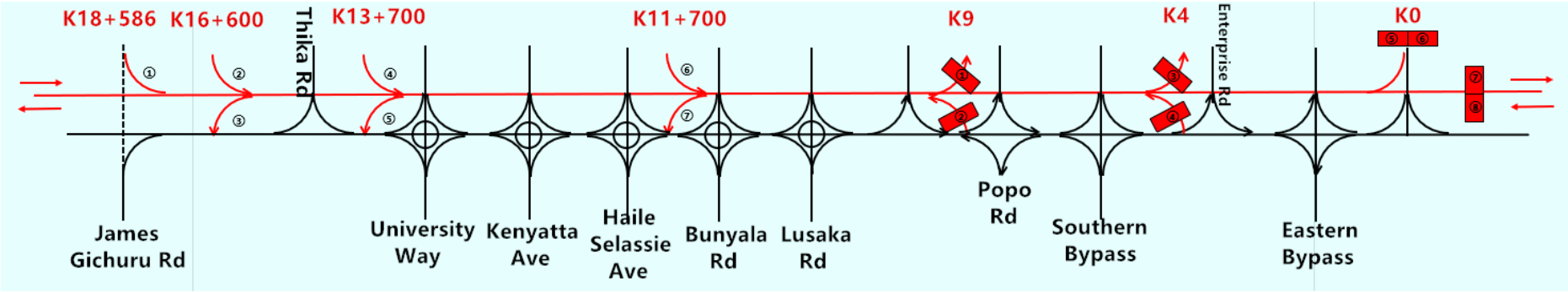


Scheme of the Project – Location of Interchanges

- **Main factors** of locating the interchanges:
  - Attracting traffics,
  - Existing road networks,
  - Topography,
  - Land acquisition,
  - Investment return.

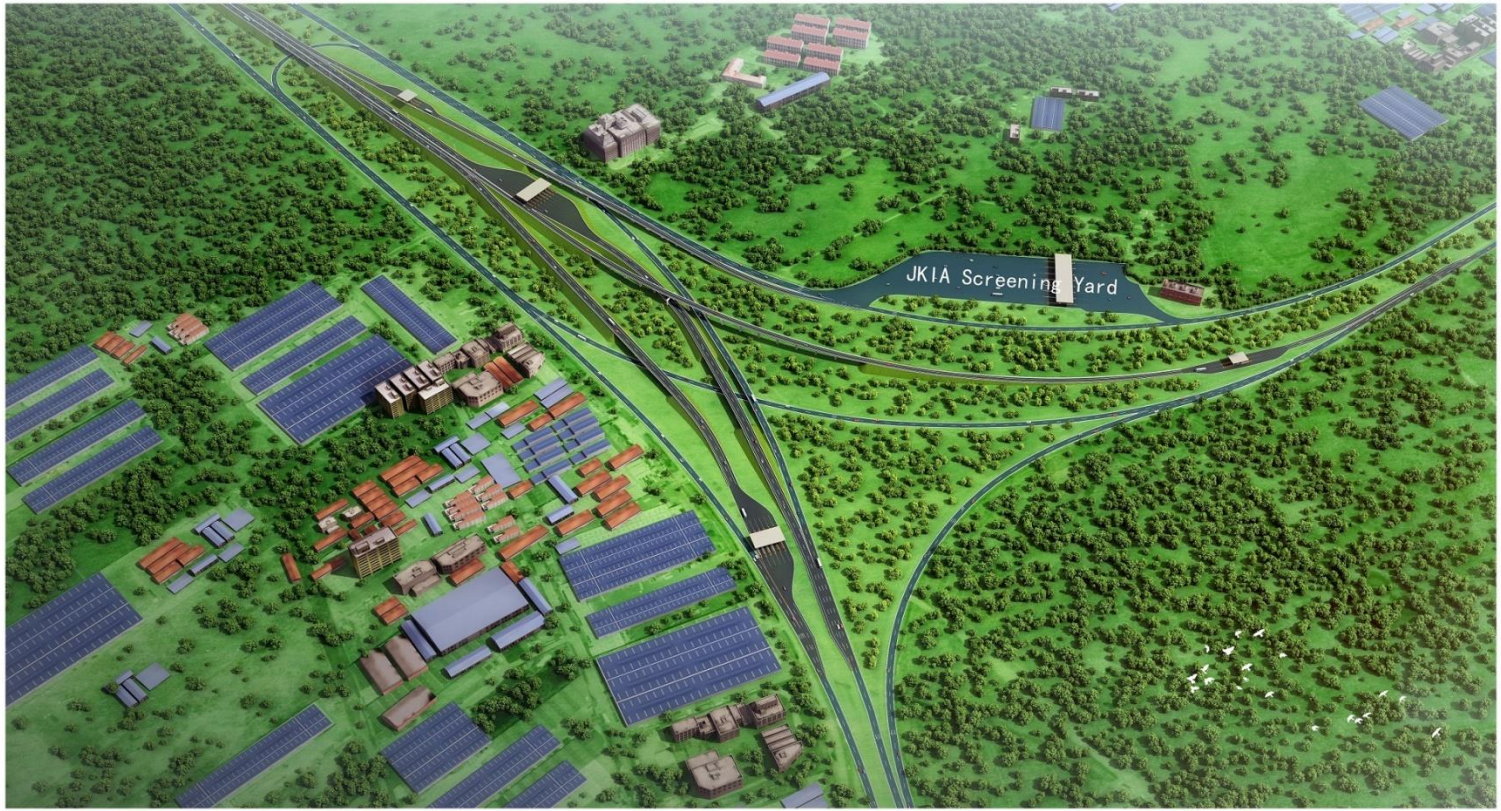
No.	Chainage	Model	Location	Interval /km
1	K0+000	Y-shaped	JKIA	0
2	K4+000	Simple	Enterprise Rd	4
3	K9+000	Simple	Capital Center	5
4	K11+700	Simple	Haile Selassie Ave	2.7
5	K13+700	Simple	Thika Rd	2
6	K16+600	Simple	Westlands	2.9
7	K18+586	T-shaped	James Gichuru Rd	2.1

