國際

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保存年限：

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裝

發文日期：中華民國107年4月2日
發文字號：營授辦建字第1070024120號
速別：普通件
密等及解密條件或保密期限：
附件：如說明一(1071167369_107D2010772-01.pdf、1071167369_107D2010773-01.PDF、1071167369_107D2010774-01.PDF、1071167369_107D2010775-01.PDF)

主旨：檢送駐俄羅斯代表經濟處經濟組函為該駐紮國相關商情資料1份，請查照並週知會員。

說明：依據奉交下行政院公共工程委員會107年3月29日工程企字第10700082130號函轉駐俄羅斯代表處經濟組107年3月15日俄經字第10700000660號函副本辦理。（如附影本）

訂

正本：台灣區環境保護工程專業營造業同業公會、臺灣區綜合營造工程工業同業公會、臺灣區基礎工程專業營造業同業公會、臺灣防水工程專業營造業同業公會、臺灣區擋土支撐及土方工程專業營造業同業公會、臺灣庭園景觀工程專業營造業同業公會、臺灣區地下管線工程專業營造業同業公會、臺灣區施工塔架吊裝及模版工程專業營造業同業公會、臺灣區預拌混凝土工程專業營造業同業公會、臺灣區鋼構工程專業營造業同業公會、臺灣區營建鑽探工程專業營造業同業公會、中華民國土木包工商業同業公會全國聯合會、中華民國全國建築師公會
副本：行政院公共工程委員會、建築管理組、中部辦公室(營建業務)(均含附件) 電子公文交換章 2018-04-02 11:58:37

線

檔　　號：
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發文日期：中華民國107年3月29日
發文字號：工程企字第10700082130號
速別：普通件
密等及解密條件或保密期限：
附件：如說明(107082130-1.PDF、107082130-2.PDF、107082130-3.PDF)

主旨：函轉駐俄羅斯代表處經濟組函，為有關歐洲復興開發銀行(EBRD)擬與哈薩克合作投資阿拉木圖輕軌工程計畫(Almaty LRT PPP Project)政府採購案事，請轉知所屬會員參考運用，請查照。

說明：檢送駐俄羅斯代表處經濟組107年3月15日俄經字第10700000660號函及其附件影本乙份。

正本：中華民國工程技術顧問商業同業公會、中華民國營造工程工業同業公會全國聯合會
副本：內政部、交通部、財政部、工程產業全球化專案辦公室、本會技術處(均含附件) 電子公文交換章 2018-03-29 12:41:24

電子公文

檔　　號：
保存年限：

駐俄羅斯代表處經濟組　函

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受文者：行政院公共工程委員會

發文日期：中華民國107年3月15日
發文字號：俄經字第10700000660號
速別：普通件
密等及解密條件或保密期限：
附件：如文

主旨：有關歐洲復興開發銀行(EBRD)擬與哈薩克合作投資阿拉木圖輕軌工程計畫(Almaty LRT PPP Project)政府採購案事，請 鑒察。

說明：

一、依據EBRD俄羅斯、中亞及蒙古地區基礎建設業務主任Ekaterina Miroshnik本(107)年2月28日未列文號電子郵件辦理；本組本年2月28日俄經字第1070000530號函諒蒙察及。

二、本組於28日約晤M主任就我國參與歐洲復興開發銀行事交換意見，渠提供之EBRD擬與哈薩克合作興建阿拉木圖輕軌工程政府採購計畫略以：該計畫預定將採「公私合作夥伴」(Public-Private Partnerships, PPP)方式進行，自2019年開始推動，計時共計26年，系統路線全長22.7公里，包含36個場站、71個月台及其他相關設施，預計每天載客量7萬人次，總投資約900億KZT(約合90億台幣)。

三、M主任表示我國具備軌道工程營造能力及經驗，並有相關車軌道輛產業，爰建議我有意合作廠商可參與投資；計畫資訊將於歐銀網站(www.ebrd.com)公告。檢送本案計畫及

