Certificate No.: Guohuanpingzheng Jiazi No. 1703

Environmental Impact Assessment
For
Harbin Cold Weather Smart Public Transportation System Project
(Public Transport Corridors Component)

Restructuring Stage

Entrusted by

Harbin Transportation Bureau

Prepared by

Heilongjiang Xingye Environmental Protection Technology Co., Ltd.

Revised by

HJI Group (USA)

July 2019

Project Name: Harbin Cold Weather Smart Public Transportation System Project (Public Transport Corridors Component)

Project No.: HKYBGS - (2013) 008

Entrusted by: Harbin Transportation Bureau

Prepared by: Heilongjiang Xingye Environmental Protection Technology Co., Ltd.

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PREFACE

Urbanization and motorization have led to constant increase in gasoline consumption in China, and energy will become an important factor affecting China's social and economic development in the future. Over a long time, China's urban public transport system has been underdeveloped, and unable to meet the high-quality daily travelling demand of urban residents. The prominent contradictions between supply and demand in urban transport are shown by the incomplete capacity of urban public transport system, the failure of urban public transport system development in keeping simultaneous with urban development, the single structure of urban public transport system, the lack of advanced transport planning concepts, and the lack of public transport-oriented planning experience for most cities. The project is intended to optimize Harbin's urban public transport system, to improve social and economic development, and to alleviate residents' travel difficulties in cold weather. A smart public transport system is the only way to integrate data and information and ensure operational management efficiency.

The changes in Harbin's economic and transport development environment objectively have required that Harbin's transportation development must concern integrated transport as the fundamental starting point, overall planning and coordination of various traffic and transport means, optimization of transport resource allocation and exertion of combined advantages of integrated transport and accelerated construction of an integrated comprehensive transport system to promote the sustainable economic and social development. It was urgent to construct an urban smart public transport system to meet Harbin's economic development needs. Therefore, the Project Management Office (PMO) namely Harbin Transportation Bureau initiated the Harbin Cold Weather Smart Public Transportation System Project (the Project).

Hongqi Street and Youyi Road Public Transport Corridors, the original subcomponents of the original Project, encountered conflicts in construction timing and spacing with the city’s Subway Line 3 Project and the urban integrated pipe corridor project, which would cause great difficulty to the project implementation. in 2016, a project scope adjustment was undertaken based on the needs of strategic planning, urban development, industrial layout and local transportation. Under the adjusted project scope, the Xinyang Road Corridor was extended from Jincheng Street to Haining Leather Center; Hongqi Street Corridor and Youyi Road Corridor were canceled; and Nanzhi Road Corridor (Huashu Street-Gongbin Road) and Changjiang Road Corridor (Hongqi Street-Xilong Street) were added to the original Project.

Later on, Harbin Municipal Government approved a Nanzhi Road and Xinyang Road Overpass Project that had a significant impact on the bus corridor construction on Xinyang Road, Nanzhi Road and Changjiang Road (at the intersection of Nanzhi and Changjiang roads) under the World Bank project. Considering to support the city’s second ring project and overall overpass systems, therefore the project scope of the three corridors was revised again in 2018. The adjustment was approved by Harbin DRC in November 2018 (HDRC Approval No. 85 [2018]).

According to a series of domestic laws and regulations, in 2013, Harbin Transportation Bureau who is the Project Management Office (PMO), entrusted Heilongjiang Environmental Protection Science Research Institute as the environmental impact assessment (EIA) agency for the original Project. The first version of EIA Form was approved by Heilongjiang Provincial Environmental Protection Bureau (HLJ EBP) on 24 July 2013. Along with the significant project adjustment in 2016, Heilongjiang Xingye Environmental Protection Technology Co., Ltd was engaged to carryout further field investigation, on-site survey and data collection, and completed a supplementary report to match the new project scope. The supplementary EIA was approved by Harbin EPB on October 9, 2016 (HaHuanShen [2016] No.64). After another round of project adjustment in 2018, as requested by the World Bank (WB) and Harbin PMO, HJI Group (USA) who was the project management consulting company revised the EIA based on the previous two versions of reports in October 2018. Later on in June 2019, the WB made further modification based on the third version of EIA, and formed this report.

Besides the corridor components, there are three transit hub or bus depots components under the WB project - Xiangbin Bus Transit Hub, Qunli No.1 Street Bus Depot, and Harmony Street Bus Depot. There has been no significant adjustment in their design or work scope, and the environmental assessment (included in the 2016 version of EIA) has been approved by Harbin EPB. Though the land use and construction areas of Qunli No.1 Street Bus Depot was reduced in the 2018 adjustment, there is no significant change in nature and magnitude of the environmental impacts of this depot work. Therefore, the three hub or depots components are not covered in this report.

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4. Approval for Some Adjustments in the Preliminary Design of Harbin Cold Weather Smart Public Transportation System Project (No. 85 [2018])

5. Heilongjiang Provincial Environmental Protection Department's Approval for the EIA Form of Harbin Cold Weather Smart Public Transportation System Project (No. 231 [2013])

6. Harbin Municipal Environmental Protection Bureau's Approval for the EIA Form of Harbin Cold Weather Smart Public Transportation System Project (No. 64 [2016])

7. EIA Report of Harbin Cold Weather Smart Public Transportation System Project, by Heilongjiang Xingye Environmental Technology Co., Ltd., 2016

8. EIA Form of Harbin Cold Weather Smart Public Transportation System Project, by Heilongjiang Environmental Protection Science Institute, 2013

9. EIA Report of Harbin Cold Weather Smart Public Transportation System Project, by Heilongjiang Environmental Protection Science Institute, 2013

1. General Introduction

1.1 Project Profile

1.1.1 Basic information

Project Name: Harbin Cold Weather Smart Public Transportation System Project - Public Transport Corridors Component (the Project hereafter)

Project Location: The three corridors are located along the three selected main streets in Harbin urban area, namely Nanzhi Road, Changjiang Road and Xinyang Road.

Project Management Office (PMO): Harbin Transportation Bureau

1.1.2 Background

The economic development and transportation condition have been largely changing in Harbin, which required the transportation system be developed in an integrated way, by utilizing various transportation means and optimizing all transportation resources, to enhance the advantages of integrated transportation, to accelerate the construction of a comprehensive transportation system, and to promote sustainable economic and social development. Therefore, it was urgent to build an urban smart public transportation system to meet the economic development needs in Harbin. Therefore, Harbin Transportation Bureau as the PMO initiated the Harbin City Cold Weather Smart Public Transportation System Project that was planned to cover an area of 52,278.3 m^2 with a total investment of RMB 1,435,418,600. For the original Project, the Environmental Impact Report Form was approved by Heilongjiang Provincial Environmental Protection Bureau (HLJ EPB), which was documented as Heihuanshen [2013] No. 231.

As the components of the original Project scope, Hongqi Street and Youyi Road Public Transport Corridors would become conflicted with the Subway Line 3 Project and the Integrated Pipeline Corridor Project in time and space, which would cause great difficulty in the Project's implementation. Adjustment of the project scope became necessary to meet the requirements of strategic planning, urban development, industrial layout and local people's travelling. The adjusted contents include extension of Xinyang Road Corridor (Xiangzheng Street-Jincheng Street) to Haining Leather Center; cancellation of the Hongqi Street and Youyi Road Corridors; and addition of Nanzhi Road (Huashu Street-Gongbin Road) and Changjiang Road (Hongqi Street-Xilong Street) Corridors.

In 2017, Harbin Municipal Government approved another project to build viaducts along the Nanzhi and Xinyang roads, which had a significant impact on the implementation of the World Bank project. The project design had to be adjusted again. Harbin DRC approved the adjustment in November 2018 (HDRC Approval No. 85 [2018]).

1.1.3 Project rationale

(1) The Project is needed by building a city suitable for living and travelling.

Implementation of the public transportation corridors can help Harbin improve urban environment, enhance urban functions, increase urbanization level, create better living and travelling conditions, and improve local residents' living quality.

(2) The Project will improve the urban layout and optimize the urban road network

Implementation of the public transportation corridors can improve spatial transfer of people and materials, guide urban layout planning, optimize urban road network, and establish a sustainable urban comprehensive transport system. With the bus corridor system, the urban spatial structure can be promoted to a healthy system.

(3) The Project is needed to alleviate regional traffic congestion and promote economic development

Implementation of the public transportation corridors can guide the urban spacial development and stimulate the economic growth around the corridors. At the same time, it can reduce the traffic volume in the city centers and alleviate the traffic congestion in the old urban areas.

(4) The Project will help overcome the local residents' travelling difficulties in cold weather

Harbin, as one of the typical cold cities in northeast China, has a long and snowy winter. Local residents had to overcome icy roads and slippery roads. The Project will build a people-oriented, smart and low-carbon bus priority corridor system, especially in the cold winter to provide passengers with a warm traveling environment, improve the quality of public transportation system, and solve people's traveling problems in cold weather.

1.2 Purposes of EIA

Implementation of this Project will generate certain impacts on the environment in the proposed project area. This EIA is intended to predict the impacts of the project implementation on the environment by investigating the environmental baseline, analyzing the pollution sources, anticipating the possible environmental impacts, proposing feasible measures to prevent and mitigate pollution and negative impacts, to provide basis for project decision making, project environmental protection design and project environmental management in the construction and operation periods, and to realize the economic, social and environmental benefits of the project implementation.

(1) Various environmental impacts brought by the design, construction and operation activities of the Project are evaluated, which can provide basis for optimizing project design;

(2) Through investigating the environmental baseline along the project, understanding of the environmental background in the project area, predicting the environmental pollution and ecological damage potentially caused by project implementation, and proposing feasible mitigation measures, the negative environmental impacts brought by the project implemented can be effectively controlled.

(3) The EIA conclusions will provide basis and guidance for environmental management during the construction and operation periods of the Project, help the project implementation meet national and local regulations on environmental protection, and provide scientific basis for economic development and environmental planning in the areas along the corridors.

1.3 EIA Procedures

In January 2013, Harbin Transportation Bureau (Harbin PMO) entrusted Heilongjiang Environmental Protection Science Research Institute to carry out the environmental assessment for the original Project to meet the requirements of domestic EPBs and the World Bank. The original Project was approved by Heilongjiang EPB on July 24, 2013 (No. 231 [2013]).

In January 2016, due to the change of proposed location of corridors (change from Hongqi Street and Youyi Road to Nanzhi Road and Changjiang Road), Harbin Transportation Bureau (Harbin PMO) entrusted Heilongjiang Xingye Environmental Protection Technology Co., Ltd. to carry out EIA for the adjusted Project to meet the requirements of both China and the WB. On October 9, 2016, the Harbin EPB approved the EIA Form for this Project (No. 64 [2016]).

In September 2018, to meet the mid-term review requirements and match the further design adjustment scheme, as requested by the WB and Harbin PMO, HJI Group (USA) (the project management consulting company) revised the EIA based on the previous two versions of reports in October 2018. Later on in June 2019, the World Bank modified the third version of EIA, and formed this report.

The three transit hub or bus depots components under the WB project has been no significant adjustment in their design or work scope, and the environmental assessment (included in the 2016 version of EIA) has been approved by Harbin EPB (No. 64 [2016]). Though the land use and construction areas of Qunli No.1 Street Bus Depot was reduced in the 2018 adjustment, there is no significant change in nature and magnitude of the environmental impacts of this depot work. Therefore, the three hub or depots components are not covered in this report

1.4 Environmental Assessment Basis

1.4.1 National laws, regulations and policies

(1) Environmental Protection Law of People’s Republic of China, effective on Dec 26th, 1989;
(2) Law of the People's Republic of China on Environmental Impact Assessment, effective on Sep 1, 2003;
(3) Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution, effective on Sep 1, 2000;
(4) Law of the People´s Republic of China on the Prevention and Control of Ambient Noise Pollution, effective on Mar 1, 1997;
(5) Water Pollution Prevention and Control Law of the People's Republic of China, revised on Feb 28, 2008;
(6) Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes, effective on Apr 1, 2005;
(7) Urban and Rural Planning Law of the People’s Republic of China, effective on Jan 1, 2008;
(8) Land Administration Law of the People’s Republic of China, effective on Aug 28, 2004;
(9) Law of the People's Republic of China on Soil and Water Conservation, effective on Jun 29, 1991;
(10) Decree No. 253 (1998) of the State Council of the People's Republic of China concerning Regulations on the

Administration of Construction Project Environmental Protection, effective on Dec. 12th, 1998;
(11) Notice of the State Environmental Protection Administration on Certain Problems with Environmental Noise in EIA of Construction Projects Involving Roads, Railways (including Light Rails), etc. Huanfa [2003] No.94;
(12) Interim Measures for Public Participation in Environmental Impact Assessment, issued by the State Environmental Protection Administration, Huanfa [2006] No.28.
(13) Limits and Measurement Methods for Emissions from Light-duty Vehicles (II) (GB 18352.2-2001)
(14) Urban Greenery Regulations, effective on March 1, 2007

1.4.2 Local regulations, policies and documents

(1) Decision on Some Issues concerning Strengthening Environmental Protection (CPC Heilongjiang Provincial Party Committee, Heilongjiang Provincial People's Government, 1997)
(2) Regulations of Heilongjiang Province on Environmental Protection (1995.4.1);
(3) Heilongjiang Province Environmental Monitoring Management Measures (2001.10.1)
(4) Standard for Surface Water Function Zoning in Heilongjiang Province (DB23/485-1998)
(5) Measures for Implementation of Soil and Water Conservation Law of the People's Republic of China in Heilongjiang Province (1993.12.1)
(6) Measures for Safe Production Management of Construction Projects in Heilongjiang Province
(7) Regulation on Project Construction Supervision in Heilongjiang Province (DB 23506–1999)
(8) Harbin Urban Greenery Regulations, effective on January 1, 2015

1.4.3 WB guidelines

(1) OP / BP4.01 Environmental Assessment and its Annexes, April 2013;
(2) Collection of Data about EIA of the World Bank;
(3) EHS General Guidelines - General Guide to Environment, Health and Safety, April 2007

1.4.4 Project design documents

(1) Proposal for Harbin Cold Weather Smart Public Transportation System Project using World Bank Loan, Jan 2013;
(2) Feasibility Study Report for Harbin Cold Weather Smart Public Transportation System Project- Component 1: Public Transport Corridor Construction Project, Mar 2016;
(3) Preliminary design for the Harbin Cold Weather Smart Public Transportation System Project- Component 1: Public Transport Corridor Construction Project, June 2018
(4) Harbin Bus Company: public transport hub construction projects, locations of bus initial and terminal stations, public transport corridor construction projects, bus route maps, etc.;
(5) Harbin Environmental Protection Bureau: The 13th Five-Year Plan of Environmental Protection in Harbin
(6) Harbin Construction Bureau: data about waste disposal sites and urban greening, etc;
(7) Traffic Police Battalion: Harbin motor vehicle reports, situation of traffic accidents, status quo of urban traffic management and traffic management improvement plans and downtown traffic congestion solution plans;
(8) Education Bureau: basic data about all school in Harbin urban area;
(9) Forestry Bureau: data about animals and plants in Harbin;
(10) Tourism Bureau: Harbin's overall planning and overall planning for tourism development, etc.
(11) Civil Affairs Bureau: basic information about endowment institutions under jurisdictional administration of Harbin, etc;
(12) Water Drainage Company: data about sewage pipe network, etc. in Harbin;
(13) Meteorology Bureau: meteorological data about Harbin's urban area over the years;
(14) Hydrology Bureau: hydrological data of Harbin, etc.
(15) Water Affairs Bureau: Harbin's water intake data, etc;
(16) Health Bureau: basic data about all hospitals in Harbin's urban area;
(17) Cultural Relics Bureau: whether the project area involves investigation of cultural relics, etc;
(18) Planning Bureau: Harbin Urban Master Plan (2011-2020), Harbin Comprehensive Transportation Development Plan (2011-2030), etc.

1.4.5 EIA technical guidelines

(1) Technical Guidelines for Environmental Impact Assessment - General Principles, HJ2.1-2011;
(2) Technical Guidelines for Environmental Impact Assessment- Ambient Air, HJ2.2-2008;
(3) Technical Guidelines for Environmental Impact Assessment - Acoustic Environment, HJ2.4-2009;

(4) Technical Guidelines for Environmental Impact Assessment - Ecological Environment, HJ19-2011;
(5) Specifications for Environmental Impact Assessment of Construction Projects (JTG B03-2006);
(6) Technical Specifications for Comprehensive Control of Soil and Water Conservation (GB/T16543.1~16453.6-2008);
(7) Technical Policy on Prevention and Control of Ground Traffic Noise Pollution Huanfa [2010] No.7;
(8) Technical Standards for Highway Projects (JTGB01-2003).

1.5 Classification and Assessment Scope

1.5.1 Classification

In accordance with national classification regulations, it was required to prepare EIA Form for the Project. Based on the classification method specified in the WB's operational manual OP4.01 EIA, this Project was classified as environmental Category B project. The two systems' requirements on EIA are similar.

1.5.2 Assessment scope

According to *the Technical Guidelines for Environmental Impact Assessment* and *the Code for Environmental Impact Assessment of Highway Construction*, the subjects and scope of assessing the impacts of the Project were determined as shown in Table 1-5-1.

Table 1-5-1: Assessment Subjects and Scope

Subject	Assessment Scope
Ecology & solid waste	Within 200m on both sides of the road centerline and other areas disturbed in project construction.
Noise and vibration	Within 200m on both sides of the road centerline.
Air	Within 200m on both sides of the road centerline.
Wastewater	Within 200m on both sides of the road centerline, including the drain inlets.

1.6 Assessment Factors

According to the pollution characteristics of this project, through screening and identification, assessment parameters of each subject were selected as shown in Table 1-6-1.

Table 1-6-1: Assessment Parameters

Subject	Parameters	
	Construction Period	Operation Period
Ecology & solid waste	Soil erosion, green belts, construction waste, and domestic waste	Landscape, vegetation restoration, and waste brought by buses and passengers
Noise	Equivalent continuous A sound level	Equivalent continuous A sound level
Vibration	VL_{zmax}	VL_{z10}
Air	TSP	NO_2, CO
Wastewater	SS, COD, petroleum	SS, BOD_5, petroleum

1.7 Application of Standards

The WB's *EHS General Guidelines - General Guide to Environment, Health and Safety* and China's relevant standards were compared, and the stringent ones were selected for the environmental assessment in this report.

1.7.1 Noise

1. Noise in construction phase

Noise from construction machinery is the main source of noise in the construction activities of the Project. The EHS General Guidelines don't have regulations on noise produced at construction sites, so the *Noise Limits for Construction Site (GB12523-2011)* are applied as shown in Table 1-7-1.

Table 1-7-1: Noise Limits for Construction Site (GB12523-2011)

Daytime [dB(A)]	Nighttime [dB(A)]	Scope
70	55	For all Projects

2. Noise in operation phase

Noise from traffic is the main source of noise in the operational phase of the project facilities, and its impacts can be evaluated through assessing the acoustic environmental quality along the roads. The relevant standard values of the national *Acoustic Environmental Quality Standard (GB3096-2008)* and the WB's EHS General Guidelines are presented in tables 1-7-2 and 1-7-3 respectively. According to the comparison, the two systems have same noise limits for residential, office, cultural and educational areas. The national standards are more stringent on the noise levels in industrial and commercial areas; and the EHS has no noise limits on traffic, commercial and residential mixed areas. Therefore, the national standards are applied for the evaluation.

Table1-7-2: EHS Noise Level Guidelines

Receptor	One Hour [dB(A)]	
	Daytime (07:00~22:00)	Night (22:00~07:00)
Residential; institutional; educational	70	70
Industrial; commercial	55*	45

Table 1-7-3: Standards for Acoustic Environmental Quality (GB3096-2008)

Class		Daytime [dB(A)]	Nighttime [dB(A)]
0		50	40
1		55	45
2		60	50
3		65	55
4	4a	70	55
	4b	70	60

For the noise receptors along the trunk road corridors, Class 4a standard of the *Standards for Acoustic Environmental Quality (*GB3096-2008*)* is applied for the street-facing buildings that are 3-floor high and above; and 60 dB(A) and 50 dB(A) are applied to the significantly sensitive receptors such as schools, hospitals, sanatoriums and nursing homes for daytime and nighttime respectively. Application of the noise standards to the receptors within 200 meters of the road corridors is shown in Table 1-7-4.

Table 1-7-4: Application of Noise Standards to the Receptors

Road Corridor	Standard	Direction to the Road	Road Section
Nanzhi Road (Huashu Street - Gongbin Road)	Class 4a	Both sides	All street buildings along Nanzhi Road
	Class 3	East side	Huashu Street ~ Xianfeng Road
	Class 1	West side	Huashu Street ~ Xianfeng Road
	Class 1	Both sides	Xianfeng Road ~ Minjiang Road
	Class 3	East side	Minjiang Road ~ Hanshui Road
	Class 1	West side	Minjiang Road ~Hanshui Road west side
	Class 3	East side	Hanshui Road ~ Gongbin Road
	Class 2	West side	Hanshui Road ~ Gongbin Road
Changjiang Road (Hongqi Street - Xilong Street)	Class 4a	Both sides	All street buildings along Changjiang Road
	Class 1	Both sides	Hongqi Street~Railway Line
	Class 3	Both sides	Railway Line ~Xilong Street
Xinyang Road (Jincheng Street-Haining Leather Center)	Class 4a	Both sides	All street buildings along Xinyang Road
	Class 2	Both sides	Jincheng Street ~Longhua Road
	Class 1	Both sides	Longhua Road~Haining Leather Center

3. Noise impacts to workers

There is no noise standard for occupational health and safety applicable in China. Therefore, the WB's general EHS guidelines are applied here. Noise limits for different working environments are provided in Table 1-7-5. It's applied to evaluate the noise endured by the workers who operate machinery in the construction activities.

Table 1-7-5: EHS noise limits for different working environment

Categories for different sound functional area	Average (LAeq, 8h)	Max (LAmax, fast)
Heavy Industry (no oral communication required)	85	110
Light Industry (few oral communication required)	50～65	110

1.7.2 Wastewater

The facilities implemented under the Project are urban roads. The wastewater generated in the operation phase is from the road surface runoff in rainy days, and is to be discharged into urban sewerage network. According to relevant national regulations, Class III standard of the *Integrated Wastewater Discharge Standard* (GB8978-1996) should be applicable to evaluate the wastewater that is generated in the road operation and discharged into local sewer systems and treated by municipal wastewater treatment plants with Grade III treatment technology. There are no limit values given by the WB on this type of storm water or surface runoff. So the standards of GB8978-1996 are applied here with the detailed values presented in Table 1-7-6.

Table 1-7-6: Wastewater Discharge Standard

Standard.	Class	Pollutant	Standard Value (mg/L)
*Integrated Wastewater Discharge Standard (*GB8978-1996*)*	Class III	SS	400
		BOD_5	300
		COD	500
		Petroleum	30

1.7.3 Vibration

The *Standard for Vibration in Urban Environment* (GB10070-88) is applied to the areas along the Project.

Table 1-7-7: Vibration Standards in Vertical Direction in Various Urban Areas [dB(A)]

Area	Daytime	Nighttime
Special Residential Areas	65	65
Residential and Cultural and Educational Areas	70	67
Mixed Areas, Central Business District	75	72
Industrial Concentration Zone	75	72
Both Sides of Traffic Trunk Roads	75	72

1.7.4 Air

The project area is a mixed with rural area, industrial area and commercial area, and Class II of the *Ambient Air Quality Standard* (GB3095-2012) should be applicable according to China's regulations. As recommended by the WB's *EHS guidelines*, the standard values of the *WHO's Ambient Air Quality Guidance* are also applicable. The comparison of the two standard systems is shown in Table 1-7-8.

It can be seen from the table that the EHS recommends the same standard values for CO and NO2 as the GB3095-2012 standards, and but it doesn't have standard limits for TSP. Therefore, Class II standard values of the *Ambient Air Quality Standard* (GB3095-2012) are applied for ambient air assessment .

Table 1-7-8: Standards Applicable to Air Assessment

Item	Average time	Class II of GB3095-2012 (ug/m^3)	EHS recommended values (ug/m^3)
TSP	Year average	200	—
	24h average	300	—
	Hour average	—	—
NO_2	Year average	40	40
	24h average	80	—
	Hour average	200	200
CO	24h average	4000	—
	Hour average	10000	—

1.7.5 Solid waste

The *Standard for Pollution Control of Industrial Solid Waste Storage and Disposal* (GB18599-2001) is applied for solid waste management.

1.8 Assessment Period

The assessment period is divided into two stages: construction period and operation period.

Construction period: 1.5 year in total from October 2018 to March 2020.
Operation period: from 2020 till 2025 for mid-term prediction, and till 2033 for long-term prediction.

1.9 Highlights of Assessment

Based on the potential major environmental impacts of the public transportation corridor project and the environmental sensitivity of the project area, following areas are highlighted in the EIA process:

(1) Impacts on Acoustic Environment: focusing on anticipating the impacts of the construction and operation activities on schools, hospitals, and residential areas on both sides of the roads.

(2) Impacts on Urban Ecological Environment: focusing on analyzing the impacts on urban landscapes and surrounding environment.

(3) Impacts on Ambient Air: focusing on the impacts of vehicle emissions on schools, hospitals, and residential areas on both sides of the roads.

(4) Public Participation: focusing on carrying out surveys to institutions, schools, hospitals, and residential areas on both sides of the roads.

1.10 Assessment Methods

Based on the "Point-Based, Point and Line Combination and Whole-Line Feedback" principle, various methods were adopted in the EIA.

Data collection, field investigation and literature review were adopted for assessing the impacts on ecology; analogy method was used for wastewater analysis; and model calculation method was utilized for noise and air assessment.

1.11 Identification of Project-Affected Factors

Based on the nature of the project, the improvement in urban traffic conditions, and the characteristics of pollutant emission, identification forms were used to identify the project-related environmental factors and their influencing magnitude. The results of the identification are shown in Tables 1-11-1 and 1-11-2.

It can be seen from Table 1-11-1 and Table 1-11-2 that the main adverse impacts of the bus corridor project on the environment would be generated in the construction period, shown as the impacts on the traffic, health and safety, acoustic environment, ambient air and ecological environment in the construction areas; and such impacts are local, short-term and reversible. In the operation period, the main impacts would be favorable on urban transportation, health and safety, socio-economy and local people’s living standard along the corridors, and these impacts are extensive and long-term.

1.12 Environmental Sensitive Areas/Receptors

The investigation results show that in the project area, there is no ecologically sensitive areas/receptors such as nature reserves, scenic spots, forest parks, or basic farmland protection areas; no water sensitive areas/receptors such as surface water bodies, groundwater, or any water source protection areas; and no physical cultural resources such as cultural relics, ancient building, or ancient trees etc.

For noise and air impacts, the residential complexes, schools, universities, hospitals or nursing apartments along the corridors are sensitive receptors, which are listed in Table 1-12-1.

Table 1-11-1: Identification of Project-Affected Environmental Factors

Environmental Resources		Natural Environment						Ecological Resources						Social Environment							Quality of Life					
		Groundwater hydrology	**Groundwater quality**	**Surface water hydrology**	**Surface water quality**	**Ambient air quality**	**Acoustic environment**	**Urban ecology**	**Forest and vegetation**	**Wild animals**	**Aquatic animals**	**Endangered animals**	**Fisheries and aquaculture**	**Land use**	**Industrial development**	**Agricultural development**	**Water supply**	**Transportation**	**Fuel structure**	**Energy conservation**	**Aesthetics and tourism**	**Health and safety**	**Society and economy**	**Entertainment**	**Cultural relics**	**Living standard**
Construction Period	Road closure	/	/	/	/	/	/	-1	/	/	/	/	/	/	/	/	/	-2	/	/	-1	-1	-1	/	/	-1
	Site clearance	/	/	/	/	-1	-1	-1	/	/	/	/	/	/	/	/	/	-1	/	/	-1	-1	/	/	/	/
	Excavation	/	/	/	/	-2	-2	-1	/	/	/	/	/	/	/	/	/	-1	/	/	-1	-1	/	/	/	/
	Material Transportation	/	/	/	/	-1	-1	/	/	/	/	/	/	/	/	/	/	-1	/	/	-1	-1	/	/	/	/
	Installation & construction	/	/	/	/	/	-1	/	/	/	/	/	/	/	/	/	/	-1	/	/	-1	-1	+1	/	/	/
	Material stacking and storage	/	/	/	/	-1	/	/	/	/	/	/	/	/	/	/	/	-1	/	/	-1	-1	/	/	/	/
Summary		**/**	**/**	**/**	**/**	**-5**	**-5**	**-3**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**-7**	**/**	**/**	**-6**	**-6**	**/**	**/**	**/**	**-1**
Operation Period	Surface runoff	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	+1	/	/	/	/
	Waste gas emission	/	/	/	/	-1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	-1	/	/	/	/
	Noise	/	/	/	/	/	-1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	-1	/	/	/	/
	Solid waste	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	Bus operation	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	+1	+1	/	/	+1
	Road operation	/	/	/	/	/	/	+1	/	/	/	/	/	/	/	/	/	/	/	/	+1	+1	+1	/	/	+1
	Traffic facilities	/	/	/	/	/	/	+1	/	/	/	/	/	/	/	/	/	/	/	/	+1	+1	+1	/	/	+1
Summary		**/**	**/**	**/**	**/**	**-1**	**-1**	**+2**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**/**	**+2**	**+2**	**+3**	**/**	**/**	**+3**

Note: a. 3-Significant impact; 2-Moderate impact; 1-Minor impact; "+" indicates positive impact; "-" indicates negative impact.
b. The environmental factors for operation period are present as positive factors and negative ones. Only major factors are considered here.

