THIS PRINT COVERS CALENDAR ITEM NO.: 11

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY

DIVISION: Transit

BRIEF DESCRIPTION:

Authorizing the Director of Transportation to execute Contract Modification No. 7 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles, with Siemens Mobility, Inc., to enhance the vehicle design with passenger comforts and engineering refinements that improve fleet performance; and to advance Phase 2 Production acceleration activities for early fleet replacement, for an amount not to exceed $43,514,046, with no increase in the total Contract price, achieved through planned change allowances and a decrease in the escalation allowance; and no increase in the term of the Contract.

SUMMARY:

- In 2014, the SFMTA Board of Directors approved Contract No. 2013-19 with Siemens Industry, Inc. (Siemens) to provide up to 260 Light Rail Vehicles (LRVs) for an amount not to exceed $1,192,651,577, and a term not to exceed 15 years.
- Through Contract Modifications Nos. 1 through 4, the SFMTA Board approved updates to the vehicle design, 44 additional vehicles, and optional spare parts and equipment.
- On October 22, 2019, the Director of Transportation authorized Contract Modification No. 5 to expedite the design and pilot installation of track brakes to reduce flat wheels.
- On December 6, 2019, the SFMTA Board approved Contract Modification No. 6 including feedback-driven passenger comforts and engineering refinements that improve fleet performance, provisions for weight incentives and other administrative issues, and initial funding of Phase 2 long-lead activities essential to the early fleet replacement plan.
- The proposed Modification enhances the vehicle design with added passenger comforts and engineering refinements, provides funding of Phase 2 acceleration activities essential to the early fleet replacement plan, and increases amounts for parent company guarantees.

ENCLOSURES:
1. Resolution
2. Modification No. 7
3. http://centralsubwaysf.com/FSEIS-SEIR (Central Subway Final SEIS/SEIR)
4. https://sfgov.org/sfplanningarchive/environmental-impact-reports-negative-declarations (Event Center SFEIR)

APPROVALS: **DATE**

DIRECTOR _____ March 9, 2020

SECRETARY _____ March 9, 2020

ASSIGNED SFMTAB CALENDAR DATE: March 17, 2020

PURPOSE

The purpose of this item is to obtain authorization for the Director of Transportation to execute Contract Modification No. 7 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles, with Siemens Mobility, Inc., to enhance the vehicle design with passenger comforts and engineering refinements that improve fleet performance; and to advance Phase 2 Production acceleration activities for early fleet replacement, for an amount not to exceed $43,514,046, with no increase in the total Contract price, achieved through planned change allowances and a decrease in the escalation allowance; and no increase in the term of the Contract.

STRATEGIC PLAN GOALS AND TRANSIT FIRST POLICY PRINCIPLES

This request supports the following SFMTA Strategic Plan Goals:

Goal 1: Create a safer transportation system for everyone
Objective No. 1.2: Improve safety of the transit system

Goal 2: Make transit and other sustainable modes of transportation the most attractive and preferred means of travel
Objective No. 2.1: Improve transit service
Objective No. 2.2: Enhance and expand use of the city's sustainable modes of transportation.

Goal 3: Improve the quality of life and environment in San Francisco and the region
Objective No. 3.5: Achieve financial stability for the agency

This item will support the following Transit First Policy Principles:

1. Improves the safe and efficient movement of people and goods.
2. Improves public transit as an attractive alternative to travel by private automobile.
8. Allocates transit investments to meet the demand for public transit generated by new public and private commercial and residential developments.
9. Promotes the use of regional mass transit and the continued development of an integrated, reliable, regional public transportation system.

DESCRIPTION

Background

In 2014, the SFMTA Board of Directors approved Contract No. 2013-19 with Siemens Industry, Inc. (Siemens) to provide up to 260 light rail vehicles (LRVs or LRV4s), including two options for expansion LRVs to handle growth related to the Central Subway Project and systemwide ridership increases (the LRV4 Contract or the Contract), all for an amount not to exceed $1,192,651,577, and a term not to exceed 15 years.