工程會　1070319

10700082130

財務規劃資料如附件，併請卓參。

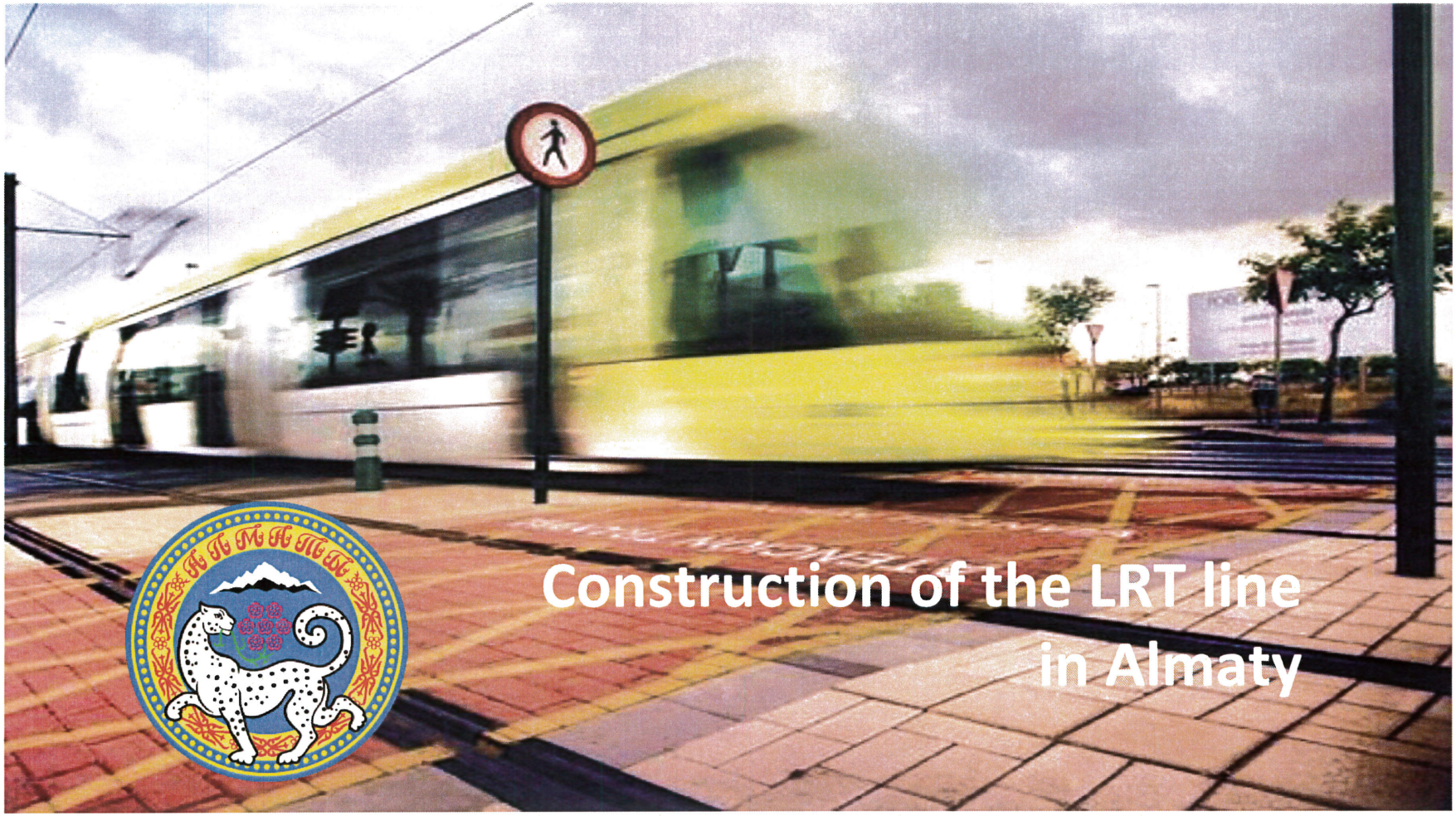
正本：經濟部、經濟部國際貿易局、行政院公共工程委員會
副本：經濟部國際合作處、經濟部投資業務處(均含附件，因附件檔案過大因此將以電郵寄送) 電2018-03-19交15:13:54章

駐俄羅斯代表處經濟組

裝

訂

線



Construction of the LRT line in Almaty

Introduction

Presentation content:

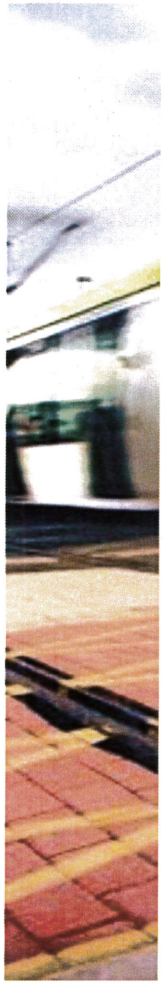
- Technical parameters
- Line characteristics
- Depot
- Rolling Stock
- Operating characteristics
- Scope of Private Partner's contract
- CAPEX, OPEX and project schedule

DBFOM model

DBFOM = Infrastructure + Rolling Stock

- One contract
- Payments for availability based on KPI's (operation)
- Total duration 26 years

Almaty



Technical parameters

- Total length: 22,1 (+0,6) km
- Number of stations: 36 (number of platforms: 71)
- European gauge: 1435 mm
- Peak hour headway: 4 min/direction
- Max speed at the line: 60 km/h
- Minimum width of the LRT corridor: 8 m
- Minimum radius at crossings: 30 m
- Standard platforms size: 75 m x 3 m
- LRT single unit length: 30 m – 35 m
- Rolling stock: 36 units
- New depot

Technical parameters

Almaty LRT telecommunication system will consist of:

- Integrated telecomunication system
- Fibre Optic Cable Network
- TETRA Radiosystem
- Passenger Visual Display System
- Public Announcement System
- Telephone, Intercom and Data Network systems
- Automatic Fare Collection System integrated with City's ticketing system
- CCTV System
- Fire Alarm System
- Access Control System
- Clock Network