Table 1-11-2: Analysis of Nature of Environmental Impact Brought by the Project

Environment Resources \ Nature of Impact		Adverse Impact												Favorable Impact							
		Construction Period						Operation Period						Construction Period				Operation Period			
		Short-term	Long-term	Reversible	Irreversible	Local	Extensive	Short-term	Long-term	Reversible	Irreversible	Local	Extensive	Short-term	Long-term	Local	Extensive	Short-term	Long-term	Local	Extensive
Natural resources	Groundwater hydrology																				
	Groundwater quality																				
	Surface water hydrology																				
	Surface water quality																				
	Air quality	√		√		√			√		√		√								
	Acoustic environment	√		√		√			√		√		√								
Biological resources	Urban ecology	√		√		√													√		√
	Forest & animals																				
	Wild animals																				
	Aquatic animals																				
	Endangered animals																				
	Fisheries and aquaculture																				
Social environment	Land use																				
	Industrial development																				
	Agricultural development																				
	Water supply																				
	Transportation	√		√		√													√		√
	Fuel structure																				
Living quality	Energy conservation																				
	Aesthetics and tourism	√		√		√													√		√
	Health and safety	√		√		√													√		√
	Society and economy	√		√		√													√		√
	Entertainment																				
	Cultural relics																				
	Living standard	√		√		√													√		√

Table 1-12-1: Noise and Air Sensitive Receptors Along the Corridors

Corridor	No.	Sensitive Receptor	Distance to		Position to the Road	Condition of the Buildings	Noise Standard and Number of Noise-affected People		Ambient Air Quality Standard
			Road Side	Road Center					
Nanzhi Road public transport corridor	1	Tiyu Community	22m	47m	West side	First row: 2 buildings, 6 storeys	Class 4a, 108 hhs, 324 ppl		Class II
	2	Harbin No.38 Middle School	54m	79m	East side	Class 2, 80 teaching staff and 1200 students			Class II
	3	Campus Community	21m	46m	West side	First row: 1 building, 24 storeys	Class 4a, 156 hhs, 468 ppl	Class 1, 156 hhs, 468 ppl	Class II
						Second row: 1 building, 24 storeys			Class II
	4	Ganlan Community	15m	40m	East side	First row: 4 buildings, 24 storeys	Class 4a, 624 hhs, 1872 ppl	Class 2, 1092 hhs, 3276 ppl	Class II
						Second row: 7 buildings, 24 storeys			Class II
	5	Harbin Industrial Art School	33m	58m	West side	Class 1, 25 teaching staff, 500 students			Class II
	6	Hongtu Community	19m	44m	East side	First row: 2 buildings, 6 storeys	Class 4a, 108 hhs, 324 ppl	Class 1, 270 hhs, 810 ppl	Class II
						Second row: 5 buildings, 6 storeys			Class II
	7	Baiyuexingcheng Community	23m	48m	West side	First row: 2 buildings, 28 storeys	Class 4a, 572 hhs, 1716 ppl	Class 1 720 hhs, 2160 ppl	Class II
						Second row: 2 buildings, 28 storeys			Class II
	8	Harbin No.87 Middle School	35m	60m	West side	Class 1, 120 teaching staff, 1500 students			Class II
	9	Chang'ancheng Community	35m	60m	East side	First row: 5 buildings, 8 storeys	Class 4a, 480 hhs, 1440 ppl	Class 2, 960 hhs, 2880 ppl	Class II
						Second row: 10 buildings, 8 storeys			
	10	Kunlun Community	25m	50m	West side	First row: 2 buildings, 6 storeys	Class 4a, 316 hhs, 948 ppl	Class 1, 108 hhs, 324 ppl	Class II
						Second row: 2 buildings, 6 storeys			
	11	Heping Community	25m	65 m	East side	First row: 3 buildings, 6 storeys	Class 4a, 162 hhs, 486 ppl	Class 1, 216 hhs, 648 ppl	Class II
						Second row: 4 buildings, 6 storeys			
	12	Hongqiao Middle School	25m	65m	East side	Class 1, 100 staff, 1100 students			Class II
	13	Xinheng Modern Town	35m	75m	East side	First row: 5 buildings, 8 storeys	Class 4a, 253 hhs, 759 ppl	Class 1, 1746 hhs, 5238 ppl	Class II
						Second row: 9 buildings, 8 storeys			Class II
	14	Longbu Urban Garden Community	66 m	106 m	West side	First row: 4 buildings, 8 storeys	Class 4a, 220 hhs, 660 ppl	Class 1, 220 hhs, 660 ppl	Class II
						Second row: 4 buildings, 8 storeys			
	15	Taihai Garden Community	28m	68m	West side	First row: 5 buildings, 6 storeys	Class 4a, 360 hhs, 1080 ppl	Class 1, 360 hhs, 1080 ppl	Class II
						Second row: 5 buildings, 6 storeys			Class II
	16	Mengke Vision Community	28m	68m	East side	First row: 2 buildings, 32 storeys	Class 4a, 384 hhs, 1152 ppl	Class 1, 576 hhs, 1728 ppl	Class II
						Second row: 3 buildings, 32 storeys			Class II
	17	Yueshan International Community	36m	76m	West side	First row: 2 buildings, 33 storeys	Class 4a, 396 hhs, 1188 ppl	Class 1, 452 hhs, 1356 ppl	Class II
						Second row: 2 buildings, 33 storeys			Class II
	18	Taishan Community	22m	62m	West side	First row: 5 buildings, 6 storeys	Class 4a, 360 hhs, 1080 ppl	Class 1, 288 hhs, 864 ppl	Class II
						Second row: 4 buildings, 6 storeys			Class II
	19	Huizhan Home Community	48 m	88 m	East	First row: 6 buildings, 6 storeys	Class 4a, 432 hhs, 1296 ppl	Class 1, 360 hhs, 1080 ppl	Class II
						Second row: 5 buildings, 6 storeys			

Corridor	No.	Sensitive Receptor	Distance to		Position to the Road	Condition of the Buildings	Noise Standard and Number of Noise-affected People		Ambient Air Quality Standard
			Road Side	Road Center					
	20	Taixinguodian Community	55m	95m	East	Second row: 2 buildings, 33 storeys First row: 5 buildings, 6 storeys	Class 4a, 1144 hhs, 3432 ppl	Class 1, 1144 hhs, 3432 ppl	Class II
	21	Gannan Community	19 m	59 m	West	First row: 3 buildings, 6 storeys	Class 4a, 162 hhs, 486 ppl		Class II
	22	Zhujiangjiayuan Community	50 m	90 m	West	First row: 4 buildings, 6 storeys Second row: 5 buildings, 6 storeys	Class 4a, 288 hhs, 864 ppl	Class 2, 360 hhs, 1080 ppl	Class II
	23	Zhujiangjunjing Community	61 m	101 m	East	First row: 3 buildings, 6 storeys Second row: 3 buildings, 6 storeys	Class 4a, 162 hhs, 486 ppl	Class 2, 162 hhs, 486 ppl	Class II
	24	Gongbi Urban Garden Community	24 m	64 m	East	First row: 4 buildings, 8 storeys Second row: 5 buildings, 8 storeys	Class 4a, 200 hhs, 600 ppl	Class 2, 253 hhs, 759 ppl	Class II
Changjiang Road public transport corridor	25	Yueshan International Community	75m	105.5m	South	First row: 4 buildings, 32 storeys Second row: 4 buildings, 32 storeys	Class 4a, 1440 hhs, 4320 ppl	Class 1, 1440 hhs, 4320 ppl	Class II
	26	Mengke Vision Community	115m	145.5m	North	First row: 3 buildings, 32 storeys Second row: 3 buildings, 32 storeys	Class 4a, 1080 hhs, 3240 ppl	Class, 1 1080 hhs, 3240 ppl	Class II Class II
	27	Northeast Agricultural University	95m	117.25m	South	Class 2, 3000 staff and 22000 students			Class II
	28	Hongshengmingdu Community	50m	72.5m	North	First row: 1 building, 6 storeys Second row: 2 buildings, 6 storeys	Class 4a, 120 hhs, 360 ppl	Class 2, 233 hhs, 699 ppl	Class II
Xinyang Road public transport corridor	29	Harbin No. 10 Hospital	20m	50m	South	Class 2, 588 medical care staff, 302 beds			Class II
	30	Yingbin Home Community	33m	63m	South	First row: 4 buildings, 8 storeys Second row: 2 buildings, 8 storeys	Class 4a, 218 hhs, 654 ppl	Class 2, 378 hhs, 1134 ppl	Class II
	31	Yingbin Community	20m	50m	South	First row: 3 buildings, 12 storeys Second row: 3 buildings, 8 storeys	Class 4a, 168 hhs, 504 ppl	Class 2, 396 hhs, 1188 ppl	Class II
	32	Sanjing Home Community	48m	78m	South	First row: 3 buildings, 33 storeys Second row: 3 buildings, 8 storeys	Class 4a, 368 hhs, 1104 ppl	Class 2, 562 hhs, 1686 ppl	Class II
	33	Muslim Community	15m	55m	North	First row: 3 buildings, 8 storeys Second row: 1 building, 8 storeys	Class 4a, 186 hhs, 558 ppl	Class 2, 142 hhs, 426 ppl	Class II
	34	HLJ No.3 Hygiene School	20m	60m	North	Class 2, 60 staff			Class II
	35	Bethel Hospital	15m	55m	North	Class 2, 50 medical care staff, 30 beds			Class II
	36	Hongyang Primary School	35m	75m	North	Class 2, 120 staff and 800 students			Class II
	37	Harbin Women's Federation Preschool Teachers College	20m	60m	North	Class 2, 83 staff			Class II
	38	Jinshan Garden Community	135m	165m	South	First row: 1 building, 6 storeys Second row: 1 building, 6 storeys	Class 4a, 120 hhs, 360 ppl	Class 2, 120 hhs, 360 ppl	Class II
	39	Yingbin Nursing Apartment	35m	75m	South	First row: 1 building, 11 storeys	Class 2, 100 ppl		Class II

Note: hhs - households; ppl - people

2. Project Description

2.1 Basic Information

Project Name: Harbin Cold Weather Smart Public Transportation System Project (Public Transport Corridor Component)

Construction Location: The public transport corridor component is located in the downtown area of Harbin with 3 public transport corridors to be constructed in the urban area: Nanzhi Road Public Transport Priority Corridor (Huashu Street- Gongbin Road), Changjiang Road Public Transport Priority Corridor (Hongqi Street- Xilong Street) and Xinyang Road Public Transport Priority Corridor (Xiangzheng Street- Haining Leather Center). All the three public transport priority corridors are reconstructed ones. The Project location is shown in Figure 2-2-1.

Construction Scope: It includes construction of public transport corridors and establishment of the supporting intelligent systems;

Based on the latest approved preliminary design, the corridor component involves a total investment amount of 164.18 million Yuan, including project construction costs of 121.50 million Yuan, other costs of 31.70 million Yuan and contingency fee 10.98 million Yuan. The component is to adjust the road cross section, repair the road surface, adjust the location of bus bays (stops), and install traffic facilities etc.

2.2 Project Composition

Table 2-2-1: Project Composition and Main Works

Item		**Descriptions**
Composition	**Nanzhi Road public transport corridor**	The Nanzhi Road Public Transport Priority Corridor, with its starting point to be the intersection of Nanzhi Road and **Huashu Street** and the ending point to be **Gongbin Road**, involves a total length of 6,269.34 m, planned to be an urban trunk road, the road direction based on the original road design, with the planned road boundary line of 50/80m.
	Changjiang Road public transport corridor	The Changjiang Road Public Transport Priority Corridor, with its starting point to be the intersection of Changjiang Road and **Hongqi Street**, and the ending point to be **Xilong Street**, involves a total length of 5,390.68m, planned to be an urban trunk road, the road direction based on the original road design, with the planned road boundary line of 80m.
	Xinyang Road public transport corridor	The Xinyang Road Public Transport Priority Corridor, with its starting point to be the intersection of Xinyang Road and **Xiangzheng Street**, and the ending point to be **Haining Leather Center**, involves a total length of 6,059.56m, planned to be an urban trunk road, the road direction based on the original road design, with the planned road boundary line of 60m.
Main Works	**Road Works**	To remove old road surfaces and curbs, pave motorways and sidewalks, and install new curbs. For the region with serious damage, the road foundation shall be excavated and rebuilt; If the structure is intact or only the surface is damaged, the treatment plan is to mill and plane the surface. Different structures are adopted based on cross section design and original road surface elevations.
	Traffic Works	To provide safety facilities like traffic guide signs, traffic indication signs, traffic line markings, ground signs, road nameplates and traffic barrier guardrails and conduct corresponding renovation and traffic guidance on the road intersected within the intersection scope.
	Bridge Works	To renovate a pedestrian overpass under Changjiang Road Corridor works. Two additional stairways will be built to connect the existing overpass with the road middle-type bus stops to ensure pedestrians' safe and smooth arrival at the bus stop and reduce the effect on the traffic on the main trunk road at the same time.
	Electrical Works	The existing streetlights are in good condition, and only need to be moved locally and adjusted appropriately as needed. Besides, power for the bus stops and their shelters is taken from the nearby box transformer or street light circuits.

Item		Descriptions
	Pipelines	To lay power cables for bus stops and traffic control systems along the corridors, and adjust the wellhead position of the original pipelines at the same time. Some storm drain inlets will be removed, built, or reinforced.
	Bus stops and shelters	To relocate bus stops or build new ones, installing bus shelters (some of them are heat preserving ones), paving the bus bays with non-slip tiles, and equipping with light box-type and/or electronic bus boards.
	Landscaping & green belts	To provide additional greenbelts and other decoration landscapes along the corridors. In addition, the green belts in the middle of Changjiang Road will be removed leaving the space to be used for bus lanes.
Removal Works and Spoils		Old roads, sidewalks, curbs, and bus stops will be removed. The spoils generated will be sent to landfills designated by the municipal department.
Temporary Land Occupation		The road corridors project will be implemented on their permanently occupied land, with no need of additional temporary land occupation.
Project Cost		The construction and installation cost for the bus corridor component is estimated at RMB 121.50 million, other cost estimate is RMB 31.70 million, and contingency fee is RMB 10.98 million .

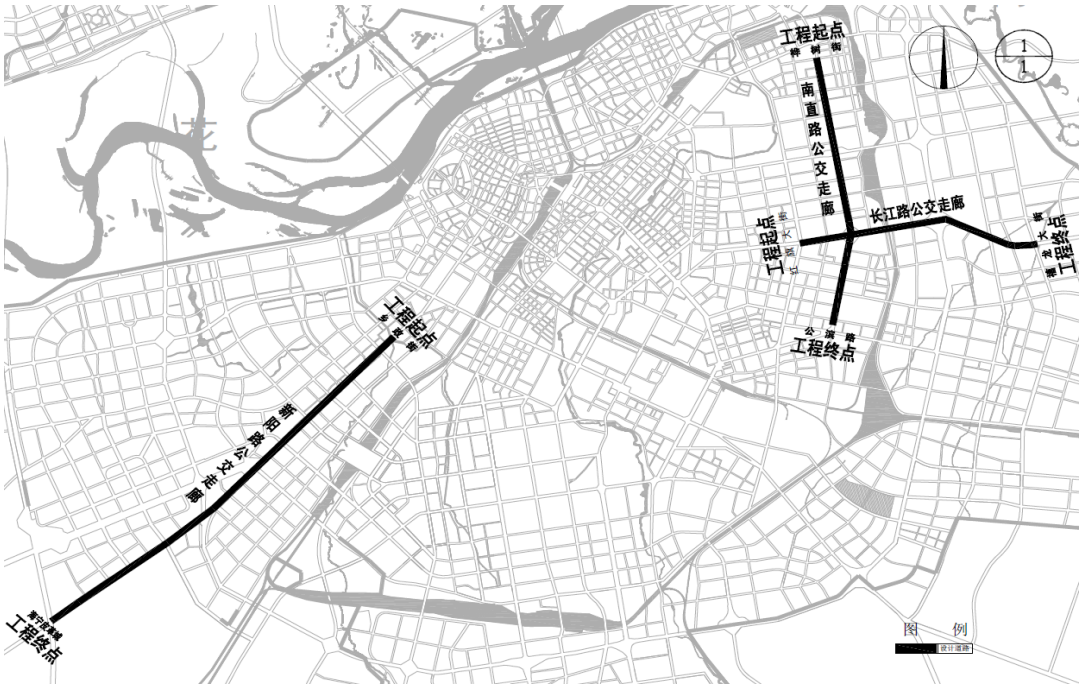


Fig 2-2-1: Project Location

2.3 Project Design

The Project is to renovate three trunk roads to serve as smart public transportation corridors. During the design process, the WB's basic ideas and principles about building cold weather smart public transportation system have been considered. The existing road widths will be kept unchanged, and the transportation resources will be redistributed to ensure the efficiency of public transportation and slow traffic systems, to avoid parking on street, inhibit excessive consumption of private cars, and to ensure the majority of people to travel smoothly.

2.3.1 Nanzhi Road Public Transport Corridor (Huashu Street- Gongbin Road)

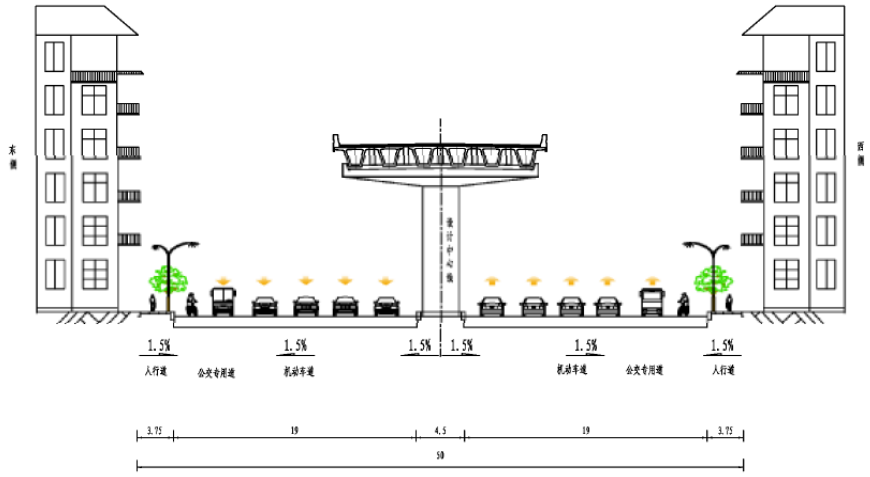
1) Overall Plan

The Nanzhi Road Public Transportation Corridor starts from the intersection with Huashu Street, and ends at the intersection wtih Gongbin Road, with a total length of 6,269.34 m and design width of 50/80m. It was planned as an urban trunk road with the original route alignment unchanged. The road shall go through the following points: Huashu Street, Hongtu Street, Huaihe Road, Huanghe Road, Changjiang Road, Ganshui Road, Gongbin Road, etc. Two-plate cross section is adopted, and the road plane design meets the requirements for safety and driving

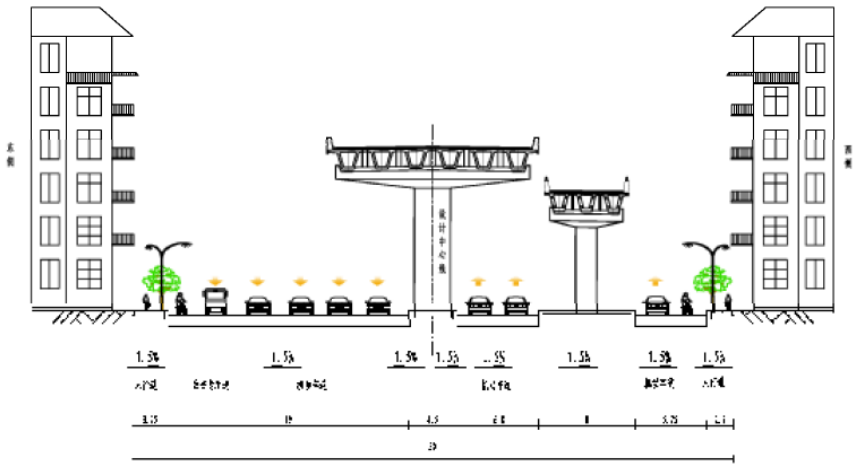
comfort, consistent with the existing road centerline. Since this corridor works will be implemented simultaneously with the east ring viaduct improvement project, the road pavement works and part of the traffic signs and marking works on Nanzhi Road will be implemented under the east ring viaduct project. 25 bus stops (including 4 warm stops), traffic signs and signals, central guardrail and pedestrian railing will be built on the Nanzhi Road corridor under the WB project,.

2) Cross-section design

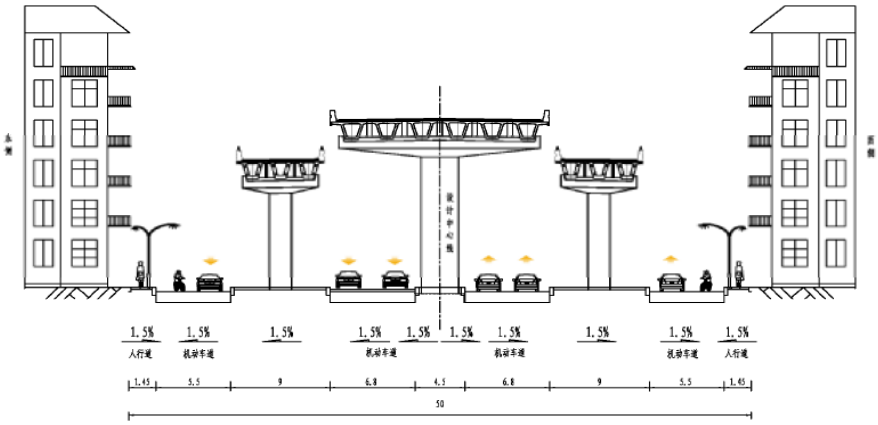
(1) Huashu Street~ Bus Bridgehead Section (K0+287.437~K0+780, K1+100~K2+040), excluding the ramp bridge at Hongtu Street



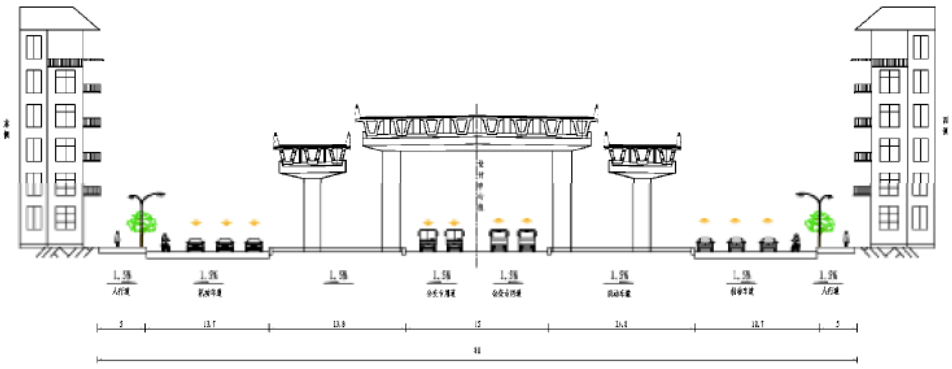
(2) Hongtu Street Ramp Bridge Section (K0+780~K1+100)



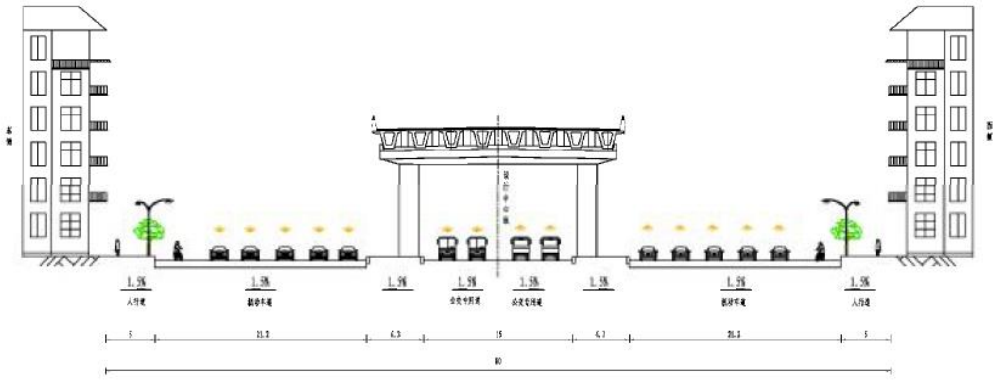
(3) North side of Xianfeng Bridge Approach Bridge section (K2+040~K2+580)



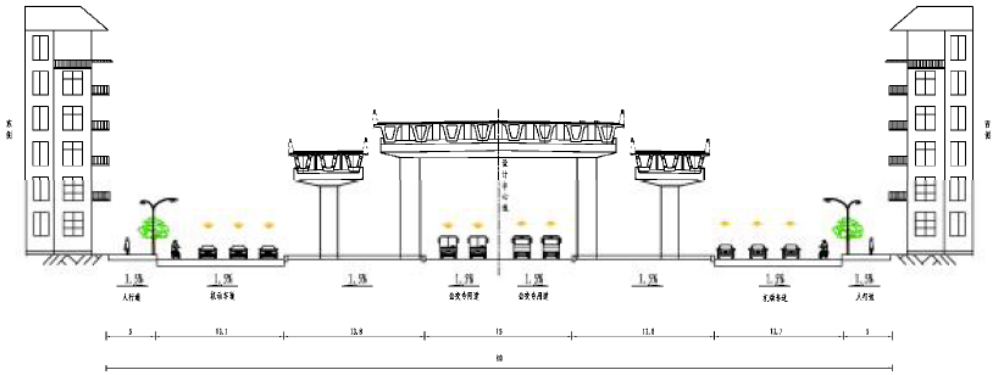
(4) South side of Xianfeng Bridge Approach Bridge section (K2+580~K3+120)



(5) Xianfeng Overpass ~ Gongbin Road (K3+120~K3+680, K5+080~K6+690)



(6) Changjiang Road Approach Bridge Section (K3+680~K5+080)



3) Road pavement

The Nanzhi Road pavement works will be conducted in the other overpass construction project and excluded in the WB Project.

4) Traffic works

It's to provide safety facilities like ground signs and traffic line markings, 8 traffic guide signs, 59 road nameplates, and 13.74 km of traffic barrier guardrails.

5) Bus stops

25 bus stops are to be built under Nanzhi Road Corridor works, 14 of them are of roadside type and the rest 11 are middle-street type. They have semi-enclosed waiting spaces to keep out the wind in winter. 4 of the bus stops have heat preserving bus shelters equipped with solar power systems to supply power and heating in winter. Light box-type bus boards and electronic bus boards will be placed to provide hardware support for the smart bus navigation system. The ground of bus stops shall be paved with non-slip tiles.

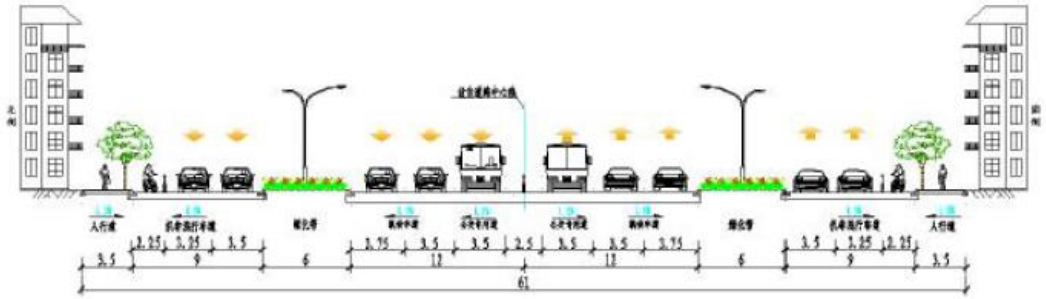
2.3.2 Changjiang Road Public Transport Corridor (Hongqi Street-Xilong Street)

1) Overall Plan

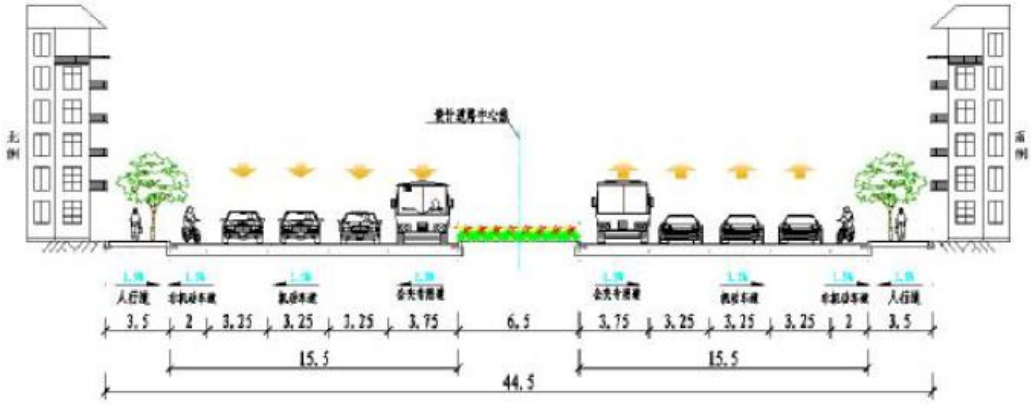
The Changjiang Road Public Transport Corridor starts from the intersection with Hongqi Street, ends at the intersection with Xilong Street. The section of the road is 5390.68m long and 80m wide, and is planned to be an urban trunk road with the original route alignment unchanged. The road shall go through the following points: Hongqi Street, Nanzhi Road, Huagong Road, and Xilong Street, etc. The types of two-plate cross section and three-plate cross section were adopted, and the road plane design will meet the requirements for safety and driving comfort and consistent with the existing road centerline. The corridor design scheme mainly includes roadway renovation, sidewalk renovation, traffic signs and marking, pedestrian overpass renovation, and greening works. The cross-section design of this section of road corridor is shown in the following figures. The roadway is a two-way 1.5%, and the non-motorized lane and sidewalk are a one-way 1.5%. In order to facilitate the mechanization of construction, roadways and sidewalks are adopted straight slope.

