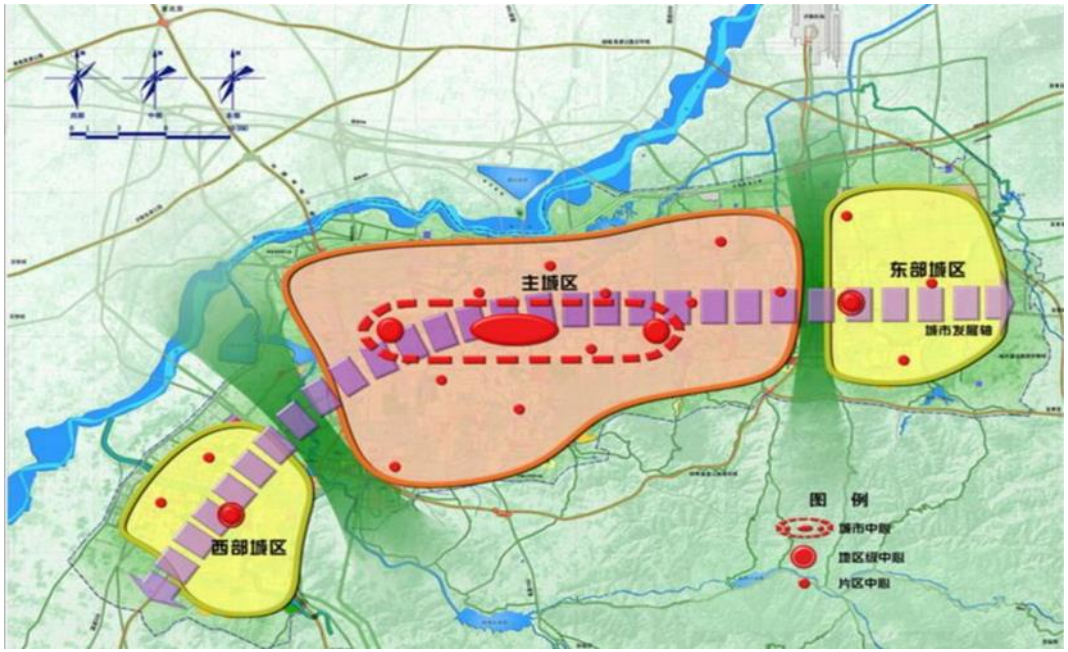
Shandong Spring City Green Modern Trolleybus Network Demonstration Project

March 2017

1. City characteristics - Urban form

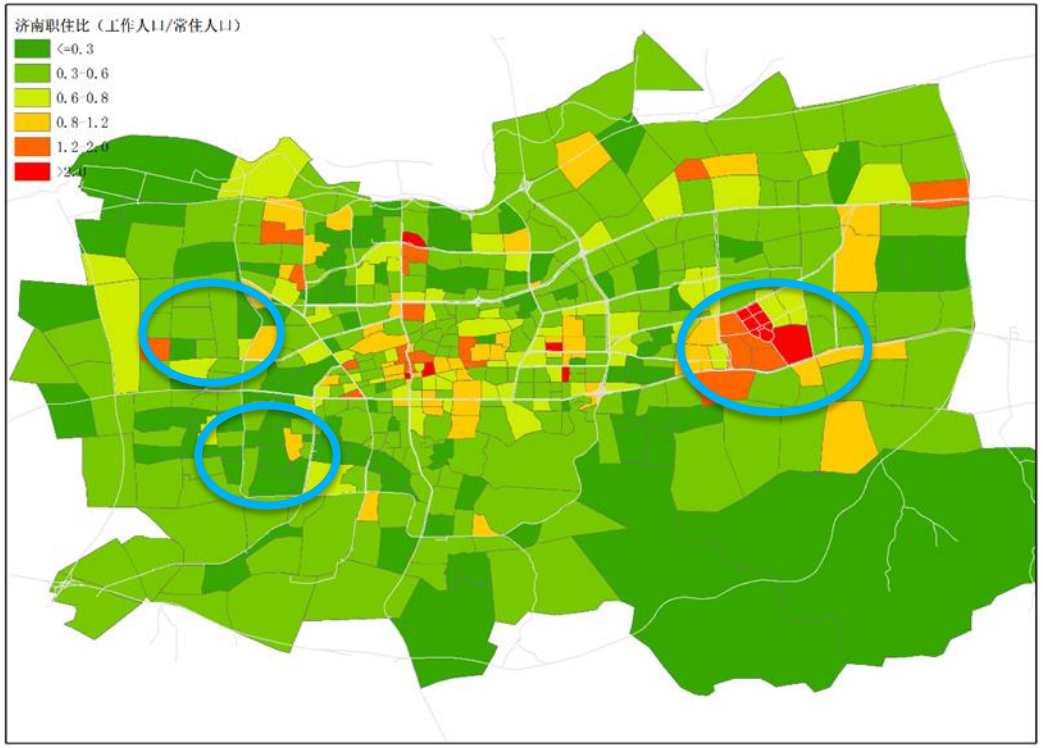
- A “belt-shaped” city with long and narrow distance from east to west , the distance from east to west is about 63 kilometers, and the distance from south to north is 18 kilometers