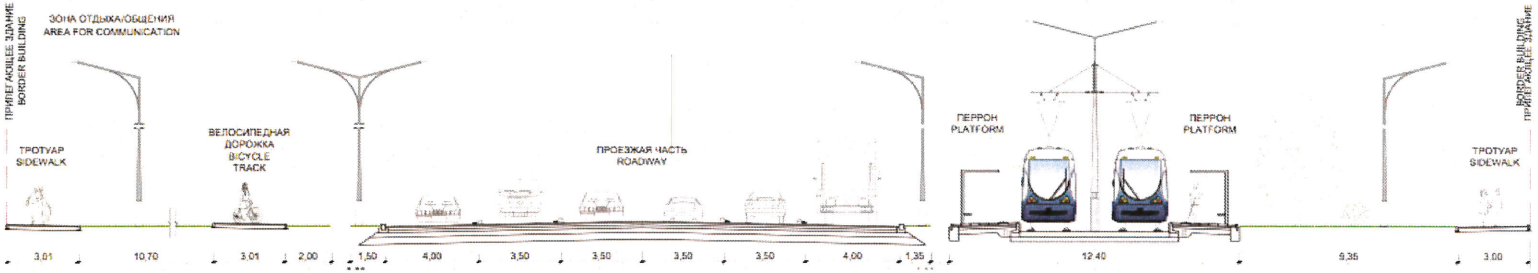
LRT Signals Priority:

- Bi-directional communication between LRT controler and City's traffic lights controler.
- Real-time communication between controlers.
- Data network protection by firewalls.
- Priority granted on basis current traffic situation and adherence to train schedule.
- System design on CENELEC EN 50 126, EN 50 128, EN 50 129 Standards

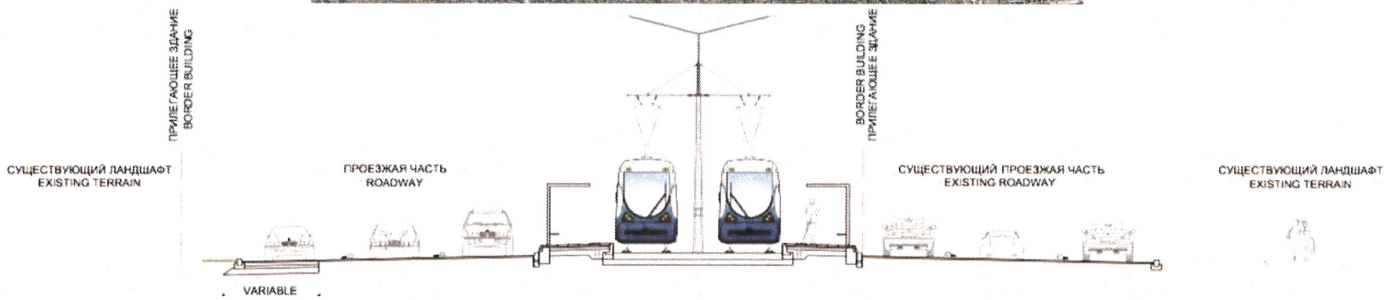
Catenary and power supply

- Trams power supply voltage Un=600V DC, supplied by 2 new and 6 modernized traction substations
- Construction of lightning (LED) and catenary on the same structure
- Catenary consisting of sterling silver wire type DjpS 100mm^2 and Messenger wire 95 mm^2.
- Monitoring of catenary electrical parameters using SCADA from the central control room in new tram depot

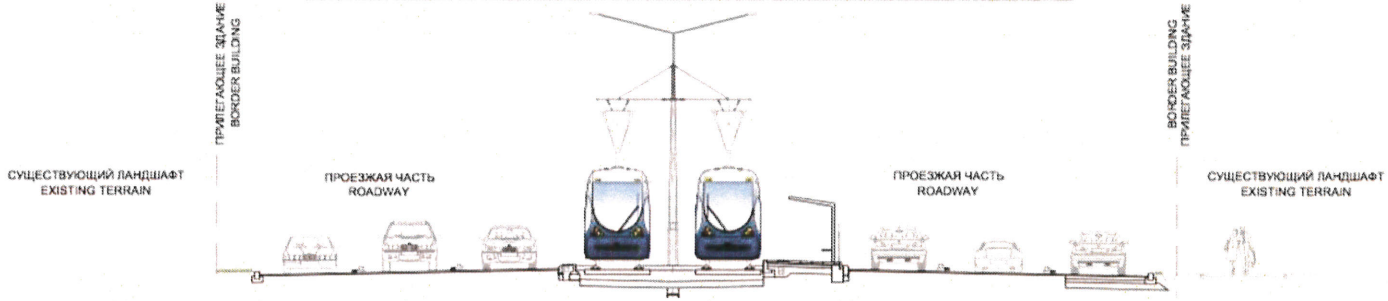
Line characteristics and typical cross sections: Section A

