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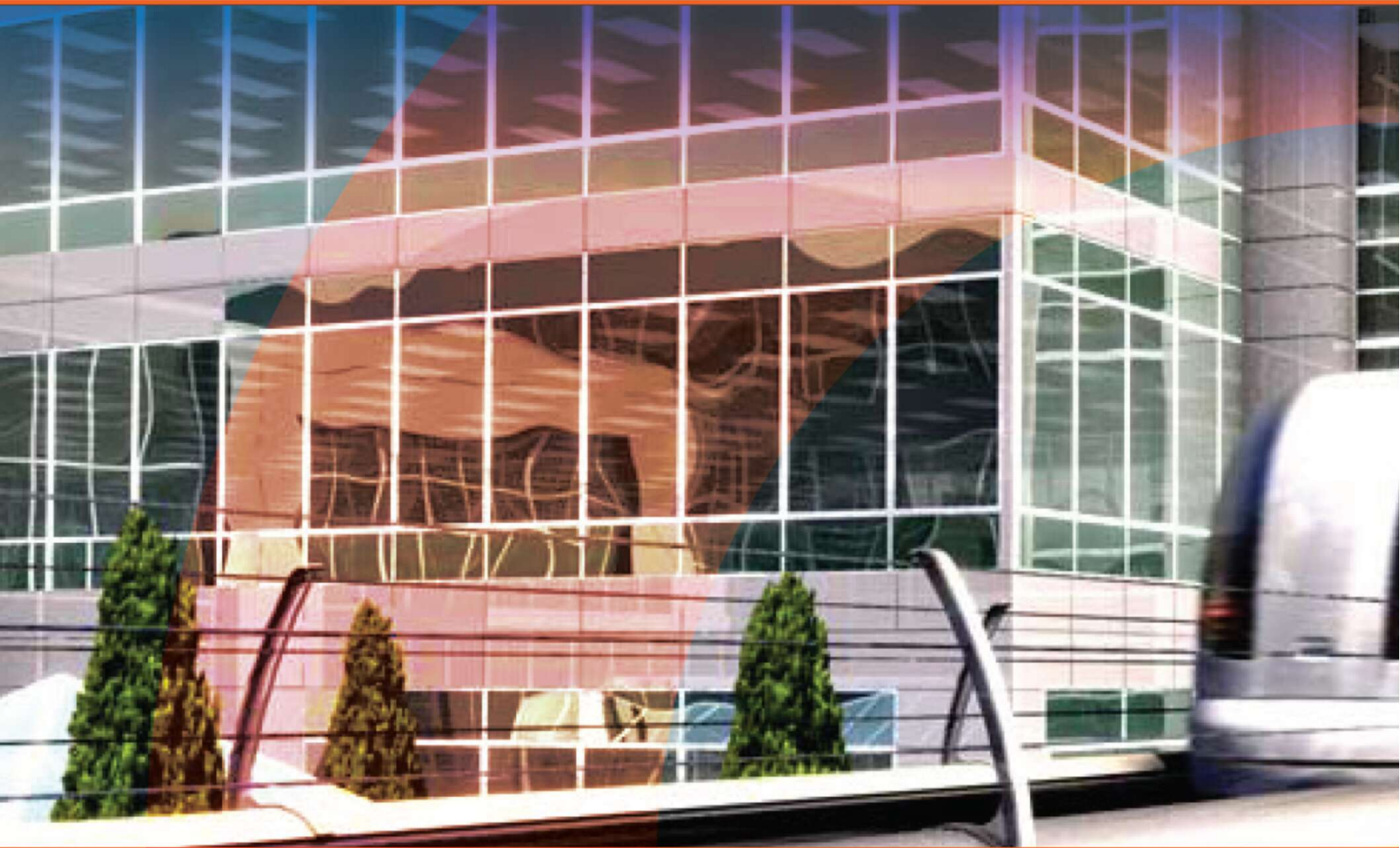
PERSONAL RAPID TRANSIT

PRE-FEASIBILITY STUDY

PROPOSED PUBLIC-PRIVATE PARTNERSHIP (PPP) PROJECT | KIGALI, RWANDA

Prepared by PRT Consulting, June 2019





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EXECUTIVE SUMMARY



Population of

1.5 million

in 2017 and anticipated to increase

3x to 4.8 million

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Kigali is growing rapidly with the 2017 population of 1.5 million anticipated to increase three-fold to 4.8 million by 2040. With its growing car traffic and winding roads, Kigali is likely to follow the path of typical large cities around the world and become heavily congested. The hilly terrain is not suited to rail-based modes and a current study is indicating bus rapid transit will do little to alleviate the growth in car traffic. Motorcycle taxis (motos) provide on-demand door-to-door service, but are a noisy and unsafe option that increases the level of traffic congestion and chaos. A properly implemented Personal Rapid Transit (PRT) system can provide a better solution for sustainable urban mobility. It can be shown that PRT has the ability to attract significant numbers of passengers from cars and motos -- reducing traffic congestion, while providing safe, affordable on-demand service that is non-stop from origin to destination.

Vuba is intended to be a Rwandan company that will become majority Rwandan-owned over time. Vuba intends to implement a driverless personal rapid transit (PRT) system in Kigali as a Public-Private Partnership (PPP) project. In addition to helping solve Kigali's mobility and congestion challenges, this project is intended to form the launching platform for exporting Rwandan-made PRT systems across Africa.