- “One City, Two Regions”

1. City characteristics – Population & Job

- On the east direction, the job are much more than residents, on some west and south parts, residents are more than jobs.



（济南市无轨电车发展规划研究）

230,000 car registrations per year

Based on the current growth of new vehicle registrations in Jinan and under existing traffic conditions (1771km roads by now), 327 km road infrastructure need to added every year.

Severe bus and mixed traffic congestion

Wide stations and ample turnstiles, but extremely low passenger demand

Project Components and Output

- Output 1: Zero-emission public transport network and infrastructure constructed.

- Output 2: Modern trolley bus and service standards developed and implemented with 30% women drivers

- Output 3: Travel Demand Management measures for Jinan prepared.

Background

- The Project is included in the ADB PRC 2016-2018 Country Operations Business Plan for 2017 as a firm project for $150 million.

- ADB had conducted the initial reconnaissance mission on 19-20 April 2016 in Jinan and the government, ADB and CDIA agreed that ADB and CDIA will conduct the TA in parallel.

- ADB and CDIA have been worked together to prepare a joint terms of reference for TA consulting service and distributed the TA activities between ADB and CDIA.

- CDIA finished the recruitment of the consulting team on 20 July 2016 for CDIA part of the TA and ADB is processing PPTA.

Processing Schedule (dated 29 July 2016)

The major milestones up to loan effectiveness are summarized in below table:

Milestones	Expected Completion Date
Approval of concept paper	September 2016
PPTA implementation	October 2016 - July 2017
Fact-finding mission	March 2017
Interdepartmental and sector-focused review	April 2017
SRM	May 2017
Board consideration	June 2017
Loan effectiveness	September 2017

Due Diligence Required under PPTA

The project will be developed and designed by a project preparatory technical assistance (PPTA). Due diligence of the project under the PPTA includes the following:

(i) Technical
(ii) Economic and financial
(iii) Governance
(iv) Poverty and social
(v) Safeguards
(vi) Emissions and health impacts
(vii) Climate risk and vulnerability

CDIA TA and ADB PPTA Processing and Implementation

DB PPTA Processing and Implementation Schedule. The processing and
plementation schedule of ADB PPTA is tentatively planned as below:

- CDIA consulting took in charge of the technical part of the TA and ADB PPTA team took in charge of the due diligence part of the TA.
- CDIA TA was implemented from July 2016 to November 2016.
- ADB PPTA is currently under implementation.

Table 4 Technical Assistance Processing and Implementation Schedule

Major Milestones	Expected Completion Date
Approval of concept paper	September 2016
Consultant selection and mobilization	October 2016
TA midterm review	December 2016
TA final review and loan fact-finding	March 2017
TA closure	July 2017