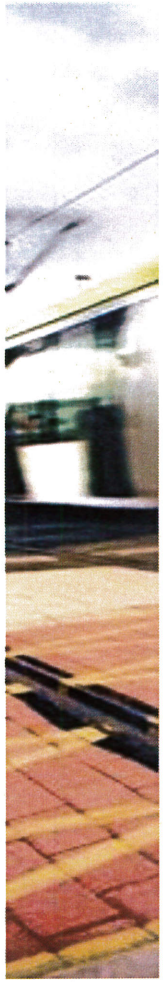


Line characteristics and typical cross sections: Section B

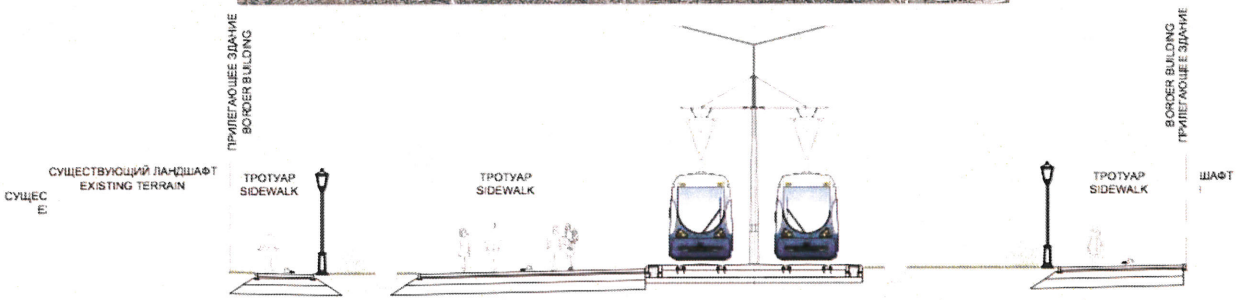


Line characteristics and typical cross sections: Section C

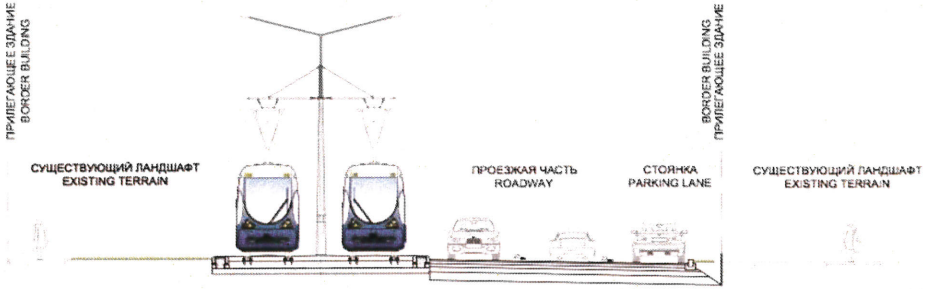




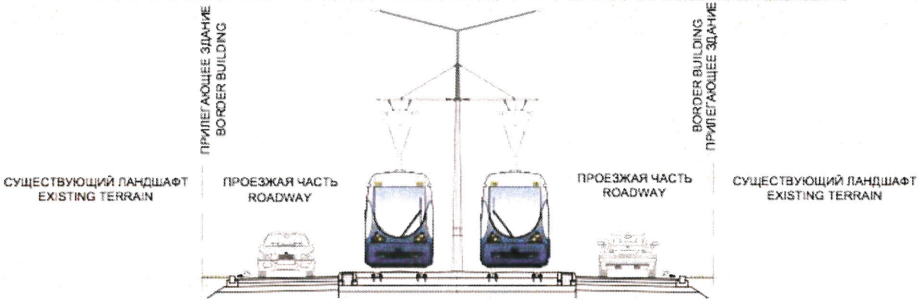
Line characteristics and typical cross sections: Section D



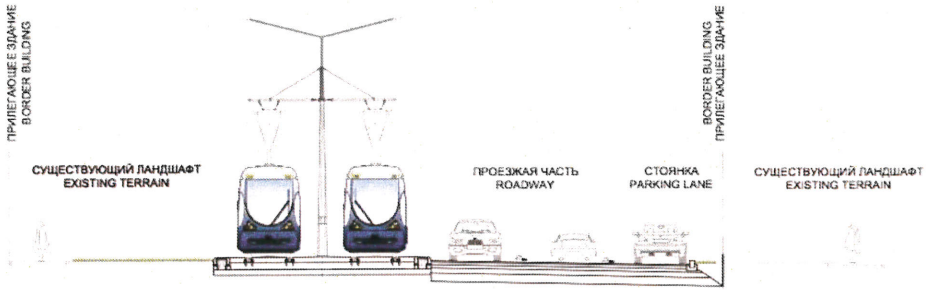
Line characteristics and typical cross sections: Section E



Line characteristics and typical cross sections: Section F



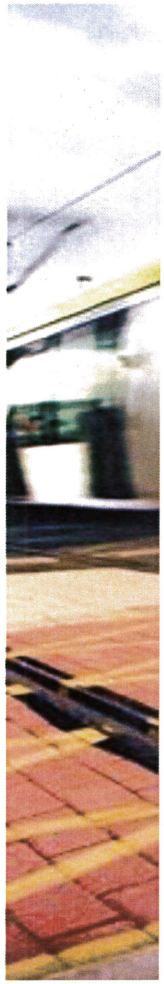
Line characteristics and typical cross sections: Section G



Depot

Main parameters:

- Area: 11,3 ha
- Capacity: 40 LRV's
- Maintenance facilities
- Operation Control Center
- Storage facilities

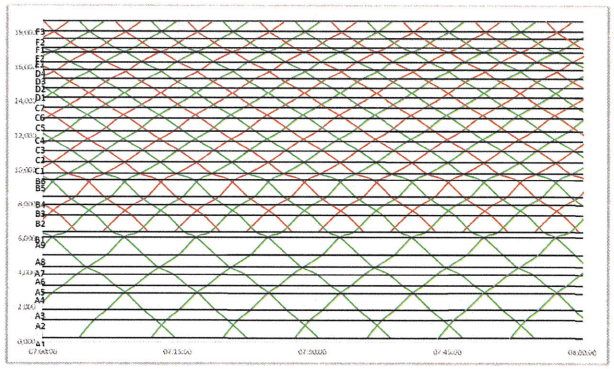


Rolling Stock

- Track gauge: 1435 mm
- Number of LRV's: 36
- Length: 30 - 35 m
- Width: 2,65 m
- Low floor: 100%
- Entry height: 300-350 mm
- Minimum radius: 25m
- Minimum capacity: 60 seats, 150 standing
- Number of doors: 6 (4 double, 2 single)
- Electric system: 750 V DC
- Operating temperature range: -40˚C to +40˚C