Scheme of the Project – Toll Stations



Chainage	K9		K4		K0 (to the airport)		K0 (to Mombasa)	
Toll stations	Toll station 1	Toll station 2	Toll station 3	Toll station 4	Toll station 5	Toll station 6	Toll station 7	Toll station 8
No. of toll lanes	3	3	2	2	3	3	8	6

Scheme of the Project – K0 Interchange



Scheme of the Project – K4 Interchange

Scheme of the Project – K9 Interchange

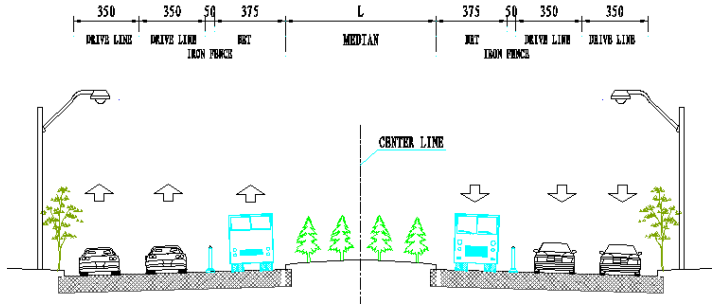
Scheme of the Project – K11+700 Interchange

Scheme of the Project – K13+700 Interchange

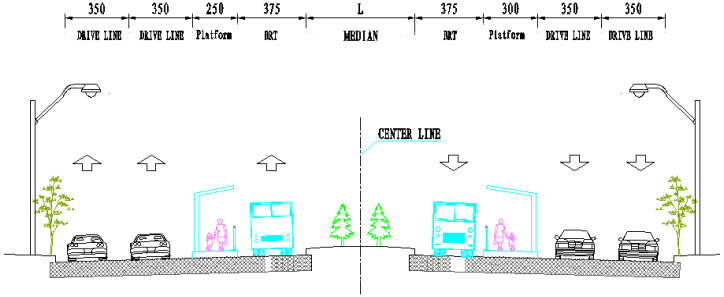
Scheme of the Project – K18+586 Interchange