The PPP project will provide a PRT system comprised of approximately 144 km of guideway and 97 stations, with an initial deployment of 2,500 driverless electric vehicles. This system will serve 66 square kilometres of the most densely-populated areas of Kigali. It will have speeds up to 100 km/hr and capacity of approximately 20,000 passengers

per hour per direction. ***The proposal would be to design, build, finance, operate, maintain and transfer the system.*** Financing could be 100% private, but opportunities exist for government participation if desired. A detailed feasibility study is planned to be completed in early 2020 followed by implementation of an initial loop(s) by the end of 2022. Completion of the system described here is planned for late 2024.

Vuba brings considerable staff experience related to developing lightweight vehicles and driverless transit projects.



Other team members will include a program management/construction management (PM/CM) company; one or more local construction firms; a transportation planning firm such as a Surbana Jurong; PRT Consulting, a professional engineering and planning firm specializing in PRT; a local architectural firm and an IT firm with experience developing transportation ticketing applications.

The PRT system is comprised of small, four to six-passenger driverless electric vehicles serving a large number of stations connected by a network of dedicated guideways. Typically, both the stations and the guideways are elevated above surface traffic and

COMPRISED OF INITIALLY DEPLOYING

144 km of
Guideway

97
Stations

Initially Deploying
Approximately
2,500
Vehicles

pedestrians. This arrangement is designed to greatly alleviate surface congestion and allow increased opportunities for safe pedestrian zones, bike lanes and vibrant green spaces throughout the city. The reduction in surface traffic should also reduce the need for vehicle parking/staging areas and expensive projects to widen and straighten existing roads. In some situations, passenger stations may be brought down to ground level, or they may be attached to upper floors of buildings (such as hotels, shopping centers or office buildings) to increase convenience and utility.

A tiered fare structure is proposed wherein passengers may choose “Premium” fare (similar to taxi fare) for the highest level of service; a “Standard” fare (similar to moto fare) if they are willing to share a ride with others; or an “Economy” fare (similar to bus fare) if they are willing to share a ride with others and wait a bit longer for an available vehicle. With any level of fare, passengers will receive a higher level of service, safety and comfort than that which is currently provided by existing modes of transport.

The PRT system will be supported by, and will support, motos and buses. At the same time, a PRT system will compete with these other modes. Within its service area, PRT will provide superior service for a

similar fare price. If the current transportation system in Kigali were left “as is,” by 2050 the mode share of trips within the service area being studied would be 19% by public transit and 43% by car. With the addition of a PRT system, the public transit share is projected to increase to 57% and the car share is projected to be just 26%. The increased reliance on public transit within the PRT service area would likely encourage bus and moto usage outside the PRT service area. Intermodal facilities will be located around the perimeter of the PRT service area to further facilitate all modes supporting each other.

This project will have positive economic impacts resulting from the provision of high-quality public transportation to citizens of all economic levels. Citizens and businesses benefit greatly when reliable, affordable transportation is readily available to connect people to jobs, wherever they may be located. Real estate values are known to rise in areas served by public transit, and new businesses are expected to pop up due to increased flow of potential customers. The PRT system itself will create new high-quality jobs in the service and manufacturing sectors. Other opportunities will be created to educate and train people who wish to work in these sectors.

The PRT System will have speeds up to

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PRT will have a dramatic positive impact on public health and safety. Statistics show that by 2040, about 200 lives may be saved annually in Kigali due to reduced traffic accidents, and many more injuries will be averted. Significant health improvements can be expected due to the reduction of noxious emissions from vehicles.

The PRT system is comprised of highly efficient electric vehicles, which will be powered to a large extent by renewable energy. To accommodate this, the stations and guideways will be built with integrated solar panels. Additional solar capacity may be added through nearby solar farms. This project will reduce CO2 emissions by approximately 12M tons over its 50-year life. In addition, it will help reduce the area of pavement contributing to the heat-island effect.

Being mostly elevated and supported by narrow columns, the land requirements for this project are minimal. The surface space needed per kilometre is about one hundredth that needed for bus rapid transit.

The capital costs for the Kigali PRT system are projected to be US\$1.3 billion. While this represents a significant expenditure, the very high projected number of passengers to be carried must be taken into consideration. Analysis shows that the costs per PRT passenger are lower than other forms of public transit. A preliminary analysis of the overall economic impact of this project over a 50-year period found a positive impact of US\$3.8 billion, and the benefits exceeded the costs by a multiple of 4.9 times.

The implementation plan for this project follows the path typical for a public private partnership (PPP) project resulting from an unsolicited proposal. This project is considered to have a good likelihood of success since it solves problems related to mobility, congestion, accidents, pollution and CO2 emissions, while helping Kigali meet many of its long-term goals. While a detailed feasibility study is needed to verify viability, the results of this pre-feasibility study are very positive.

The risks associated with this project are similar to those of any transportation project. However, the risks associated with *not* doing this project include the strong likelihood of negligible increase in the use of public transit, leading to significant growth in car traffic, resulting in greatly increased congestion. Cities around the world have shown that large expenditures on road improvements do not result in reduced traffic congestion, but rather a steady march toward more vehicles, more accidents, more emissions, and increased congestion. Modern cities must be developed around new solutions that seriously address the issues of traffic congestion, safety, pollution and sustainability.

This project offers Kigali the opportunity to have a sustainable transportation system that minimizes congestion while accommodating the predicted large growth in population. ***It offers Rwanda the opportunity to become a technology leader in green, sustainable Smart City mobility that can be exported throughout Africa and beyond.***



This system will serve
66 square km
of the most densely-populated areas of Kigali.