Operating characteristics

- Total length: 22,1 (+0,6) km
- Maximum operational speed: 50 km/h
- Commercial speeds ~ 22,3 km/h
- Travel times (depending on the route):
  - A-F 50 min
  - G-F 44 min
- LRT passengers per day: 77 000 – 112 000.
- Max PPHD: 2800 – 3800
- Operational hours: 5 am – 11 pm
- Peak hour headway: 4 min/direction
- Daily vehicle-kilometers travelled: 5 500 – 6 000
- Rolling stock: 36 units



Number of passengers per day:

2021 – 77 000

2030 – 98 000

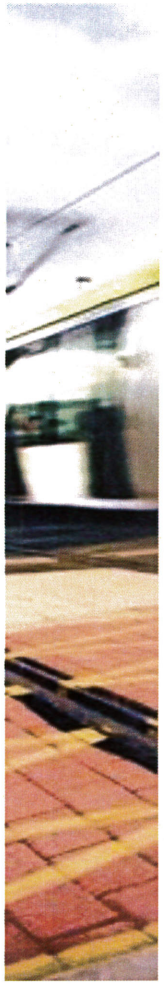
2047 – 112 000

PPHD (Passengers per hour per direction):

2021 – 2 800

2030 – 3 100

2047 – 3 800



Scope of Private Partner's contract

Design and build stage (3 years):

The LRT Project in Almaty requires construction of totally new infrastructure in the existing urban environment. The scope of the whole project includes:

- Road lay-out changes with traffic signalling
- Power supply system modernization (substations: 2 new and 6 to be refurbished)
- Alignment – tracks structure, road crossings, platforms with stops and facilities
- Re-urbanization of public spaces within the LRT corridor – paving, street lightning, and drainage
- Catenary
- Telecommunication system
- Centralized control system
- Depot (rolling stock and infrastructure maintenance facility)

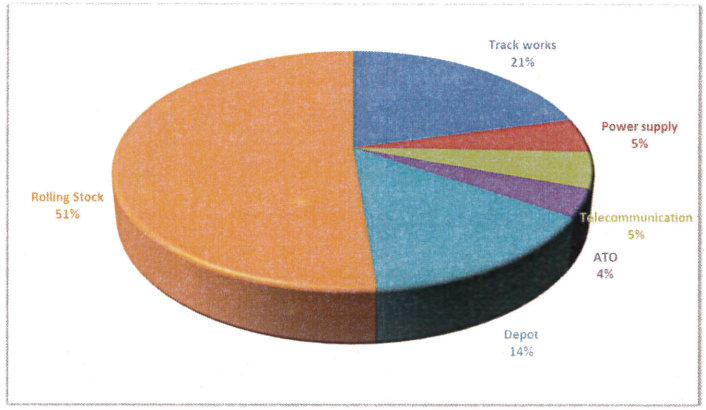
Operation stage (23 years):

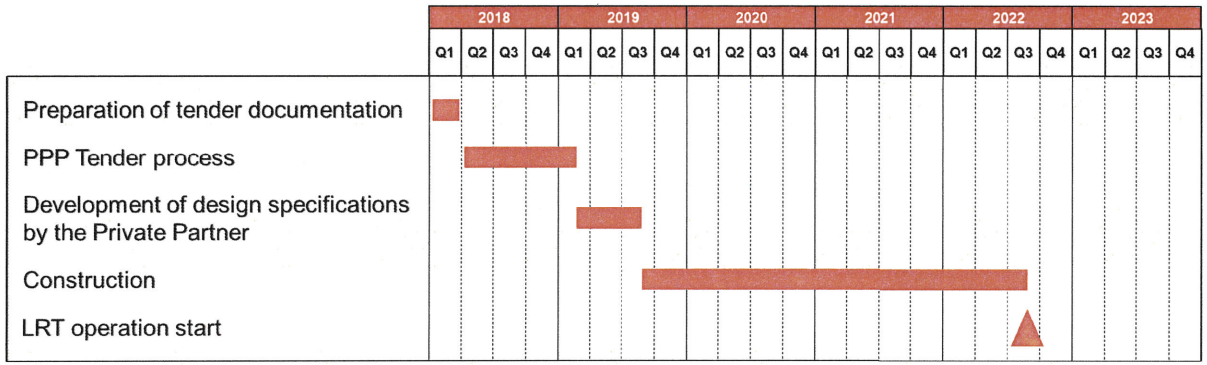
- Maintenance of the LRT infrastructure
- Aquirement and maintenance of the rolling stock
- LRT traffic control

Diversion of the underground utilities will be executed by Public Partner before the beginning of LRT works.