2) Cross-section design

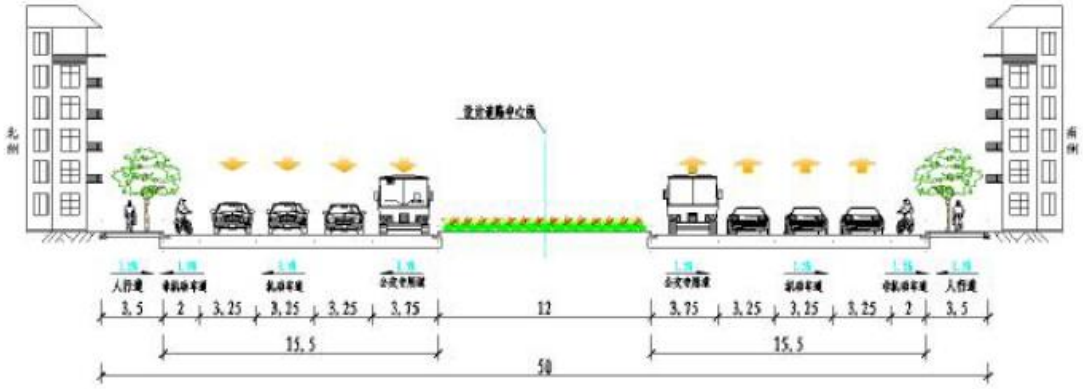
(1) Hongqi Street~Railway Bridge Section (K0+000~K1+440)



(2) Railway Bridge ~ Dujiadian Section (K1+440~K4+020)



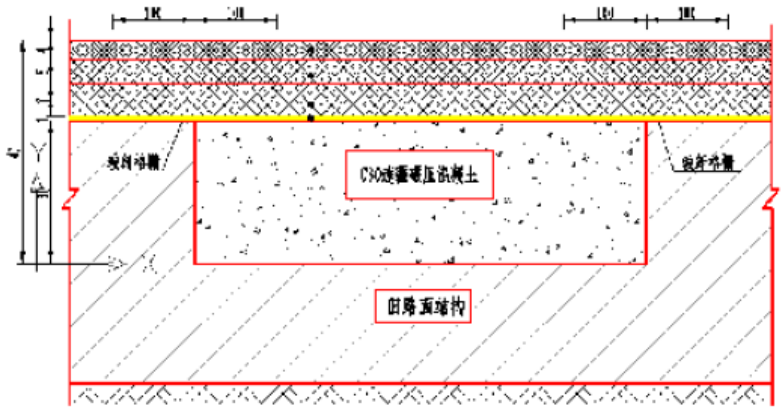
(3) Dujiadian~Xilong Street Section (K4+020~K5+390.68)



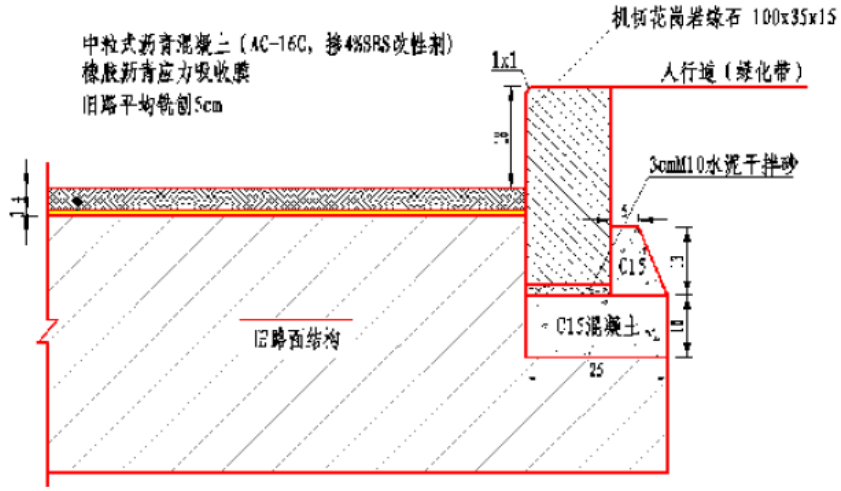
3) Road Pavement

In general, pavements on Changjiang Road are in good condition. Under the corridor renovation works, milling and surfacing will be undertaken to improve the roads' condition, by keeping the current pavement width and road elevation unchanged. Considering the damage situation, the following pavement schemes will be adopted:

(1) For road sections with serious damage, the road foundation is excavated and rebuilt.



(2) If the structure is intact and only the surface is damaged, the treatment plan is to mill and pave the road surface. The structure will be built as following:



4) Bridge Works

There's an existing pedestrian overpass near Northeast Agriculture University to be renovated under the Changjiang Road Corridor works. Two additional stairways will be constructed to connect the overpass with the road middle-type bus stops to realize passengers' three-dimensional street crossing, ensure pedestrians' safe and smooth arrival at the bus stop, and reduce the effect on the traffic on the main trunk road. Considering the snowy weather in winter, the surfaces of the bridge and stairs are easy to get icy, therefore anti-skid surfaces are designed to these structures.

5) Traffic Works

It's to provide safety facilities including 64 traffic guide and direction signs, and 6.79 km of traffic barrier guardrails.

6) Bus Stops

It's to install 8 new bus stops.

7) Electrical Works

The existing streetlights are all in good condition, and only 15 need to be relocated locally as needed.

8) Pipeline Works

800m power cables will be laid to supply electricity for bus stops and traffic control systems along the corridor. In addition, 240 drain inlets will be removed, built, dredged or reinforced, and 150 manholes will be reinforced.

9) Landscaping Works

It's to remove 4424 m^2 of existing greenbelts, build 694 m^2 of new greenbelts, and construct 82 tree pools.

10) Removal Works

There will be 7904 m^2 of roads, 6950 m^2 of sidewalks, and 1568 m of curbs to be destructed; and 177000 m^2 of roads to be milled. It's also to remove 10 old bus stops. There will be 15954 m^3 of spoils generated, 8850 m^3 of which are from road milling (5cm thick).

2.3.3 Xinyang Road Public Transport Corridor (Xiangzheng Street-Haining Leather Center)

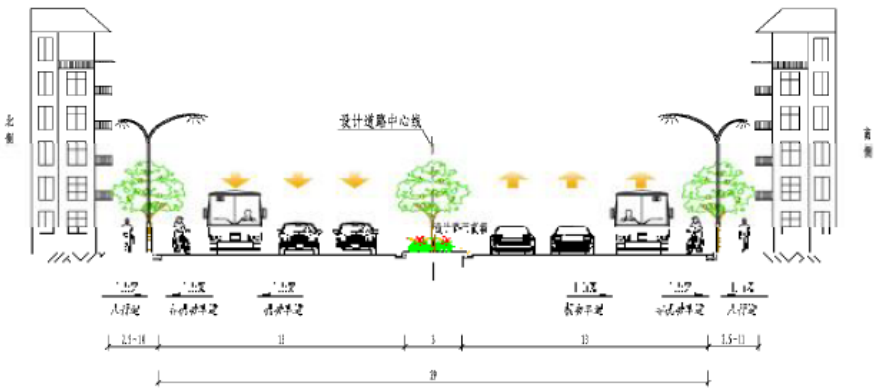
1) Overall Plan

The Xinyang Road Public Transport Corridor starts from the intersection with Xiangzheng Street, and ends at Haining Leather Center, with a total length of 6059.56m and a width of 60m. It's planned to be an urban trunk road, keeping the original routine alignment design unchanged. The road shall go through the following points: Xiangzheng Street, Xiangli Street, Zhigong Street, Shangjiang Street, Lijiang Road, etc. The one-plate cross section is adopted, and the road plane design meets the requirements for safety and driving comfort, consistent with the existing road centerline. Implemented simultaneously with the overpass projects, road pavement and sidewalk renovation along the Xinyang Road corridor will be carried out under the WB project.

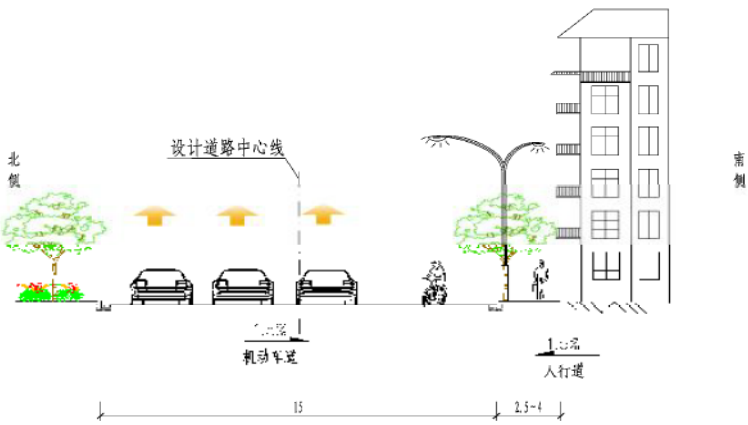
2) Cross-section design

The cross-section of the project design is shown in the figure below. The roadway is a two-way 1.5%, and the non-motorized lane and sidewalk are a one-way 1.5%. In order to facilitate the mechanization of construction, roadways and sidewalks are adopted straight slope.

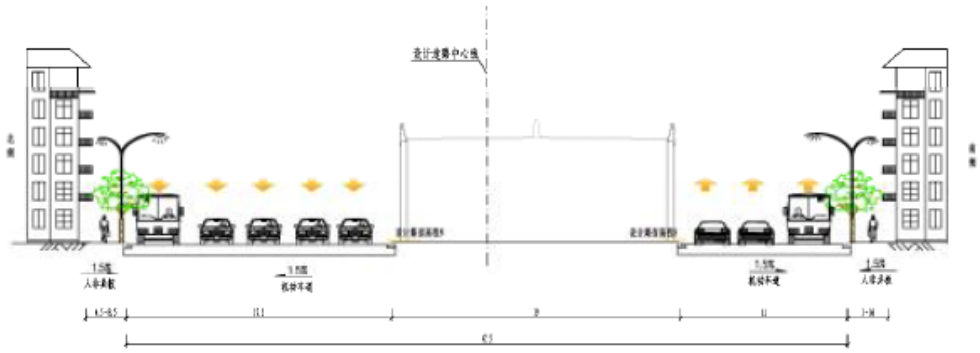
(1) Haining Leather City ~ Airport Turntable road (TK0+000~TK1+192)



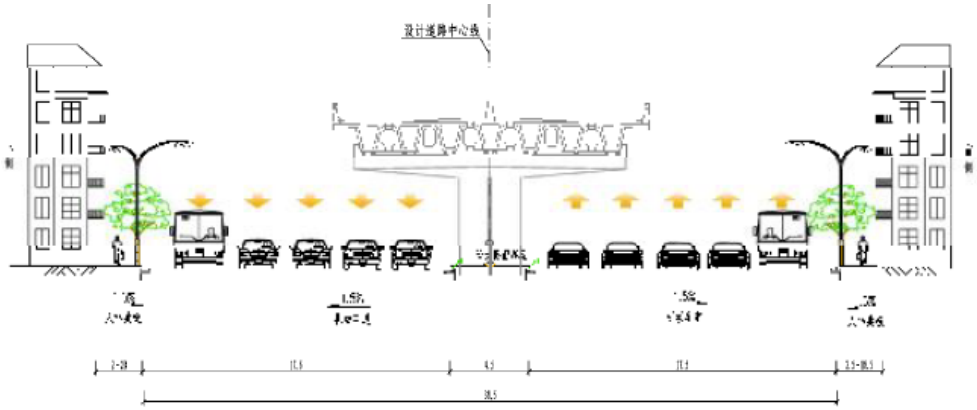
(2) Airport Turntable road (TK1+192~TK1+382.45, K0+000~K0+205.31)



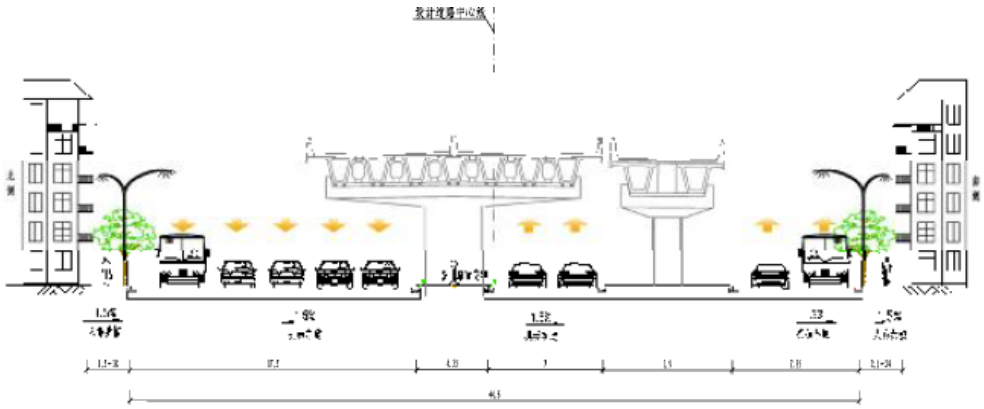
(3) Airport Turntable road ~ Develop Zone Planning and Architectural Design Institute (K0+205.31~K0+766.275)



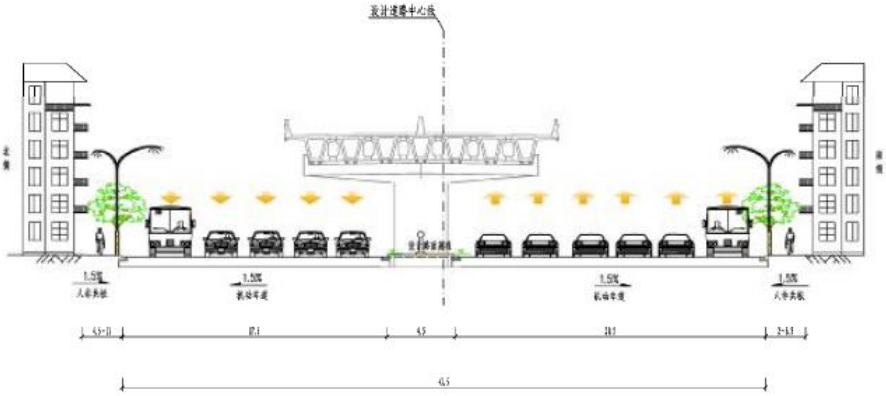
(4) Develop Zone Planning and Architectural Design Institute ~ Lijiang Road (K0+76.275~K1+591.871)



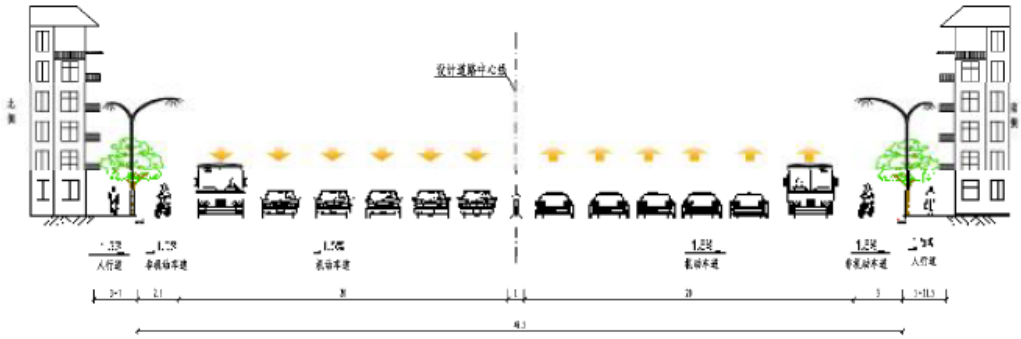
(5) Lijiang Road – Democratic Seven Street (K1+591.871~K2+0000)



(6) Democratic Seven Street ~ Hexie Auenue (K2+000~K2+160)



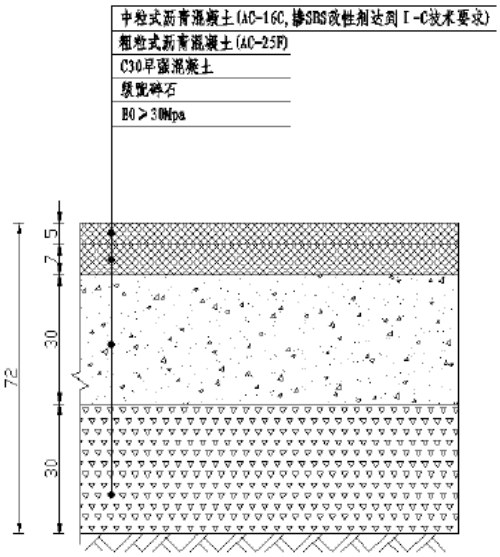
(7) Xiangli Street ~ Xiangzheng Street (K4+478.487~K4+677.589)



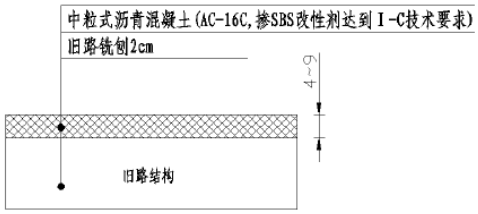
3) Road Pavement

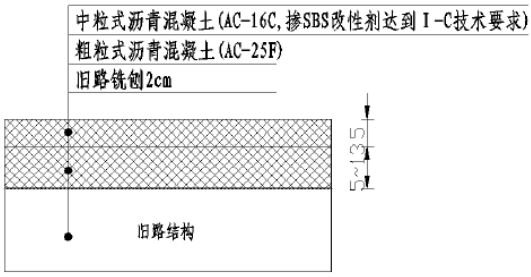
In general, pavements on the Xinyang Road are in good condition. For the corridor works, milling and surfacing will be undertaken to improve the pavement condition, by keeping the existing pavement width and road elevation unchanged. Considering the existing damage situation, the following pavement schemes will be adopted:

(1) For road sections with serious damage, the road foundation is excavated and rebuilt.



(2) If the structure is intact and only road surface is damaged, milling and surface paving will be applied for the road renovation. Base on the difference of road surface elevation between the design scheme and the actual condition, the following structures are adopted accordingly.





4) Traffic Works

It's to provide safety facilities including 110 traffic guide and direction signs, 12 reflective safety barriers, and 4.682 km of traffic barrier guardrails.

5) Bus Stops

It's to install 22 new bus stops, of which 4 have heat preserving bus shelters.

6) Electrical Works

It's to install 105 streetlights.

7) Pipeline Works

5200m power cables and 2000 m electric wires will be laid, and 20 wiring manholes to supply electricity for bus stops and traffic control systems along the corridor.

8) Removal Works

There will be 3216 m^2 of roads, 47008 m^2 of sidewalks, and 7526 m of curbs to be destructed; and 114254 m^2 of roads to be milled. It's also to remove 14 old bus stops. There will be 18703 m^3 of spoils generated, 2285 m^3 of which are from road milling (2cm thick).

3. Environmental and Social Settings

3.1 Natural Environment

3.1.1 Geographic Location

As a typical Cold Zone city, Harbin, also called “Ice City” is located between 125º42’ and 130º10’ east longitude and between 44º04’ and 46º40’ north latitude and its climate is temperate continental monsoon climate. Winter (from November to March) in Harbin lasts fro five months beginning from October 3 and ending at April 30 (210 days). The average temperature is below 10 ºC and the weather is cold and dry. January is the coldest month and its average temperature is -20.3ºC, the extreme low temperature being -38.1ºC (in urban areas). In midwinter, the temperature always drops sharply and big snowstorm would hit the city due to outbreak of severe cold air and its southward movement which seriously affects the city’s traffic and makes it inconvenient for people to go outside. The city district of Harbin is mainly distributed on the three-stage terraces shaped by the impact of Songhua River: the first terrace is flat and its elevation varies between 132 m and 140 m. It mainly includes Daoli District and Daowai District. The second terrace whose elevation varies between 147 m to 175 m is gradually developed from the first terrace and there is no clear boundary between the two terraces. It mainly covers part of Nangang District and Xiangfang District in a large area and it is an important agriculture district of Harbin provided deep soil layer and fertile soil after erosion of running water for a long time. The third terrace covers Huangshanzuizi and southern part of Pingfang District and its elevation varies between 180 m and 200 m. It gradually expands to Zhangguangcai Ridge southeastwards in hilly area.

3.1.2 Hydrology

All rivers within the territory of Harbin flow into Songhua River System and Mudanjiang River System, mainly Songhuajiang River, Hulan River, Ashi River, Lalin River, Mangniu River, Mayan River, Dongliangzhu River, Ni River, Piao River, Feiketu River, Shaoling River, Wuyue River, Woken River, etc. Songhua River originates from the Heaven Pool of Changbai Mountain in Jilin Province and its tributary, as the largest river way of Harbin in irrigation volume, flows across the middle part of Harbin from west to east. The annual precipitation is about 500 mm and the rainy season is from June to September contributing more than 70% of the whole year’s precipitation. The Xiquanyan Reservoir, the largest water conservation work in Harbin, was impounded in 1996. It controls a catchment of 1,151 km^2 and covers a reservoir area of 40.86 km^2. It serves irrigation water for additional 15,133.3 hectares of farmland. Water resources in Harbin is characterized by the features that there is less self-producing water and more passing water and the water distribution is unbalanced because of rich water reserves in the east and poor water reserves in the west. The per capita occupation volume of water resources in Harbin is 1,630 cubic meters.

3.1.3 Meteorology

As a typical Cold Zone city in Northern China, Harbin, also called “Ice City”, has highest longitude among big cities in China and it is controlled by temperate continental monsoon climate. Four seasons in Harbin are distinctive: winter is long and cold; summer is short and cool; and spring and autumn are transitional seasons which last quite short and temperature in the two seasons change rapidly.

In spring, Harbin’s temperature rises quickly featured by little precipitation, dry air, changeable weather and fluctuated temperature; the monthly temperature varies greatly, normally 8℃ to 10 ℃; and gale weather is more frequent in Spring with its number of the gale weather tops the four seasons.In summer, Harbin is warm and rainy and the light, heat and precipitation are sufficient; its monthly temperature varies least in all seasons; the temperature of July is the highest in all seasons; the average temperature remains 23.0 ℃ all year round; summer has the most precipitation, but it rains lightly; and the number of days for average heavy rain is one to two days and extraordinary rainstorm is rare.

3.2 Social Environment

3.2.1 Administrative Division and Population

Located in the south part of Heilongjiang Province, Harbin is the provincial capital of Heilongjiang Province as well as the most important central city in China’s Northeast district, having Daqing Oil Field to its northwest, connecting Northeast Economic Zone of Changchun, Shenyang, and Dalian to its south, and overlooking forest treasure of the Greater Khingan Mountains and the Lesser Khingan Mountains to its north. Harbin has nine districts of Daoli District, Daowai District, Nangang District, Xiangfang District, Pingfang District, Daowai District, Hulan District, Acheng District, and Shuangcheng District, seven counties of Bin County, Bayan County, Yilan County, Yanshou County, Mulan County, Tonghe County and Fangzheng County, and three county-level

cities of Wuchang, Shuangcheng and Shangzhi. By 2017, there are a total of 109.29 million people (permanent population) in Harbin including7.049 million people within the urban area (64.5 percentage).

3.2.2 City Layout and Economy

Harbin, the famous city for ice-snow tourism in winter, is the provincial city of Heilongjiang Province and the center of politics, economy, trade, technology, as well as cultural undertaking in Heilongjiang Province. Harbin has a complete infrastructure of transportation, energy, post and telecommunications, communications, and power supply; the urban area is sanitary and neat; the development of trade, tourism, entertainment and catering is with unique feature; and the industries of finance, insurance, information consultation as well as real states are booming showing that Harbin is functioned better. As a comprehensive industrial city with solid industrial foundation, Harbin is one of the oldest industrial bases and one of the commodity grain bases in China. After China's Reform and Opening-up Policy, Harbin has fastened its face of economic development and its comprehensive economic strength is growing continuously forming a new industrial pattern combining industries of medicine, food, chemicals, etc. and four competitive industries of manufacture, medicine, food and chemicals.

According to survey data, the regional GDP reached 635.50 billion yuan in 2017, an increase of 6.7% over the previous year. Among them, the primary industry realized an added value of 68.88 billion yuan, with an increase of 3.7%; the secondary industry realized an added value of 182.07 billion yuan, with an increase of 3.6%; the tertiary industry realized an added value of 384.55 billion yuan, with an increase of 9.0%. The three industrial structures were adjusted from 11.3:31.1:57.6 of the previous year to 10.8:28.7:60.5 in 2017. The per capita GDP of the registered population is 66,301 yuan, with an increase of 7.0%. The non-public ownership economy achieved an added value of 344.17 billion yuan, an increase of 8.0%, accounting for 54.2% of the city's regional GDP. Nine counties (cities) achieved a regional GDP of 164.23 billion yuan, an increase of 4.3%, accounting for 25.8% of the city's regional GDP, and a contribution rate of 17.2% to the city's economic growth.

At the end of 2017, the total population employed in Harbin is 5.095 million, a year-on-year increase of 0.7%, including 2.802 million urban employees, an increase of 4.7%. The number of newly-employed people in urban areas was 111,000, down 3.0%. The laid-off workers and unemployed people re-employed 73,000, and the rural labor force transferred 1.546 million. At the end of the year, the urban registered unemployment rate was 3.68%, a decrease of 0.06 percentage points.

In 2017, the total general public budget revenue was 77.02 billion yuan, an increase of 8.2% over the previous year. Among them, the general public budget revenue was 36.81 billion yuan, an increase of 8.4%. The tax revenue of general public budget revenue was 29.52 billion yuan, an increase of 13.1%. The general public budget expenditure was 95.85 billion yuan, an increase of 9.4%.

3.2.3 Communication and Transportation

In 2017, the total cargo transportation volume was 87.17 million tons, an increase of 2.2% over the previous year. The total turnover of cargo transportation was 34.01 billion tons, an increase of 6.5%. The total passenger transportation volume was 1,192,900,000, a decrease of 4.8%. The total passenger transportation turnover was 33.66 billion person-km, an increase of 7.5%.

At the end of 2017, Harbin Taiping International Airport has opened 244 route lines, an increase of 37 from the end of the previous year. Among them, there are 28 international routes; 216 domestic routes, an increase of 40. In the whole year, the number of passengers entering and leaving the Harbin Taiping International Airport was 18.810 million, an increase of 15.6%. Air cargo and mail throughput was 121,000 tons, down 2.9%. The city's private car ownership was 1.657 million, an increase of 13.6%. Among them, the number of personal small passenger cars was 1.345 million, an increase of 16.6%. There are 25.8 vehicles per 100 urban households and 7.0 vehicles per 100 rural households.

Harbin is an key open city in the inland of China and a pilot city of comprehensive reform and it enjoys a series of preferential policies given by the country, especially that Harbin's "Inland Port", the first inland port in China's inland city and a port city without coast, is approved by the State Council making it possible for container cargo to enter and leave ports and go in bond and out bond directly, which compensates the shortcoming that there is no harbor.

3.2.4 Urban Development and Environmental Protection

In 2017, the total supply of state-owned construction land was 1843.8 hectares, an increase of 50.2% over the previous year. Among them, the industrial and mining storage land was 233.5 hectares, down 24.7%; the commercial land was 165.4 hectares, down 22.0%; the residential land was 355.4 hectares, up 33.1%; the other land for infrastructure and other land was 1089.5 hectares, an increase of 148.5%.

A total of 259,000 mu of afforestation was completed throughout the year. There are 16 wetland parks with an area of 20,500 hectares, including 13 state-level wetland parks and 3 provincial-level wetlands. There are 11 provincial nature reserves with an area of 121,100 hectares. The standing timber volume is 93.86 million cubic meters, and the forest coverage rate is 46.0%. Completed 131,000 mu of artificial afforestation.

The annual ambient air quality in urban areas reached 270 days, the average annual value of fine particulate matter (PM2.5) was 58 μg/m3, the annual average value of inhalable particulate matter (PM10) was 87 μg/m3, and the annual average value of nitrogen dioxide was 44 μg. / cubic meter, the annual average value of sulfur dioxide is 25 micrograms / cubic meter. The average environmental noise in urban areas is 59.2 decibels, and the average urban traffic trunk noise is 73.3 decibels.

The water compliance rate of urban centralized drinking water sources is 100%; the proportion of the water quality section of the Songhua River mainstream is 100%.

3.2.5 Infrastructure Development

In 2017, total 88 bridges or highway project were started to construct, including the Binbei Railway and Highway Bridge, the Suiman Highway and Kunming Street connection line in Limin Development Zone National Highway, Xiangyang Road in Hulan District, and the surrounding roads of the Hongqiao Bridge, the North Municipal Road Network Project, and the Hunan City supporting roads, and etc. 59 road and bridge projects such as one-street tunnel bridge, Guofang Road (Phase I) and highway bridge area, have been completed and put into use. 19 construction source network plant stations were started, 80 kilometers of various types of pipelines were newly built or renovated, and the first phase of the underground integrated pipe gallery pilot project completed 23.5 kilometers of construction tasks. The pipeline entry corridor has preliminary realized. and started the construction of the second phase of the underground integrated pipe gallery project. Phase I, Phase II and Line 3 of Metro Line 1 have been opened to traffic. Metro Line 1 Phase 3, Line 2 Phase 1 and Line 3 Phase 2 are being constructed. The total mileage under construction is 69.14 kilometers. 15,000 public parking berths were added.

At the end of 2017, there were 292 coded bus lines, including 24 newly opened, adjusted and extended bus lines. The total length of bus operation lines reached 5689.8 kilometers, of which 879 kilometers were newly added. A total of 7,519 buses were operated, including the addition and renewal of the 1555. The annual bus passenger traffic reached 1.36 billion passengers. A total of 18,193 taxis, passenger traffic reached 570 million passengers. The length of the subway operation line is 21.8 kilometers, and the passenger traffic is 756.8 million.

In 2017, 12 shantytown renovation construction projects were started, and 8256 houses were started to work, completing 118% of the annual plan; 8789 were completed, completing 126% of the annual plan. A total of 11,900 sets of relocated houses were built, and 11,900 households were relocated. 2,701 public rental housing units were provided, completing 140% of the annual plan.

The city's new central heating capacity of 8 million square meters, centralized heating area of 273 million square meters, centralized heating penetration rate reached 95%; the city's total gas supply pipeline length of 4234.7 kilometers, natural gas users 1.924 million, of which household users 190.7 Ten thousand households.

3.3 Traffic Status and Development

3.3.1 Traffic status and planning

Harbin is an important highway, railway and aviation hub in Heilongjiang Province, northeast China and even in the whole country and in Northeast Asia. The land transport links between Heihe, Tongjiang, Manchuria, etc. and Chinese inland areas need to pass through the territory of Harbin. In the future, some international air transportations may need transfer at Harbin Taiping Airport. Therefore, it is necessary to carefully coordinate the interrelationship between cross-boundary traffic, outbound traffic and traffic within the city.