Experts	International Person-Months			National Person -Months		
	ADB	CDIA	Sub total	ADB	CDIA	Sub total
1. Public Transport Planner (CDIA TA Team Leader)	0	4	4	1	3	4
2. Trolleybus Specialist	1	1	2	1	3	4
3. Urban Transport Policy Specialist (ADB TA Team Leader)	3	0	3	4	0	4
4. Demand Modelling Specialist	2	2	4	2	3	4
5. Traffic Engineer	2	2	4	0	0	0
6. Traffic Engineer (Deputy Team Leader)	0	0	0	0	3	3
7. IT Specialist	0	1	1	0	2	2
8. Emission Specialist	1	0	1	2	0	2
9. Station Design Architect	0	1	1	1	1	2
10. Economic and Financial Specialist	1	0	1	1	0	2
11. Urban Rail Specialist	0	0	0	1	0	1
12. Environmental Specialist	1.5	0	0	2	0	2
13. Resettlement/Social Development Specialist	1	0	1	2	0	2
14. Health (emission) Specialist	1	0	1	1	0	1
Total	12.5	11	23.5	17	15	30

Loan Processing (dated 27 March 2017)

The major milestones up to loan effectiveness are summarized in below table:

Milestones	Expected Completion Date
Draft FSR	31 March 2017
FSR Approval	28 April 2017
TA closure	31 July 2017??
Loan Negotiation Endorsement	June 2017
FCUP approval by NDRC	June 2017
MOF clearance	June 2017
Loan Effectiveness	??

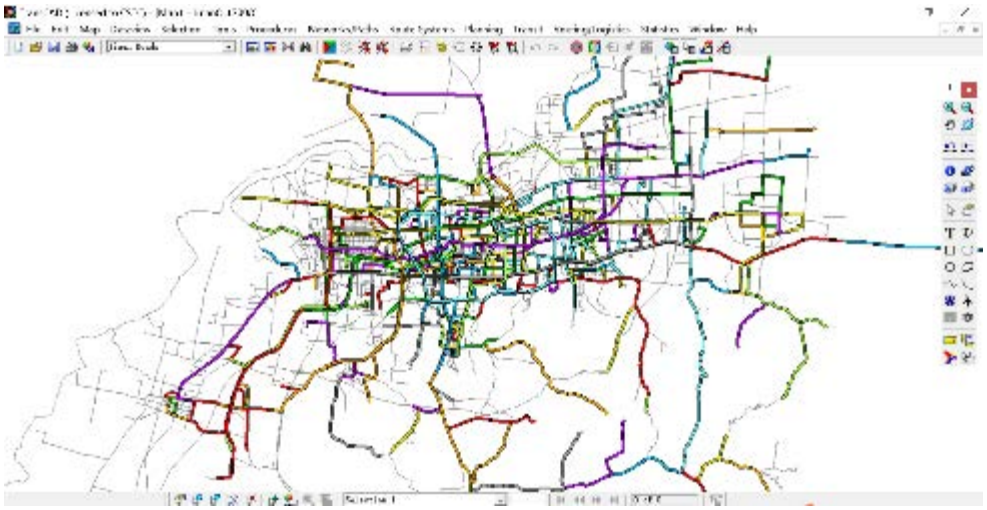
CDIA TA - speed up FSR reporting process

- The main contents of FSR draft report, including transit demand forecast, corridor plan, bus route plan, ITS, bus fleet estimation and cost estimation are based on the PFS report.

Corridor plan of FSR

CDIA TA - travel demand model

- PFS team developed Jian transit demand model, including road network, transit system, transit passenger OD matrix, set a good foundation for PPTA team to refine the model.



Jinan transit model

Transit desire line

CDIA TA - traffic engineering cost estimation

- PFS team made a detailed cost estimation on the 8 construction parts of modern trolleybus system, and now the FSR and PPTA traffic engineering cost estimation is mainly based on the PFS team cost estimation method.

No.	Name of Project or Expense	Investment Estimation (10 thousand)					Investment Proportion
		Construction Project	Equipment Acquisition	Installation Project	Other Expenses	Total (100 million)	
1	Construction Investment					22.69	100.0%
1.1	Project Expenses	70081	130183	11079		21.13	93.1%
1.1.1	Construction of Modern Trolley bus Network	0	53446	10695	0	6.41	28.3%
1.1.2	Renovation Project of Bus Station	24370	0	0	0	2.44	10.7%
1.1.3	Construction Project of Bus Lane	17739	0	0	0	1.77	7.8%
1.1.4	Construction Project of Supporting Infrastructure	23872	0	0	0	2.39	10.5%
1.1.5	Vehicle Acquisition Project	0	72482	0	0	7.25	31.9%
1.1.6	Renovation Project of Public Transport Intelligent System	0	3855	384	0	0.42	1.9%
1.1.7	Traffic Management Promotion Project	4100	400	0	0	0.45	2.0%
1.2	Other Expenses	0	0	0	4437	0.44	2.0%
1.3	Preparation Expenses	0	0	0	11165	1.12	4.9%

CDIA TA - travel demand management policy

- PFS team made a analysis for the existing TDM policy and E-bike development situation in Jinan and give planning principles and suggestions, and this helps the PPTA TDM policy development and multi-mode policy development, and we are working with PPTA parking expert Willem Brouwer to deepen and refine this part.