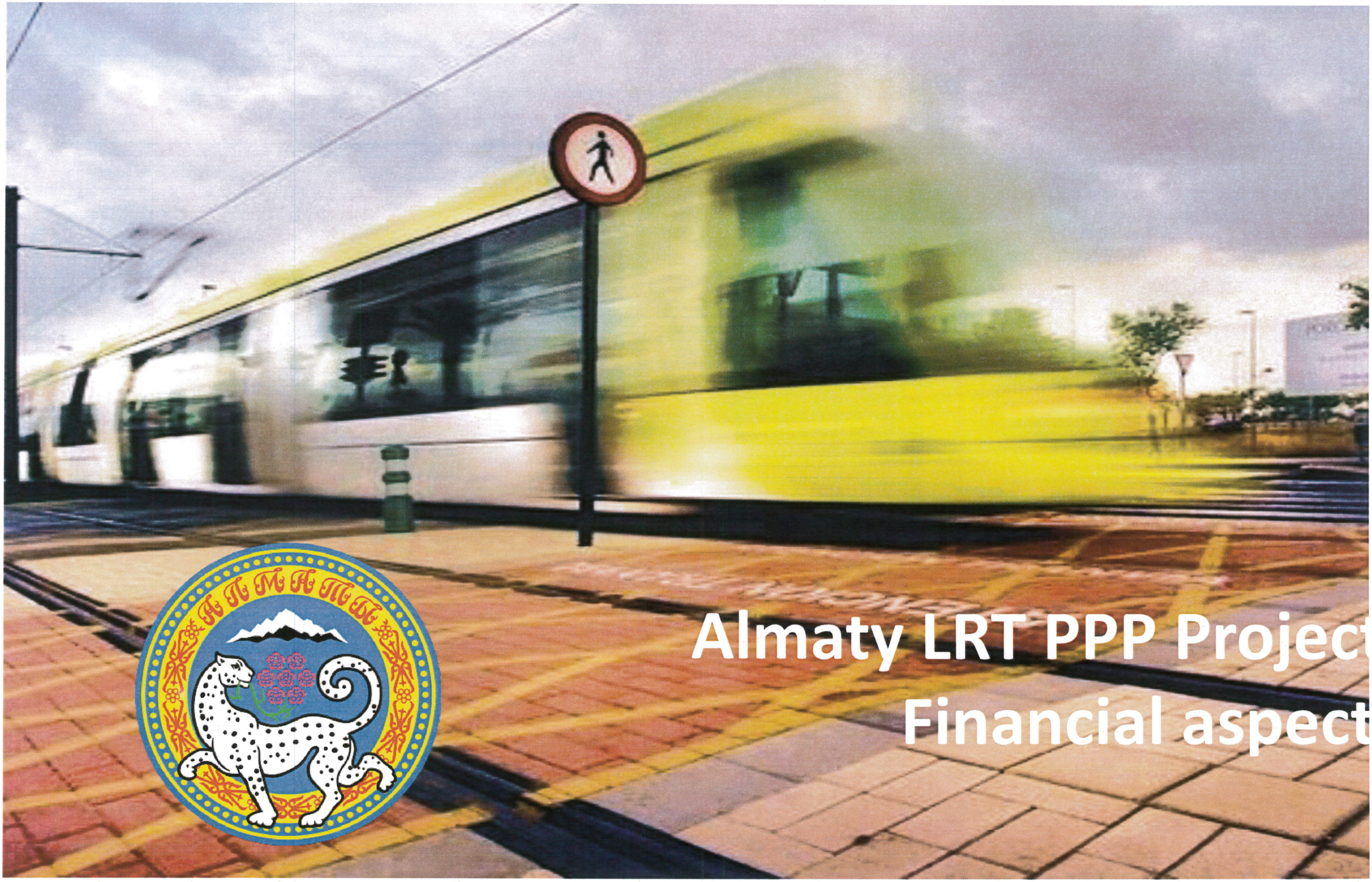
CAPEX, OPEX and project schedule

- Private Partner's CAPEX: **170 – 190 mln EUR**
- Private Partner's OPEX: **5,2 mln EUR / year**
- Capital grant, % of Private Partner's CAPEX: 45-50%





THANK YOU !!!



Almaty LRT PPP Project
Financial aspect

Payment mechanism (1/2)

Availability payment will:

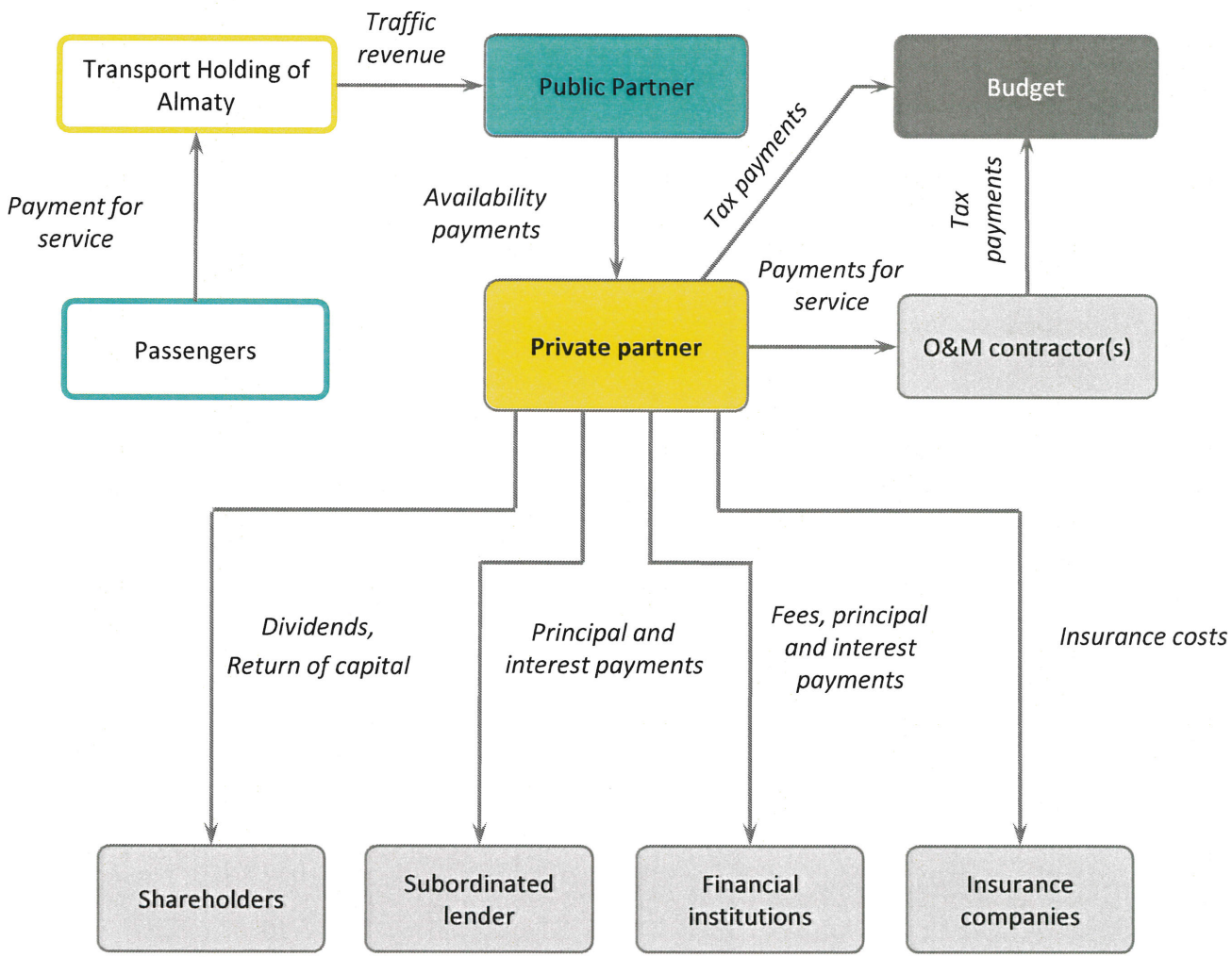
- be guaranteed by the City in accordance with the PPPA (Republican guarantee is not the Project). Availability payments will be secured in the Almaty budget directly
- be linked to Project KPIs
- be determined based on the bid proposal
- cover:
  - capital expenditures
  - operation and maintenance cost
  - senior debt service (DSCR => 1.2)
  - payback of the equity subject to required return (Target Equity IRR is 15%)
- be subject to adjustment for the applicable official inflation indexes and currency ex

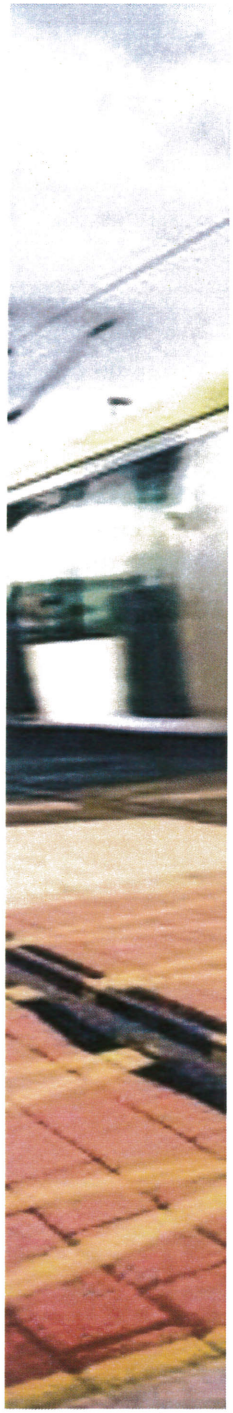
Additional revenue rights (advertising revenue, retail etc.) shall be granted to the Priva

The Project Company will not be required to take the tariff (including electricity tariffs

FX risks

Payment mechanism (2/2)