Based on the research scope determined according to *Harbin Urban Master Plan (2011-2020)*, the total land area in Harbin's downtown area is 4187 km^2, with the specific scope including the administrative jurisdictions of Daoli District, Daowai District, Nangang District, Xiangfang District, Pingfang District and Songbei District, Hulan urban area and Shuangjing Town, Changling Town, Shenjia Town and Mengjia Township, Acheng urban area (including Xinli Street and Sheli Street) and Feiketu Down, Liaodian Township and Hongxing Township. The urban downtown area established by Harbin includes Nangang District, Daoli District, Daowai District and Xiangfang District. Pingfang District and Acheng District are relatively independent in terms of geographical location. Songbei District and Hulan District are redefined administrative districts and also major construction development areas on the north bank of Harbin. Nangang District and Daoli District are the downtown area where Harbin's economic, cultural, scientific, educational and health, administrative trade, tourism, entertainment, transportation and public utility units are most concentrated, involving the most prosperous regional activities.

Presently, Harbin's urban road network has 1862 roads, with a total length of 2166 kilometers, including expressway length of 167 kilometers, main trunk road length of 463 kilometers and secondary trunk road length of 341 kilometers, with an average road network density of 6.5km/km^2 in built-up areas and trunk road network design of 2.93km/km^2. Currently, a "Two Axes, Three Rings and Ten Radiation Lines" has basically taken shape. Besides, Harbin is a national well-known railway city, with its urban pattern deeply influenced by railway construction, with the city divided into different areas by railways and rivers, the downtown area and main functional areas only connected with limited roads.

By 2020, the planned average road network density in the main urban area will be 6.95km/km^2, trunk road network density 3.6km/km^2, 94 km^2 land used by urban roads, with the land used by roads to occupy 16.82% of the land used for urban construction, with per capita land used for roads to be 16.21m^2. According to the statistics of Harbin's traffic control department, by 2017, the number of motorized vehicles had reached 1657000 in Harbin, with the number of private cars reaching nearly 1.35 million. Generally, average 100 urban households own 25.8 cars; and every 100 rural households own 7.0 cars.

Based on Harbin's economic development level and urban development scale, Harbin Transportation Bureau, Harbin Urban and Rural Planning Bureau and the Planning Research Institute of the Ministry of Transport prepared the *Outline of Harbin's Comprehensive Transportation Development Plan (2011-2030)* in May 2011, in which it is pointed out that through flexible bus lane construction and operation modes, the public's support for public transport priority can be gradually obtained. At the same time, considering the social public's acceptance of the special bus lane system and their adaptation to the traffic order, soft isolation of bus lanes shall be conducted, with exclusive right of way-based operation mode adopted during peak hours to minimize the impact on social vehicles. When the passenger flow conditions are mature and the social acceptance degree complies with the required conditions, a shift to the all-weather operation mode will be implemented. After the conditions are mature, gradual transition to the public transport corridors will be realized.

Currently, Harbin's external transport channels are also an integral part of the integrated transport network within the territory of Harbin. In addition, Harbin's city-wide transport network includes the network of the radiation-type trunk roads between the downtown area and each group and the trunk roads connecting the groups. Based on the planning in the urban transport network involved in the integrated traffic network layout planning, a general trunk road network based on "One Ring Road, Nine Radiation Roads, Three Longitudinal Roads and Fourteen Liaison Trunk Roads "will be formed, with a scale of reaching about 3,450 kilometers. At the same time, the Songhua River-crossing channel project and the rural road network will be further improved. Harbin has 6 road channels crossing the Songhua River within the 3rd Ring Road, i.e. 3rd Ring West (Songhua River) Bridge, Songhua River Road Bridge, Jingwei Street Tunnel, Songpu Bridge (completed), Hongqi Street Bridge and 3rd Ring East River Bridge. Besides, Subway Lines No. 2, 4 and 5 river-crossing channel projects have also been planned. The liaison trunk roads between each district and county and the groups include three north-south vertical trunk lines and fourteen liaison trunk lines.

Specific policies for urban road network planning involved in the main urban transport network include: improving the urban road network system and increasing efforts to construct expressway roads and main trunk roads, with the road network pattern dominated by ring roads plus grid roads, with focus placed on the planning and construction "Two Axes, Three Ring Roads and Sixteen Radiation Roads"-based main urban area skeleton road network, coupled with the construction of river-crossing channels in the urban area section to effectively promote the construction of urban access roads and give full play to the function of the overall road network.

In which: The two axes refer to the East Dazhi Street-West Dazhi Street-Xuefu Road and their extension lines, and the Zhongshan Road-Hongjun Street-Jingwei Street and their extension; the three ring roads refer to the inner ring, the 2nd ring and the 3rd ring; the sixteen radiation roads refer to Harbin-Zhaodong Highway, north section of Harbin-Yichun Highway, Songpu -Limin Road, Songbei Avenue and its extension line, Songpu-Qianjin Avenue and western extension line, Gongnong Street, Chengxiang Road, Baojian Road-Harbin-Shuangcheng Highway, Haxi Street, Haping Road, Hongqi Street and Tongxiang Street, extending south to Pingfang, Sandadongli Road and Jinxiang Street, Changjiang Road and its extension, Gongbin Road-Hacheng Road, Xianfeng Road (Harbin-Tongjiang) and Shugang Road.

3.3.2 Public transport status and planning

With the formation of "One River, Two Cities, Ten Groups"-based urban spatial structure, there is a more urgent demand to construct a highly efficient and convenient modernized transportation infrastructure security system dominated by public transport. On the basis of further improving the road network in the core area on the south bank of the Songhua River, it is necessary to further improve the criss-cross ring-like interconnected urban rapid road and main trunk road system and gradually form a traffic network pattern featuring rational structure layout on

both banks and along the river. Currently, Harbin's main public transport includes conventional bus routes and waterway routes as well as rail transport and taxi expected to be completed.

(1) Regular buses

Harbin's road network structure is imperfect, with poor network accessibility and circuitousness, and limited traffic and travelling path choice, unable to realize the balanced distribution of road traffic on the road network. Traffic and travelling heavily depend on roads, easily causing the gathering of vehicles on major traffic roads.

By the end of 2017, there were 292 bus routes, 24 bus lines were new added, adjusted or extended. the total length of the routes reached 5689.8 km, and new adding operation length is 879 km. there were 7519 buses, 1555 buses were newly purchased or renewed. In 2017, Harbin's yearly public transport-based passenger volume reached 1.36 billion person-times. There are total 18193 taxis, and the yearly passenger volume reached 570 million.

(2) Rail Transport

By 2017, The Phase 1 and Phase 2 of Harbin's Subway Line 1 and phase 1 for Subway Line 3 have been completed and put into operation. The Phase 3 for Subway Line 1 and Phase 1 for Subway Line 2 and Phase 2 for Subway Line 3 are under construction. The total length under construction is 69.14 km. The length of subway operation line is 21.8 km, with a yearly passenger volume 76.8 million.

4. Status of Environmental Quality

4.1 Ambient Air

According to the *Summary of Harbin's Environment Quality in 2017*, In 2017, the number of days, meeting the environmental air quality standard, in Harbin urban area was 270 days, accounting for 74.2% of the effective monitoring days in the year. Among them, excellent for 89 days, good for 181 days, over-standard for 95 days. The primary pollutant in the over-standard days is fine particulate matter (PM2.5). The average annual value of fine particles is 58 $\mu g/m^3$, and the overall evaluation exceeds the standard; the annual average value of inhalable particulate matter (PM10) is 87 $\mu g/m^3$, and the overall evaluation exceeds the standard; the annual average value of nitrogen dioxide is 44 $\mu g/m^3$, and the overall evaluation exceeds the standard. The annual average value of sulfur dioxide is 25 $\mu g/m^3$, and the overall evaluation meets the standard; the 95th percentile of the annual average value of nitric oxide is 2.0 mg/m^3, satisfying the secondary standard; the 90th percentile of the daily mean value of ozone is 133 $\mu g/m^3$, satisfying the average secondary standard for the day.

Based on the morning data provided by Harbin EPB for the road sections along the project corridors, in 2017, the concentrations of NO_2 and CO at the monitoring point on Nanzhi Road were 48$\mu g/m^3$ and 3.1mg/m^3 respectively; those at the point on Changjiang Road were 54$\mu g/m^3$ and 1.9mg/m^3; and those on Xinyang Road were 54$\mu g/m^3$ and 2.0mg/m^3. They all met daily average value of Class II standard of Ambien Air Quality Standard (GB3095-2012), 80$\mu g/m^3$ for NO_2 and 4.0mg/m^3 for CO.

4.2 Acoustic Environment

According to the *Summary of Harbin's Environment Quality in 2017*, the acoustic environment quality in urban areas is general (level 3). The equivalent sound level of the acoustic environment in the urban area is 48.4-77.7 decibels, and the weighted average of the equivalent sound level area is 59.2 decibels, which is 0.7 decibels higher than the previous year.

Road traffic noise: The acoustic environment quality of urban roads is poor (four levels). In 2017, a total of 66 roads were monitored, with a length of 120.2 kilometers and 158 monitoring points. The monitoring area covers all trunk lines in the urban area. The average equivalent sound level ranged from 65.0 to 85.2 decibels, and the length-weighted average equivalent sound level was 73.3 decibels, up 0.1 decibels year-on-year, and the national standard (70 decibels) was 0.05 times. There are 12 roads that meet the standards, accounting for 18.2% of the monitored road sections.

Functional area noise: In 2017, there are 17 monitoring points in the acoustic environment of the urban functional area, which are monitored once every quarter year, total 4 times. A total of 68 points were monitored in various functional areas, 68 points each during the daytime and at night. 44 points meet the standard in the daytime, accounting for 64.7% of the monitoring points in the daytime; 35 points meet the standard in the nighttime, accounting for 51.8% of the night monitoring points. From the annual equivalent sound level, the 2nd and 3rd functional zones are meeting the standard during the daytime and nighttime, and the 1st and 4th functional zones are exceeding the standard during the daytime and nighttime. Among them, the 4th functional areas (on both sides of trunk way), the nighttime indicators far exceeding the standard for around 13.6 decibels.

Since the three bus corridors constructed in this project are located in the urban area of Harbin, the evaluation areas on both sides of the road are mostly residential areas. There is no noise source of large industrial and mining enterprises within 200m of the road centerline. The main noise source is traffic noise. Based on the morning data of 2017, the daytime noise levels on the three road corridors were 69.6-88.7 decibels. In general, the acoustic environment didn't meet the standard and the acoustic environment quality was poor.

4.3 Ecological Environment

The ecological environment assessment scope of this project involves a typical urban ecological environment, with two types, i.e. the urban ecological environment and the suburban ecological environment at the edge of the city.

The urban ecological environment system is mainly composed of artificial green vegetation, including public green spaces such as parks, green belts along the roadsides, isolating green belts and the soil where the vegetation and stands are. The urban ecological environment is subject to urban planning, with the greening rate, greening types and greening distribution within the framework of urban planning. The main vegetation relating to the ecological environment involved in the assessment areas of the project are mainly distributed in the evaluation areas of Xinyang Road-Chengxiang Road Subprojects. The status quo of vegetation in the assessment areas of other subprojects is very simple, all of which are artificially planted roadside shrubs or shrub and grass vegetation in the isolation belts.

According to the Harbin "13th Five-Year Plan for Ecological Environment Protection", the forest coverage rate in Harbin is 46%, the forest savings is 91.52 million cubic meters, the wetland reserves are 294,800 hectares, and the green coverage rate in the built-up area is 36%.

5. Analysis of Alternatives

5.1 Alternatives for Road Configurations

Based on the traffic volume analysis and forecast for the three bus corridors, in accordance with the World Bank's conception of sustainable transportation, and considering the simultaneously constructed overpass projects on Nanzhi Road and Xinyang Road, two alternatives for road configurations have been studied and compared: (i) widening the roads; and (ii) keeping the road width unchanged but reallocating the lanes for different functions. The second scheme was selected because it would not only meet the demand of future traffic development, but also reduce relocation of structures, utility poles or trees along the roads.

5.2 Other Alternatives

Alternatives for bus shelters that can better protect passengers from the cold, wind and snow and can provide them safety and comfort with non-slippery floor material for the bus bays, especially in cold weather, were considered in design. In addition, the EIA suggested that bus stops be set close to traffic signals for passengers to access through ground level crossings. Efforts should be made to avoid construction of new pedestrian overpasses and underpasses or removal of existing ones to consider needs of the vulnerable. Anti-slippery floors should be designed for the overpasses.

5.3 With and Without the Project

Without the Project, there would be increasing traffic congestion at intersections as well on roads in urban areas. The vehicle speed would be slower, which would result in more fuel consumption and more exhaust gas emission at idle speed. This would cause waste of fuel and pollution to environment, and also increase people's traveling time and reduce their work efficiency. The negative impacts of the "Without the Project" scenario are obvious.

On the contrary, the "With Project" scenario will effectively resolve the traffic jam issues, increase vehicle travel speed, reduce the exhaust gas emission, and provide more convenient conditions for people to travel. This would help save energy and eliminate air pollution as well.

To conclude, the positive benefits of the "With Project" alternative will greatly overweigh the adverse impacts; and its negative impacts are much less than those of the "Without the Project" scenario.

6. Anticipated Environmental Impacts and Mitigation Measures in Construction Period

6.1 Social Impacts

6.1.1 Impacts on urban transportation

(1) This project involves a number of road sections, and Changjiang Road, Xinyang Road and Nanzhi Road in the three public transport corridors have heavy traffic currently. During project construction, half sides of the road sections will be closed, so urban traffic may be affected, causing traffic jams in urban areas. Other construction activities such as material transportation, road cleaning, and traffic facilities installation will aggregate the congestion. The impacts may be more significant at some sections and in the morning and evening peak hours.

(2) During construction, the use of a large quantity of construction machinery and transport vehicles will increase the traffic volume in the areas along the line, causing interference with urban traffic.

(3) Drawing traffic indication signs on road surface, and installation of direction boards and isolation barriers will occupy roads or sidewalks to cause disturbance to local traffic.

(4) During construction, due to road construction, the pedestrian passage will be crowded, which will have large but relatively short-term impacts on pedestrian's movement.

Before the project starts, Harbin PMO and contractors need to prepare specific traffic organization programs, submit them to the traffic management authorities for approval, include their main ideas into the EMP, and strictly implement the proper measures to mitigate the impacts on urban traffic. Detailed measures are presented in the Traffic Management Plan that is an attachment to the stand-alone EMP.

6.1.2 Impacts on local people's life and activities

During project construction, some of the road sections will be closed or partly closed, barriers will be established around the construction sites on the roads, and some buses will change their regular routes etc. As well as various construction activities, these will bring inconvenience to local people's traffic, movement, work or daily life. This will to certain extent elevate their living quality temporarily. The construction barriers close to shops or enterprises will disturb their business. The impacts generated by construction activities on local people's life can be mitigated by implementing proper mitigation measures as described in the EMP.

6.1.3 Impacts on municipal infrastructure

The three public transport corridors to be constructed in the project mainly involve road pavement replacement, with no effect on urban water supply, sewage pipeline networks, gas and communications facilities. Installing power cables used for the bus stops or traffic facilities may cause disturbance to the power use of local residents, shops or enterprises nearby. In addition, the storm drain inlets on the Changjiang Road will be dredged, relocated, installed or reinforced, which will improve the drainage systems along the road.

6.1.4 Impacts on health and safety

During construction of the roads, the traffic situation will become complex and disordered, which will affect pedestrian's safety. When sidewalks are under construction, or other construction activities have to occupy sidewalks, pedestrian have to walk onto the motor roads. This will bring significant risks to their safety though the impacts would be temporally. Due to there are some schools and hospitals along those three roads, these sensitive points may be adversely affected during the construction period, such as the safety of children and students, hospital visits and ambulances. Specific environmental mitigation measures are needed to address these environmentally sensitive points. To protect local people's safety especially in the areas close to schools or hospitals, the contractors should make more efforts to consult with these institutions to work out details management plans, carry out education and propaganda, and implement specific traffic dispersion.

In addition, nuisance of noise, vibration and dust from construction will cause problems to physical and mental health of local people and pedestrian. They might suffer from respiratory problems, or visual or auditory problems due to the nuisance. At the same time, workers who operate construction vehicles and machinery are another group of people affected by the nuisance as well as other possible injuries and accidence, especially when they are working on the busy urban trunk roads. According to the characteristics of the Project, noise intensity of the main construction machinery ranges between 71dB(A) and 98dB(A) within 5m to the machinery. Most of the noise levels have exceeded the limit 85 dB(A) that workers should endure when they undertake heavy labor work as regulated by the World Bank's EHS General Guidelines. This requires the contractors to strictly implement the EMP, strengthen noise and dust control, enhance labor protection, and provide adequate education and training.

6.2 Ambient Air

6.2.1 Impacts on ambient air

The construction of the public transport corridors will produce dust that is the key factor affecting the ambient air. Wind can cause the materials piled up in the open area to produce dust, especially in the case of high wind speed and dry materials with no covering, which can cause serious dust pollution. During construction, the activities of transportation, loading and unloading materials, and mixing of powdered materials will generate a certain amount of dust that will be dissipated into the surrounding atmosphere and cause impacts on regional air quality. In addition, construction machinery and heavy transport vehicles will also emit waste gases that contain carbon monoxide (CO), nitrogen oxides (NOX) and hydrocarbons (HC). The more serious pollution will be generated when vehicles drive faster.

(1) Dust on road

Vehicles will cause flying dust on road while transporting construction materials or solid waste. There are some factors causing fugitive dust on road, including vehicle driving speed, wind speed, dust accumulation on road surface and humidity of dust accumulated on road. Among which, the wind speed can also directly influence the dust transmission distance. When it's windy, the dust pollution on road will be prominent during construction.

Table 6-2-1 shows the level of dust caused by vehicles during the construction of Beijing-Tianjin-Tanggu Expressway that was monitored by the Highway Research Institute of the Ministry of Transport. The monitoring location was located at 150m downwind the road, and the TSP concentration was 5.093mg/m^3. The monitoring also revealed that the air pollution increased when the wind speed became higher.

Table 6-2-1: TSP Levels during Construction of Beijing-Tianjin-Tanggu Expressway

Monitoring Point	Source of Dust	Distance to Road (m)	Monitored TSP (mg/m^3)
Wuqingyang Village	Dust caused by vehicles while laying cement to stabilize the top layers	50	11.652
		100	19.694
		150	5.093

The table above shows rapidly reduced fugitive dust concentration with the increase in the distance. In accordance with the national *Standards for Ambient Air Quality*, Class II standard value for TSP is 0.3mg/m^3 (24-hour average). This implies that the TSP levels along the road construction sites will be largely exceeded the standard, and requires proper mitigation measure to be implemented to reduce the air pollution.

(2) Dust from floury materials

The type and nature of materials and wind speed in the ash stacking yard have a lot to do with the amount of fugitive dust generated. The materials with low specific gravity are susceptible to disturbance, thereby causing dust. The larger the proportion of small particles in the materials, the larger the amount of dust generated. The fugitive dust in the stacking yard includes the fugitive dust when wind blows over the material pile, the fugitive dust generated during loading and unloading and secondary fugitive dust caused by the dust that builds up on the road surface when vehicles pass. This will lead to serious dust pollution, and produce certain impacts on the surrounding environment.

6.2.2 Mitigation measures

The following dust prevention and control measures are recommended in this EIA. Contractor shall improve, refine and implement them to reduce dust arising in construction.

1. A site cleaning team shall be established by the contractor to do water spraying and dust suppression work on non-rainy days, with water to be sprayed 4~5 times a day. Relevant investigation shows that spraying water is easy and effective measure to suppress dust and can reduce dust by about 70% and decrease the dust impact scope by 20-50m, greatly reducing the impact on the surrounding environment.

2. It's forbidden to produce concrete, lime or asphalt at the construction sites by relevant regulationss. Mixed commercial concrete shall be purchased to avoid dust-related pollution caused by on-site mixing.

3. Transportation of construction materials, sand and earth shall be well managed and various measures shall be taken to prevent escape, overflow, leakage and dripping. Solid waste shall be removed from the site in a timely manner, and is shouldn't be thrown away randomly in loading and unloading. Enclosed vehicles shall be used and transport vehicles shall not be loaded too full and shall be covered with tarpaulin. During transportation, the vehicles shall run at a medium speed to prevent waste residual leaking and dust flying along the way; and waste

should be prevented from falling onto the ground. The excavated earth should be directly loaded onto transport vehicles to avoid transportation after it gets dry.

4. During construction, vehicles will carry attached earth out of construction sites, producing impacts on urban environment and generating dust in dry weather. It is required to provide flushing faucets and flushing platform at the exit of the construction sites, with designated personnel responsible for flushing to prevent earth being brought away by wheels.

The above measures can control dust generated in construction to a large extent. After construction is completed, the dust will disappear naturally. Therefore the dust generated in construction will not have significant impacts on ambient air in the surrounding areas.

6.3 Wastewater

6.3.1 Impacts of wastewater

(1) Wastewater from construction activities

Wastewater during construction mainly includes sandstone material washing wastewater and mechanical equipment washing wastewater. Sandstone material washing wastewater and mechanical equipment washing wastewater contains sediment, COD and a small amount of petroleum. It can be recycled after sedimentation and oil separation treatment. A small amount of wastewater will be discharged into the municipal drainage network after sedimentation. Basically, it will have little impact on the combined collection system and the following wastewater treatment facilities.

(2) Surface runoff

During the rainy season, sediment and dust will flow into the nearby municipal pipeline with the rainwater. The scouring of the construction site by rainwater may block the urban drainage pipe network system and increase the concentration of suspended solids in the rainwater drainage system.

(3) Domestic wastewater from workers

Camps will be established along the corridor roads according to the bidding results. They will use existing buildings as construction management offices as well as workers' camping places. Water supply and wastewater sewers are well equipped since the buildings are located in urban area. There are usually limited amount of people staying in the camp including different numbers of workers mobilized as needed by construction arrangements. The volume of domestic wastewater generated at the camp is small, and the domestic wastewater is discharged into local sewage systems.

6.3.2 Mitigation measures

During construction period, the contractors shall conduct an organized design for discharge of surface water. The surface water shall not be discharged without management, as it will cause pollution to environment. The detailed measures are as follows:

(1) Construction wastewater shall not be directly discharged into municipal pipes. In this project, it's proposed that the wastewater be treated using natural sedimentation method. After sedimentation treatment, the liquid supernatant is used for spraying to control the flying dust on the construction site.

(2) Enhance management of material stacking at site, and prevent surface runoff containing high level of SS. Barriers or blocking facilities should be set around earth or sand stacks to settle the runoff before discharge into drainage systems.

(3) Avoid oil leakage of machineries and forbid dumping of waste oil.

(4) Domestic wastewater generated by workers is discharged into local sewage systems.

6.4 Noise

6.4.1 Impacts of noise

(1) Sources of noise

There are various kinds of construction machinery used in various types of construction activities under the bus corridors Project, which are shown in Table 6-4-1. The noise intensities of the machinery is given in Table 6-4-2.

Table 6-4-1: Various Machinery Used in Construction Period

No.	Main Construction Activities	Main Machinery
1	Foundation of vehicle roads	Trunk, excavator, vibratory roller, wheel roller, bulldozer, loader
2	Vehicle road milling	Trunk, asphalt trunk, sprinkling trunk, milling machine, paver, vibratory roller, wheel roller
3	Sidewalks, pedestrian overpass	Trunk, concrete trunk, excavator, loader
4	Curbs	Trunk, sprinkling trunk, loader
5	Bus bays, bus shelters	Trunk, clamshell crane, generator
6	Green belts	Trunk, loader
7	Drain inlets, manholes	Trunk, concrete trunk, hydraulic hammer, generator
8	Barriers, lamps etc.	Trunk, clamshell crane
9	Destruction works	Trunk, excavator, loader, clamshell crane

Table 6-4-2: Intensities of Machinery Used in Construction Period

No.	Machinery	Type	Distance to machinery (m)	Maximum Noise [dB(A)]
1	Loader	ZL50	5	90
2	Hydraulic hammer	DBE131	5	98
3	Vibratory roller	8T, 14T, 26T, 35T	5	86
4	Wheel roller	30T	5	76
5	Bulldozer	SD16	5	86
6	Excavator	EX40	5	84
7	Paver	3000-2	5	82
8	Generator	200KW	1	98
9	Clamshell crane	20T	5	81
10	Trunk	5T, 10T, 30T	5	92
11	Milling machine [1]	W2000	1	88.5

Road construction is different from other construction, in which the noise produced has following characteristics:

(1) There are many kinds of construction machinery to be used in road construction. Different types of machines will be used in different construction stages, and different amounts of machines will be used in a same construction stage. These make noise generated in road construction become occasional.

(2) The characteristics of noise from different construction machinery are varying. Some machines produce noise that is vibrating, sudden and impulsive and has greater impacts on human beings; and some produce noise that has low frequency, is uneasy to decay, and makes people feel annoyed and irritated. The noise levels of all construction machinery are large, some of them can be up to more than 90dB(A), and the difference of noise levels is also big.

(3) Sources of construction noise have different characteristics too: there are fixed noise sources, and also moving noise sources. Construction machines are often exposed outdoors, and they will move in a small range within a certain period of time. This increases the range of noise pollution during the influencing time compared with fixed noise sources, but the construction noise pollution will still be kept within a local scope compared with moving sources.

(4) Compared with its range of influence, the movement scope of construction machinery is relatively small, therefore construction machines can be basically recognized as point noise sources.

(5) For a specific road section, the construction noise pollution will only occur in a fixed period of time.

Most of the machinery used in the project construction are movable noise sources which have a certain mobility and discontinuity. Among which, the moving range of vehicles is larger, while the moving scope of other machines such as bulldozer, excavator, etc. is smaller. The construction machinery have different characteristic as noise sources, and their impacts of noise are obviously time-bound.

[1] Noise Situation and Noise Source of Middle Type Milling Machine, http://www.vezzs.com/productshow.asp?id=7744

(2) Anticipated noise impacts

Considering the complexity of construction noise and its influencing time and space, the national *Environmental Noise Emission Standard for Construction Site* (GB12523-2011) is applied to evaluate the noise influences of different construction machines at different distances. Accordingly, the contractor can take appropriate measures to prevent noise pollution based on the actual situation in the construction.

(3) Calculation of the noise levels

The anticipated noise values (no superposition with current value) of various construction machineries in different distances are shown in Table 6-4-3.

Table 6-4-3: Anticipated noise levels of various construction machinery Unit: dB (A)

No.	Machinery	Anticipated Noise Level						
		5m	10m	20m	40m	50m	80m	100m
1	Loader	90	84.0	78.0	72.0	70.0	67.5	65.5
2	Hydraulic hammer	98	92.0	86.0	80.0	78.0	75.5	73.5
3	Vibratory roller	86	80.0	74.0	68.0	66.0	63.5	61.5
4	Wheel roller	76	70.0	64.0	58.0	56.0	53.5	51.5
5	Bulldozer	86	80.0	74.0	68.0	66.0	63.5	61.5
6	Excavator	84	78.0	72.0	66.0	64.0	61.5	59.5
7	Paver	87	81.0	75.0	69.0	67.0	64.5	62.5
8	Generator	98	92.0	86.0	80.0	78.0	75.5	73.5
9	Clamshell crane	81	75.0	69.0	63.0	61.0	58.5	56.5
10	Trunk	92	86.0	80.0	74.0	72.0	69.5	67.5
11	Milling machine	89	83.0	77.0	71.0	69.0	66.5	64.5

As the sound pressure level of construction machinery is higher and will have some influence on the construction site and surrounding environment during construction, not only having a varying degree of construction noise impact to the nearby residents, but also having a serious impact on the construction machinery operators and on-site construction workers.

In accordance with *the Noise limits for Construction Site* (GB12523-2011), most of the noise sources of the main equipment exceeds the standard. The anticipated acoustic environment within 50m of the noise source with a strength of 90dB(A) exceeds the standard; during night construction, the ambient noise within 200m exceeds the night standard value of 55dB(A). It will be seen from this that the noise of road construction has a great influence on the environment within 50m around the construction site, and also has a certain impact within the scope of 50 to 100m, the influence is more serious specially in night construction. But its noise impact characteristics are short term and temporary, once the construction activity is finished, the construction noise will be ended. During the second round of public consultation, most respondents had concerns to noise nuisance generated in the construction activities. They expressed that the noise nuisance would not be accepted without implementing proper mitigation measures. Accordingly, the mitigation measures have been improved in the EIA report. The contractors are therefore required to implement these measures to reduce the noise impacts.

(4) The noise impacts on significantly sensitive receptors

Many sensitive receptors are located within 50m of the road boundary. Despite the short construction period, there are still serious impacts on these receptors, especially for the significantly sensitive receptors such as hospitals, schools and elderly apartments.

1. Along Nanzhi Road Corridor, the significantly sensitive receptors such as Harbin Industrial Art Design School, Harbin No.87 Middle School and Hongqiao Middle School are all located within 35 m to the roadside. The noise limits to their acoustic environment should be 55 dB(A) for daytime and 45 dB(A) for nighttime. This corridor works only involve the activities such as installing bus stops, traffic direction boards and isolation barriers, which will use truck, clamshell crane, and generator etc. The machinery noise level could achieve 80 dB(A) at these receptors, which would largely exceed the standard.

2. Along Changjiang Road Corridor, the significantly sensitive receptor Northeast Agricultural University is located within 95 m to the roadside. The noise limits to its acoustic environment should be 60 dB(A) for daytime and 50 dB(A) for nighttime. A pedestrian overpass will be renovated by adding two new bridge stairs to connect the overpass with the road-middle bus stop. Machinery such as excavator, bulldozer and trunk will be used in the construction. The noise level would achieve 65 dB(A) at the university, which would exceed the standard.

3. The schools, hospitals and nursing apartment are close to Xinyang Road, but the construction on this corridor has been substantially completed.

6.4.2 Mitigation measures

Most of the sensitive receptors such as hospitals and schools have installed soundproof windows or other noise reducing facilities that can effectively reduce noise. In the second round of public participation, targeted investigations were conducted to these sensitive receptors, and a wide understanding has been received from the respondents. The contractors should work out reasonable construction schedules and strictly implement the EMP to reduce the impacts of noise.

(1) The construction unit shall adopt those that conform to relevant state standards and select low-noise construction machinery and techniques. If any fixed machinery equipment will cause great vibration, they shall be provided with anti-vibration base. In addition, maintenance and repair of construction equipment shall be strengthened, so as to ensure its better function and lower the intensity of noise source.

(2) The noise from road construction machines is characterized by abruptness, irregularity, discontinuousness, and high strength. Where any construction causes loud noises, it shall be arranged in the daytime (06:00~22:00) or appropriate adjustment may be made to operation time of construction machines. In order to reduce the noise caused by transportation of materials and construction activities such as knocking etc., contractors are required to implement good construction practice and conduct effective management.