Scheme of the Project – BRT

- **Alignment**: from Athi River to James Gichuru Rd, along A8 Rd.
- **Length**: 32 km.
- **Stations**：16 stations,
  - 6 with new-built footbridges,
  - 3 reconstructing the existing footbridges,
  - 2 with new-built underground footpaths,
  - 2 using existing intersections,
  - 3 ground stations.



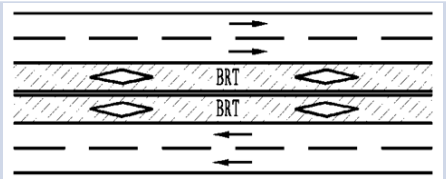
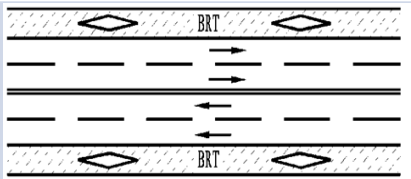
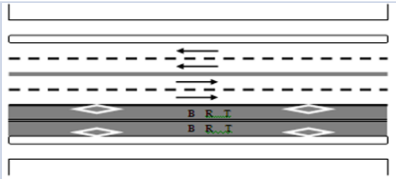
Standard cross section of BRT



Standard cross section of BRT stations

Scheme of the Project – BRT

➢ Comparison of BRT lane layouts

Compared item	Road-center layout	Road-side layout	Same-side layout
Legend			
Traffic interference	Small	Large	Relatively small
Transport efficiency	High	Low	Low
Engineering quantities	Add auxiliary facilities for crossing the street	Crossing facilities may not be arranged	Add auxiliary facilities for crossing the street
Road reconstruction	Large	Small	Small
Long-term widening	Easy	Relatively difficult	Relatively easy
Road separation	Small	Large	Relatively small
Conclusion	**Recommended**		

Scheme of the Project – BRT

➢ **Cost and financial evaluation of BRT**

- Construction cost: USD 48 million;
- Vehicle purchasing cost: USD 9.4 million;
- Operation expense: USD 4.4 million annually.
- **Financial cost-benefit analysis:** IRR: -5.91%
  - Construction period: 2 years; Operation Period: 10 years.
  - Price: Ksh. 50-150 per person.
  - Principal of pricing: public service and low investment return.
- **Economic cost-benefit analysis:** EIRR: 12.68%
  - Method of analysis: change of social resource consumption “with project” compared with “without project”, considering indirect benefits and contributions to national economy.
  - Qualitative and quantitative methods combined.

Scheme of the Project – BRT

➢ **Recommendations of the Development Model:**

- The FIRR is negative, while the EIRR is 12.68%, and it is significant for public service and benefit.
- **Option 1:** GOK invests and engages Contractors for both Infrastructure Construction and O&M service ;
- **Option 2:** GOK engages private investor to construct and operate the BRT, and provide subsidy to the investor to reach acceptable return.

4. Financial Analysis

Financial Analysis– CAPEX

Capital Expense of the Project (Million USD)

Items	Amount
Construction Cost	451.2
Customs Duty	0
VAT (16%)	0
Total Static Investment	451.2
Financial Expense during construction	58.0
Total CAPEX	**509.2**

