The Big B

A. Applicant Information

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4. The Big B
5. Application ID (#170811-000101)
6. Application Type – Individual on behalf of Bechtel Infrastructure Corporation

B. Executive Summary

What is the BIG B?

The "Big B" is a semi-automated *robotic system* which will provide rapid installation of typical modern train communications and control systems infrastructure. The Big B will install the safest, most reliable, and cost-effective system wide network of primarily cabling and supplemental wireless devices.

How will the BIG B meet the MTA's Core Objectives:

The most cost-effective communications infrastructure required to reliably support ridership cellular and Wi-Fi usage is a strategic combination of both cable and wireless devices. For cellular connectivity in the subway it is proposed to primarily use coaxial cable (leaky feeder) with only targeted areas of the transportation network with a distributed wireless antenna system (DAS). Again, installing cable in tunnels is traditionally time consuming, but with the Big B the proposed communications network will have a low maintenance, zero-downtime, reliable cellular and signaling communications network.

For ridership Wi-Fi connectivity, it is proposed to have an entirely wireless network; with wireless devices in each of the train cars and with at least one car in each trainset with the mother wireless antenna to distribute the signal from a station side source to the rest of the train cars in the trainset.

The entire proposed communications network will all be made possible by the use of Big B, this system of semi-automated robotics will expedite the deployment and allow for rapid installation of all subway infrastructure. Robots are fantastic for executing repetitive tasks, with precision and safety that is unachievable by humans. Big B is scalable similar to how any production line operation can be configured and replicated to produce at almost any rate – depending on the allowable resources.

Implementation of the Big B robotics system will execute more work in less time, while using less resources, and providing a better product. Resulting in a cost reduction that varies depending on how you implement the system, but at the end of the day will save millions of dollars of public spending.

C. Technical Overview

1. The Big B is an innovation that will enlighten the existing, failing capital improvement program and will dramatically accelerate the implementation of the proposed rail infrastructure system. The team's innovation is focused primarily on the execution and implementation of the physical rail infrastructure. In fact, the proposed communications system is a strategic arrangement of both industry standard cable and wireless communication devices – focusing on cable as the primary solution. A cable centric solution paired with Big B would provide the safest, most reliable, and cost effective option available.

   Key features of the Big B semi-automated robotic system is its ability to minimize impacts to the existing MTA passenger trains while in operation. Big B is quick (demobilization/remobilization), agile, and nimble enough to climb off the railway and into stations, onto platforms, or service bays to avoid long-term disruptions to the passenger services. When Big B is in operation it is not unreal for its system of robotics to; drill holes, string cable, install brackets, and other miscellaneous tasks at a rate on the order of a *miles per day*. These two functionalities alone should remove decades from the current, 40yr-plus MTA maintenance program schedule.

   Big B will without a doubt reduce the current number of craft hours required during the installation of the infrastructure. This automated work will be executed with mechanical precision and efficiency, thus increasing safety and quality which will further compound the schedule reduction effect from implementing Big B. The

amount of time saved, which will be decades, by using the Big B will offset the system's estimated tens of millions of dollars (USD) capital cost.

Automation in the construction industry is on the raise and there are plenty of success stories behind the use of automation and robotics to efficiently execute work. There are currently a few small pockets of semi-automated robotics in railway construction, Big B is capitalizing and taking this concept it to the next level. The proposed robotic system is still in the early preliminary design phase, but with an additional few months of development Big B will materialize into a game changer for the industry.