(3) In nighttime (22:00~6:00), construction machines with loud noise shall not be operated. Where continuous construction is required, the construction unit shall contact local environmental protection department as the case may be and obtain a license for construction in the nighttime. At the same time, a public notice shall be issued to gain maximum support from the citizens. Measures for noise reduction such as establishment of mobile or temporary sound barriers shall be taken.

(4) The Sites for loading and unloading materials or for locating machinery should be located far from significant sensitive receptors such as residential areas, schools and hospitals etc. Where there are large areas of residential communities within 50m near the construction site, transportation of construction materials is prohibited in the nighttime. Where transportation shall be arranged in the nighttime, “no honking” and “speed limit” signs shall be set up. The speed of vehicles in the nighttime in such areas shall be limited to less than 30km/h.

6.5 Vibration

There are many kinds of vibration sources that cause the vibration in construction works, in which the foundation work, foundation improvement work, land consolidation operation, transportation heavy vehicle driving, etc. are the main sources.

Construction of this project includes reconstruction of roads, construction of pedestrian passage and construction of bus stops. Ground vibration caused by foundation improvement project mainly includes the tamping operation of sand and soil, and the construction equipment is vibrating hammer and other tamping equipment. Vibration caused by heavy vehicle running is the vibration influence caused by roller, diesel vehicle and so on. According to the information provided in the *Japan Environmental Impact Assessment Manual*, the vibration of construction machineries is shown in Table 6-5-1.

Table 6-5-1: Vibration levels of construction machineries Unit: dB

Equipment name	Point of 5m	Point of 10m	Point of 20m	Point of 30m
Vibratory hammer	75	67	48	44
Road roller	58	53	50	48
Diesel vehicle	62	58	54	51

From Table 6-5-1 we can see that as the influence of vibration of the above construction machineries being transmitted to 10m from the vibration source, it conforms to the requirements on residential, cultural and educational area in the *Standard for Vibration in Urban Area Environment*, as well the requirements on both sides of trunk roads. The distance between the construction site of the project and the residential buildings, schools, and kindergartens is about 15 to 40m, therefore, it is forbidden to use vibrating hammers and other vibrating construction machinery to do the work at night, to prevent vibration nuisance. Before the construction, the construction unit should fully understand the vibration of the project, choose to use the construction machinery with small vibration, consider the anti-vibration device for the machine at the same time. Improving the understanding of vibration of related engineering personnel in construction, shortening the operation time of construction machinery, and reasonably allocating and arranging the job location and time.

6.6 Urban Ecology and Landscape

6.6.1 Impacts on urban ecology and landscape

(1) Impacts on green vegetation

About 4424m^2 of green belts will be removed from the middle of Changjiang Road to leave the space for construction of bus corridors. This will reduce the green coverage in local area to a certain extent. About 694 m^2 of the destructed green belts will be re-planted on the sides of the road for landscaping under the Project. The remaining destructed green belts will be relocated to other areas in the city by garden management authorities to keep the city's overall vegetation coverage unchanged. The green belts removal and re-planting works will be approved by the garden management authorities before implementation, and be undertaken under their instruction.

(2) Impacts on urban landscape

The construction activities of the corridor works will have following impacts on the urban landscape:

(1) The construction activities will destruct vegetation such as green belts, so as to destroy the natural landscape elements, and damage the local landscape to a certain extent.

(2) The soil excavation, earth and soil, building materials stacking in the construction process, especially the temporary stacking of construction abandoned soil, construction waste, etc. will affect the urban health environment and urban landscape.

(3) The disorder parking of some temporary buildings or mechanical equipment in the construction process will also bring about uncoordinated factors and influences to the surrounding landscape.

(4) Isolation measures such as guardrail and surrounding cloth, etc. shall be equipped during the construction process of reconstruction of roads, which will bring some damage to the landscape of the city.

6.6.2 Mitigation measures

During construction, the existing ecological landscape will be changed instantaneously. Therefore, the construction shall be phased step by step in one area after another, so as to protect the ecological landscape along the routes. The following attentions shall be paid to construction:

(1) During construction, less occupation of land, vegetation and roads is preferred, so as to reduce adverse impacts of construction on ecological environment.

(2) For stack of excavated earth, measures shall be taken to prevent it from being soaked, flushed or washed away.

(3) Excavation and back filling shall be reasonably coordinated. Protective measures shall be taken for spoil ground. Excavation and back filling shall be avoided in rainy days, so as to prevent water and soil loss, water pollution and obstruction of drainage pipelines due to rainwater.

(4) During construction, attentions shall be paid to protection of vegetation such as trees and green land in neighbouring area.

6.7 Solid Waste

Domestic waste mainly comes from abandoned objects in the life process of the construction workers, with the composition similar to municipal solid waste, and mainly being organic component. Camps will be set along the road corridors according to bidding results. Existing buildings are used to work as construction management offices as well as workers' camping places. There are usually limited amount of people staying in the camps, so the generated domestic waste is limited too. Since the camps are located in urban area, the domestic waste will be collected and transported periodically by local sanitation agencies.

Construction waste mainly comes from road surface milling, removal of road and traffic facilities, and abandoned materials etc. There are about 34700m^3 of solid waste generated from the three roads' renovation activities, 11135 m^3 of which are from road milling. They might have following impacts on urban ecology and landscape:

- Improper disposal of abandoned soil or construction waste, or exposed surface formed in excavation activities will potentially cause soil and water loss in windy or rainy days. However, the excavation and backfilling activities will be well arranged in a timely manner, and the abandoned soil and construction waste will be transported to the designated construction waste landfill sites for disposal. Therefore, they will not cause significant water and soil loss.

- Stacks of earth and rock, sand and stone, cement, clay and other building materials, as well as waste soil and waste materials will have negative impacts on urban landscape if they cannot be organised in a proper way on site or transported away in a timely manner.
- Fugitive dust and slag leakage produced during transporting abandoned soil will lay dust on road surface, green belts and structures along the way of transportation, which will brings some influence on urban environmental sanitation and landscape.

Through strict requirement on the third-party construction waste treatment company and proper management of construction sites, the impacts on urban ecology and landscape will be minimized.

7. Anticipated Environmental Impacts and Mitigation Measures in Operation Period

7.1 Social Impacts

(1) Saving travel time and improving people's quality of life

Implementation of the bus corridors project can greatly improve the speed of urban traffic flow, save traveller's travel time, improve efficiency, and enable them to create more value for the society. This will largely improve local people's satisfaction and overall quality of life.

(2) Reducing traffic congestion and improving public transport reliability

After the implementation of the bus corridors project, the proportion of public transport will increase in urban residents' traveling modes, and that of private cars will decrease. Together with the effect of improved road surface conditions, the vehicles' running speed will be increased and traffic congestion will become less. Hence the speed of buses will also be improved. In addition, optimization of bus corridors and implementation of the smart traffic system will improve the accuracy of public transport information, reduce bus delay, and increase bus operation efficiency. The improvement of the public transport facilities will also provide fast, comfortable and well-organized services to passengers while waiting for and taking the buses, which will improve the safety and reliability of public transport.

(3) Improving environmental quality and reducing risks to public health

After the corridor project is put into operation, the average speed of the vehicles will be increased, and traffic jam phenomenon will be reduced, then there will be few car starts and horns on the roads. As waste gas emissions will be at a low level when cars keep running at a constant speed, so the emissions and noise will be greatly reduced for the same type of vehicle, fuel and so on. This will play an important role in improving urban air quality and acoustic environmental quality, and hence reduce risks to public health.

(4) Enhancing the city's competitiveness, improving investment environment, and promoting urban economic development

Developing regional road traffic resources and strengthening the integrated construction of road traffic facilities will have a profound impact on promotion of the healthy development of Harbin city economy and each social undertaking. After the project is completed, it is bound to further strengthen the external image of the city, improve the competitiveness of the city, attract more foreign investment, and hence promote urban economic development.

7.2 Ambient Air

With the operation of the bus corridors project, the vehicle exhaust will become the main pollution to the ambient air quality along the roads. The source of vehicle exhaust can be modelled as a linear source of continuous emissions. The amount of emissions is closely related to the amount of traffic, and it depends on the type of vehicle and the condition of the running vehicle. Vehicle exhaust pollutants mainly come from crankcase leakage, fuel system volatilization and exhaust pipe discharge, mainly carbon monoxide, nitrogen oxides and so on. In 2013, the government revised the "Light Vehicle Pollutant Emission Limits and Measurement Methods (China Stage 5)" (GB18352.5-2013), and will start to implement the V-stage limit in 2019. The project will be completed and operational in 2020. According to the above standard requirements, the V-stage standard will be applied. Therefore, according to the requirements of the new standard, the emission factors of small cars and medium-sized cars are revised. The recommended values of vehicle exhaust factor E_{ij} are shown in Table 7-2-1.

Table 7-2-1: Revised Vehicle Exhaust Factor E_{ij} Values (g/km)

Average speed (km/h)		50	60	70	80	90	100
Small car	CO	1.66	1.26	0.95	0.78	0.54	0.41
	NO_2	0.05	0.06	0.08	0.10	0.10	0.11
Mid-size car	CO	5.43	4.71	4.46	4.58	5.14	6.26
	NO_2	1.03	1.20	1.37	1.58	1.67	1.77
Large-size car	CO	5.25	4.48	4.1	4.01	4.23	4.77
	NO_2	10.44	10.48	11.10	14.71	15.64	18.38

Therefore, according to the predicted traffic volume and vehicle composition, the intensities of vehicle exhaust pollutants during the operation period are calculated and shown in Table 7-2-2.

Table 7-2-2: Intensities of Vehicle Exhaust Pollutants

Road	Time	Pollutants	Intensity for Peak hour traffic (converted to small car)
Nanzhi Road Bus Priority Corridor	2019	CO	2.75
		NO_2	0.30
	2025	CO	2.90
		NO_2	0.25
	2033	CO	3.30
		NO_2	0.35
Changjiang Road Bus Priority Corridor	2019	CO	2.32
		NO_2	0.24
	2025	CO	2.61
		NO_2	0.27
	2033	CO	3.10
		NO_2	0.33
Xinyang Road Bus Priority Corridor	2019	CO	2.55
		NO_2	0.30
	2025	CO	2.80
		NO_2	0.35
	2033	CO	3.25
		NO_2	0.35

Diffusion of vehicle exhaust pollutants is related to topographical and meteorological conditions along the road. The diffused pollutants will cover parallel liner belts on both sides of the road. The concentration of the pollutants will gradually reduce along with more distance from the road central line until it gets close to the background baseline level.

The project is only setting three bus corridors within existing width of road without adding any vehicle lanes; so it will not result in an increase in current traffic volume. After the bus corridors become operational, the proportion of public transport will be increased while the traffic volume of private cars will be less than that under the Without-project scenario. With the improved bus corridor routes, road surface conditions and traffic facilities, the traffic jam will be alleviated, the vehicles' running speed will be increased, and the situation of vehicles running at idle speed will be relieved. As exhaust emissions will be at a low level when vehicles keep running at a constant speed, so the emissions will be greatly reduced under the same vehicle and fuel conditions. Therefore, reduction of traffic volume and alleviation of running at idle speed will play an important role in improving urban air quality. In general, the operation of the corridors project will not have additional impacts on the ambient air quality along the roads, but will make contributions in air pollution control.

7.3 Wastewater

Surface runoff from rainwater is the major wastewater generated in operation of urban roads. The main pollutants include SS, BOD_5 and Petroleum. There are many factors affecting the concentration of runoff pollutants with strong randomness and high contingency. According to the research on road runoff pollution situation by the Southern China Environmental Research Institute of the Ministry of Environmental Protection, the concentrations of pollutants in road surface runoff are shown in Table 7-3-1.

Table 7-3-1: Runoff Pollutant Concentrations

Items	5-20 minutes	20-40 minutes	40-60 minutes	Average Value
SS (mg/L)	231.42-158.22	158.22-90.36	90.36-18.71	100
BOD_5 (mg/L)	7.34-7.30	7.30-4.15	4.15-1.26	5.08
Petroleum (mg/L)	22.30-19.74	19.74-3.12	3.12-0.21	11.25

From the above table we can see the concentration changing procedure that the pollutant concentrations reach the maximum levels in 0~5 minutes, then gradually decrease, and tend to be stable one hour after the rain. By comparing with Class III standard values of the *Integrated Wastewater Discharge Standards* (GB8978-1996) that are 400 mg/L for SS, 300 mg/L for BOD^5, and 30 ml/L for petroleum, it's recognized that even though the

pollutant concentrations of the primary rainfall are relatively high, they can still meet the Class standards. This means that the road surface runoff can be discharged into local municipal drainage systems that connect with second grade wastewater treatment facilities.

The calculation formula of runoff pollutant emission is given below, and the computing results are shown in Table 7-3-2. The annual runoff production and the annual pollution load are relatively low for the combined sewer systems and municipal wastewater treatment plants (WWTP) in Harbin (for example Wenchang WWTP has a capacity of 650,000 m^3/day). So the runoff will not have significant to the sewage systems.

$$E=C\times H\times A\times a\times 10^{-9}$$

Where:

E - Annual emission intensity, unit: *t/a*;

C - Mean value of 60 minutes, unit: mg/L;

H - Mean annual precipitation, unit: mm;

A - Pavement area, unit: m^2;

a - Runoff coefficient, non-dimensional.

Table 7-3-2: Pollution Loads of Road Surface Runoff from the Project Operation

Items	SS	BOD_5	Petroleum
Mean value of 60 minutes (mg/L)	100	5.08	11.25
Mean annual precipitation	509.8		
Runoff coefficient	Road 0.6		
Pavement area (m^2)	Road area 670833		
Annual runoff production (t/a)	25052		
Annual pollution load (t/a)	2.51	0.127	0.282

7.4 Traffic Noise

7.4.1 Traffic noise prediction

The noise of the bus priority corridor during the operation period is mainly due to the traffic noise. According to the data provided by the feasibility study of this project, the specific trend traffic volume prediction results are shown in Table 7-4-1.

Table 7-4-1: Traffic Volume Prediction (pcu/d)

Road Corridor	2019	2025	2033
Nanzhi Road Corridor	10170	10855	12260
Changjiang Road Corridor	8540	9935	11495
Xinyang Road Corridor	9715	10785	12415
Volume ratio between nighttime and daytime	0.8:0.2		
Duration for nighttime and daytime	16 hours for daytime, 8 hours for nighttime		

Due to the difference on road structure and the distribution of buildings on both sides, the sound field distribution on both sides of the road will also be different. The driving vehicles on the road have different driving conditions such as uniform speed, acceleration, braking, turning and climbing. Moreover, the project involves many sections, each road crosses are located closer to each other. At this time, the analysis of each road without considering the noise superposition between the roads becomes complicated and inaccurate. Therefore, in order to make the evaluation results credible, this evaluation uses the grid point prediction method to predict the ground road noise impact, and then correct the results considering about the road surface slope and pavement materials. The vehicle operating under uniform speed conditions are mainly considered.

According to the data provided by the feasibility study report, the vehicle traffic volume and road design parameters of different sections of the forecast year are based on the current survey results and combined with the development trend.

This evaluation is based on the "Acoustic Environmental Quality Standards" (GB3096-2008), using the equivalent sound level at daytime and the equivalent sound level at night as the evaluation value, and adopting prediction

mode recommended in the Appendix A.2 in HJ 2.4-2009 "Environmental Impact Assessment Technical Guidelines Acoustic Environment".

Regardless of the attenuation caused by the obstacle, a Cartesian coordinate system is established in the background image of the project, with the intersection point of roads as the origin, the north direction is the Y axis, and the east direction is the X axis, and the grid point is used to predict the noise level attenuation. Based on the selected parameters, the attenuation caused by obstacles is not considered, and the noise of various types of vehicles at the predicted points is calculated. The status quo of the highway is being used. The background value and the predicted value are superimposed on the current monitoring to obtain the noise prediction value. The accumulated traffic noise predicted values received at the daytime and nighttime prediction points are shown in the tables below.

Table 7-4-2: Prediction of Traffic Noise Along Nanzhi Road Bus Corridor [dB(A)]

Distance to roadside (m)	2019		2025		2033	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
20	59.56	49.09	60.98	51.02	62.01	52.33
35	58.57	48.48	59.61	50.34	61.24	51.64
40	57.00	47.27	58.98	49.02	60.28	51.09
60	55.42	46.42	58.12	48.95	59.69	50.32
80	54.22	45.07	57.94	48.08	58.74	49.98
100	53.26	44.87	57.01	47.18	57.84	48.88
120	52.48	44.23	56.95	46.99	57.69	47.94
140	51.81	43.98	55.94	46.11	57.07	47.1
160	51.13	42.62	55.32	49.26	56.32	46.35
180	50.71	42.03	54.64	44.97	55.64	45.67
200	50.31	41.09	53.20	43.34	54.27	45.03

Table 7-4-3: Prediction of Traffic Noise Along Changjiang Road Corridor [dB(A)]

Distance to roadside (m)	2019		2025		2033	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
20	56.94	49.98	58.88	50.71	60.18	51.37
35	56.26	49.17	57.88	49.33	59.97	50.82
40	55.06	48.82	56.41	49.04	58.26	49.81
60	54.36	48.12	55.5	48.99	57.15	49.21
80	53.53	47.54	54.44	48.09	55.73	48.44
100	53.11	46.52	53.77	47.06	54.85	48.04
120	52.95	45.12	53.54	46.58	54.51	47.47
140	52.73	44.51	53.2	45.79	54.3	46.51
160	51.46	43.21	52.04	44.68	52.88	45.22
180	50.93	42.57	51.48	43.95	52.16	44.25
200	50.23	41.98	50.96	42.33	51.33	43.2

Table 7-4-4: Prediction of Traffic Noise Along Xinyang Road Corridor [dB(A)]

Distance to roadside (m)	2019		2025		2033	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
20	56.96	49.98	58.88	50.71	60.18	51.37
35	56.26	49.11	57.88	49.33	59.97	50.82
40	55.06	48.82	56.41	49.04	58.26	49.81
60	54.36	48.12	55.5	48.99	57.15	49.21
80	53.55	47.54	54.41	48.09	55.73	48.44
100	53.11	46.52	53.77	47.06	54.85	48.04
120	52.95	45.12	53.54	46.58	54.51	47.47
140	52.73	44.51	53.20	45.79	54	46.51
160	51.46	43.21	52.04	44.68	52.88	45.22
180	50.93	42.57	51.48	43.95	52.16	44.25
200	50.27	41.98	50.96	42.33	51.33	43.20

7.4.2 Analysis

It can be seen from the noise prediction results that comparing with the current monitoring results, the traffic noise on the sensitive points meet the standard in the recent period. The maximum noise value of the mid-term Nanzhi Road Bus Priority Corridor is 1.08dB(A) higher than the standard, and the maximum value at night is 1.14dB(A) higher; the maximum value at night for Xinyang Road is 0.82dB(A) exceeding the standard. In the long-term, for Nanzhi Road, the maximum value at daytime is 2.12dB(A) higher than the standard, and the maximum value at night is 2.33dB(A) higher; For Xinyang road, the maximum value at daytime is 0.60dB(A) exceeding the standard, and the maximum value at night is 1.37dB (A) higher than the standard. The impact of traffic noise on sensitive points during project operation mainly occurs in the long-term. Analogous to the current domestic traffic noise control experience, the installation of ventilation and sound insulation window, the noise reduction will be more than 25dB (A). At present, most of the acoustic environment sensitive targets such as residential areas, schools, and hospitals involved in this project have installed soundproof windows.

The project is only setting three bus corridors within existing width of road without adding any vehicle lanes; so it will not result in an increase in current traffic volume. Along with the proportion of public transport increased, the traffic volume of private cars and overall traffic volume will relatively decrease, and there will be less noise generated. With the improved public transportation system under the Project, the situation of traffic congestion will get alleviated, and the traffic noise impacts will be further reduced. In general, the operation of the corridors project will not have additional impacts of traffic noise to the acoustic environment along the roads, but will make contributions in noise control.

7.5 Urban Ecology and Landscape

City landscape is the complex of natural landscape, landscape architecture, cultural landscape; city landscape ecology requires the relationship coordination among the natural landscapes, city buildings, city resources development, economic development and ecological environment protection, to make the city to be orderly developed, to solve the city ecological disease, and form a virtuous circle of ecosystem in the city.

The appearance of the city is first acquired by people's feelings about the city, and one of the most important aspects of city appearance is urban roads and public facilities. This project is urban trunk road and sub trunk road, therefore, the proper greening to the periphery and interior of above facilities, not only can achieve the purpose of beautifying the city, but also can achieve the effect of reducing the repression sense of the building to people with greening. In terms of colour, the blue sky, green trees are all calm colours, and can make people feel calm. Together with street lights, flower beds, peels and so on, a colourful street landscape can be formed.

7.6 Snow Removal from Roads

At present, most snow melting agents used for snow removal in winter in northern China are chloride snow melting agents, the concentration of ion in water increases when the snow melting agent is dissolved in water, decreasing the liquid phase vapour pressure of water, but the solid phase vapour pressure of ice does not change. In order to achieve the state of equal vapour pressure of solid and liquid phase in equilibrium coexistence of ice and water mixtures, to facilitate ice melting, therefore, snow melting agent can be used to remove ice and snow, but it has some harm to the environment. It brings great harm to the green belt along the road and the farmland; corrodes roads, bridges and other road facilities; contaminates groundwater resources. As the use of snow melting agent has a great harm to the environment, currently Harbin government has formulated the snow clearing scheme in winter, snow melting agent can be used in 56 slope road sections, and the three corridors in this project are not within these 56 slope road sections.

Snow will be removed by snow remover in winter for the three corridors of the project, without snowmelt agent being used, and removed snow and ice will be transported to snow storage field as waste. Road waste snow of bus priority corridor of Xinyang Road in winter is transported to Guxiang snow storage field (right side of Xuejia old airport road), and road waste snow of bus priority corridors of Changjiang Road and Nanzhi Road in winter is transported to Changjiang Road snow storage field (right side of 6km of Ha-E Highway). These two snow storage field’s present situation is idle land, there are no residents and industrial factories, etc. around, having the space to store plenty of snow.

In winter, the snow on the bus corridors will be transported to designated snow storage fields for stacking. Most of the snow will seep into the ground or flow along ditches after melting in warm weather, and a small amount of the melted snow will flow into drainage system and be discharged into the sewer network. The snow removal agency is responsible for protecting the environment of the snow storage field to prevent excessive snow stacks, avoid a large amount of water on the ground due to melting, and solve other environmental problems.

7.7 Environmental Risks

After the Project is completed and becomes operational, the road surface conditions will improve, and the traffic facilities and isolation barriers will be enhanced. This will help effectively improve traffic situation, and reduce traffic accident rate. At the same time, after the implementation of the Project, the proportion of private cars will decrease while more people would like to take public transport for traveling. The overall traffic volume will decrease compared with the Without-project scenario. This will also reduce the traffic accident rate.

The urban trunk roads as bus corridors will be under proper management by stringent enforcement of laws to restrict transportation of dangerous and hazardous subjects. This is required to effectively prevent accidents from happening, and protect the environment and human safety from risks.

8. Public Participation

8.1 Purpose and Significance

According to the *Environmental Impact Assessment Law of the People's Republic of China* and HF2006 (No.28) *Interim Measures for Public Participation in Environmental Impact Assessment* and the requirements of the World Bank, public participation is required in this project.

Public participation in environmental impact assessment of this project is to enable local residents to timely and accurately understand the significance of project construction, as well as the advantages and disadvantages, the direct and indirect influence brought by the project construction, at the same time, to understand their attitudes towards construction projects and the main issues concerned, to find out the solution to the problem together from the public interest, in order to achieve the perfection and justice of evaluation work, and to ensure the smooth implementation of the project construction, to avoid pollution disputes during project construction and operation.

8.2 Methods and Principles

According to the requirements of the *Environmental Protection Law of the People's Republic of China, Environmental Impact Assessment Law of the People's Republic of China, Interim Measures for Public Participation in Environmental Impact Assessment* and other relevant laws and regulations and relevant business policies of the World Bank, and by learning from the successful experience of similar projects in China, this evaluation adopts issuance of Public Participation Questionnaire, online publicity, related department visits and their combinations other ways to carry out public participation activities, to put forward difficult problems to the public, answer the mitigation measures to solve environmental problems.

In order to fully understand the views of the public on the impact of the project and the degree of satisfaction with the measures for mitigation of environmental impact, public opinion consultation and information release were carried out separately for the sub projects of this environment evaluation.

8.3 First Round of Public Participation

8.3.1 Methodology

The social investigation method is adopted, in the form of random access, respondents are asked to answer what they need to investigate. Providing the public with opportunities to participate, a questionnaire survey was conducted among people involved in the project area, and the well prepared survey forms of the construction project are issued to the public, to get feedback by collecting the questionnaires.

In the process of public participation, this project adopts the forms of online publicity, questionnaires release, display of the draft of environmental impact assessment and newspaper publicity. The issuance of public participation questionnaire related to the construction of this project was carried out by Harbin Transportation Bureau and Heilongjiang Xingye Environmental Protection Science and Technology Co., Ltd. in Changjiang Road, Nanzhi Road and Xinyang Road of Harbin City from June to August of 2016. The full text of the draft of all environmental impact assessment reports in this project were displayed in *the Construction Project of Intelligent Public Transportation System in the Alpine City of Harbin* of Harbin Traffic Bureau and Heilongjiang Xingye Environmental Protection Science and Technology Co., Ltd. for people to look up, and were published on Harbin Traffic Bureau website for download and consult.

Online publicity of the full text of the environmental impact assessment report form of the Construction Project of Intelligent Public Transportation System in the Alpine City of Harbin was carried out on Harbin Traffic Bureau website (http://www.harbin-jtj.gov.cn) on Sep. 6 of 2016, and no feedback was received during the publicity. The screenshot of online publicity is shown as follows:

Fig 8-3-1: Screenshot of online publicity

After the publicity of this project, any telephone or letter about the project construction and environmental protection from the public has not been received.

8.3.2 Questionnaire

The survey involved different age groups and different cultural levels, and was conducted on the staff and other individuals in the vicinity of the evaluation scope, having certain representativeness. A total of 300 people were surveyed in this project, and 282 questionnaires were included.

The public survey mainly adopts the form of questionnaire release. The Public Participation Questionnaire is shown in Table 8-3-1.

Table 8-3-1: Public Participation Questionnaire

Name		Gender		Age		Nationality		Education	
Occupation		Work or living place					Contact number		

Project information: The project is located in Harbin City. In which the proposed 3 bus corridors are all located inside the city of Harbin, and the 3 bus corridors respectively are: Nanzhi Road bus priority corridor (Huashu Street- Gongbin Road), Changjiang bus priority corridor (Hongqi Avenue- Xilong Avenue) and Xinyang Highway bus priority corridor (Xiangzheng Street- Haining Leather City). The 3 bus priority corridors are all of reconstruction.

Construction activities: To adjust the road cross section, repair the road surface, transform the nodes of main road intersections and transform and adjust the location of bus bays (stops) based on the intersection renovation. After road surface renovation, the number of lanes on the road surface will maintain the same as the number of existing lanes.

1. What is your understanding of the project construction?	Understanding		Ordinarily		Slightly	
2. What's your opinion on the construction of this project?	Approval		Disapproval		Doesn't Matter	
3. Do you think whether the works can improve the local traffic conditions?	Yes		No		Don’t know	
4. What are the beneficial effects of this project construction?	Developing economy		Protecting environment		Providing convenience	
5. What are the adverse effects of this project construction?	Quality of life		Regional environment		Personal income	
6. What do you think of the impact of this project on vegetation?	Great		Ordinarily		Slightly	

7. What do you think is the most important or the most concerned environmental issue for you during the construction period?	Dust pollution		Noise pollution		Inconvenience of travel	
8. What measures do you suggest to mitigate the impact?	Greening		Noise barriers		Others	
9. Do you have any special opinion on noise?	Yes (please put forward in detail in the following table)		No opinion		Unknown	
Other opinions and suggestions on the construction of this project can be put forward here						

8.3.3 Results analysis

The public engagement questionnaires of the project were distributed by the following means. The staff of Harbin Transportation Bureau and Xingye Environmental Protection Technology Co., Ltd had inquired the residents of surrounding area of the project, made explanations to them and distributed the public engagement questionnaires of the proposed projects.

The general information of the participants in the questionnaire survey is shown in Table 8-3-2, and the list of all participants in the questionnaire survey is shown in Table 8-3-3.