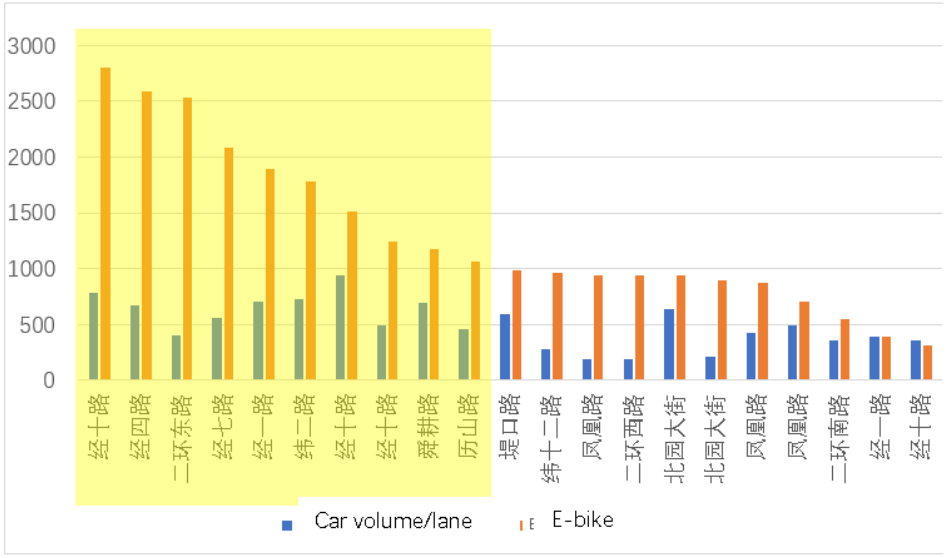


Fig7-22 E-bike and cars flow in peak for 21 roads (vehicles/hour/lane)

Field survey of bike lane on jingqi road

CDIA TA - bus depot planning

- PFS report made a plan for bus depots, including 8 new bus depots and 8 existing bus depots upgrading, both FSR and PPTA traffic engineering design adopted PFS report plan results.

A total of 16 bus depots were planned, including 8 upgrading terminals and 8 new depots with a total area of 26.58 hectares.

CDIA TA - power supply facility planning

- PFS report made a plan for power supply facility , including 77 10kv substations, FSR refined the substation location based on the PFS result, and PPTA traffic engineering team adopt the substation plan and removed some points according to the shorter short-term corridor length.

PFS 10kv substation plan

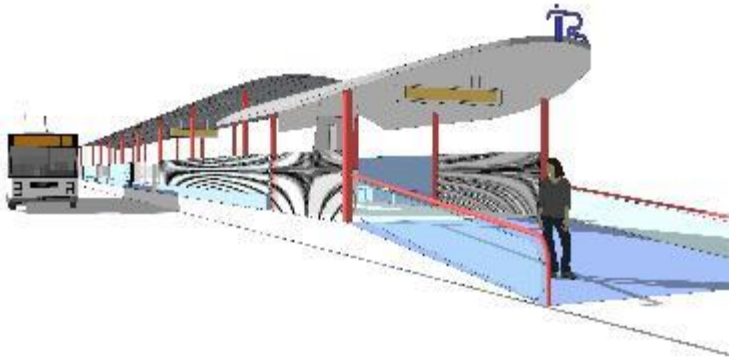
序号	拟定位置	建设用地情况现状	备注
1	黄西路口东 100m	高架桥下中央绿化带	
2	西工商河路口西 80m	高架桥下中央绿化带	
3	水北路西 140m	高架桥下中央绿化带	
4	窑头大沟桥西 240m	高架桥下中央绿化带	
5	工业北路齐鲁制药厂	路侧绿化带	路中修路
6	华福楼广场东 300m	路侧绿化带	路中修路
7	乐动健身中心	路侧绿化带	路中修路
8	济钢（工业北路 21 号）	路侧绿化带	路中修路
9	邢店立交	路侧绿化带	
10	青岛路跑场路口东 100m	路北侧绿地需扩建至道路外，树木移除。	
11	青岛路齐州路路口向南 400m	路东幼儿园路西小学，需占用路东在建住宅楼用地	齐州路 1469/1472 号
12	堤山河西路烟台路口向东 200m	路侧绿化带	
13	槐荫人民检察院中央绿化带	需占用检察院西邻龙腾国际门前绿地	张庄路 375 号
14	济南东站	路北广场绿地	
15	花园东路侧旁路路口	路侧绿化带	
16	经一纬二路口东 300m	需占用及扩建信和花园小区门前绿地	明湖西路 1148 号