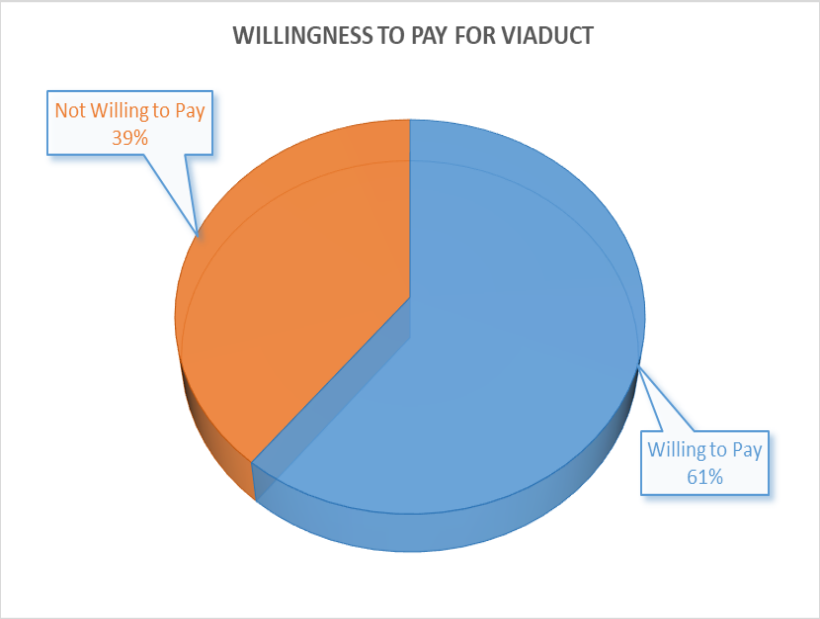
Financial Analysis – OPEX

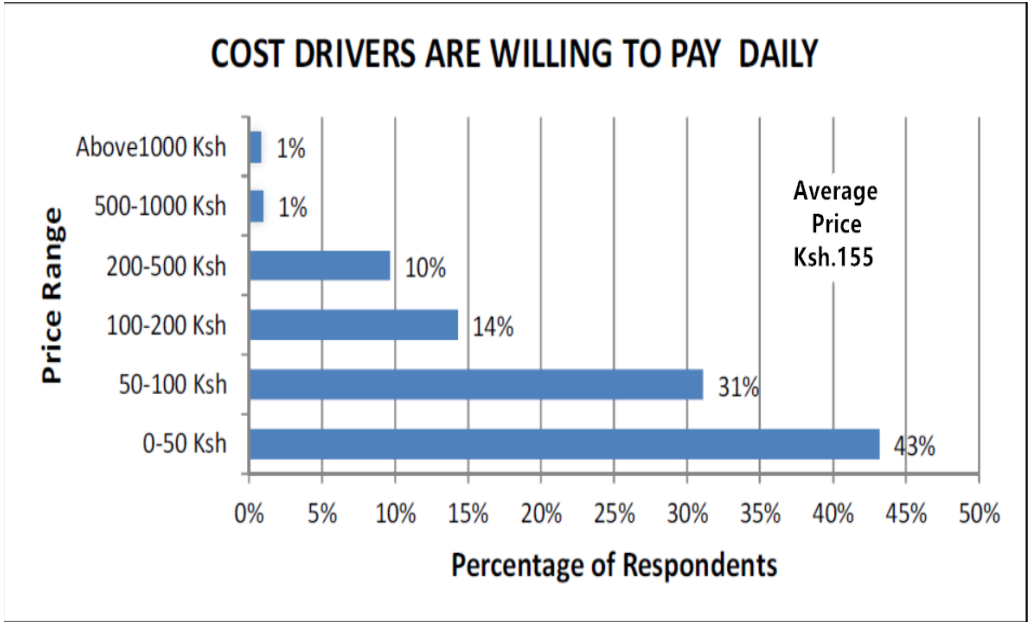
Operation Expense of the Project (Million USD)

Costs \ Year	2023	2030	2035	2040	2047	2049	Total
Operation management	4.98	5.92	6.70	7.58	9.01	9.47	188.96
Maintenance	0.76	0.93	1.08	1.25	1.54	1.63	30.82
Re-pavement			8.00		12.00		20.00
Total O&M Cost	**5.74**	**6.86**	**15.78**	**8.84**	**22.55**	**11.10**	**239.77**