The LRV4 Contract includes replacement of the 151 Breda LRVs, which are scheduled for retirement beginning in 2021. Replacing these older and less reliable vehicles is an established need in the SFMTA Capital Plan and will have immediate impact on overall system performance.

Under the LRV4 Contract, Siemens will deliver LRVs in two phases: Phase 1, for 68 expansion vehicles (24 from the base Contract, 40 from Option 1 and 4 Phase W [Warriors] vehicles), and Phase 2, for the 151 replacement vehicles. Siemens has delivered all 68 Phase 1 LRVs. Phase 2 deliveries are due to commence in May 2021, with completion of the Contract currently scheduled for 2025, which assumes continuation of the early fleet replacement plan. Option 2 for 45 Vehicles has not been exercised.

The following actions have occurred since award of the Contract:

- On March 31, 2015, the SFMTA Board approved Modification No. 1 to the Contract to exercise Option 1 for 40 additional LRVs to be delivered after the Phase 1 delivery of 24 vehicles.

- On October 30, 2015, the Director of Transportation approved Modification No. 2 to the Contract to update the list of approved major suppliers, and clarify Contract language.

- On August 16, 2016, the SFMTA Board approved Modification No. 3 to the Contract, which added design changes to provide enhancements to passengers, enable full systems integration, and reduce the life-cycle costs of the LRVs, in the amount of $19,596,728, with no increase in the total Contract price.

- On June 17, 2017, the SFMTA Board authorized the Director of Transportation to execute Modification No. 4 to provide four additional LRV4 vehicles for an amount not to exceed $15,875,000, with no increase in the total Contract price.

- On November 28, 2018, the Director of Transportation approved the assignment of the Contract from Siemens Industry, Inc., to its affiliate, Siemens Mobility Inc. Both companies are wholly owned subsidiaries of Siemens, AG, a German multinational conglomerate.

- On October 22, 2019, the Director of Transportation, under his authority, executed Contract Modification No. 5 to expedite the design and pilot installation of track brakes to the power trucks as a method to reduce the frequency of flat spots on wheels caused by activation of the push button emergency brake (PBEB), in the amount of $466,505.

- On December 6, 2019, the SFMTA Board approved Contract Modification No. 6, for the design of feedback-driven changes to the interior configuration and seating, along with other engineering refinements that improve fleet performance, including installation of track brakes on all remaining Phase 1 vehicles. Also included in Contract Modification 6 were provisions for weight incentives and other administrative issues, as well as initial funding of Phase 2 long-lead activities essential to the early fleet replacement plan, such as establishment of an additional production line for carshells at a new facility in Sacramento.

Modification No. 7

Working closely with the San Francisco County Transportation Authority (SFCTA) and the Metropolitan Transportation Commission (MTC), the LRV4 project team has developed a fully funded LRV4 program with Phase 2 being initiated in two steps. Modification No. 6, approved in December 2019, was the first step, consisting of $9.8M in design enhancements and schedule compression activities.

Approval of Contract Modification No. 7 will allow the Agency to proceed to the second step. This Modification will authorize $19,899,553 to complete acceleration activities required to continue the early fleet replacement plan, and $23,614,493 in additional design enhancements, including the implementation of track brakes on all Phase 2 vehicles, the implementation of interior reconfigurations on all Phase 1 and Phase 2 vehicles, and multiple engineering refinements that update the vehicle design prior to initiation of Phase 2 production. In total, Modification No. 7 represents approximately four percent of the Contract value.

Modification No. 7 accomplishes the following:

- **Design enhancements** that implement lessons learned on all future production vehicles and, where appropriate, retrofit vehicles previously delivered.
- **Phase 2 acceleration activities** to compress the schedule by up to 16 months and realize the benefits of the early fleet replacement plan.

Design Enhancements

The design enhancements respond to passenger and operator feedback and implement valuable lessons learned throughout the Phase 1 deployment. The changes detailed in the table below improve the efficiency of maintenance and operations, standardize features across old and new fleets, and address the comfort of our passengers. These changes go beyond the original requirements of the Contract and are distinct from fleet defects or warranty issues, for which Siemens is responsible.