FSR 10kv substation location selection

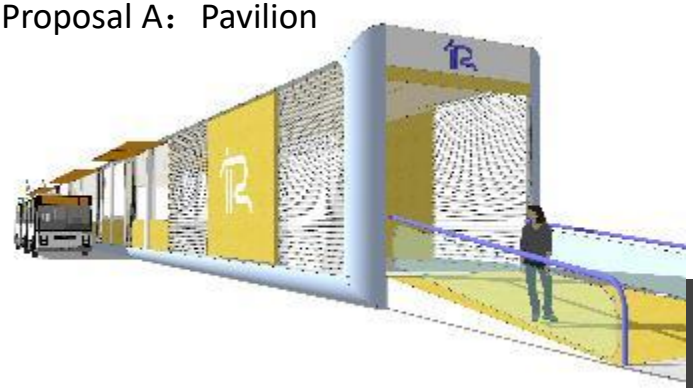
CDIA - Trolleybus station architectural design and refinement

First draft for the workshop on Mar.20 already finished, we will improve and refine the design according to the workshop conclusion and suggestions.

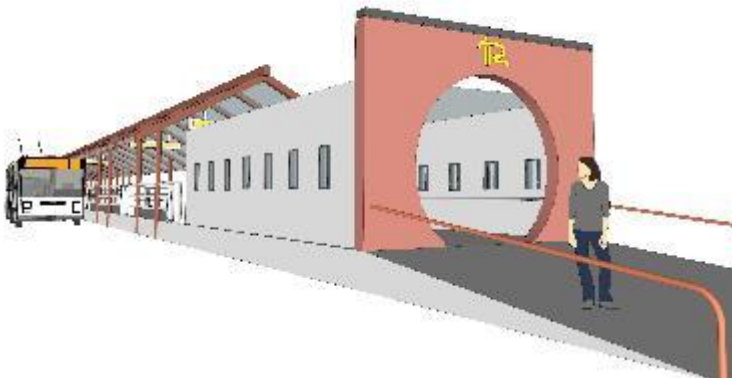
Proposal B： Cruise



Proposal A： Pavilion



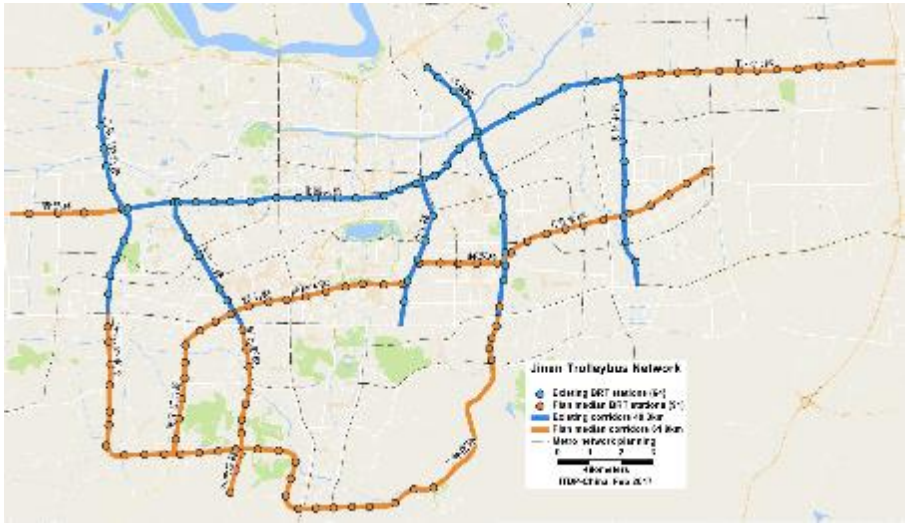
Proposal C： Dwellings



CDIA TA - develop long-term trolleybus corridor

- PFS report made a plan for whole trolleybus corridor from year 2017-2030, including 6 horizontal corridors, 8 vertical corridors, total