



Massachusetts Bay Transportation Authority

Red Line Fleet No. 3 Car Replacement

Request for Board Approval

December 12, 2016



Thinking outside the old T box...

This proposal to purchase new Red Line cars rather than overhauling outdated ones will benefit:

- **MBTA riders:** More trains, running more frequently;
- **Taxpayers:**
 - The T will end up with 120 new cars good for 30 years instead of getting no more than 10 years of extra life out of a fleet of 84 cars that are already nearly 25 years old
 - The new cars will cost \$310K less per car than rehabbing the old cars currently in use
- **Massachusetts economy:** The new cars will mean added work for the CRRC factory in Springfield, MA, extending jobs and economic activity through 2023



Proposal to Purchase Additional No. 4 Cars from CRRC

Proposal:

- Purchase up to 134 additional Red Line cars (120 cars ordered directly, with an option to purchase 14 more) from CRRC MA Corporation (CRRC) to replace Red Line #3 cars and add capacity
- Achieve standardized Red Line fleet
- Allows for Red Line capacity increase of up to 50%
- Manufactured in Massachusetts
- Total contract: up to \$280 million



Red Line No.3 Current Status and Options

- There are 86* No. 3 cars, put into service in 1993-94 (currently 23-24 years old)
- There are 132 CRRC-produced cars currently on order (known as Red Line No. 4, replacing Red Line No. 1 and No. 2). Once those are put in service, the No. 3 cars will be the only veteran Red Line fleet
- A midlife overhaul was never performed and is several years overdue
- To maintain service levels, the No. 3 fleet must be overhauled extensively or replaced

* Only 84 cars are operational



Red Line No.3 Current Status and Options

- LTK Engineering Services estimates overhaul costs at \$204.3M for 84 cars
 - › \$2.43M per car
 - › Would extend period of reliable service for 8 to 10 years
- Overhaul does not include propulsion and braking upgrades necessary to achieve the MBTA's 3 minute headway target
 - › Upgrading propulsion and braking systems is technically complex and would cost an additional \$18.54M
 - » \$220K per car
 - › Total cost to overhaul and upgrade 84 cars: \$222.8M
 - » \$2.65M per car
 - › MBTA would also need to acquire additional vehicles to attain headway goal



Red Line No.3 Current Status and Options

- Alternatively, MBTA can replace the No. 3 cars with a new expanded vehicle fleet identical to the No. 4 cars currently on order
- New cars would have latest propulsion and braking systems, allowing Authority to achieve 3 minute headway target without additional cost
- Provides opportunity to standardize entire Red Line fleet with a single vehicle class with a 30 year service life