Table 8-3-2: General information of participants of public engagement questionnaire

Places of survey		Surrounding areas of the construction project
Means of survey		Distribution of questionnaire
Number of questionnaires distributed		282
Number of questionnaires received		282
Occupation	Public servants	6%
	Teacher	23%
	Worker	30%
	Farmers	28%
	Other	13%
Gender	Male	60%
	Female	40%
Degree of education	College degree or above	32%
	Senior high school or Technical secondary school	58%
	Junior high school or below	10%

Table 8-3-3: List of the participants in the questionnaire survey

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
1	Wang Yanyu	Female	29	Han	Senior high school	None	Songbei District, Harbin	13936327503
2	Zhao Yadong	Female	46	Han			Songpu Town, Songbei District, Harbin	13125923611
3	Zhang Guoqing	Male	51	Han	Vocational school	Driver	Sanchine pharmaceuticals company	13149606678
4	Li Yanyan	Female	47	Han	Junior college	Freelancer	Building 35, Wangzhaoxincun, Xiangfang District	13104501977
5	Jiang Ying	Female	32	Han	Junior college	Management	No.4 Wangzhao Street, Dongli District	18646001311
6	Yang Xiaohong	Female	43	Han	Vocational school	Freelancer	Huashu Community, Daowai District, Harbin	15945996071
7	Wei Zhenggang	Male	41	Han	Senior high school	Driver	Harbin Transportation Group Public Tram Head Office	15204653920
8	Qiu Liping	Female	35	Han	Senior high school	Sales	Vessel Electronic Shopping Mall	82561797
9	Zhang Xuegang	Male	41	Han	Junior high school	Dispatcher	Harbin Public Transport Group Public Tram Co., Ltd	15004512055
10	Sun Huimin	Female	53	Han	College	Official	Office of Civil Air Defence of Heilongjiang Province	15846635582
11	Li Qiao	Female	31	Han	Junior college	Employee	Shanghecheng Community, Daowai District, Harbin	13945661984
12	Zhu Lili	Female	39	Han	Vocational school		Xinqiao Street, Daowai District, Harbin	15636177461
13	Li Hongliang	Male	50	Han	Senior high school	Worker	Nangang District, Harbin	15846609805
14	Liu Shouxia	Female	60	Han	Senior high school	Retired	Dayoufang Street, Daowai District, Harbin	15245015007
15	Xia Jinhuan	Female	40	Han	Senior high school	Freelancer	Wangzhaosidao Street, Xiangfang District	13936574928
16	Sun Shuquan	Male	70	Han	Junior High School	Worker	Harbin Institute of Technology Group Inc	15114609156
17	Zhang Pingping	Female	41	Han	Junior High School	Insurance	No.31 Wuxu Street, Xiangfang District	13836002290
18	Ding Dehua	Female	56	Hui	Senior high school	None	No.15 Gongbin Road, Xiangfang District	13945173397
19	Li Wengang	Male	42	Han	Senior high school	None		13946156222
20	Liu Chunxiang	Female	46	Han	Senior high school	Waitress	Dacheng Street, Nangang District, Harbin	15045866019
21	Chang Lina	Female	42	Han	Senior high school	Accountant	Perlite Factory, Harbin	13936507339
22	Li Peng	Male	35	Han	Junior college	None		13636691455
23	Zhao Dan	Female	29	Han	Bachelor degree	Accountant	Harbin Civil Affairs Bureau	18145112610
24	Wang Shian	Male	66	Han	Senior high school	Worker	No.106 16th South Street, Daowai District	13804608595
25	Li Jun	Female	42	Han	Senior high school	Driver	Huahui Heating Group	18245040436
26	Lin Lin	Female	34	Han	Bachelor degree	Accountant	No.1 Dongzhi Road	13845088928
27	Zhang Lijuan	Female	54	Han	Senior high school	Self-employed	Yaoliujiayuan Communicty, Da Youfang Street, Daowai District	13796823501
28	Wang Nannan	Female	35	Han	Junior college	Foreign company	Qingnianchengbang Community, Daowai District, Harbin	13684604577
29	Zhang Yao	Female	31	Han	Bachelor degree	None	Jingwei Street	13039998375

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
30	Liu Sijia	Female	23	Han	Junior high school	None	Junmin Street, Xiangfang District	15004616622
31	Li Hongjie	Female	47	Han	Senior high school	Worker	Xiangxihuayuan Community, Xiangfang District	13945131693
32	Sun Shuzhen	Female	53	Han	Junior college	None	No.101 Anding Street	13384608190
33	Yang Haitao	Female	35	Hui	Junior college	Employee	Harbin Yuanda Co., Ltd	18646641244
34	Wang Mengyu	Female	23	Han	College degree	Lecturer	No.22 Xiangcheng Distreet, Xiangfang District, Harbin	13101668420
35	Fan Tiantian	Female	23	Han	Junior college	Student	Harbin Engineering University	18246169281
36	Cui Yan	Female	45	Han	Junior college	Doctor	Provincial Hospital, Xiangfang District, Harbin	15145060107
37	Wu Xianli	Female	44	Han	Junior college	Salesman	Tongxiang shop, Hongqi Street, Xiangfang District, Harbin	15145063797
38	Liu Chunling	Female	48	Han	Technical school	Worker	Harbin Automobile Co., Ltd	15204619832
39	Jiang Xihong	Female	42	Han	Vocational school	Worker	Harbin Public Transport Group Co., Ltd	18346061711
40	Han Xue	Male	35	Han	Senior high school	Worker	Harbin Automobile Co., Ltd	13945016907
41	Fu Yan	Female	49	Man	Junior high school	Worker	Harbin Automobile Co., Ltd	13029864680
42	Qu Jiayin	Female	41	Han	Senior high school	Citizen	Xiangfang District	15945166929
43	Li Shuqin	Female	53	Han	Senior high school	Citizen	Xiangfang District	18345080431
44	Sun Xiangzhi	Female	63	Han		Citizen	Xiangfang District	13613622704
45	Zhang Shusen	Male	55	Han	Junior college	Worker	Hanxiang Street, Nangang District	13796632690
46	Hou Jinming	Male	55	Han	Junior high school	Official	No.502-3 Hongqi Street	13796613562
47	Yang Shihua	Male	50	Han	Vocational school	Worker	Automobile Head Office	15004616620
48	Yan Shimin	Male	45	Han	Senior high school	Worker	No.114 Yongsheng Street, Xiangfang District	15004616792
49	Zhao Jun	Male	39	Han	Senior high school	Worker	Chang'ancheng Community, Daowai District	13936677122
50	Wang Yujun	Male	50	Han	Senior high school	Worker	No.5 Wangzhao Street, Xiangfang District	15046118607
51	Luan Ying	Female	32	Han	Junior college	Accountant	No.17 Xiangbin Road, Xiangfang District	18245039000
52	Chen Dongbai	Male	38	Han	Junior college	Worker	Baimao Community, Xiangfang Disstrict	18504660918
53	Chen Guofeng	Male	44	Han	Junior college	Worker	8th Nonglin Street, Xiangfang District	13946093025
54	Li Xianming	Male	28	Han	Senior high school	Worker	No.6 Xingfu Road, Xiangfang District	18245012927
55	Li Zhigang	Male	54	Han	Vocational school	Management	6th Haping Street, Xiangfang District, Harbin	15114563094
56	Guo Caixia	Female	42	Han	Vocational school			13936134972
57	Li Zhe	Female	32	Han	Junior college	None	Hongqi Community	18946109757
58	Chen Xianwu	Male	48	Han	Senior high school	Worker	Taoci Community	13836111871
59	Dong Weishi	Male	50	Han	Vocational school	Worker	Automobile Head Office	15004616839
60	Liu Guoyi	Male	56	Han	Senior high school	Driver	No.25 Linji Street, Harbin	13936635912
61	Wu Shuyan	Female	45	Han	Junior high school	Driver	Group 5, 8th neighborhood committee, Shengli Street, Acheng District, Harbin	13936102130
62	Wei Hongli	Female	44	Han	College	Employee	No.32 Central Street, Daoli District, Harbin	13633665807

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
63	Jiang Weiwei	Male	34	Han	College	Section member	Cehui Road, Nangang District, Harbin	13804537653
64	Wang Liping	Female	40	Han	Junior college	Section member	Nanzhi Road, Nangang District, Harbin	13945066553
65	Ben Zhiping	Male	55	Han	College	Official	No.198 Diduan Street, Daoli District	13945119172
66	Feng Zhixia	Female	40	Han	Bachelor		No.29 Anping Street, Daoli District	13703600516
67	Chen Tao	Male	39	Han	Junior college	Leader of motorcade		15636815168
68	Gao Ming	Female	46	Mongolian	Senior high school	Citizen	Xiangfang District	15104654128
69	Wang Zhigang	Male				Worker	No. 456 Xuanhua Street, Nangang District	15004616625
70	Hou Rui	Male	35	Han	Junior college		Room 202, 6th Unit, No.502-3 Hongqi Street	13199480022
71	Zhang Lei	Male	32	Han	Junior college	Worker	No.117 Wenjing Street, Nangang District, Harbin	13946007792
72	Wu Xiuquan	Male	50	Han	Junior high school	Worker	Keda Community, Nangang District	18745195117
73	Zheng Qingbo	Male	45	Han	Junior college			13804516198
74	Wang Guanghai	Male	45	Han	Junior college	Worker	No.198 Gongbin Road, Xiangfang District, Harbin	15046095093
75	Wang Guangyin	Male	42	Han	Senior high school	Worker	Chengxiang Road, Daoli District	13633621886
76	Li Yong	Male	40	Han	Junior college	Worker	West Dazhi Street, Nangang District, Harbin	13945073187
77	Wang Heng	Male	47	Hui	Junior college	Worker	Minsheng Road, Xiangfang District	15046119918
78	Liu Lichen	Male	52	Han	Junior college	Worker	Builing 6, Wangzhaoxincun, Dongli District	15004616819
79	Liu Zhibin	Male	43	Han	Vocational school	Worker	No.58 Hongmin Street, Xiangfang District	13904506455
80	Jiang Chengkun	Male	35	Han	Junior college	Worker	Hongqi Community, Daowai District, Harbin	15204671778
81	Sun Bo	Male	49	Han	Senior high school	Worker	No.39, Beima Road, Daowai District	15663805971
82	Li Shaohua	Male	45	Han	Professional high school	Worker	Room 302, 2#2 Unit, No.28 Xianghua Street, Xiangfang District, Harbin	13704503071
83	Gao Wei	Female	43	Han	Senior high school	Worker	No.243 Tongxiang Street	15663807275
84	Zhang Chengyi	Male	57	Han	Vocational school	Worker	No.8 2nd Songle Street	15004616763
85	Li Jieliang	Male	40	Han	Senior high school	Worker	No. 82 Tongxiang Street	15045010520
86	Zhang Lidong	Male	45	Han	Junior college	Worker	Xinheng Modern Town, Nanzhi Road	13836163007
87	Zhang Rui	Female	38	Han	Senior high school	Worker	Kang’an Road	13845085534
88	Guo Yunpeng	Male	42	Han	Senior high school	Worker	Taoli Company	13945004068
89	Wang Baozhu	Male	44	Han	Senior high school	Management	No.58 Hongmin Street, Xiangfang District	13936509701
90	Zhao Haibin	Male	46	Han	Bachelor degree	Worker	No.62 Manzhouli Street, Nangang District	15004616817
91	Liu Jun	Male	48	Han	Junior high school	Worker	No.12 Taiping Street, Taiping District	13836116207
92	Wang Chunmin	Male	74	Han	Senior high school	Retired	National People’s Committee	13059014005
93	Yang Li	Male	40	Han	Senior high school	Service	Public Transport Co., Ltd	13936429290
94	Yang Hongxi	Male	32	Han	Vocational school	Worker	No.90 Sanhe Road, Xiangfang District	13946150475
95	Zhang Xiang	Male	38	Han	Bachelor degree`	Veterinarian	Northeast Agricultural University	13936137801

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
96	Yue Yunlei	Male	37	Han	Senior high school	Self-employed	No.106 Haping Road, Xiangfang District	13936664812
97	Wang Dongqing	Female	34	Han	Bachelor degree	Employee	Anning Street, Daoli District	15645116772
98	Li Li	Female	37	Han	Senior high school	Commerce	No.49 Dongzhi Road, Daowai District, Harbin	15936547261
99	Wang Kai	Male	43	Han	Senior high school	None	Jingwei 2nd Street, Daoli District, Harbin	13945167632
100	Zhang Jun	Male	46	Han	Bachelor degree	Self-employed	No.539 Dongzhi Road, Daowai District	15004616687
101	Hu Zhongge	Male	53	Han	Senior high school	Worker	No.53 Nanzhi Road, Daowai District	15046682105
102	Wu Dongbin	Male	43	Han	Junior college	Service	Bus Group Co., Ltd	15146611669
103	Zhang Rongjie	Female	52	Han	Senior high school	Worker	Retired	15145058275
104	Xu Feng	Male	48	Han	Junior college	Worker	Daowai District, Harbin	13945137238
105	Shi Mingyu	Male	56	Han	Senior high school	Worker	Changchun Street, Daowei District, Harbin	15004616836
106	Hu Yihui	Male	45	Han	Junior college	Management	Baoda Community, Daowai District, Harbin	13946026098
107	Wang Zhongcai	Female	45	Han	Primary school	None	Qunli Street, Daoli Distreet	18345030342
108	Qin Yufang	Female	46	Han	Senior high school	Migrant worker	Jiangbei, Doali District	15134657257
109	Sun Shuhua	Female	48	Han	Vocational school	Health worker	Dongke Street	15904616056
110	Liu Lina	Female	45	Han	Junior high school	Migrant worker	Dongke 3rd Street	15645106443
111	Li Dong	Female	48	Han	Senior high school	Health worker	Dongke Street	13703612390
112	Guo Liang	Male	34	Han	Senior high school	Freelancer	No.291 Nanzhi Road	13115308360
113	Yang Wei	Male	47	Hui Nationality	Senior high school	Accountant	Private Company	13766811671
114	Liu Minan	Male	42	Han	Senior high school		Lvyin Community, Daowai District, Harbin	13946067910
115	Yan Guanglin	Male	48	Han	Senior high school	Vehicle management	Daowai District, Harbin	18045045001
116	Xu Jinling	Female	41	Han	Senior high school	Dispatcher	Room 602, 4#6 Unit, Heping Community	15245078578
117	Cai Shujun	Male	40	Han	Junior high school	Driver	No.29 Dongbeixinjie Street, Daowai District, Harbin	18246041384
118	Wang Yongli	Male	43	Han	Senior high school	Worker	Heping Community, Daowai District, Harbin	15846514093
119	Wang Binyu	Female	40	Han	Vocational school	Worker	Transportation Group Automobile Co., Ltd	13936458319
120	Wang Lei	Male	33	Han	Vocational school	Worker	Transportation Group Automobile Co., Ltd	13904616081
121	Wu Dazhi	Male	39	Han	Vocational school	Worker	Transportation Group Automobile Co., Ltd	13766846290
122	Chen Ruifeng	Male	43	Han	Vocational school	Worker	Transportation Group Automobile Co., Ltd	15004616821
123	Wang Qiang	Male	40	Han	Junior high school	Cleaner	No.77 Wenming Street, Harbin	15846512694

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
124	Dong Fei	Male	35	Han	Vocational school	Self employed	3rd South Jianguo Street, Harbin	13936187171
125	Wang Kai	Male	45	Han	Junior high school	None	Zhengyang Wooden Ware Factory	13836517071
126	Guo Rui	Male	33	Han	Senior high school	Real estates	Gongle Community, Daoli District, Harbin	13796068883
127	Liu Lincheng	Male	46	Han	Senior high school	Worker	Anfeng Street, Daoli District, Harbin	13895789759
128	Li Mingbo	Male	47	Han	Senior high school	Management	Taoci Community, Daowai District	13936567080
129	Yang Linyu	Female	42	Han	Senior high school	Driver	Harbin Automobile Head Office	13946133247
130	Liu Zhong	Male	37	Han	Senior high school	Driver	Ansheng Street, Daoli District, Harbin	15244770575
131	Chen Jing	Female	45	Han	Bachelor degree	Employee	No.31 Xiangbin Road, Xiangfang District	13904504997
132	Yao Lei	Female	25	Han	Junior college	Employee	Automobile Company	15045027564
133	Wang Xu	Male	36	Han	Junior college	Worker	No.335 Songming Street, Nangang District, Harbin	15084669127
134	Wang Tingting	Female	31	Han	Senior high school	Worker	No.46-6 Mulan Street, Nangang District, Harbin	13836026544
135	Gao Yongquan	Male	27	Han	Senior high school	Worker	No.39 4th North Street, Daobei District, Harbin	18182809994
136	Ma Qian	Female	37	Han	College	Worker	No.49 Caiyi Street, Xiangfang District, Harbin	15084669135
137	Yu Qinghe	Male	48	Han	Senior high school	Vehicle management	Luyin Community, Daowai District	13936338028
138	Zhao Shuxian	Female	50	Man	Senior high school	Health worker	Qinghewan, Daoli District, Harbin	18724632696
139	Meng Guiqin	Female	45	Han	Junior high school	Health worker	Chaiyi Street, Xiangfang District, Harbin	13845076108
140	Liu Fengying	Female	41	Han	Primary school	Health worker	17th Motorcade	13945101647
141	Liu Weihua	Female	46	Han	Junior high school	Health worker	17th Motorcade	18704609760
142	Zhao Jidong	Male	46	Han	Senior high school	Driver	Transportation Group Public Transport Co., Ltd	15245051978
143	Wu Xiang	Male	50	Han	Junior college	Bus driver	Harbin Transportation Group Public Transport Co., Ltd	13804507112
144	Wang Tiejun	Male	37	Han	Junior college	Driver	Harbin Transportation Group Public Transport Co., Ltd	13946175686
145	Gong Ting	Male	34	Han	Senior high school	Driver	Harbin Transportation Group Public Transport Co., Ltd	13766813232
146	Wang Dianhong	Male	45	Han	Junior high school	Dispatcher	Hegu Street	13766824432
147	Zhang Nan	Male	39	Han	Senior high school	Vice team leader	No.116 Motorcade	15561875199
148	Chen Ping	Male	39	Han	Junior college	Team leader	Sub 24-2, Hegu Street, Daoli District	18249093811
149	Tian Li	Female	42	Han	Vocational school	Standing Committee	No.116 Motorcade, Harbin Transportation Group Public Tram Co., Ltd	15804621408

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
150	Li Hang	Male	36	Han	Junior college	Bus driver	Public Transport Co., Ltd	18246826677
151	Yu Xianwen	Male	56	Han	Bachelor degree	Bus driver	Harbin Public Transport Co., Ltd	13945088153
152	Lin Yubing	Male	46	Han	Senior high school	Driver	Public Transport Co., Ltd	18946098275
153	Li Dashun	Male	45	Han	Senior high school	Driver	Ansheng Street, Harbin	18746016908
154	Li Yujie	Female	45	Hui	Senior high school	None	Daoli District	15546164090
155	Han Yong	Male	40	Han	Senior high school	None	Xiangfang District	13936428234
156	Yang Jinlong	Male	52	Han	Vocational school	Worker	No.6 Wenku Street, Nangang District, Harbin	13845183883
157	Jia Chunyan	Female	45	Han	Junior high school	Worker	Nangang District	13836015864
158	Zhang Tingge	Male	47	Han	Senior high school	Driver	Transportation Group Public Tram Co., Ltd	15776314411
159	Li Qiwu	Male	47	Han	Junior high school	Driver	Transportation Group Public Tram Co., Ltd	13633621051
160	Ge Quanjun	Male	38	Han	Senior high school	Driver	Transportation Group Public Tram Co., Ltd	13845120080
161	Tong Meiling	Female	49	Man	Junior high school	Worker	Gongwuyuan Community	13945104655
162	Zhang Yan	Female	43	Han	Junior high school	Worker	Meichengjiayuan Community	18003662484
163	Lin Lanying	Female	50	Han	Senior high school	Worker	Public Transport Group	13936318089
164	Kang Liyong	Male	48	Han	Junior college	Vehicle management	No.1130 Motorcade, Public Transport Group 2nd Company	15846629771
165	Sun Shufen	Female	56	Han	Junior high school	Retired	Yinbing Community, Guxiang Street, Daoli District	15804630256
166	Wu Ruomin	Male	60	Han	Junior high school	None	康安路 85-5 号 No.85-5 Kangan Road	15636835525
167	Yang Zhenhai	Male	53	Han	Junior high school	None	C6 Building Minshengshangdu Community	15904601078
168	Yang Shan	Male	44	Han	Senior high school	Management	Heping Community, Daowai District	13654689508
169	Wang Shengcun	Male	46	Han	Senior high school	None	Hezhou Street	15004691384
170	Wang Yanmei	Female	50	Han	Senior high school	Retired	Qunlixinyuan Community	13936401090
171	Jing Yurong	Female	47	Han	Junior college	Manager	Aijian Street	13796066677
172	Fan Yaling	Female	46	Han	Junior college	Salesman	7th Qunli Street	15134560608
173	Zu Hongbo	Female	35	Han	Junior high school	Freelancer	Gongyuan Road, Hulan District	13613673882
174	Bi Lina	Female	50	Han	Junior college	Employee	Hujun Community	15046662358
175	Li Zhirong	Female	52	Han	Bachelor degree	Division head	Building F, Taishan Community	15545118078
176	Cai Hong	Female	48	Han	Junior college	Employee	No.8 Senlin Street	
177	Xing Weilin	Male	54	Han	Senior high school	Driver	Hongcheng Community Daowai District, Harbin	18245131426
178	Zhang Xiaoyan	Female	41	Han	Senior high school	Clerk	Harbin Ping’an Insurance	13101617385
179	Piao Zhisui	Male	57	Chaoxian	Senior high school	None	Dajiang Community, Guxiang Street, Daoli District	18946168383
180	Ren Fuhua	Female	47	Han	Senior high school	None	No.28 Heliang Street, Daoli District	15104606864
181	Liu Yongqiang	Male	44	Han	College	Project Manager	Harbin Thermal Power 3rd Company	18646275595
182	Shi Guixiang	Female	54	Han	Senior high school	None	Daowai District, Harbin	13936627841

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
183	Zhang Ying	Female	42	Han	Junior college	Marketing	No.72 Yanxing Road, Nangang District, Harbin	13946075800
184	Zhang Qinghua	Female	52	Han	Senior high school	None	Songpu District	13845012546
185	Wang Wei	Male	46	Han	Junior high school	Driver	Herun Street, Daoli District	13042258237
186	Lu Qinghai	Male	45	Hani	Senior high school	Employee	哈市南岗区 Nangang district, Harbin	13662813819
187	Zhao Liang	Male	23	Han	Junior college	Property consultant	Songbei District, Harabin	18345016522
188	Shi Haipeng	Male	17	Han	Professional high school	Student	No.16, Andao Street, Harbin	15765549813
189	Wang Yan	Female	28	Han	Bachelor degree	Actor	Anjian Road, Daoli District	18686858483
190	Zhang Mingxi	Male	18	Mongolian	Senior high school	Student	Songbei District, Harbin	18345067538
191	Ma Jiaojiao	Female	32	Han	Junior high school	Employee	Jichang Road, Daoli District, Harbin	15804639513
192	Yng Lianzhen	Male	49	Han	Junior high school	Driver	No.29 Motorcade, 7th Branch Company	13895718584
193	Liu Zhenghua	Male	36	Han	Junior college	Driver	No.29 Motorcade	18686702206
194	Zhao Zhengming	Male	44	Han	Senior high school	Driver	No.29 Motorcade, 7th Branch Company	13039977117
195	Yang Zhixiong	Female	47	Han	Senior high school	Driver	No.29 Motorcade	18845614452
196	Feng Debin	Male	49	Han	Junior high school	Driver	No.29 Motorcade	18745779518
197	Ma Jiao	Female	30	Han	Junior high school	Migrant worker	Daowei District, Harbin	13244556623
198	Wang Xifang	Male	53	Han	Bachelor degree	Bus driver Bus driver	Public Transport Co., Ltd	13766898877
199	Wang Yanhong	Female	32	Han	Senior high school	Self-employed	Uint 5, Building 28, Min'an Community, Daoli District	13313613145
200	Han Xiaochun	Female	52	Han	Senior high school	Retired	Hubin Town, Songbei Strict	13089997051
201	Geng Dongyan	Female	43	Han	Senior high school	Self-employed	Qingming Community, Nan'gang District	18246027344
202	Liu Fang	Male	60	Han	Senior high school	Retired	Hongguang Village, Songbei Town	13904607274
203	Yu Haiyan	Female	34	Han	Junior high school	Shop assistant	Hupanjiayuan Community, Songbei Distreet, Harbin	13936641681
204	Liu Haibo	Female	35	Han	Senior high school	Self-employed	Songbei District, Harbin	13796612387
205	Wang Ping	Female	37	Han	Junior high school	Shop assistant	Qianjin Community Songbei Community, Harbin	15224676807
206	Gao Feng	Male	46	Han	Junior high school	Driver	Sub No.73 Gongsi Street	13936576512
207	Wang Yingbo	Male	54	Han	Senior high school	Driver	Wenhua Street	13845058237
208	Wang Shaofeng	Male	44	Han	Senior high school	Driver	Wenhua Street	13796673177
209	Bao Kuo	Male	39	Han	Senior high school	Driver	Hesong Community, Daoli District	13945188236
210	Yang Dexiang	Male	37	Han	Technical school	Driver	Wenhua Street	13613609894

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
211	Wang Xiaoguang	Male	34	Han	Junior college	Driver	Wenhua Street	13263635055
212	Zhang Xuejun	Male	46	Han		Driver	Wenhua Street	15124578710
213	Li Chunli	Female	49	Han	Junior college	Bus driver	No.5 Heping Road	86223434
214	Liu Tao	Male	43	Han	Senior high school	Driver	Wenhua Street	13684627381
215	Xu Ming	Male	35	Han	Vocational school			15114562471
216	Niu Kegang	Male	44	Han		Driver		13069707175
217	Yang Jiwei	Male	60	Hui	Senior high school	Retired	No.248 Jingwei Street, Daoli District, Harbin	15804627765
218	Yang Tong	Male	31	Hui	Bachelor degree	Auditor	Daoli Branch	18345180001
219	Liu Zhigang	Male	50	Han	Senior high school	Driver	Wenhua Street	15104575791
220	Jin Bailin	Male	54	Han	Junior college	Bus driver	Pingfang Railway Station	15004616756
221	Shi Xiaolei	Female	36	Han	Vocational school	Bus driver Driver	No.31 Tielin Street, Nangang District, Harbin	18245119789
222	Ma Zhenhua	Female	27	Han	Bachelor degree	Statistician	Wenming Street	86223434
223	Liu Tao	Male	43	Han	Senior high school	Driver	Sub No.73 Wenhua Street	13684627381
224	Lin Peng	Male	43	Han	Junior high school	Driver	18th Street, Daowai District	18945088824
225	Zhang Lu	Male	38	Han	Senior high school	Driver	Wenhua Street	18646133376
226	Zhang Tiebin	Male	41	Han	Junior high school	Driver	Xiangfang District	15804632478
227	Qu Yi	Male	40	Han	Senior high school	Driver	Wenhua Street	13144617798
228	Pan Jie	Female	38	Han	Senior high school	Driver	Wenhua Street, Daoli District	13904605689
229	Xing Wei	Male	40	Han	Senior high school	Driver	Wenhua Street	13936160206
230	Qu Yandong	Male	45	Han	Junior college	Tranportaion Group	No.48 Wenming Street	18745002775
231	Peng Chuanxin	Male	48	Han	Vocational school	Bus driver	No.30 Xiangbin Road, Harbin	13836178776
232	Boa Junbo	Male	52	Han	Junior college	Bus driver	5th Qingming Street, Nangang District	13936341516
233	Li Yanling	Female	51	Han	Junior college	Standing commitee	West Harbin Station	15004616840
234	Yu Qiuyan	Female	44	Han	Senior high school	Bus driver	Harbin Transportation Group Public Tram Co., Ltd	15846531649
235	Sun Jian	Male	43	Han	Technical school	Transportation group	No.9 Xiangbin Road, Harbin	15045070370
236	Zhao Shilong	Male	45	Han	Vocational school	Transportation group	No.48 Wenming Street	13946022437
237	Zhang Guoqiang	Male	37	Han	Bachelor degree	Transportation group	Harbin Public Tram Co., Ltd	18745193688
238	Li Feng	Female	46	Han	Bachelor degree	Transportation group	No.48 Wenming Street, Nangang District, Harbin	13945143919

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
239	Wang Xiuzhi	Female	43	Han	Junior college	Standing commitee	No.9 Xiangbin Road	13796668172
240	Li Kai	Male	39	Han	Senior high school	Driver	No.73 Wenhua Street	18646093202
241	Yu Jie	Male	44	Han	Vocational school	Team leader	No.119 Motorcade, Harbin	15245058280
242	Pan Delin	Male	56	Han	Senior high school	Driver	Wenhua Street	15846636553
243	Lang Libin	Male	54	Han	Junior college	Transportation group	Public Transport Co., Ltd	13804580730
244	Li Dachun	Male	45	Han		Team leader	No.9 Gongbin Road	18545182048
245	Cao Siwen	Female	30	Han	College	Comprehensive business	No.115 Tongzhan Street, Xiangfang District	13946175697
246	Zhou Haipeng	Male	31	Han	Junior college	Team leader	No.9 Xiangbin Road	13936261693
247	Li Liang	Male		Han	College	Driver	Wenhua Street	13304639970
248	Chen Baolei	Female	41	Han	Vocational school	Railway staff	Harbin Railway Passenger Department	13603624089
249	Kou Ziyue	Female	26	Han	Bachelor degree	Employee	Minshengguoji Community	18903614409
250	Li Yang	Female	28	Han				15846355514
251	Bai Yanan	Female	38	Han	Vocational school		No.243 Xianfeng Road	18246186620
252	Sun Yilei	Female	28	Han	College	Cost estimator	Jianguo Street	13091444498
253	Zhang Hongyu	Male	35	Han	Senior high school	Repairman	Songbei District	15904604200
254	Zhang Hongmei	Female	38	Han	Junior college	Teacher	No.122 Middle School	18645034197
255	Jiang Zhiguo	Male	48	Han	Junior college	Driver	Wenhua Street	13936260828
256	Hei Jinghua	Female	49	Hui	Bachelor degree	Police	Patrol Police and Special Police Station	13836913116
257	Tian Yujie	Male	64	Han	Senior high school	Retired	Miaopu Street, Nangang District, Harbin	13796678571
258	Chen Xiuli	Female	62	Han	Junior high school	Retired	Wenxing Street, Nangan District, Harbin	13936622713
259	Tian Yuan	Female	36	Han	College	Employee	Anyang Road, Daoli District, Harbin	13936184637
260	Peng Lihua	Female	56	Han	Junior high school	Retired	Gongnong Street, Harbin	13074585490
261	Li Yingli	Female	52	Han	Junior high school	Worker	Retired	15545017760
262	Zhong Weiyan	Female	31	Han	Junior college	Worker	Harbin China Unicom	18603656186
263	Cheng Guangbin	Male	45	Han	Senior high school	Employee	Harbin Transportation Group	13895774071
264	Hu Shuxin	Male	40	Han	Vocational school	Freelancer	Jinxiang Street, Xiangfang District, Harbin	15765569841
265	Li Hongwen	Female	43	Han	Junior college	Employee	No.239 Liaohe Road, Nangang District	13304809701
266	Xu Xingguang	Male	31	Han	Junior college	None	None	15245031286
267	Liu Jia	Male	46	Han	Senior high school	None	None	13039969936
268	Xu Jing	Female	43	Han	Vocational school	None	None	15046095691
269	Wang Zhiyong	Male	37	Han	Junior college	Vehicle management	Transportation Group	15846587577

No.	Name	Gender	Age	Nationality	Educational	Occupation	Work or living place	Tel.
270	Yang Li	Female	38	Han	Junior college	Self employed	No.50 Diling Street, Daowai District, Harbin	15146622281
271	Sun Qiuju	Female	44	Han				13946077616
272	Tao Wensheng	Male	48	Han	Senior high school	Dispatcher	Anxin Street, Daoli District	13796678863
273	Yang Xiaoxia	Female	47	Han	Senior high school	Health Center	Daoli District	13633606997
274	Chu Huinan	Female	50	Han	Junior high school	Worker	No.8 3rd Hexing Street, Nangang Disrict, Harbin	18745137180
275	Zhao Lei	Female	44	Han	Senior high school	Worker	4th Fuhua Street, Nangang District, Harbin	18714516001
276	Li Meili	Female	43	Han	Senior high school	Worker	No. 95 Caiyi Street, Xiangfang District, Harbin	15846589135
277	Li Liping	Female	42	Han	Junior college	Worker	Provincial Power Equipment Factory	18145115178
278	Wang Hua	Female	46	Han		Worker	Hepan Garden, East Mucai Street, Harbin	15245126233
279	Yang Hong	Female	40	Hui	Junior college	Employee	Xiangfang District, Harbin	15004642010
280	Xu Deyou	Male	35	Han	Vocational school	Vice team leader	Guoyuan Street	15804514867
281	Sun Yanhong	Female	42	Han	Junior college	Dispatcher	Line 21	15545157188
282	Li Bin	Male	42	Han	Senior high school	Driver	Wenhua Street	15545158109

The statistic results of the public engagement are shown in Table 8-3-4.