Modification No. 7 Changes

Change	Description	Continuous Improve-ment Benefits	Number of Vehicles	Per Vehicle Cost	Total Mod 7 Cost
Lockable Convenience Outlet	A lockable cover will be added to the convenience outlet.	Maintenance/ Operations	219	$735.22	$161,014
Passenger Information Signs (PIS)	Multiple Passenger Information System (PIS) enhancements that update the technology consistent with evolving performance needs and expectations.	Passenger	219	$846.77	$185,443
Train Digital Records (TDR6) Hard Disk Drive (HDD) Unmounted	The Train Operator Display (TOD) shall display a message when the TDR6 HDD is unmounted to assist maintenance, troubleshooting, and verifying readiness for service.	Operations/ Maintenance	68	$583.10	$39,651
Corner Hatch additional retention clips	The Corner Hatch shall be modified to prevent it from quickly opening when unlocked.	Operations/ Maintenance	219	$1,157.47	$253,485
Replace Door Touch Strips with Push Button	On 151 Phase 2 vehicles only, each doorway shall have 'keep door open' push buttons instead of the touch strips as installed on Phase 1 vehicles.	Passenger	151	$1,784.37	$269,440
Push to Close locking feature addition to exterior EDR door	The Exterior Manual Emergency Door Release access panel shall include a locking feature when pushed closed.	Operations/ Maintenance	219	$1,253.85	$274,593
Pre Wiring for Additional Clipper card readers	Wiring for additional Clipper card readers will be included on Phase 2 Vehicles.	Passenger/ Operations	151	$1,380.20	$208,410
Provisions for ease of tire replacement	Wheel hubs specified in this change will be designed with a hole pattern for easier tire replacement and use with shop equipment on Phase 2 Vehicles.	Maintenance	121	$3,413.56	$413,041

Change	Description	Continuous Improve-ment Benefits	Number of Vehicles	Per Vehicle Cost	Total Mod 7 Cost
PIS 40 A pattern change	The Passenger Information System shall be modified to allow remote and manual changes to information displays at any time.	Passenger/ Operations	219	$1,680.51	$368,031
Track Brakes Installation	Adding track brakes to all Phase 2 vehicles to alleviate flat wheels.	Maintenance	151	$19,497.96	$2,944, 192
Implementation of Interior Seating – Phase 1 Single Transverse	Seat changes, retrofits Phase 1 vehicles with single transverse seating and related reconfigurations.	Passenger	68	$112,445.03	$7,646,262
Implementation of Interior Seating – Phase 2 Single Transverse	Seat changes, production of first 50 Phase 2 vehicles with single transverse seating and related reconfigurations.	Passenger	50	$47,894.32	$2,394,716
Implementation of Interior Seating – Phase 2 Double Transverse	Seat changes, production for 101 Phase 2 vehciles with double transverse seating and related reconfigurations.	Passenger	101	$73,823.91	$7,456,215
		TOTAL			$22,614,493

Most of the design enhancements listed above are refinements to existing features that update or improve the original design. One major enhancement is the **installation of track brakes** on all 151 Phase 2 Vehicles as a method to reduce frequency of flat spots on wheels caused by activation of the push button emergency brake, which has negatively impacted operations and maintenance. This change will complete the fleetwide track brake program started in Modifications Nos. 5 and 6.