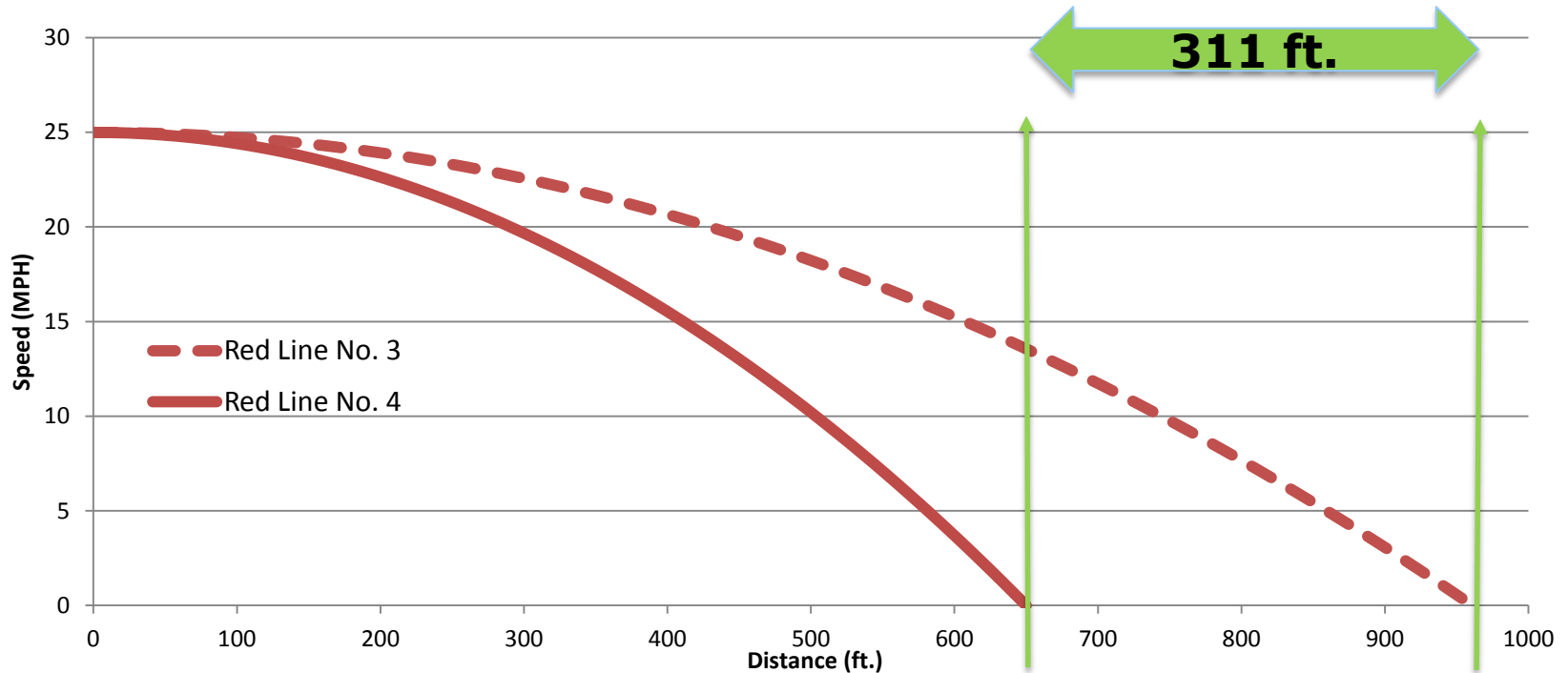
New Red Line Car Improvements

- Current Red Line signals are based on the braking calculations of the older No. 3 cars
- New Red Line No. 4 cars have:
 - › Advanced Propulsion System
 - › Improved Trigger for Vehicle Signal Controller
 - › Improved Braking Control Technology



New Red Line Car Improvements

- New No. 4 cars reduce braking calculation distance by 30 percent compared to current cars





New Vehicles Could Increase Capacity by 50 Percent

- Red Line's theoretical maximum capacity will increase from 13 to 20 trains per hour with:
 - › No. 4 cars' performance
 - › Minor speed code changes
 - › Replacement of the No. 3 cars with No. 4 vehicles



Red Line Simulation Results Existing vs. Expected New Car





Standardizing the Red Line Fleet Will Benefit Customers

- Larger standardized fleet of new No. 4 cars will:
 - › Permit the MBTA to reduce headway from 4.5 minutes to 3 minutes
 - › Increase capacity by 50% during rush hours (approximately 30K passengers/hour)
 - Larger entirely interoperable fleet will allow MBTA to implement a life-cycle maintenance program:
 - › Routine maintenance will not impact service levels
 - › Better maintained vehicles will suffer fewer breakdowns reducing related service interruptions
 - › Cars' service lives should be extended
 - New cars will provide at least 30 years of reliable service, compared with 8 to 10 years for overhauled cars
 - Standardized Red Line fleet means Blue, Orange and Red lines will all be standardized
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Sole-Source Contract Warranted

- Sole-source procurement is justified where the goods are available from only one source, as is the case here
- After considerable analysis, the Authority's staff has concluded that:
 - › A follow-on purchase from CRRC is the only way to achieve genuine standardization
 - › A standardized fleet will improve operational flexibility because all Red Line cars will be interoperable
 - › Standardization will increase maintenance efficiency
 - › Standardization will save millions of dollars over the service life of the new fleet in inventory costs, workforce training, and manpower expenses



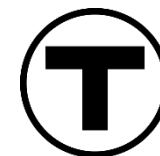
Sole-Source Contract Warranted

- Acquiring “standardized” vehicles from another manufacturer via a new competitive procurement is not feasible:
 - › Industry experience shows that different manufacturers cannot sufficiently match systems and technology to achieve genuine standardization
 - › Manufacturers use different car designs, have established relationships with different component/parts manufacturers, etc.
- Standardization through another source would require the Authority to dictate car design and use of key subs/suppliers
 - › Eviscerates “competitive” procurement
 - › Places much higher risk on the MBTA



Sole-Source Contract Warranted

- In addition, instituting a competitive procurement would entail additional non-recoverable costs and delay
 - › Would likely result in a 28-month delay in delivery of first No. 3 replacement car, and a commensurate delay in increasing Red Line capacity
 - › Would cost the MBTA an estimated \$8.5M-\$10M in otherwise avoidable consulting engineering services
 - › MBTA would spend an estimated \$1.6M in additional maintenance costs to keep No. 3 in operation during the delay period



Pricing and Other Significant Terms

- Following months of negotiations, we anticipate that CRRC will provide the following terms:

Item	Price per Car	Total
120 Cars in Married Pairs	\$1,850,000	\$222,000,000
Capital Spare Parts		\$16,500,000
	Subtotal	\$238,500,000
Option: Extension of Technical Support from 2 to 5 Years*		\$10,500,000
	Total	\$249,000,000

* Includes \$10.5M for extension of CRRC's technical support obligation on all Orange and Red Line cars acquired from CRRC cars from 2 years under the 2014 Contract to 5 years.