length 238.3km, and based on this, PPTA traffic engineering team removed some curbside bus lanes, made a short-term median BRT corridor construction plan.

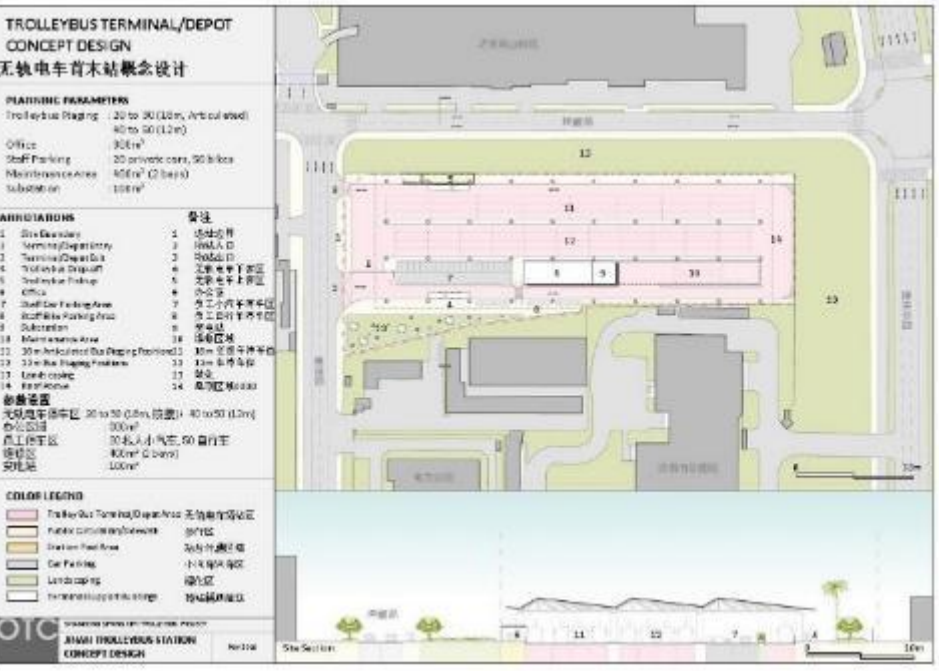
PFS trolleybus corridor plan to year 2030



Median BRT network plan of PPTA consulting team

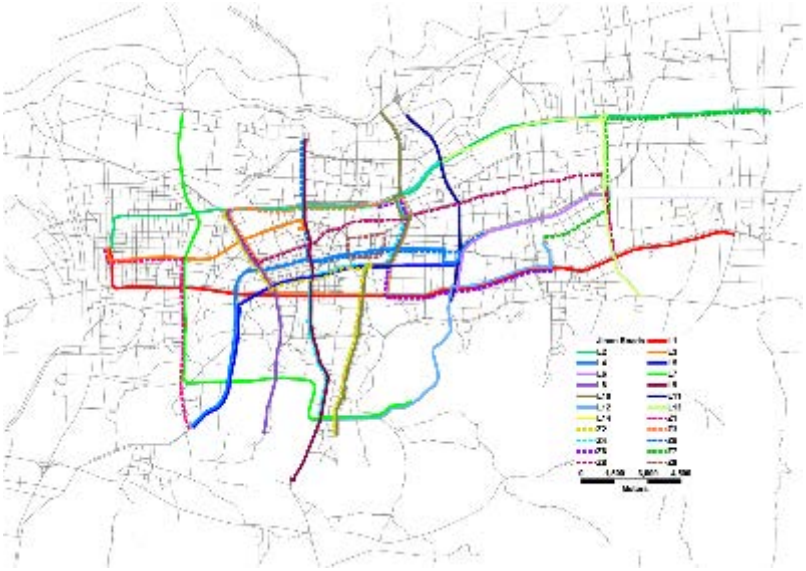
CDIA TA - Support to PPTA trolleybus depot design

- PFS report made a concept design for one trolleybus terminal, including the terminal contents layout, size forecast, and architectural concept design, providing a good basis and guide for the PPTA stage trolleybus depot design and size forecast.