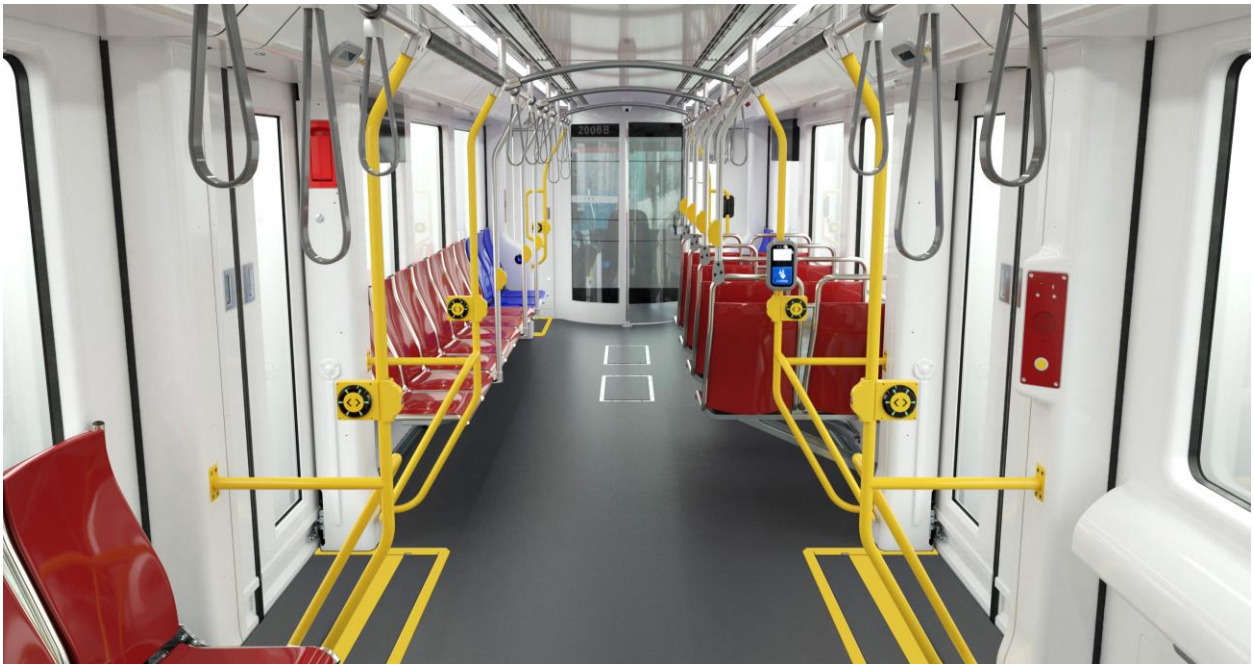
The most significant enhancements implement two styles of **passenger interior and seating reconfiguration:** one style for the Phase 1, Option 1, and Phase W interior retrofits; and a second style for Phase 2, with double-wide transverse seating. Modification No. 6 authorized Siemens and its suppliers to develop the detailed designs for improved passenger amenities, including additional stanchions, better hand straps, forward-facing transverse seats, and individual seating based on passenger feedback received during Phase 1. Under Modification No. 7, Siemens will implementat the new interior configurations on all LRV4 vehicles. Reconfiguration plans have been broken into three parts to accommodate a retrofit of vehicles already delivered, reconfiguration compatible with the existing carshell design for early Phase 2 vehicles, and reconfiguration compatible with an updated carshell that will be delivered for 101 Phase 2 Vehicles.
All 68 Phase 1, Option 1 (40 LRVs), and the 4 Phase W vehicles (Nos. 2001-2068) will have:

- All existing in-service seating removed.
- Two-inch lower seat height (except the fixed seating above and adjacent to the signalling system (ATCS) box)
- Individual passenger inserts to replace bench seats and flip seats
- Areas of single passenger transverse seats

The first 50 Phase 2 vehicles (Nos. 2069-2118) will match the Phase 1 reconfiguration similar to the rendering below.

The final 101 Phase 2 vehicles (Nos. 2119-2219) will have a significant re-design to accommodate a new interior seating layout with double transverse seats, which will be similar to the rendering below and include:

- Two-inch lower seat heights (except the fixed seating above and adjacent to the ATCS box).
- Single passenger inserts to replace bench seats and flip seats
- Areas of double-wide passenger transverse seats



The carshell weight is expected to increase to accommodate structural reinforcements needed to handle the load of double-wide transverse passenger seats. The preliminary engineering work approved with Modification No. 6 includes a carshell analysis to understand the structural changes necessary to support the new seating arrangement and verify that these changes can be accomplished within the 80,000-lb. weight limit of each vehicle.