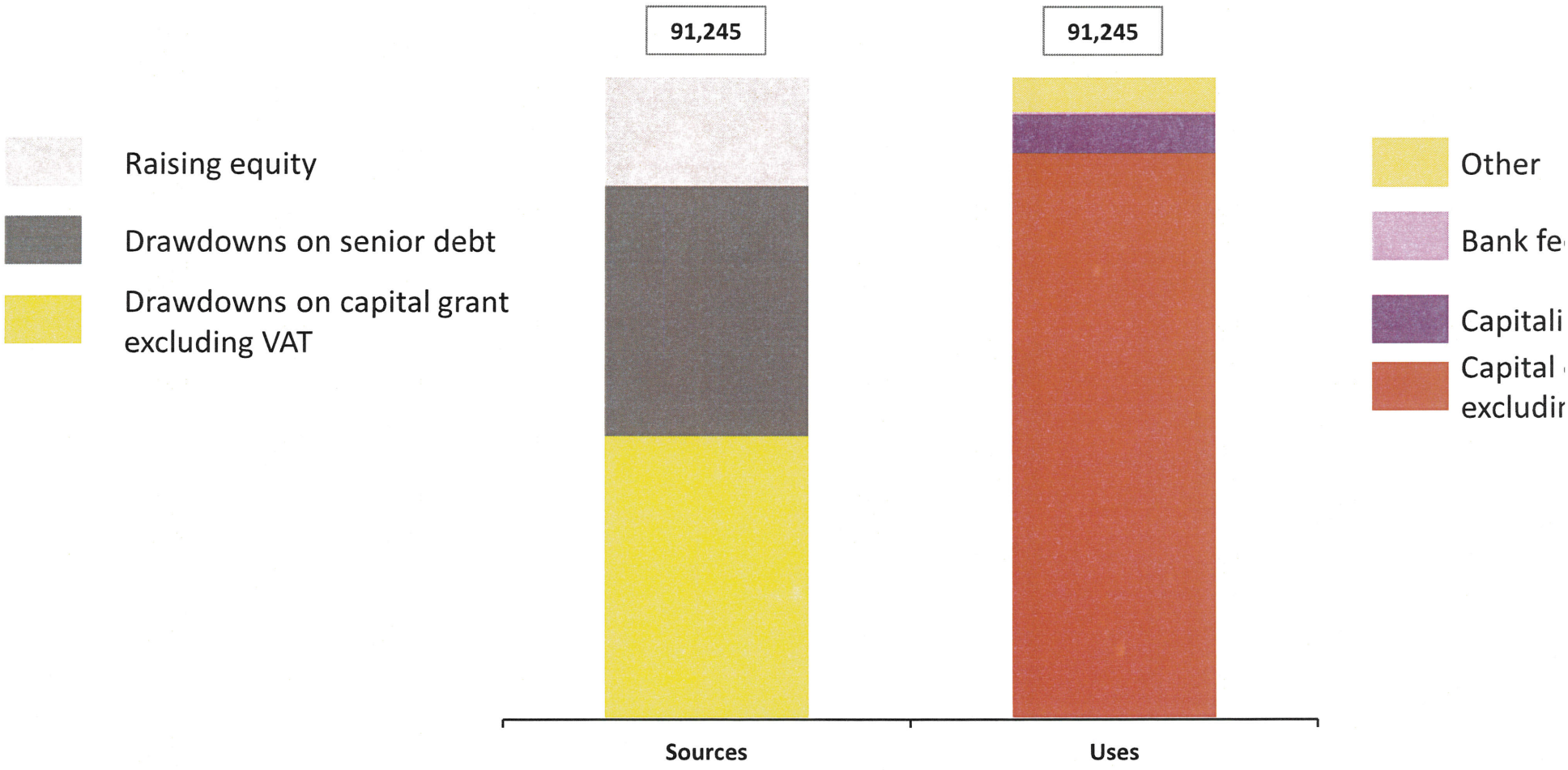
Financing of the Project

- Financing of the Project is the Project Company's responsibility
- Significant capital grant is planned (50% of Private Partner's CAPEX)
- Capital grant will be secured at contract award and denominated in local currency (FX component is subject to discussion)
- Preparation of land plots shall be done by Akimat on public procurement basis (not th the PPP agreement)
- A number of leading financial institutions have been consulted and have shown prelim interest in the Project (EBRD)
- FX component will be included in availability payment to increase bankability of the Pr

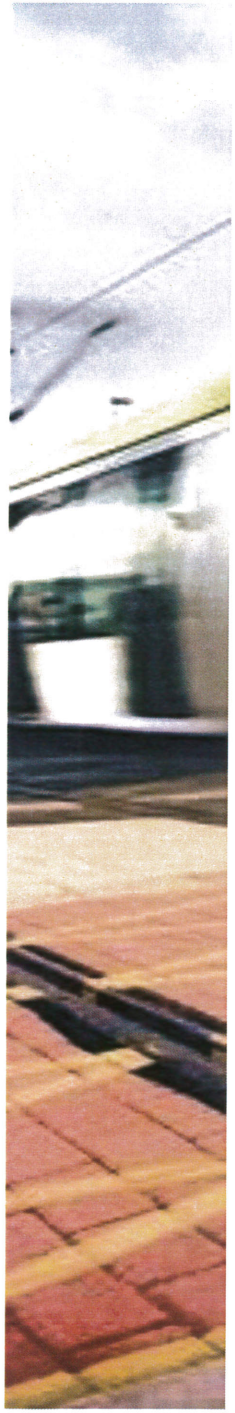
Risk matrix

Risk category	Risk Allocation		
	Private	Public	
Preparation of land plots		✓	
Design	✓		
Construction	✓		
Contamination on the Site present at handover to private partner		✓	
Demand (traffic)		✓	
Operation/Maintenance	✓		
Financing			
Changes in interest rates after financial close	✓		
Changes in rate of inflation during operation		✓	
Forex risk		✓	
Legislation and tax changes - general	✓		
Legislation and tax changes - specific		✓	
Political changes		✓	
Force majeure			

Sources and Uses, construction stage (91,245 mln KZT)



Sources and Uses, construction and operation stages (mln KZT)



Thank you!