Financial Analysis – Tariff and Revenue

- **Survey and Analysis of the Willingness to Pay the Charges**





Financial Analysis – Tariff and Revenue

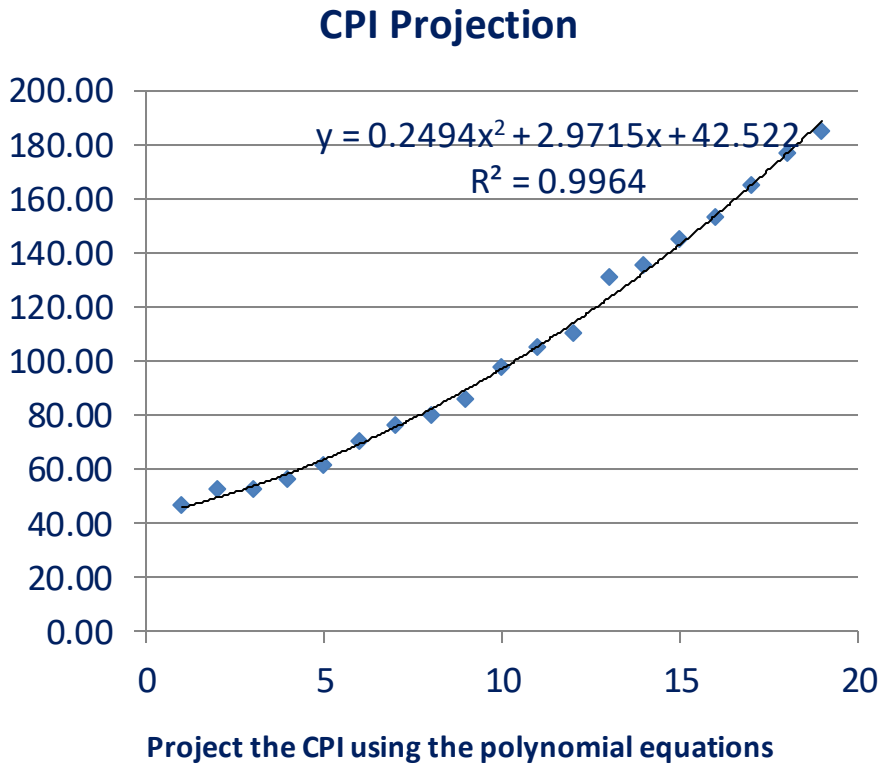
- Based on *THE PUBLIC FINANCE MANAGEMENT (ROAD TOLLS AND NATIONAL TOLL FUND) REGULATIONS, 2018, Draft, Second Schedule and Third Schedule*, the toll rates and classes of vehicles are as follows:

Class	Description of Motor Vehicle	Ordinary Identifier
Class 1	2 wheeled motor vehicles	Motor cycles
Class 2	3 wheeled motor vehicles	Tri-cycles (tuk tuk)
Class 3	**Light Vehicles with 2 axles**	**Police vehicles, military vehicles, ambulances**
Class 4	Light Vehicles with High Bonnet	Police vehicles, military vehicles, ambulances
Class 5	Heavy Vehicles with less than 4 axles	Police vehicles, military vehicles, ambulances, fire service vehicles
Class 6	Heavy Vehicles with 4 or more axles	Police vehicles, military vehicles, ambulances, fire service vehicles

Class	Prescribed toll rate per kilometre (Ksh./km)	Toll Traffic Ratio
Class 1	0.0	0.0
Class 2	0.0	0.0
Class 3	**6.00**	**1.0**
Class 4	9.00	1.5
Class 5	24.00	4
Class 6	30.00	5

Financial Analysis – Tariff and Revenue

No	Year	Month	CPI	Inflation Rate
1	2000	Jan	46.98	
2	2001	Jan	52.60	11.97%
3	2002	Jan	52.85	0.46%
4	2003	Jan	56.21	6.37%
5	2004	Jan	61.35	9.14%
6	2005	Jan	70.48	14.87%
7	2006	Jan	76.22	8.15%
8	2007	Jan	79.75	4.63%
9	2008	Jan	86.07	7.93%
10	2009	Jan	97.55	13.33%
11	2010	Jan	104.89	7.52%
12	2011	Jan	110.57	5.42%
13	2012	Jan	130.82	18.31%
14	2013	Jan	135.62	3.67%
15	2014	Jan	145.40	7.21%
16	2015	Jan	153.43	5.53%
17	2016	Jan	165.37	7.78%
18	2017	Jan	176.93	6.99%
19	2018	Jan	185.47	4.83%