The LRV4 procurement project team has negotiated with Siemens the specified scope, as well as impact to cost, delivery schedule, and payment schedule for all changes in the table above. Staff compared the proposed costs for the modifications with independent cost estimates and believes they are fair and reasonable.

Additional design enhancements are currently being planned. Specifically, the LRV4 team is working closely with operators on a set of updates to the cab layout and operator controls. These changes are being finalized and will be part of a future Contract modification.

Continued Production Acceleration Activities

Modification No. 6 previously approved $5,603,000 for the first of two planned acceleration steps. The first step, *Initial Production Acceleration Activities*, allowed work to begin on long-lead tasks essential to setting up a new carshell production line. By starting those tasks early, the SFMTA created the opportunity to compress the vehicle delivery schedule by up to 16 months (from 2027 to 2025) and realize the cost and reliability benefits of replacing the legacy Breda fleet early. Modification No. 7 allocates $19,899,533 for the second and final step – *Continued Production Acceleration Activities.*

The Agency has identified retirement of the Breda vehicles as the most effective means to increase vehicle availability and service reliability in the future. Expanding the number of Siemens vehicles in service at an earlier date will result in fewer service interruptions due to breakdowns, reduced operations and maintenance costs, reduced passenger crowding, and enhanced accessibility to riders. To eliminate problems with the reliability of the Breda fleet, the

SFMTA developed an early fleet retirement plan, which was approved by the Federal Transit Administration. Compressing the vehicle delivery schedule comes at a cost, but that cost is offset by operating savings and other quantifiable benefits to service. Management has weighed these benefits and costs and remains resolved that this investment is critical to improving service reliability.

In April 2019, as staff prepared to initiate Phase 2 replacement on this accelerated timeline, the SFMTA experienced serious mechanical issues involving the LRV4 doors and couplers. During this time, the Agency also experienced lower-than-expected reliability with the new vehicles. The SFMTA project team identified shortcomings to be resolved before Phase 2 of the procurement could be initiated. Working through a structured performance program, the SFMTA project team tracks Siemens' progress towards reliability and operations goals, and quickly identifies and resolves issues as they arise. In recent months, the LRV4 reliability has improved and is closely matching the predicted reliability growth. Reliability Mean Distance Between Failures (MDBF) for December was above 10,000 and the preliminary figure for January is above 16,000 miles. The observed improvement is the result of several corrections to various systems, including headlights, cameras, and brake systems. The SFMTA project team continues to work with Siemens to ensure it makes consistent and continued progress towards the established contractual reliability target (mean distance between train delays of 25,000 miles, projected to be achieved by June 2020.

The production acceleration activities require establishing an additional production line for carshells. Siemens' production capacity for its existing facility is fully committed beyond the production rate currently scheduled in the Contract. Siemens has agreed to establish a new facility several miles from its current location in Sacramento. Leasing a new facility and fitting it out for carshell production is a significant undertaking and requires Siemens to do the following:

- Enter into a lease agreement and convert a new facility. including electrical, gas, and air.
- Acquire and install production equipment, including crane, lifting, turning, and integration and welding equipment.
- Retain staff for production ramp-up, and then ongoing management at the satellite facility.
- Establish and maintain site-specific materials management logistics.
- Coordinate supplier ramp-up.
- Initiate and then coordinate other industrial engineering start-up tasks.

Establishing an additional production line for LRV4 carshells allows for a compressed schedule and moves up the completion of Phase 2, accelerating the delivery of all vehicles after #2131, with the final vehicle advanced 14 months to 2025 instead of 2027.

Accelerating the retirement of the Breda fleet remains a primary goal. With the the fleet reliability goals met and the reliability trend increasing, the LRV4 team recommends full approval of the production acceleration activities, and pursuit of the early fleet replacement plan.

These Modification No. 7 changes will not increase the overall term of the Contract. Timely execution of this Modification allows for the adoption of a compressed Project Delivery Schedule (Exhibit 3 to Modification No. 7).