CDIA TA - Support to PPTA environment team

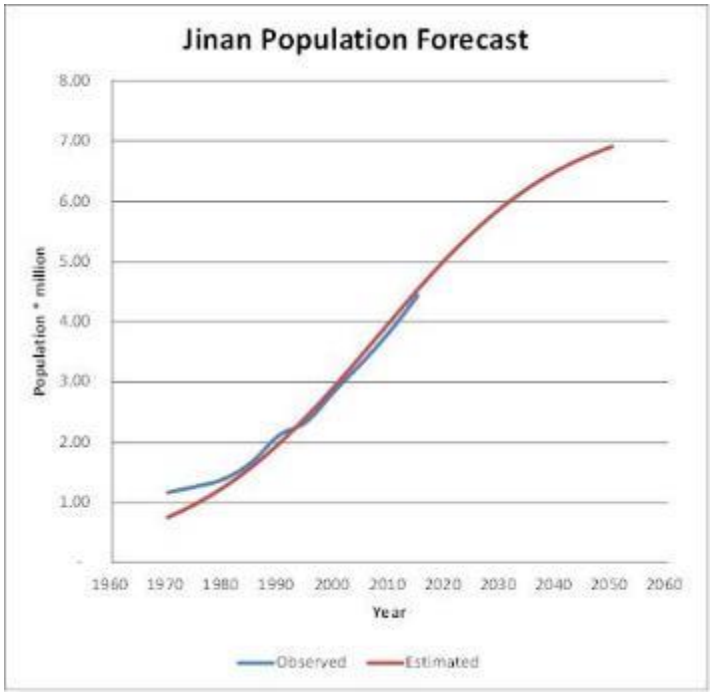
- PFS team provided detailed bus route map and route ridership info to PPTA environment team for the Initial Environmental Examination.