Project the CPI using the polynomial equations

Financial Analysis – Tariff and Revenue

Tariff of the operation period of the Project (Ksh./vehicle)

Class of vehicle	Class 3		Class 4		Class 5		Class 6	
Toll station	K0, K4	K9	K0, K4	K9	K0, K4	K9	K0, K4	K9
2023-2027	***200***	100	300	150	800	400	1,000	500
2028-2037	***300***	150	450	225	1,200	600	1,500	750
2038-2049	***400***	200	600	300	1,600	800	2,000	1,000

- The Project Company has the right to adjust the tariff based on market demand;
- The tariff in the table is based on USD (e.g., 2 to 4 US dollars for Class 3 vehicles), the Project Company has the right to adjust Ksh. tariff when the currency rate changes.

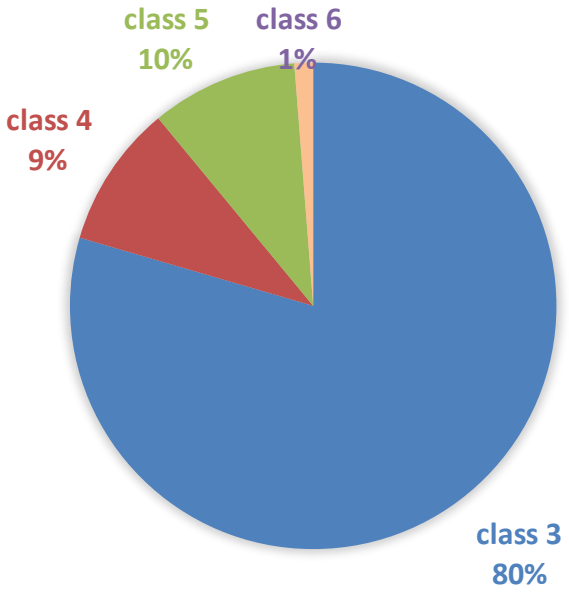
Financial Analysis – Tariff and Revenue

Forecasted Traffic Volume (Vehicle/day)

Year	2023	2028	2033	2038	2043	2049
Volume	22,176	36,902	45,534	51,357	54,339	55,236

Revenue (Million USD/year)

Year	2023	2028	2033	2038	2043	2049
Revenue	20.4	51.1	63.2	95.0	100.5	102.1



Ratio of different classes of vehicles

Financial Analysis – Other Inputs

Items	Inputs
Construction period	3 years
Operation period	27 years
Interest of Loan	7%
Debt : Equity	75:25
Grace period of loan	3 years
Repayment period of loan	17 years
Corporate Income Tax	30%
VAT for Operation Period	16%
Withholding tax of Dividend	10%

Financial Analysis – FIRR

Item	Output
Equity injection (million USD)	127.3
Debt Injection (million USD)	*381.9*
Total CAPEX (million USD)	509.2
Project IRR (post-tax)	***6.91%***
Static Payback Period (year)	***16.67***
Equity IRR- Dividend (post-tax)	***6.21%***
Equity IRR- Dividend (Exempt withholding tax on dividend)	***6.68%***

Financial Analysis – EIRR

- EIRR: **23.62%**
- ENPV: **USD 795.0 million**
- Economic benefit-cost ratio (EBCR): **2.81**
- Static payback period: **7.8 years**
- Accumulated TAX paid by the Project Company: **USD 268.4 million**