Pricing and Other Significant Terms

- Price per car is \$40K lower than the price (including exercised options) of the 58 No. 4 cars purchased under the 2014 Contract to replace Fleet 2
- LTK and the Authority have determined the CRRC price is fair and reasonable
- 3-year option to purchase 14 additional cars at \$1.85M to \$2.12M per car depending on when option is exercised, and associated spare parts for \$2M
- Current pricing expires 1/31/17 – afterward prices will increase per the escalation terms of 2014 CRRC contract
- Overall average cost per car, including project costs:
 - › Under CRRC's offer – \$2.34M
 - › Under overhaul and upgrade alternative – \$2.65M



Pricing and Other Significant Terms

- Additional new cars identical to the CRRC-produced No. 4 fleet would provide replacements for the existing 86 No. 3 cars and sufficient additional cars to:
 - › Implement life-cycle maintenance program
 - › Achieve the 3 minute headway target and increase capacity
- New cars will be delivered from June 2022 through September 2023 at a rate of 8 per month
- No. 3 cars will require \$36.46M in targeted reliability improvements to maintain service levels until new cars arrive



Pricing and Other Significant Terms

- Favorable payment terms of:

Milestone	% of Base Contract
NTP	10%
Placement of major supplier purchase orders	15%
Pro rata completion of car shell of each vehicle	25%
Pro rata delivery of each vehicle	47.5%
Acceptance of each vehicle	2.5%
Technical Support	Billed monthly in arrears

- CRRC to provide a standby letter of credit or surety bond for 30% of the base contract



Springfield Manufacturing Plant

- Per the 2014 Contract, CRRC is building a plant in Springfield for final assembly of all new Red & Orange Line vehicles
 - › CRRC will use the facility as its North American headquarters
 - › CRRC expects to complete the facility in September 2017, and manufacturing to begin in April 2018
- CRRC estimates that the plant will create at least 150 new permanent jobs in Springfield
 - › CRRC has conducted extensive outreach to staff the facility, including partnering with the Commonwealth, the City of Springfield, and local colleges and vocational training programs
 - › 2014 Contract requires CRRC to compensate plant employees at regional market rates



Total Project Costs

- Estimated Total Project Costs:

Component	Cost
Proposed Contract*	\$249,000,000
Professional Services	\$11,855,920
Force Accounting/Project Administration	\$4,037,103
Indirect	\$2,633,848
Subtotal	\$267,526,871
Contingency 5%	\$13,376,344
Total	\$280,903,215

* Includes purchase of 120 cars and associated spare parts, and exercise of the technical support option, which would extend CRRC's technical support obligation on all Orange and Red Line cars acquired from CRRC from 2 years under the 2014 Contract to 5 years.



Projected Cash Flows

Fiscal Year	Cash Flow (mm)
2017	\$58.83
2018	\$0.06
2019	-
2020	-
2021	-
2022	\$20.21
2023	\$148.75
2024	\$43.53
2025	\$3.68
2026	\$3.68
2027	<u>\$2.15</u>
Total	\$280.90

Project Costs Include:

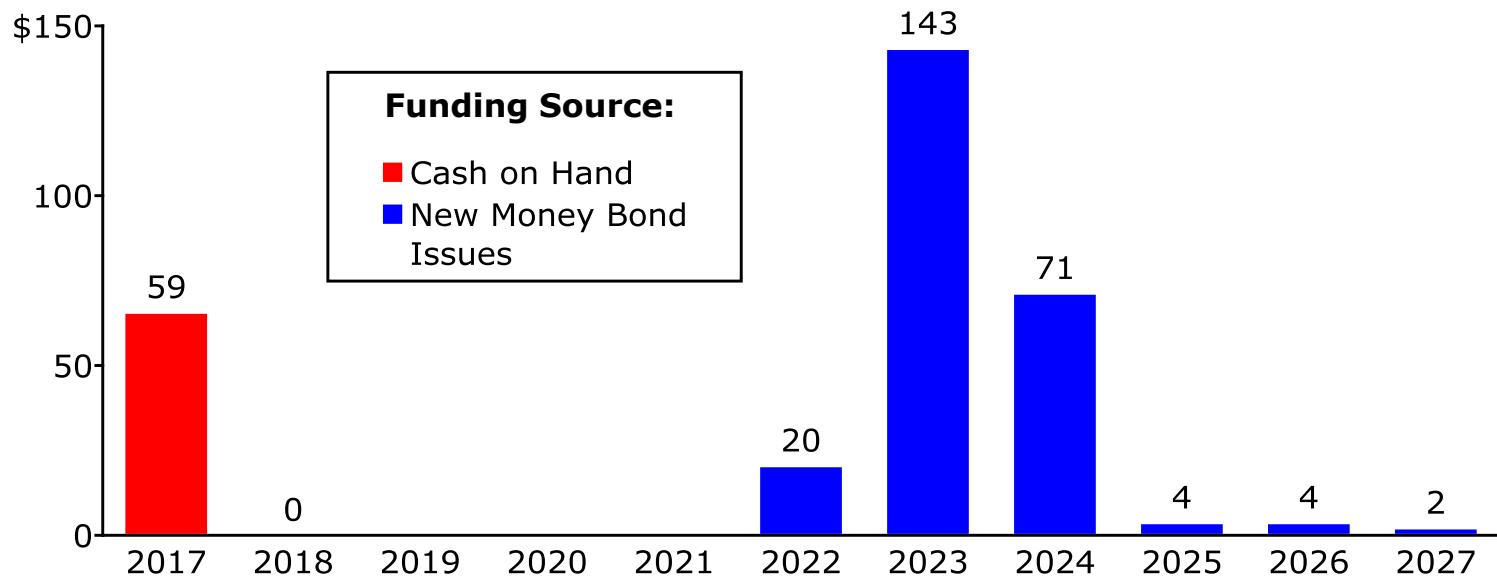
- Vehicle Procurement
- Professional Services
- Force Accounting/Project Administration
- Indirect Costs
- 5.00% Contingency