Table 8-3-4: Summary of public opinions from the survey

Content of survey	Answers		
What is your understanding of the project construction?	Understanding 85%	Ordinarily 10%	Slightly 5%
What's your opinion on the construction of this project?	Approval 100%	Disapproval	Doesn't Matter
Do you think whether the works can improve the local traffic conditions?	Yes 100%	No	Don’t know
What are the beneficial effects of this project construction?	Developing economy 37%	Protecting environment 12%	Providing convenience 51%
What are the adverse effects of this project construction?	Quality of life 26%	Regional environment 69%	Personal income 5%
What do you think of the impact of this project on vegetation?	Great 5%	Ordinarily 17%	Slightly 78%
What do you think is the most important or the most concerned environmental issue for you during the construction period?	Dust pollution 34%	Noise pollution 45%	Inconvenience of travel 21%
What measures do you suggest to mitigate the impact?	Greening 72%	Noise barriers 7%	Others 21%

Public opinions

According to the result of questionnaire and oral enquiry, over 90% of participants support the construction of the project. The main reasons are as follows:

(1) Currently, the infrastructure in Harbin cannot satisfy the traffic demand. As a result, the speed of traffic flow is lowered and more vehicular pollutants are discharged. Poor traffic conditions results in low degree of satisfaction. Therefore, this project will improve the current traffic conditions and facilitate citizens’ travelling.

(2) The project will also improve residents’ living environment and livelihood.

(3) The project will improve environment, promote tourism, improve investment environment and promote economic development of Harbin.

Main public concerns:

The public mainly concerns about the impacts of noise and dusts on ecology and surrounding environment during construction. They require the construction units to implement strict environmental management during construction and future operation, preserve local environmental quality and obtain sustainable and balanced environmental and social economic development.

Solutions:

(1) Preventives measures will be taken respectively targeting at the impacts of dusts and noises on ecology during construction. Stricter measures will be considered and implemented at sensitive areas where there are schools, residential communities and hospitals. There will be billboards on the construction sites which specify the content of construction, contact person and complaining telephone etc. Meanwhile, a detailed environmental management and monitoring plan will be formulated.

(2) During each design of the project, full consideration will be given to the safety of pedestrians during construction.

8.3.4 Conclusion of public engagement

In this assessment, public engagement is realized by means of online publicizing and questionnaires. During the period of online publicizing, no objections were raised by the public. For citizens who are directly affected, the construction unit has made explanations and conduct widespread consultation with local residents. All participants in the survey support this project and no one raised any objections.

From the analysis of the statistics of questionnaires, the public vigorously supports this project, believing that it will promote local economy and increase job opportunities. With respect to environmental impacts of the project construction, the public shows the concerns relating to noise pollution, flying dust pollution, ecological damage and loss of resources. The public has a strong sense of environmental protection. It's recommended that measures such as greening, sound barriers and other means be taken to mitigate environmental impacts.

8.4 Second Round of Public Participation

In order to make the public participation survey more representative, according to the requirements of WB expert, a second round of public participation is required for the sub-projects (public transport priority corridor construction projects) adjusted in the mid-term adjustment. World Bank environmental expert requires the public participation method shall include online publicity, questionnaires, and interviews with environmentally sensitive points (especially schools, hospitals, senior apartments).

8.4.1 Methodology

Based on the requirements of WB expert, a second round of public participation is required for the corridor construction sub-project. The World Bank environmental expert requires the public participation method shall include online publicity, questionnaires, and interviews with environmentally sensitive points (especially schools, hospitals, senior apartments). Thus, the second round public participation survey includes online publicity, questionnaires release, interview seminar and newspaper publicity as well.

8.4.2 Information disclosure

The online publicity of the full text of the environmental impact assessment report of the project will be published on the Harbin Traffic Bureau website. On Feb. 3rd, 2019, the PMO has carried out the publicity on Harbin Traffic Bureau website (http://www.harbin-jtj.gov.cn) for the second round public participation for the environmental assessment on the mid-term adjustment content of Harbin cold intelligent public transport system construction project. The full text of the report can be download from the website. Until now, no feedback was received during the publicity. The screenshot of online publicity is shown as follows:

Fig 8-4-1: Screenshot of Second Round Online Publicity

Fig 8-4-2: Assess to the full text of EIA Report for the Midterm Adjustment

On March 27, 2019, the Harbin Municipal Transportation Bureau re-disclosed the mid-term adjustment EIA report in the Harbin Daily newspaper. The newspaper publicity screenshots are as follows:

世行贷款哈尔滨高寒城市智能公交系统建设项目
环境、社会影响评价第二轮公众参与公示

公众朋友们，你们好！

黑龙江兴业环保科技有限公司受哈尔滨市交通运输局委托，承担哈尔滨高寒城市智能公交系统建设项目的环境影响评价工作。

河海大学受哈尔滨市交通运输局委托，承担哈尔滨高寒城市智能公交系统建设项目的社会影响评价工作。

根据相关规定，现由哈尔滨市交通运输局针对该项目下的公交优先走廊子项目进行公众参与公示，现将项目情况及社会、环境影响评价工作情况公示如下：

一、项目概况

名称：哈尔滨高寒城市智能公交系统建设项目－公交优先走廊建设子项目

建设地点：黑龙江省哈尔滨市新阳路、南直路和长江路，共计177公里。

二、项目的承办单位和联系方式

联系人：哈尔滨市交通运输局 联系电话：86772969

三、公众参与方式

本项目的详细信息已在哈尔滨市交通运输局网站上公示，公众可网上查询。

哈尔滨市交通运输局 2019年3月27日

Fig 8-4-3: Second Round of Newspaper Publicity

After the second round publicity of this project online and on the newspaper, any telephone or letter about the project construction and environmental protection from the public has not been received.

8.4.3 Questionnaire survey

Following the requirements of World Bank experts, on November 15-16, 2018, the PMO released public participation questionnaires to publics related to the construction of the project on Changjiang Road, Nanzhi Road and Xinyang Road in Harbin, to soliciting public opinion and suggestions on the corridor construction. During the questionnaire survey, the investigators introduced the contents of the public transport priority corridor construction project and the necessity of the project to the respondents, and truthfully explained the possible impact of the project on the environment and the proposed prevention measures.

A total of 90 questionnaires (about 30 in each corridor) were distributed in this survey, and 89 valid questionnaires were received back.

Table 8-4-1: Public Participation Questionnaires for Publics Along Roadside

Name:	Gender:	Age:	Nationality
Culture Degree:	Occupation:	Phone:	Remarks:
Working company or address:			

Project introduction:

Project Name: Harbin City Cold Intelligent Public Transport System Project - Public Transport Priority Corridor Construction Project

Construction Site: The construction site of the project is the downtown area of Harbin, and all the 3 public transport corridors to be constructed are in the urban area of Harbin, with the 3 public transport corridors being Nanzhi Road Public Transport Priority Corridor (Huashu Street- Gongbin Road), Changjiang Road Public Transport Priority Corridor (Hongqi Street- Xilong Street) and Xinyang Road Public Transport Priority Corridor (Xiangzheng Street- Haining Leather Center). All the three public transport priority corridors are reconstructed ones.

Construction Scope: The Public Transport Priority Corridor Construction Project: including the construction of public transport priority corridors and the construction of supporting public transport corridor intelligence; Based on the latest approved preliminary design, the corridor construction subproject involves a total investment amount of 164.18 million Yuan, including project construction costs of 121.50 million Yuan, other costs of 31.70 million Yuan and contingency fee 10.98 million Yuan.

The main impacts on the environment during the construction and operation periods are reflected in the impact on the social environment (urban transportation, residential life, urban infrastructure, etc.), air quality, water environment, noise, urban ecology, and solid waste.

Questionnaire Survey

Question	Answer	Yes	Comments
In your opinion, what are the major environmental problems in your area?	Air pollution		
	Noise		
	Surface water		
	Underground water		
	Soil		
	Solid waste		
	Fetor		
	Risk from chemistry		
	Other		
How far is your working place from the project location?	Within 1km		
	1-3km		
	3-5km		
	More than 5km		
How far is your living place from the project location?	Within 1km		
	1-3km		
	3-5km		
	More than 5km		
In your opinion, what is the influence of XX project on the surroundings?	Air pollution		
	Noise		
	Surface water		
	Underground water		
	Soil		
	Solid waste		
	Fetor		
	Risk from chemistry		
	Other		
Do you satisfy with the mitigation measures in this project?	Very satisfy		
	Satisfy		
	Satisfy basically		
	Very disappointed		
	Not sure		
	Disappointed		
Under current condition, do you accept the influence that the project may have on you?	Yes		
	Not		
	Not sure		
Before the public participation, do you know about this project?	Yes		
	No		
Before the public participation, do you understand the environmental effect of this project?	Understand		
	Basically understand		
	Not understand		
After know about all information, do you understand all positive and negative effect that the project may have?	Understand very well		
	Understand		
	Basically understand		
	Not understand		
In your opinion, which aspect should be focused for this project?	Gas exhausted be treated effectively		
	Emission control		
	Wastewater treatment		
	Underground water protection		
	Soil protection		
	Use recyclable resources to reduce solid waste		
	Noise to residents		
	Protect the health and safety of the community		

Question	Answer	Yes	Comments
	Protect the health and safety of workers		
	Other		
How do you like the current bus services on the road?	Good		
	Bad		
	Not sure		
Do you think this project will promote the bus service on the road?	Yes		
	No		
	Not sure		
How to improve the bus service in your opinion?	Adding stops		
	Adding lines		
	Adding buses		
	Improve intellect system		
	Better care		
	Other		
Do you understand the negative effect during project construction?	Very well		
	Somehow		
	Basically		
	No		
After knowing about all information, do you think the construction of this project is necessary or not?	Necessary		
	Basically necessary		
	Not necessary		
	Either way		
Which is the major problem during the construction in your opinion?	Noise		
	Dust		
	Solid waste		
	Traffic jam		
	Other		
	No major impact		
Without environmental protection measure, will you accept the environmental impact during construction?	Accept		
	Basically accept		
	Not accept		
	Not sure		
After understanding the environmental protection measure to be implemented, do you accept the environmental impact of the project during the construction period?	Accept		
	Basically accept		
	Not accept		
	Not sure		
After comprehensive consideration, do you agree to the construction of this project?	Yes		
	No		
	Not sure		
Do you understand the negative impact on the environment during the operation of the project?	Very well		
	Somehow		
	Basically		
	No		
Do you understand the negative impact on occupational health and safety during project operations?	Very well		
	Somehow		
	Basically		
	No		
Do you understand the environmental measures to be implemented during the operation of the project?	Very well		
	Somehow		
	Basically		
	No		
Do you accept the impact on the ambient air quality during the operation of the project?	Accept		
	Basically accept		
	Not accept		
	Not sure		

Question	Answer	Yes	Comments
Do you accept the impact on the quality of the acoustic environment during project operation?	Accept		
	Basically accept		
	Not accept		
	Not sure		
Do you accept solid waste pollution during the operation of the project?	Accept		
	Basically accept		
	Not accept		
	Not sure		
Do you accept the impact on the ecological environment during the operation of the project?	Accept		
	Basically accept		
	Not accept		
	Not sure		
Do you accept the impact on community health and safety during project operation?	Accept		
	Basically accept		
	Not accept		
	Not sure		
What is your most concerned about the project?	Air		
	Noise		
	Surface water		
	Underground water		
	Soil		
	Solid waste		
	Other		
Do you think the construction of this project can promote local economic development?	Yes		
	No		
	Not sure		
After full consideration, do you support this project?	Yes		
	No		
	Not sure		

Table 8-4-2: Name list of Public Participate Survey

Name	Gender	Age	Nationality	Education	Occupancy	Phone	Work or living place
Xinyang Road							
Wang Xinyuan	Male	28	Han	Bachelor	Technician	13029705960	Sanjing home
Xiang Rungong	Male	35	Hui	Bachelor	Teacher	15846384583	Harbin No.10 Hospital
Liu Yuankun	Male	35	Han		Bridge engineering	18604518863	Welcome Old Apartment
Wang Lei	Male	33	Han	Bachelor	Doctors	13936519351	Welcome community
Sheng Weichun	Male	45	Han	College	Worker	13796600307	Welcome Old Apartment
Huang Hailong	Male	41	Han	College	Security	13766853399	Sanjing home
Wang Hui	Male	54	Han	Bachelor	Organ	13029705952	Sanjing home
Wang Chunyang	Female	52	Han	College	Organ	13904809201	Sanjing home
Yu Yu	Female	33	Han	Bachelor	Nurse	13796038513	Welcome community
Sun Yufeng	Female	41	Han	College	Vehicle service	18846816171	Sanjing home
Li Bonan	Female	34	Han	Bachelor	Clerk	13684628396	Welcome Old Apartment
Zhang Xin	Female	33	Han	Bachelor	Finance	13804521284	Harbin No.10 Hospital
Wei Zhuzhen	Female	54	Han	College	Worker	13045160506	Yuanda Urban Oasis

Name	Gender	Age	Nationality	Education	Occupancy	Phone	Work or living place
							Community
Zhou Shenglan	Female	33	Han	primary school	-	18246432951	Bethel Hospital
Li Dali	Male	32	Han	junior high school	Worker	13284605509	Bethel Hospital
No	Male	49	Han	junior high school	Chef	15844022976	Hongyang Primary School
Hou Lijuan	Female	48	Han	junior high school	Chef	13630596679	Hongyang Primary School
Zhang Zhenli	Male	65	Han	High school	Retired	13091886937	Welcome home
Xu Yanxiang	Male	61	Han	High school	Worker	15776253413	Sanjing home
Wang Yanling	Female	64	Han	High school	Worker	13836011856	Welcome Old Apartment
Xu Bin	Male	55	Han	High school	Worker	13351417242	Qinghewan Community
Wu Xianfu	Male	59	Man	High school	Worker	1.52468E+11	Muslim Community
Li Lianhe	Male	50	Han	High school	Worker	13796244805	Qinghewan Community
Cheng Lijun	Male	57	Han	High school	Worker	15645079080	Jinshan Garden
Zhang Yongli	Male	42	Han	High school	Worker	13313662322	Harbin Women's Federation Preschool Teacher School
Yan Xiuhua	Female	56	Han	High school		86074608	Jinshan Garden
Zhao Yuhong	Female	58	Han	High school	Worker	13796091536	Muslim community
Wang Lina	Female	37	Han	High school	Teacher	15046229916	Harbin Women's Federation Preschool Teacher School
Nanzhi Road							
Yu Ying	Female	47	Han	College	Freelance	13845070382	Shuili Community
Li Yunping	Male	48	Han	University	Staff	15804622228	Huashu Jiayuan Community
He Tingting	Female	31	Han	Bachelor	Staff	17654120914	Dongzhi Community
Zhang Yan	Male	45	Han	College	-	13945188957	Peaceful community
Han Xiaojuan	Female	43	Han	High school		13936565908	Ganlancheng Community
Li Lichun	Male	45	Han	College		13845000389	Dayoufang Community
Wang Xingwei	Male	39	Han	College	Staff	13945173383	Kunlun Community
Xu Li	Female	32	Han	College	-	13945118383	Hongtu Community
Jiang Taotao	Male	30	Han	College	Staff	13613669935	Qijiang Community
Ma Li	Female	32	Han	College	-		Hongtu Community
Soviet Army	Male	55	Han	Secondary school	Security officer		Chang'an City Community
Zhang Hongwei	Male	45	Han	College	Civil servant	15084169210	Chang'an City Community
Lu Zhiwei	Male	35	Han	Bachelor	Clerk	13766938136	Peaceful community
Du Shouting	Female	33	Han	Bachelor	Doctors	13845160800	Chang'an City Community
Kunlin	Male	46	Han	College	Clerk	18246097599	Harbin No.6 Pharmaceutical Factory
Tan Lijuan	Female	47	Han	High school		13936193715	Harbin No.6 Pharmaceutical Factory

Name	Gender	Age	Nationality	Education	Occupancy	Phone	Work or living place
peak	Male	29	Han	College	Worker	13674666283	Harbin No.6 Pharmaceutical Factory
Chai Shengna	Female	45	Han	Bachelor	Staff	15945176508	Peaceful community
Li Quanyan	Female	21	Han	Bachelor	Student	18846765290	Nangang District
Changjiang	Male	55	Han	Bachelor	Worker	15804611206	Peaceful community
Song Tao	Female	46	Han	College	Accountant	15945163972	Xinheng Modern City
Han Yong	Male	47	Han	College	Engineer	15945163972	Taihai Garden Community
Wang Xicai	Male	55	Han	College	Civil servant	13766898877	189 Nanzhi Road
Liu Wenbo	Male	45	Han	College	Civil servant	13946007489	Mengke Vision Community
Zheng Baolin	Male	42	Han	High school	Clerk	15645026607	Yueshan Guoji Community
Zheng Baohai	Male	45	Han	College	Clerk	13936392580	Yueshan Guoji Community
Yin Qian	Female	23	Han			18800414018	Zhujiang Jiayuan
Li Na	Female	56	Han	High school	Retired	13796611356	Shanshangju Community
Wang Jinglin	Male	58	Han	College	Clerk	15046095628	Gongbin Urban Garden Community
Changjiang Road							
Gao Lin	Female	30	Han	Bachelor	Clerk	13339401680	Yueshan Guoji Community
Liu Mail	Female	23	Han	College	Shopping guide		Yueshan Guoji Community
Li Lianzhi	Female	67	Han	High school	Retired	14745725094	Yueshan Guoji Community
Fu Jingyi	Female	23	Han	Bachelor	Teacher	13938302032	Mengke Vision Community
Li Weina	Female	36		the University	Staff		Mengke Vision Community
Zhang Lan	Female	58	Han	College	Retired	15936316070	Taishan Community
Su Qing	Female	30	Han	Bachelor	Staff	15046185129	Golden Berlin Community
Zhang Lijun	Male	40	Han	Bachelor	Staff		Golden Berlin Community
Yang Xu	Female	40	Han	College	Finance	13895750577	Changjiang Community
Sun Yanqiu	Female	35	Han	Junior high school	Doctor	13796081921	Changjiang Community
Wang Shuqin	Female	64	Han	Junior high school	Worker	13846089471	Harbin Petrochemical Corporation
Chen Jing	Female	48	Han	University	Staff	13904504997	Harbin Petrochemical Corporation
Gao Bin	Male	37	Han	College	Worker	13904608056	Tianfeng Plastic Products Factory
Li Yongzhi	Male	38	Han	College	Staff	18345010700	Tianfeng Plastic Products Factory
Zhang Yue	Female	25	Han	Bachelor	Clerk	13904661028	Tianfeng Plastic Products Factory
Li Shengnan	Female	42	Han	Bachelor	Staff	13694502599	Huayu Plastic Steel Factory
Li Shuwen	Male	44	Han	Secondary	-	18745172092	Huayu Plastic Steel

Name	Gender	Age	Nationality	Education	Occupancy	Phone	Work or living place
				school			Factory
Nie Weijiang	Male	56	Han	College	Staff	13936522615	Qiancheng Car Wash
Lu Changluo	Male	39	Han	University		13633619934	Baling Street, Nangang District
Yu Hai	Male	26	Han	Bachelor	Clerk	18746053205	Hongxiang Mingyuan
Ma Zhenqian	Female	29	Han	College	Clerk	15245029539	Xiangfang District
Zhu Yuying	Female	21	Han	Bachelor	College Students	15104659504	Northeast Agricultural University
Yang Zi	Female	43	Han	Bachelor	Clerk	18088771639	Lanxing Company
Chen Chen	Male	32	Han	College		15604664529	Northeast Agricultural University
Qiqi	Male	20	Han	Bachelor	College Students	45182419897	Northeast Agricultural University
Liu Chujun	Female	33	Han	College	Corporate staff	13613624449	Lanxing Company
Lu Dou	Female	25	Han	College	Staff	13845115969	Lanxing Company
Liu Jia'an	Male	26	Han	Bachelor	Staff	13804526053	Shangdong Huihuang Community
Gao Bo	Male	30	Han	Bachelor	Staff	15145110133	Shangdong Huihuang Community
Cheng Yanmin	Female	74	Han	Primary school	Retired	15045075835	Donghong Yijing Community
Du Yuwei	Male	37	Han	Bachelor	Clerk	13703651163	Donghong Yijing Community

The statistics on the issuance of the questionnaire and the objects to be distributed in this project are counted. The results are shown in the table below.

Table 8-4-3: Analysis of the Participants

Item		Number of people	Percentage (%)
Total number of the participants		89	100
Gender composition	Male	45	50.6
	Female	44	49.4
Age composition	≤30	18	20.2
	30~60	65	73.0
	≥60	6	6.7
Education	Preliminary school	2	2.2
	Middle school	5	5.6
	High school	17	19.1
	Other	65	73.0
Occupancy	Farmer	0	0
	Other	89	100

Table 8-4-4: The Summary of Questionnaire Survey

Question	Answer	Yes	%
In your opinion, what is the major environmental problems in your area?	Air pollution	37	41.6%
	Noise	31	34.8%
	Surface water	1	1.1%
	Underground water	2	2.2%
	Soil	1	1.1%
	Solid waste	8	9.0%
	Fetor	1	1.1%
	Risk from chemistry	0	0.0%
	Other	8	9.0%
How far is your working place from the project location?	Within 1km	20	22.5%
	1-3km	23	25.8%
	3-5km	12	13.5%
	More than 5km	34	38.2%
How far is your living place from the project location?	Within 1km	13	14.6%
	1-3km	17	19.1%
	3-5km	19	21.3%
	More than 5km	37	41.6%
In your opinion, what is the influence of XX project on the surroundings?	Air pollution	28	31.5%
	Noise	29	32.6%
	Surface water	3	3.4%
	Underground water	1	1.1%
	Soil	1	1.1%
	Solid waste	7	7.9%
	Fetor	0	0.0%
	Risk from chemistry	3	3.4%
	Other	17	19.1%
Do you satisfy with the mitigation measures in this project?	Very satisfy	36	40.4%
	Satisfy	28	31.5%
	Satisfy basically	19	21.3%
	Very disappointed	0	0.0%
	Not sure	6	6.7%
	Disappointed	74	83.1%
Under current condition, do you accept the influence that the project may have on you?	Yes	6	6.7%
	Not	9	10.1%
	Not sure	58	65.2%
Before the public participation, do you know about this project?	Yes	28	31.5%
	No	28	31.5%
Before the public participation, do you understand the environmental effect of this project?	Understand	37	41.6%
	Basically understand	22	24.7%
	Not understand	16	18.0%
After know about all information, do you understand all positive and negative effect that the project may have?	Understand very well	22	24.7%
	Understand	35	39.3%
	Basically understand	13	14.6%
	Not understand	14	15.7%
In your opinion, which aspect should be focused for this project?	Gas exhausted be treated effectively	8	9.0%
	Emission control	6	6.7%
	Wastewater treatment	6	6.7%
	Underground water protection	4	4.5%
	Soil protection	1	1.1%
	Use recyclable resources to reduce solid waste	1	1.1%
	Noise to residents	10	11.2%

Question	Answer	Yes	%
	Protect the health and safety of the community	29	32.6%
	Protect the health and safety of workers	13	14.6%
	Other	18	20.2%
How do you like the current bus services on the road?	Good	10	11.2%
	Bad	76	85.4%
	Not sure	1	1.1%
Do you think this project will promote the bus service on the road?	Yes	11	12.4%
	No	82	92.1%
	Not sure	0	0.0%
How to improve the bus service in your opinion?	Adding stops	6	6.7%
	Adding lines	15	16.9%
	Adding buses	19	21.3%
	Improve intellect system	22	24.7%
	Better care	44	49.4%
	Other	7	7.9%
Do you understand the negative effect during project construction?	Very well	2	2.2%
	Somehow	15	16.9%
	Basically	24	27.0%
	No	26	29.2%
After knowing about all information, do you think the construction of this project is necessary or not?	Necessary	23	25.8%
	Basically necessary	63	70.8%
	Not necessary	23	25.8%
	Either way	1	1.1%
Which is the major problem during the construction in your opinion?	Noise	1	1.1%
	Dust	21	23.6%
	Solid waste	23	25.8%
	Traffic jam	15	16.9%
	Other	39	43.8%
	No major impact	9	10.1%
Without environmental protection measure, will you accept the environmental impact during construction?	Accept	6	6.7%
	Basically accept	37	41.6%
	Not accept	19	21.3%
	Not sure	28	31.5%
After understanding the environmental protection measure to be implemented, do you accept the environmental impact of the project during the construction period?	Accept	4	4.5%
	Basically accept	53	59.6%
	Not accept	29	32.6%
	Not sure	2	2.2%
After comprehensive consideration, do you agree to the construction of this project?	Yes	4	4.5%
	No	83	93.3%
	Not sure	0	0.0%
Do you understand the negative impact on the environment during the operation of the project?	Very well	4	4.5%
	Somehow	17	19.1%
	Basically	33	37.1%
	No	22	24.7%
Do you understand the negative impact on occupational health and safety during project operations?	Very well	17	19.1%
	Somehow	17	19.1%
	Basically	29	32.6%
	No	22	24.7%
Do you understand the environmental measures to be implemented during the operation of the project?	Very well	20	22.5%
	Somehow	15	16.9%
	Basically	29	32.6%
	No	23	25.8%

Question	Answer	Yes	%
Do you accept the impact on the ambient air quality during the operation of the project?	Accept	21	23.6%
	Basically accept	29	32.6%
	Not accept	37	41.6%
	Not sure	13	14.6%
Do you accept the impact on the quality of the acoustic environment during project operation?	Accept	10	11.2%
	Basically accept	38	42.7%
	Not accept	36	40.4%
	Not sure	14	15.7%
Do you accept solid waste pollution during the operation of the project?	Accept	1	1.1%
	Basically accept	32	36.0%
	Not accept	20	22.5%
	Not sure	27	30.3%
Do you accept the impact on the ecological environment during the operation of the project?	Accept	10	11.2%
	Basically accept	33	37.1%
	Not accept	24	27.0%
	Not sure	25	28.1%
Do you accept the impact on community health and safety during project operation?	Accept	6	6.7%
	Basically accept	36	40.4%
	Not accept	23	25.8%
	Not sure	23	25.8%
What is your most concerned about the project?	Air	6	6.7%
	Noise	52	58.4%
	Surface water	29	32.6%
	Underground water	4	4.5%
	Soil	7	7.9%
	Solid waste	1	1.1%
	Other	17	19.1%
Do you think the construction of this project can promote local economic development?	Yes	7	7.9%
	No	78	87.6%
	Not sure	0	0.0%
After full consideration, do you support this project?	Yes	11	12.4%
	No	84	94.4%
	Not sure	0	0.0%
		5	5.6%

The survey results show that the proposed bus priority corridor project has been widely supported by the public, and it is believed that the construction can improve the local traffic and promote regional economic development. The public believes that its construction is necessary, and the proposed pollution prevention measures are feasible.

1 The public believe that the most important environmental problem in the current region is ambient air, accounting for 41.6%, followed by noise, accounting for 34.8%.

2 The public believe that the main impact of the bus priority corridor construction project on the environment is reflected in the ambient air and noise.

3 Through communication, the public considered that the environmental protection measures adopted by the bus priority corridor project were satisfactory.

4 Most of the respondents accepted the impact of the bus corridor priority project on them, accounting for 86.2%.

5 Most of the participants have already had a certain understanding of the project before participating in this public participation.

6 After participating in the public participation, most people have an understanding of the positive and negative impacts of the project, of which 27.6% are known and 51.7% are basically understood.

7 100% believe that bus services will improve through project implementation.

8 After a comprehensive understanding of the project, 86.2% thought that the construction of the project was necessary.

9 Most people introduced the effects of atmosphere, noise, ecological environment and safety during the construction and operation of the project.

10 96.6% of the people believe that the completion of this project can give priority to the promotion of local regional economic development.

11 After full consideration, 100% of the people support the project.

8.4.4 Discussion Seminar

Following the requirements of the World Bank environmental experts, on November 15, 2018, the PMO selected specific sensitive points and people to introduce and discuss the three corridors project. The PMO first introduced the bus priority corridor of Xinyang Road under construction and the proposed bus priority corridor project of Nanzhi and Changjiang Road. Then, the issues of concern to the masses were discussed. The main issues discussed include but are not limited to:

1 What is the distance between your work location and the project?

2 What is the distance between your place of residence and the project?

3 What is the current environmental situation at the project site?

4 Did you know about this project before this public participation event?

5 Do you understand the environmental impact of this project before this public participation event?

6 After understanding the relevant information, do you understand all the positive and negative effects of this project?

7 Are you satisfied with the environmental measures taken by the XX project?

8 In your opinion, what should be the focus of this project?

9 What do you think is the current bus service for the proposed road?

10 Do you think the project will improve the bus service?

11 How do you feel about improving the bus service?

12 After understanding the relevant information, do you think it is necessary for the construction of this project?

13 If there is no environmental protection measure, do you accept the environmental impact of the project during the construction period?