2. Yes. The Big B will operate on the existing MTA subway tracks and will interface with all of MTA infrastructure. The Big B will be nimble enough to integrate with and work around the MTA's day to day operations.
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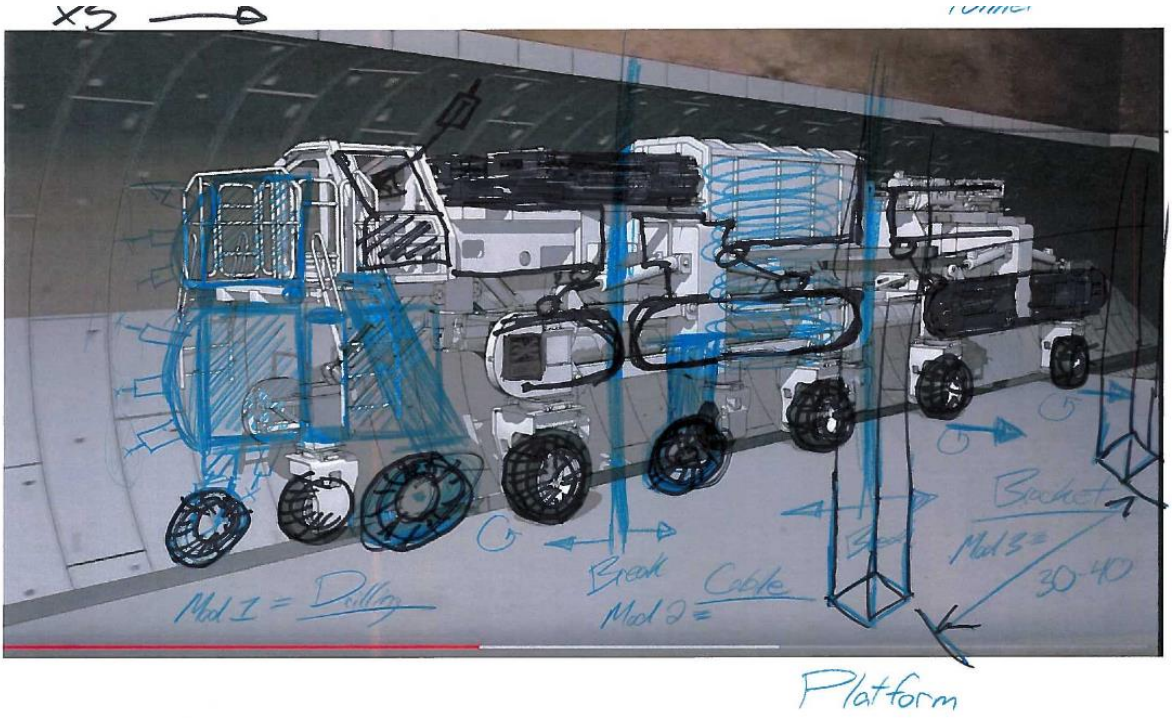
4. There is no IP with the Big B.
5. There are no assumptions which need to be validated at this time.
6. The Big B will install the safest, most reliable, and cost-effective system wide network of primarily cabling and supplemental wireless devices which will save millions of dollars for the taxpayers.
7. Below is an abstract rendering of the Big B.



D. Implementation Detail

1. There is a variation of the Big B that has been commercially used and is available for use today with some investment in engineering and robotic design.
2. Central London, UK. A similar product was used on the largest construction project in Europe – Crossrail Project. The robot that was used on this project will need to be improved with more functionality and better mobility. This will be an engineering/robotics effort which will be on the order of tens of millions of dollars.
3. We have not completed an analysis of the NYC regulatory requirements for deploying the Big B into the MTA subway system. However, we can advise that the Big B will operate like a piece of railway maintenance equipment so it will meet the railway standards.
4. Local rail trade unions may be a risk area. We will need to understand how to unions will integrate into the deployment of the Big B.
5. Implementation schedule looks like this; 2 years of engineering and testing will be required before deployment into the MTA subway network.
    i. Engineering and Robotics Design – 12 months
    ii. Prototype Testing & Calibration – 6 months
    iii. MTA Subway Testing & Commissioning – 6 months

6. Union labor integration with the Big B will need to be understood and the MTA can help us with that.
7. Supplemental Materials: References from the Crossrail project in the UK are below. The company that built the robot from this project is called ROWA.
    i. Nevin Reddy, Rail Engineering Manager, Bechtel Infrastructure Corporation, nreddy2@bechtel.com, +44 20 651 7674.
    ii. Mr. Belloli, CEO, ROWA (or ROWA Tunneling Logistics), a.belloli@rowa-ag.ch
    iii. Gregg Purcell, Construction Site Manager, Bechtel Infrastructure Corporation, gpurcell@bechtel.com

E. Cost Detail

1. The cost of the Big B is still preliminary. It is conceptually thought to be on the order of tens of millions of dollars (USD). +$10 Million (USD) per Big B system and then millions of dollars (USD) required annually for maintenance of the system, like the other typical rail maintenance equipment.

   In fact, we can get a much better idea on the projected cost of the Big B once we contact ROWA and some other robotics companies. The extremely limited time to develop this challenge proposal did not allow me to properly engage the ROWA team.

2. The Big B is front end loaded with high capital cost which is two years of engineering, testing, and building of the Big B then there will be an annual operating and maintenance budget.