Sources & Uses - Project Overview

- First year payments made using cash on hand
- New money bond issuance to finance remaining payments in FY22-FY27

Annual Payments
(millions)



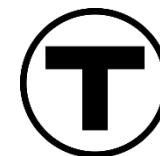
Anticipated
Bond
Issuance Size

\$200M \$200M \$200M



Sources and Uses - FY17

Lockbox Detail			
Account/Source	Funded Amount (mm)	Disbursements	Ending Balance (Jan17)
DS Reserve Fund Transfer	55.2	-27.6	27.6
FY16 State Assistance	31.2	-31.2	0.0



Debt Capacity

\$M (Based On FY 2017 Budget)	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Sales Tax Revenues (BRA) ¹	\$992.2	\$992.2	\$992.2	\$992.2	\$992.2	\$992.2
Other Revenues	\$949.3	\$980.4	\$1,011.9	\$1,044.0	\$1,076.6	\$1,109.7
<i>Total Revenue Without Additional Assistance²</i>	\$1,941.5	\$1,972.6	\$2,004.1	\$2,036.2	\$2,068.8	\$2,101.9
Operating Expenses ³	\$1,563.7	\$1,579.3	\$1,595.1	\$1,611.1	\$1,627.2	\$1,643.5
Free Cash For Debt Service	\$377.8	\$393.2	\$409.0	\$425.1	\$441.6	\$458.4
Debt Service (Excluding TIFLA/RRIF) ⁴	\$433.6	\$439.6	\$477.7	\$464.5	\$462.9	\$453.9
Debt Service (\$600 M CIP) ⁵	\$0.0	\$4.6	\$13.3	\$17.4	\$21.5	\$25.7
TIFLA/RRIF Debt Service ⁶	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<i>Total Debt Service</i>	\$433.6	\$444.2	\$490.9	\$481.9	\$484.4	\$479.6
Net Free Cash	(\$55.8)	(\$51.0)	(\$81.9)	(\$56.8)	(\$42.8)	(\$21.2)
Additional Assistance ⁷	\$187.0	\$187.0	\$187.0	\$187.0	\$187.0	\$187.0
Net Free Cash with Additional Assistance	\$131.2	\$136.0	\$105.1	\$130.2	\$144.2	\$165.8
Net Debt Service Coverage w/o Additional Assistance (Min. 1.0x)	0.9x	0.9x	0.8x	0.9x	0.9x	1.0x
Net Debt Service Coverage w/ Additional Assistance (Min. 1.0x)	1.3x	1.3x	1.2x	1.3x	1.3x	1.3x
Senior Sales Tax Revenue Bond Coverage ⁸ (Min. 2.0x)	2.66x	2.63x	2.56x	2.54x	2.63x	2.59x
<i>The following item assumes Additional Assistance:</i>						
Max Capacity In Current FY⁹		\$2,101.2	\$2,603.9	\$2,883.4	\$3,316.4	

Footnotes:

1. BRA assumes no growth rate

2. Based on 15 year historical growth rate of 1.6%

3. Operating Expenses grow at 1%

4. Existing Debt Service after certain restructuring. Assume variable rate 1.5% in FY 2017 and 2.5% thereafter.

5. \$200 M in FY 2018, FY 2019, & FY 2021

6. No TIFLA/RRIF Debt Service during this period

7. Additional Assistance assumes no growth rate

8. Required by covenant and based on BRA Divided By Existing Sr. Sales Tax Debt Service

9. Assumes new debt is issued at 5% which is conservative