14 Do you understand the environmental measures to be implemented during the operation of the project?

15 What is your most concerned about the project?

16 Do you think the construction of this project can promote local economic development?

17 After full consideration, do you support this project?

The PMO conducted in-depth communication with the participating people on the list of issues. The working place or place of residence of the people involved in the discussion was within the influence of 1km of sensitive construction of the corridor. The construction and operation of the corridor had an impact on their daily travel. At present, the Xinyang Road Corridor and the airport viaduct are under construction at the same time. The construction unit has implemented environmental protection related work in strict accordance with the environmental management plan. The public transport priority corridors of Nanzhi Road and Changjiang Road have not yet been constructed. Before this public participation event, most people have a certain degree of understanding on the project, but there is no specific concept about the environmental impact of the project. After the project staff explained, they realized that the project construction may produce positive impacts such as travel convenience, improved emissions, and some of the negative effects that may occur during project construction. Judging from the feedback effect of the people affected by the bus priority corridor of Xinyang Road, the masses are satisfied with the environmental protection measures adopted by the contractor. The respondents believe that the key concern for project construction should be the improvement of traffic travel order and the improvement of

travel efficiency after the completion of the project. The respondents believe that the current bus service level of the proposed road is basically acceptable, and the project construction will further improve and promote the service. Most of them believe that bus services should be improved in terms of increasing trains, increasing routes, increasing speed, and enhancing intelligent management applications. The masses generally believe that the construction of this project is very necessary. They also recognize the importance of environmental protection during the construction period of the project. They all said that if environmental measures are not taken, environmental problems such as noise, dust, solid waste and traffic jams during the construction period are unacceptable, and the project also has a corresponding understanding of the environmental protection measures during the operation period of the project. Different people have different concerns about the project. The people living nearby pay more attention to the noise, dust and gas emissions generated by the project construction and operation. The people working nearby are concerned about the traffic congestion during the construction period. Most of the masses believe that the construction of the project can promote the development of the local economy. After thorough consideration, the project will be firmly supported and the project construction will be helpful and eagerly awaited. The list of participants in the symposium is shown in the table below.

Table 8-4-5: Name List of Participants in the Symposium

Name	Gender	Age	Nationality	Career	Education	Phone	Address
Wang Xiaoling	Female	33	Han	Staff	Bachelor	13796081738	Gongnong Street and Lijiang Road
Li Tao	Female	34	Han	Staff	College	18045111844	Haxi Democracy Home
Zhang Qiang	Male	36	Han	Individual	Bachelor	13796616186	Democratic home
Gao Hongmei	Female	52	Han	Retired	Secondary school	19963342340	Sunshine home
Liu Yuchen	Male	28	Han	Staff	Bachelor	18914218175	Peaceful community
Wu Kejing	Male	61	Han	Retired	Secondary school	13091509480	Qunli home
Han Xiancheng	Male	65	Han	Retired	College	15245014495	Democratic home
Hou Shuang	Female	34	Han	Staff	Bachelor	13936312001	Democratic home
Tang Zhibin	Male	55	Han	Individual	College	13845004977	Democratic home
Li Qingrong	Female	57	Han	Retired	High school	15146848238	Qunli home
Yang Wei	Female	33	Han	Clerk	University	13936694940	Xinheng Modern City
Zhang Yuzhen	Female	78	Han	Retired	High school	18345197278	Dongao Village
Chen Jingbin	Male	56	Han	Resource	University	13946035460	Yueshan International
Wang Meijing	Female	23	Han	Staff	High school	18946017106	Zhujiang Junjing Community
Han Yanfeng	Male	35	Han	Staff	College	15004688439	Tianmu Community
Fu Yuanli	Female	44	Meng	Staff	College	13895798805	Golden berlin
Jiang Wei	Female	47	Han	Staff	Postgraduate	13604503623	Xinheng Modern City
Liu Changan	Male	52	Han	Staff	College	15663680007	Langjiang Road, Daoli District
Liu Xu	Male	58	Han	Staff	Bachelor	15104617066	Chang'an City
Yulin	Female	41	Han	Staff	College	15645099205	Road District Angu Street

8.4.5 Public Requirements and Suggestions

During the public participation visit and investigation, some people put forward their own opinions and views on the construction and development of the proposed project and the impact on the construction period. The simple summary includes the following aspects:

1 It is hoped that the implementation of the proposed project will be accelerated to promote the regional economic development.

2 Implement the environmental protection work during construction, and strive to reduce the impact of traffic, noise, solid waste, and air.

3 Try to avoid nighttime construction.

4 Improve the corridor greening rate and beautify the environment.

8.4.6 Adoption of Public's Suggestions

According to the information collected in the second round of public participation survey, the respondents all supported the construction of the project. No investigators were opposed to the construction of the project. They hoped that through the implementation of the project, the quality of public transportation services will be improved and regional economic development will be promoted and provide more employment opportunity as well. The public expressed concern about traffic, noise, solid waste, natural environment and other issues in the impact of the construction of the project on the environment. The public's environmental awareness and participation degree is high.

In response to the noise, traffic, and air issues, which were most concerned by the public, targeted mitigation measures have been proposed in the environmental management plan, and the environmental management plan has been transferred to the construction unit, requiring the construction unit to strengthen and implement environmental protection measures. According to the prevention and control measures, prevention and control measures will be carried out to ensure the orderly advancement of all work. At the same time, the wastewater, waste residue and ecological impacts during the construction period will also be treated to minimize the pollution. Communicate with local residents in a timely manner, work on the propaganda and guidance, and let more people understand and support the construction of the project.

At present, among the three bus priority corridors, the Xinyang Road Bus Priority Corridor has begun construction, and Nanzhi Road and Changjiang Road are in the preparation stage of the bidding documents.

During the construction of the Xinyang Road Corridor, the contractor and the supervision unit strictly implemented the environmental management plan to ensure that no environmental pollution occurred during the construction period. Relevant measures have been taken for the construction progress, traffic, noise, solid waste, air, night construction and other issues that the public is mainly concerned with, including:

- Arrange the construction period reasonably, organize the implementation of flow construction, parallel construction, cross-operation and other methods to speed up the project schedule and provide work efficiency.
- Maintain close communication with the traffic police team during the construction process to ensure pedestrian safety; all types of signs are complete to guide pedestrians.
- Ensure the mechanical integrity rate, require the construction unit to use equipment that meets environmental protection requirements, and avoid unnecessary exhaust gas and noise due to mechanical failure or environmental failure.
- Strengthen the environmental awareness training of construction workers and try to avoid night construction.
- The construction site should be "cleared at the end of the work" to avoid long-term stacking of solid waste and domestic waste.
- Strengthen the management of environmental sensitive points existing on the construction site, and prompt the construction personnel to avoid interference.

At the same time, in the preparation process of the bidding documents for Changjiang Road and Nanzhi Road, the environmental management plan was included for implementation during construction.

In the follow-up construction process, if the surrounding people's opinions and complaints about the project are received, the construction unit and the construction unit will seriously consider and respond positively, and improve according to the actual situation.

8.4.7 Conclusions

Through the feedback during the publicity period and the distribution of questionnaire, it is shown that the public has no objections on the project and they all support the construction of the project. The respondents generally believe that the construction of the project will improve the existing traffic conditions in the local area and promote regional economic development. The public believes that the construction of the project is necessary and the pollution prevention measures adopted are feasible.

8.5 Suggestions from Social Impact Assessment

1. Encourage further strengthening of public engagement

In the earlier stage of the project, there were achievements in public engagement. The social impacts assessment panel had also timely fed back the public opinions and advice to the feasibility study unit and the project management office for 3 times in a timely manner. In the next, the panel will formulate a more detailed public engagement plan and relevant information shall be brought into public timely to gain vast supports from the public. In addition, we'll listen to their suggestions and advice and improve project management.

2. Enhance information transparency of project

In the survey of earlier stage, despites a great deal of work was done to publicize the project, there was still imperfectness and some institutions and citizens were still not clear about the project. Therefore, it's suggested that the progress and significance of the project be publicized through network, television, newspapers and display windows, so as to give the citizens a sense of belonging and participation.

3. Further promote anti-poverty measures and suggestions

In the survey, we've found the population covered by subsistence security system is most sensitive to ticket price and rice of ticket price. According to the subsistence security system, if a person covered by subsistence security system takes a bus twice every day, the ticket expenses (RMB 1/time, RMB 2/day) will account for 1/6 of his/her monthly income. If the price is increased to RMB 2/time (which means RMB 4/day), the ticket expenses will account for 1/3 of their monthly income. Therefore, it's suggested that the Harbin Government implement a policy to reduce or exempt ticket prices for such impoverished group while keeping the ticket price unchanged.

In addition, in many cities across the country including some cities in Heilongjiang province, preferential tickets policies are given to the disabled. However, in Harbin, the Capital city of Heilongjiang, no such tickets preference is given to the disabled (except for disabled soldiers) regardless the type or degree of their disability. Therefore, there are complaints from the disabled living in Harbin, as tickets expenses increase their living cost and make their poverty even worse. Objectively, this also damages the image of Harbin in developing into an international cosmopolis. It's suggested that Harbin Government carefully take hardship of such group into account, and provide them preference or subsidies as per the type and degree of their disability.

4. Advice on project construction and adoption

The social impacts assessment panel has sorted 46 pieces of advice concerning the design and management of the project. The advice has been fed back to feasibility study unit and the employer: 25 pieces have been adopted by the management department; 14 pieces have been listed in feasibility study report by the feasibility study department and 7 pieces are not adopted due to economic and technical reasons.

5. Advice on mitigation measures for environmental impacts during construction

Mitigation measures for impacts on traffic. The preparation of engineering construction plan shall full take this element into account. The construction shall be avoided in rush hour for roads with especially heavy traffic (Transportation may be arranged in night time, so as to ensure smooth traffic in day time).

Reduction of dust. It's suggested that the mound surface be sprayed with water to avoid flying dust if sunny and windy weather lasts for consecutive days during construction. In addition, the contractors shall maintain a cleaning system on the construction site.

Control of construction noise. In order to reduce the impact on surrounding residents, no construction is allowed between 11 pm to 6 am in the area within 200m away from residential houses. In addition, attentions shall be given to use construction equipment and methods. Low-noise machineries shall be adopted as far as possible. Where the construction must be performed at night time and the residents lives are to be affected, measures shall be taken to reduce the noise of construction machineries. In addition, acoustic baffles may be established nearby the construction area or dense residential area, so as to ensure their living environment.

Restoration of greening of roads. After completion of construction, the damaged roads and greening shall be restored as soon as possible, so as to avoid damage to the urban functions.

6. Advice on unified management of public transport system

Currently, the public transport system in Harbin consists of units of various ownership, including state-owned units, private units and even individual-operated vehicles on some routes. There are nearly 30 public transport enterprises whose type of vehicles, vehicle specifications and tickets prices are all different. It's suggested that Harbin Government strengthen unified management such as centralized purchasing, unified labeling, unified vehicle color and unified prices, so as to facilitate maintenance and management of vehicles.

9. Environmental Management Plan

The public transport corridors component of Harbin Cold Weather Smart Public Transportation System Project will have impacts on the ecological environment, natural environment, social environment and people's life to a certain extent during the construction and operation periods. In order to timely adopt effective environmental protection measures to mitigate or eliminate unfavorable impacts, it's required to implement necessary environmental protection and monitoring plans during the construction and operation periods, which mainly aims to timely and accurately monitor the actual impacts that the project activities will cause to the environment, to monitor the implementation performance of various environmental protection measures, and to examine whether the anticipated and evaluation conclusions of the EIA report are accurate.

9.1 Purposes

This environmental management plan (EMP) provides detailed descriptions on environmental mitigation measures, environmental management organization and responsibilities, and environmental monitoring etc. It will serve as a guideline for carrying out such activities and play following roles:

(1) Specify measures to mitigate the environmental impacts on receptors. Harbin PMO, EIA agencies and project design agency shall carefully investigate and verify environmental impact receptors, figure out effective measures to mitigate the environmental impacts, and integrate them into project design.

(2) Provide a guideline for environmental protection. After approved by the World Bank, the EMP will be provided to contractors, operators and other project-related parties involved in the construction period and operation period as an environmental protection guideline.

(3) Clarify the responsibilities and roles of project-related parties. It not only clarifies the responsibilities and roles of main project-related parties and authorities, but also suggests the methods and ways of communications among different departments.

(4) Set out a plan on environmental monitoring during construction and operation periods. In order to ensure effective implementation of environmental mitigation measures and timely identification and treatment of unforeseen or unexpected environmental issues, this EMP proposes an environmental monitoring plan for the construction and operation periods.

9.2 Environmental Management Institutional Arrangements

As the contents of environmental management are different between construction period and operation period of the Project with one after another, respective institutional organizations should be arranged for each period, and environmental management should be carried out phase by phase. Harbin PMO is responsible for implementing overall environmental management during the project implementation; while local EPBs are responsible for supervising the overall environmental management for each period. The environmental management institutions and their responsibilities and the EPBs' environmental management responsibilities throughout the project cycle are presented in the stand-alone EMP.

9.3 Environmental Monitoring Plan

The purpose of the environmental monitoring plan is to check the implementation performce of environmental mitigation measures and to provide a basis for determining schedule and procedures for implementing proper mitigation measures by adjusting the EMP in accordance with monitoring results. The environmental monitoring plan was prepared based on the main anticipated environmental impacts throughout the construction and operation periods.

An environmental monitoring plan was prepared for both construction period and operation period to reflect the characteristics of urban transportation project and against the significant sensitive receptors. It's included in the stand-alone EMP. Qualified environmental monitoring agency should be engaged to carry out the monitoring exercises. Since the construction activities at Xinyang Road Corridor have been substantially completed while this report is prepared, the environmental monitoring plan doesn't cover Xinyang Road.

9.4 Mitigation Measures

Proper mitigation measures have been proposed in accordance with relevant laws, regulations and management measures and by reference to *General Environmental, Health and Safety Guidelines of* World Bank and good practice of similar projects. Various environmental subjects have been concerned in designing specific mitigation

measures for each stage of the project implementation such as preparation, construction and operation periods. A summary of the mitigation measures is presented in the stand-alone EMP.

9.5 Environmental Training Plan

The purpose of environmental training is to carry out knowledge dissemination and skill training on environment management to the project personnel at all levels. It would enable them fully understand the environmental impacts of the Project, and the requirements specified in the EMP, to enhance their skills and management level. The training would ensure them to be able to seriously and accurately implement the environmental mitigation measures, to minimize the negative environmental impacts of the Project. The detailed environmental training plan is shown in the stand-alone EMP.

9.6 Completion Acceptance of Environmental Protection Facilities

The engineering design shall take the engineering features of the project into account and give top priority to The project design should take the characteristics of the Project into account and give top priority to preventing potential pollution caused by wastewater, waste gases and noise, so as to ensure they are controlled within the discharge limits after the Project is put into operation.

According to relevant requirements of *Management Regulations for Checking and Accepting Completed Installations of Environmental Protection of Construction Projects*, Harbin PMO shall organize the operators to apply to HLJ or Harbin EPBs for environmental check and acceptance. A monitoring plan for completion acceptance should be prepared and monitoring exercises should be carried out on the environmental protection facilities and their performance once the plan is approved. The EIA reports, environmental monitoring report for acceptance, and progress reports on the EMP implementation should be in place and ready before the environmental check and acceptance is undertaken.

9.7 Grievance Redress Mechanism

A convenient, efficient, open and effective public grievance redress mechanism (GRM) will be established and maintained throughout the Project to deal with any public concerns on the project implementation and related environmental issues and to better protect the interests of affected people along the road corridors. Contractor, operator and Harbin PMO should publicize proper approaches for the public to complain, be responsible for carrying out consultation with the complainant, deal with the grievance or complaint, and make regular records on relevant information. The records may include the background of the complainant, the complaint matters, the feedback and solutions, and the follow-up inspection etc. If the grievance or complaint involves broader issues beyond the handling capacity of the above-mentioned agencies, responses or advices can be sought from other professional personnel or authorities. For the environmental issues or disputes related to the project implementation, the complainant can also appeal to local EPBs directly at the same time.

9.8 Recording and Reporting Requirements

It’s required that contractors, environmental supervision engineers, operators and Harbin PMO record the progress of the Project construction or operation, implementation of the EMP, monitoring activities and results, and environmental grievance and handling, and submit relevant reports to related agencies.

(1) Environmental supervision engineer should make detailed weekly records on the EMP implementation, and prepare and submit monthly reports to the contractor and Harbin PMO with main contents including implementation of the mitigation and monitoring measures etc.

(2) Contractor and operator should make detailed quarterly records on the EMP implementation, and prepare and submit quarterly reports to Harbin PMO with main contents including implementation of the mitigation and monitoring measures etc.

(3) For any environmental grievance occurred, the contractor, supervision engineer, operator and Harbin PMO should report the event to local EPBs and the World Bank in a timely manner, and report to upper level authorities as needed.

(4) After completing monitoring exercises as scheduled, the responsible environmental monitoring agency should submit the monitoring data and/or reports to the contractor, operator and Harbin PMO.

(5) Harbin PMO should prepare semi-annual environmental reports to reflect the implementation of the EMP, and submit the reports to the World Bank in a timely manner.

The report on EMP implementation should include, but not limited to, the following aspects:

(1) Implementation of the environmental training plan.

(2) Construction progress or operation and maintenance situation.

(3) Mitigation measures implementation, and monitoring activities and results etc.

(4) For any grievance/complaint received from the public, brief description of the event, handling solutions/decisions, and public satisfactions should be recorded properly.

(5) EMP implementation action plans for next year etc.

9.9 Cost Estimates

The total estimated environmental management cost for the public transportation corridor project is RMB 3.41 million. In which, RMB 1.74 million are for construction period and RMB 1.67 million for operation period, which are all included in the total project investment cost. The details are presented in **Table 9-9-1**.

Table 9-9-1: Environmental Management Cost Estimate

Item	Cost (RMB)
1. Preparation and Construction Periods	
1.1 EIA	44
1.2 Environmental Codes of Practices	5
1.3 Environmental mitigation measures	75
1.4 Environmental monitoring	10
1.5 Environmental supervision	10
1.6 Environmental training	20
1.7 Contingency	10
Sub-Total	174
2. Operation Period	
2.1 Environmental mitigation measures	42
2.2 Environmental acceptance	20
2.3 Environmental monitoring	45
2.4 Environmental training	10
2.5 Contingency	50
Sub-Total	167
Total	**341**

10. Conclusions and Recommendations

10.1 Overview

Project Name: Harbin City Cold Intelligent Public Transport System Project - Public Transport Priority Corridor Construction Project

Construction Site: The construction site of the project is the downtown area of Harbin, and all the 3 public transport corridors to be constructed are in the urban area of Harbin, with the 3 public transport corridors being Nanzhi Road Public Transport Priority Corridor (Huashu Street- Gongbin Road), Changjiang Road Public Transport Priority Corridor (Hongqi Street- Xilong Street) and Xinyang Road Public Transport Priority Corridor (Xiangzheng Street- Haining Leather Center). All the three public transport priority corridors are reconstructed ones.

Construction Scope: The Public Transport Priority Corridor Construction Project: including the construction of public transport priority corridors and the construction of supporting public transport corridor intelligence;

Based on the latest approved preliminary design, the corridor construction subproject involves a total investment amount of 164.18 million Yuan, including project construction costs of 121.50 million Yuan, other costs of 31.70 million Yuan and contingency fee 10.98 million Yuan.

10.2 Environmental Baseline

10.2.1 Ambient air quality

Based on the morning data provided by Harbin EPB for the road sections along the project corridors, in 2017, the concentrations of NO_2 and CO at the monitoring points on Nanzhi Road, Changjiang Road and Xinyang Road all met daily average value of Class II standard of Ambien Air Quality Standard (GB3095-2012).

10.2.2 Acoustic environmental quality

The acoustic environment quality of urban roads is poor (four levels). In 2017, a total of 66 roads were monitored, and the average equivalent sound level ranged from 65.0 to 85.2 decibels. There are 12 roads that meet the standards, accounting for 18.2% of the monitored road sections.

Since the three bus corridors constructed in this project are located in the urban area of Harbin, the evaluation areas on both sides of the road are mostly residential areas. There is no noise source of large industrial and mining enterprises within 200m of the road centerline. The main noise source is traffic noise. Based on the morning data of 2017, the daytime noise levels on the three road corridors were 69.6-88.7 decibels. In general, the acoustic environment didn’t meet the standard and the acoustic environment quality was poor.

10.2.3 Urban ecological environment

The ecological environment assessment scope of this project involves a typical urban ecological environment, with two types, i.e. the urban ecological environment and the suburban ecological environment at the edge of the city.

The urban ecological environment system is mainly composed of artificial green vegetation, including public green spaces such as parks, green belts along the roadsides, isolating green belts and the soil where the vegetation and stands are. The urban ecological environment is subject to urban planning, with the greening rate, greening types and greening distribution within the framework of urban planning. The main vegetation relating to the ecological environment involved in the assessment areas of the project is mainly distributed in the evaluation areas of Xinyang Road-Chengxiang Road Subprojects. The status quo of vegetation in the assessment areas of other subprojects is very simple, all of which are artificially planted roadside shrubs or shrub and grass vegetation in the isolation belts.

10.3 Anticipated Environmental Impacts

10.3.1 Social impacts

(1) Saving of time on travelling and improving local people’s life quality

The project will highly improve the flow speed of people and improve their efficiency by helping them save time on travelling. Therefore, more value will be created for the society.

(2) Improving environmental quality and reducing risks to health of local people

After completion of the project, the average speed of traffic flow will be improved to different extent. As less traffic congestion basically enables the vehicles to run smoothly at constant speed, there will be a significant decrease in number of vehicle start-ups and car horns. As vehicles produce less exhaust emission when driving at a constant speed, the exhaust emission and noise of vehicles are reduced under the conditions of same vehicle type and oil consumption. Therefore, this will play an invaluable role in improving urban air quality and acoustic environment, and reducing risks to local people's health.

(3) Enhancement of urban competitiveness, improvement of competitive environment and promotion of urban economy

The development of regional traffic resource and strengthened construction of traffic facilities will produce profound impacts on development of urban economy and various social undertakings in Harbin. This completion of the project will also improve Harbin's urban image and competiveness and help attract more foreign investment, and hence promote economic development.

10.3.2 Impacts on urban ecology and landscape

A part of existing green belts will be removed in construction, which will reduce the green coverage in local area and damage the local landscape to a certain extent. The soil excavation, earth and soil, building materials stacking in the construction process, especially the temporary stacking of construction abandoned soil, construction waste, etc. will affect the urban health environment and urban landscape. The disorder parking of some temporary buildings or mechanical equipment in the construction process will also bring about uncoordinated factors and influences to the surrounding landscape. Isolation measures such as guardrail and surrounding cloth, etc. shall be equipped during the construction process of reconstruction of roads, which will bring some damage to the landscape of the city.

10.3.3 Impacts of wastewater

In the construction period, wastewater mainly includes sandstone material washing wastewater and mechanical equipment washing wastewater, surface runoff containing high-level of SS generated in rainy seasons, and a small amount of domestic wastewater from workers.

During the operation period, wastewater is mainly road surface runoff from rainwater, and the main pollution factors of rainwater are SS and COD. Due to the low concentration of water pollutants in the rainwater, it is only affected at the beginning of the rain. At the same time, the urban drainage system along the roads of this project will also be improved with the construction of the project. The project is mainly for urban road projects. During the operation period, the wastewater is discharged into the urban sewage pipe network and finally enters the urban sewage treatment plant. Therefore, road rainwater will not have a significant impact on the water environment along the route after the project is completed.

10.3.4 Impacts of noise

In the construction period, many sensitive receptors are close to the construction sites, and they will suffer from the construction noise nuisance. Since the construction period at each road section would be short, so the duration of such noise impacts will be short and limited to a certain period of time. In addition, the contractors will implement proper mitigation measures that will help control or reduce the noise impacts to a certain extent.

During operation, the Project is only setting three bus corridors within existing width of road without adding any vehicle lanes; so it will not result in an increase in traffic volume. Along with the improved public transportation system under the Project, the situation of traffic congestion will get alleviated, and the traffic noise pollution will be reduced. In general, the operation of the corridors project will not have additional impacts on the ambient air quality along the roads.

10.3.5 Impacts on ambient air

In construction period, the factors affecting the ambient air are fugitive dust and stive. Wind can cause the materials piled up in the open area to produce dust, especially in case of high wind speed, dry materials and no covering, which can cause serious stive pollution. During construction, in the transportation, loading and unloading, and mixing of powdered materials, a certain amount of stive will be dissipated into the surrounding atmosphere, causing certain impact on regional air quality; besides, the main pollutants in the waste gases emitted by construction machinery and heavy transport vehicles while running are carbon monoxide (CO), nitrogen oxides (NOX) and hydrocarbons (HC), and more serious pollution will be caused when vehicles drive too fast.

During the operation period, the Project is only setting three bus corridors within existing width of road without adding any vehicle lanes; so it will not result in an increase in traffic volume. Along with the improved public transportation system under the Project, the situation of traffic congestion will get alleviated. With the vehicles' running speed increasing, the situation of vehicles running at idle speed will be relieved, and exhaust emissions will decrease as a result. In general, the operation of the corridors project will not have additional impacts on the ambient air quality along the roads.

10.4 Mitigation Measures

10.4.1 Construction period

1. Ecological environment protection

During construction, the existing ecological landscape will be changed instantaneously. Therefore, the construction shall be carried out phase by phase in one area after another, so as to protect the ecological landscape along the road corridors. It's suggested to occupy less land, vegetation and roads, so as to reduce adverse impacts on ecological environment. For stack of excavated earth, measures shall be taken to prevent it from being soaked, flushed or washed away. Excavation and back filling shall be reasonably coordinated. Excavation and back filling shall be avoided in rainy days, so as to prevent water and soil loss, water pollution and obstruction of drainage pipelines due to rainwater. Attentions shall be paid to protection of vegetation such as trees and green land in neighbouring area.

2. Noise control

Most of the sensitive receptors such as hospitals and schools have installed soundproof windows or other noise reducing facilities that can effectively reduce noise. In the second round of public participation, targeted investigations were conducted to these sensitive receptors, and a wide understanding has been received from the respondents. The contractors should work out reasonable construction schedules and strictly implement the EMP to reduce the impacts of noise.

The contractors shall adopt those that conform to relevant state standards and select low-noise construction machinery and techniques. If any fixed machinery equipment will cause great vibration, they shall be provided with anti-vibration base. In addition, maintenance and repair of construction equipment shall be strengthened, so as to ensure its better function and lower the intensity of noise source. In order to reduce the noise caused by transportation of materials and construction activities such as knocking, the contractors are required to implement good construction practice and conduct effective management. At nighttime (22:00~6:00), construction machines with loud noise shall not be operated. The Sites for loading and unloading materials or for locating machinery should be located far from significant sensitive receptors such as residential areas, schools and hospitals etc.

3. Wastewater management

During construction period, the contractors shall conduct an organized design for discharge of surface water. The surface water shall not be discharged without management to prevent pollution to the environment. Waste water generated in construction activities shall not be directly discharged into municipal pipes, but should be treated by natural sedimentation and the liquid supernatant is used for spraying to control the flying dust on the construction site. To prevent surface runoff containing high level of SS, barriers or blocking facilities should be set around earth or sand stacks to settle the runoff before discharge into drainage systems. Avoid oil leakage of machineries and forbid dumping of waste oil. Domestic wastewater generated by workers is discharged into local sewage systems.

4. Air pollution control

In order to mitigate the impacts of the construction activities on ambient air, water spraying shall be adopted at the construction site in sensitive areas to reduce the flying dust pollution. The excavated earth and stone shall be timely cleaned and transported following by a back filling. Fences shall be provided around the construction site. When they are removed, water spraying shall be provided to reduce flying dust. In addition, construction shall be ceased in extremely windy weather. Construction waste shall be timely cleaned and transported. Transportation vehicles and construction machineries shall be well maintained and the serviceability rate shall be over 90%. In addition, they shall be fuelled with high-quality oil and equipped with exhaust purification device, so as to effectively reduce exhaust emission.

10.4.2 Operation period

By strengthening traffic management, optimizing traffic signal systems, keeping road traffic clear, and eliminating idling condition, exhaust emissions from motor vehicles will be reduced.

To reduce noise influence during operation period, vehicles should be controlled from sounding horns, and road surface should be maintained and repaired in a timely manner.

10.5 Public Consultation

Public consultation is carried out by means of online information disclosure and questionnaires. During the period of online publicizing, there were no objections raised by the public. For citizens who are directly affected, the construction unit has made explanations and conduct widespread consultation with local residents. All participants in the survey support this project and no one raised any objections.

From the analysis of the statistics of questionnaires, the public vigorously supports this project, believing that it will promote local economy and increase job opportunities. With respect to environmental impacts of the project construction, the public shows the concerns relating to noise pollution, flying dust pollution, ecological damage and loss of resources. The public has a strong sense of environmental protection. It's recommended that measures such as greening, sound barriers and other means be taken to mitigate environmental impacts.

10.6 Conclusions and Requirements

10.6.1 General conclusions

The WB financed public transportation corridor project is an important part of the core road framework in urban traffic system of Harbin. After its completion, it will produce a profound impact and play an important role in diverting transit traffic, relieving traffic tension in downtown areas (in particular along the three corridors), reducing travelling time, improving urban road system capacity, promoting land development and urban development, and upgrading urban quality and grade.

The construction of this project conforms to comprehensive traffic development planning of Harbin and relevant overall urban planning. The environmental impacts of this project mainly take place in the construction period. Harbin PMO shall strengthen the overall environmental management in construction. Explicit clauses should be included in civil contracts to prescribe that the contractors carry out mitigation measures, and strict punishment procedures shall be included in the contracts as well. The contractors should enhance education to workers on environmental protection and require them to implement good construction practices.

Upon comprehensive analysis, the engineering design has taken environmental protection into account. The environmental engineering design is feasible and strongly operable in terms of technology and economy. The implementation of environmental protection plan in the engineering design and environmental protection measures in the report will well control the adverse impacts of the project construction.

According to the foregoing, this project is feasible from the angle of environmental protection.

10.6.2 Requirements

It's required that the contractors implement the EMP strictly, especially for the measures of mitigating noise and air pollution, and clear construction sites immediately right after the completion of construction activities.