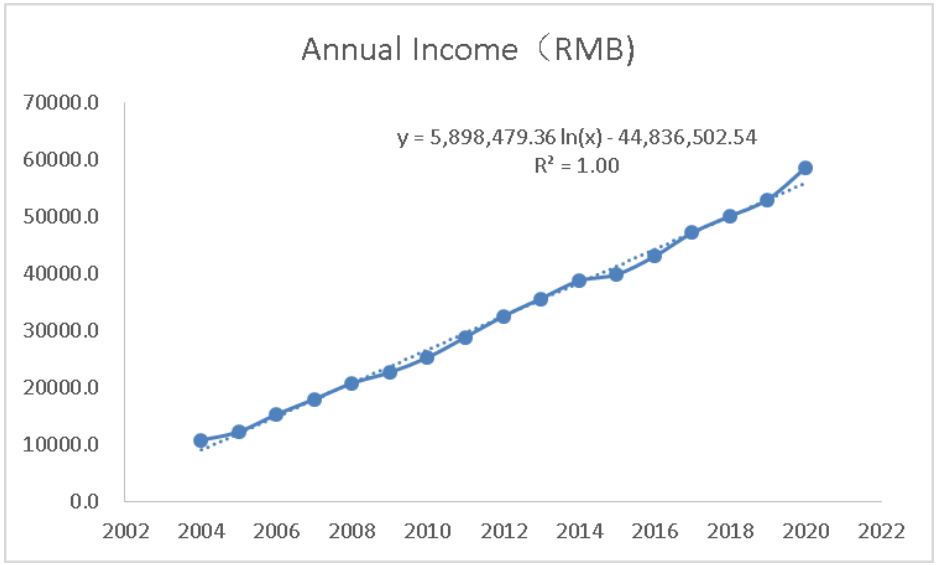


No	Name of Bus Route	Starting Station	End Station	Length of Route (km)	Modern Trolley Bus Ridership in 2022(2017)	Modern Trolley Bus Ridership in 2043(2030)
1	L-1	Ji Nan Xi Zhan	Xing Cun	30.3	4460	11352
2	L-2	Ji Nan Xi Zhan	Guo Dian	32.8	7067	9785
3	L-3	Ji Nan Xi Zhan	Ji Nan Zhan Bei Guang	10.5	2524	11340
4	L-4	Qi Xian Guang Chang	Dian Liu Zhuang	16.5	9399	13392
5	L-5	Wen Zhuang	Ge Jia Zhuang	15	5691	14952
6	L-6	Yan Shan Li Jiao Qiao	fenghuanglu	12.9	956	7776
7	L-7	Luo Kou Xi Ting Che Chang	Shandong Uneiversity N	20.3	1259	3600
8	L-8	beiyuandajie	Zhong Hai Guo Ji She Q	9.8	826	8064
9	L-9	Luo Kou	Shi Liu Li He	14.5	5874	10171
10	L-10	Gai Jia Gou	Ling Xiu Cheng Nan	16.4	1844	12664
11	L-11	Ji Nan Li Jiao Qiao	Yan Shan Li Jiao Qiao	9.4	2485	12096
12	L-12	Ling Xiu Cheng	Han Yu	16.5	1203	3912
13	L-13	Quan Fu Li Jiao	Han Yu	16.2	1883	4536
14	L-14	Bei Quan Fu	ShengLi Hospital	11.7	703	8935
15	Z-1	Xi Ke Zhan	G014	11.6	471	1824
16	Z-2	beiyuandajie	Ling Xiu Cheng	16.3	1346	4140
17	Z-3	ring route		22.3	768	2534
18	Z-4	Shi Liu Li He	Quan Fu Li Jiao Qiao	16.5	3950	3360
19	Z-5	Luo Kou	Yao Jia Zhuang	14.1	4318	5760
20	Z-6	Ji Jia Zhuang	Han Yu	13.5	805	5106
21	Z-7	Han Yu	Guo Dian	14.9	79	1896
22	Z-8	Huang Gang	Gong Jiao Jia Xiao	26.3	1865	2028
23	Z-9	ring route		5.6	1093	5927

CDIA TA - Support to PPTA health team

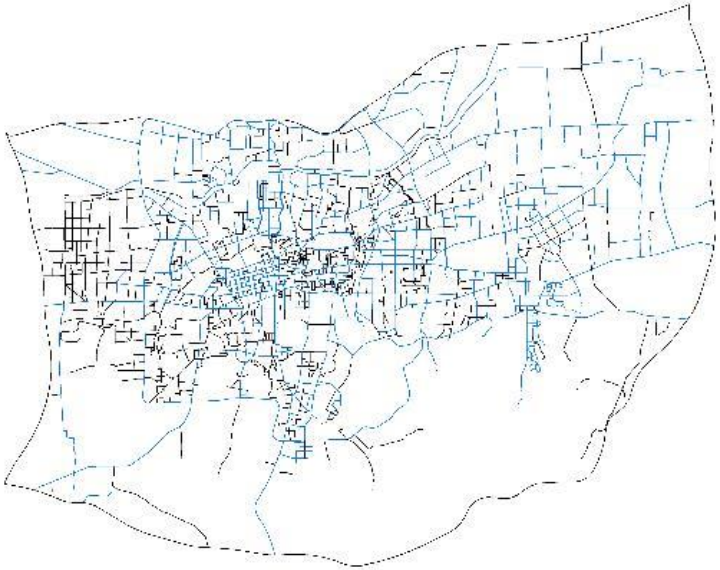
- PFS report made a projection about the population from year 2016 to year 2045 based on historical data, as a reference for health examination, later we worked more on income, Mortality Rate and other characteristics.





CDIA TA – Support to PPTA Parking policy

1. Electronic chare system application on parking to improve parking management and efficiency.
2. Cycling/e-bike use analysis and network improvement and integration with public transit system.



CDIA TA – Support to PPTA passenger travel demand analysis

PFS team will use IC card data, bus GPS data and the bus stop location data together to track passengers 'boarding and alighting station , providing IC card passengers 'travel demand info to PPTA model expert as a demand support.