5. Supports from GOK

Supports from GOK

No.	Supports	Description
1	**Exclusive concession right**	(1) Right to invest, finance, design, construction, own, O&M and transfer the Project; (2) Right to adjust the tariff; (3) No competitive projects before and during an specific period after the commencement of the Project's operation.
2	**Tax exemption and incentives**	(1) **Custom duties, VAT**, etc., in the construction period should be exempted, otherwise the Project will hardly be financial feasible because of high construction cost, high repayment of debt and low revenue during the operation period. (2) Other incentives, such as **longer term of tax loss carryforward, and exemption of withholding tax on dividend ,** will be helpful to increase the viability of the project.
3	**Municipal pipelines relocation**	GoK relocate the municipal pipelines before the construction of the Project.

Supports from GOK

No.	Supports	Description
4	**External infrastructures**	Provide external infrastructures, such as water, electricity, and telecom, connecting to the boundary of the Project site.
5	**Land acquisition and resettlement**	(1) GoK acquire additional land which exceeds the current road reserve for construction. (2) Based on initial estimation, appr. **40 acres** land needs to be acquired for the Project, including land of Kenya Railways, Uhuru Park, University of Nairobi and Boulevard Hotel. (3) We are still optimizing the design to reduce the land acquisition.

6. Progress and Planning

No.	Tasks	Tasks of CRBC	Tasks of GOK	Date commenced	Date closed	Period
1	Preparing PIIP	1. Prepare Feasibility Study and PIIP; 2. Engage a third-party technical consultant; 3. Engage a third-party financial consultant; 4. Engage a legal consultant.	KeNHA engages a Transaction Advisor.	1 Jan 2019	28 Feb 2019	59 days
2	Submit and review PIIP	1. Submit PIIP to KeNHA; 2. Revise PIIP according to the comments from GOK; 3. Revise PIIP by the third-party consultants.	1. KeNHA reviews PIIP; 2. KeNHA submits PIIP to PPP Unit (NT); 3. PPP Unit reviews PIIP and submits it to PPP Committee.	21 Jan 2019	10 Mar 2019	49 days

No.	Tasks	Tasks of CRBC	Tasks of GOK	Date commenced	Date closed	Period
3	Preparing for negotiation	1. Set up a negotiation team; 2. Draft term sheet and Project Agreement.	1. NT approves of KeNHA commencing the negotiation by written; 2. KeNHA invites CRBC to negotiate by written; 3. KeNHA sets up a negotiation team (NT, MoTI, AG, etc.)	11 Mar 2019	17 Mar 2019	7 days
4	Negotiation	Revise PIIP, financial model and Project Agreement based on negotiation.	Negotiation.	18 Mar 2019	31 Mar 2019	14 days
5	Signing Framework Agreement	1. Get internal approval; 2. Sign Framework Agreement.	1. Get internal approval; 2. Sign Framework Agreement.	1 April 2019	21 Apr 2019	21 days

No.	Tasks	Tasks of CRBC	Tasks of GOK	Date commenced	Date closed	Period
6	Signing Project Agreement	1. Get internal approval; 2. Sign Project Agreement.	1. Get internal approval; 2. Sign the Project Agreement.	22 April 2019	30 Jun 2019	70 days
7	Preparing for construction	1. Sign Construction Agreement; 2. Pro forma commencement of construction.	1. Commence land acquisition and resettlement; 2. Commence pipeline relocation; 3. Give approvals for construction.	1 Jul 2019	4 May 2019	35 days
8	Signing Financing Agreement	1. Financing due diligence; 2. Negotiate for financing; 3. Sign Financing Agreement.	1. Financing due diligence; 2. Negotiate for financing; 3. Sign Financing Agreement.	1 Jul 2019	8 Sep 2019	70 days
9	Financing Closure	1. Sign O&M Agreement; 2. Meet all the requirements of financing closure; 3. Commencement of construction.	1. Give other approvals to CRBC; 2. Complete land acquisition and resettlement; 3. Complete pipelines relocation; 4. Meet all the requirements of financing closure.	9 Sep 2019	31 Dec 2019	114 days

Thanks and Comments Please