STAKEHOLDER ENGAGEMENT

Throughout the project, the LRV4 team has worked with numerous stakeholder groups, including rail maintenance, transit management, transit operators, Safety, Accessible Services, Communications, as well as the Citizen's Advisory Council, the Multimodal Accessibility Advisory Committee, and the general public. As part of the original outreach process in 2014, the LRV4 team conducted a public survey of more than 8,000 participants to gather input to prioritize passenger comfort features of the LRV. In addition, a full scale mock-up of half a vehicle was built and used to gather input from several stakeholder groups, including operators, maintenance personnel, Accessible Services, and the general public. This feedback was used to determine key design features on the vehicles.

During the length of testing, commissioning, and acceptance of the Phase 1 expansion fleet, the LRV4 project team worked closely with SFMTA light rail operators and maintenance staff to identify areas of improvement. This feedback was solicited through informal conversations, anonymous staff surveys, and through formal reporting processes. The results of this feedback was the subject of multiple discussions with Local 250A, and several improvements were determined through an iterative prototyping process. Many of the items included in this change order are the result of this feedback and process. Additional enhancements related to the operator cab layout and operator controls are being prepared for inclusion in a subsequent Modification.

In January 2019, in response to public comment after the first LRV4 cars began revenue service, the SFMTA undertook a second round of public outreach to determine what changes may be desired to the interior configuration of the vehicle. The SFMTA conducted an intercept survey of SFMTA passengers and hosted two focus groups that gathered valuable information about rider satisfaction with the new LRV fleet. While the responses to the survey were overwhelmingly positive, the project team endeavored to address areas of passenger comfort identified through this outreach.

Using the feedback from public outreach, the SFMTA developed three primary passenger comfort update scenarios, which were subsequently presented to the SFMTA Board, the SFMTA Community Advisory Committee, the SFMTA Finance and Administration Committee, and the SFMTA Multimodal Advisory Committee for their input. The SFMTA also shared these three design options with the general public through the publication of a blog post on the SFMTA website, which included images of the three options. The SFMTA Communications team continued to solicit feedback via 311, Twitter, other social media applications, and email. Based on stakeholder feedback, the SFMTA is proceeding with the interior design configurations detailed above.

ALTERNATIVES CONSIDERED

The Agency considered the continuation of the procurement without the design enhancements and passenger interior reconfiguration as detailed above. The design enhancements included in this Modification reduce maintenance costs, improve operational functionality, and eliminate the need for future retrofits.

The Agency also conducted a cost-benefit analysis to identify the financial and operational benefits and liabilities of the Continued Production Acceleration Activities. The passenger

interior reconfiguration was weighed against a no-change alternative but was rejected because it was non-responsive to stakeholders. The replacement of the LRV fleet is an identified need within the Capital Plan and was determined among the various project alternatives to have the greatest immediate impact on light rail system performance. The benefits of accelerating the LRV replacement by speeding up the production rate and shrinking the delivery window include:

- Reduction of operating and maintenance costs
- Minimizing further investments in the existing LRV2/3 fleet
- Minimizing the time, cost and complexity of operating a mixed fleet of vehicles
- Introducing more reliable trains in service sooner

Should the SFMTA choose to abandon the early fleet retirement plan and not pursue continued production acceleration activities, Siemens woul be responsible for delivering the vehicles according to the original non-compressed schedule, with completion in 2027. As mentioned above, staff does not recommend this alternative due to the maintenance and reliability problems being experienced with the Breda fleet.

FUNDING IMPACT

Contract Cost

The total cost of Modification No. 7 is $43,514,046.

Contract Modification No. 6 allocated the Contract values and allowances as shown in the Table below.

	Value	Escalation Allowance	Total
Base 175	$ 648,632,001	$133,300,188	$ 781,932,189
Option 1 - 40 Cars (Exercised in Mod 1)	$ 161,134,617	$810,360	$161,944,977
Option 2 - 45 Cars (Not yet exercised)	$ 149,805,495	$53,230,995	$203,036,490
Modifications (2-6)	$45,737,921		$45,737,921
Total	$ 1,005,310,034	$187,341,543	$ 1,192,651,577

Item 1.1 of the Schedule of Prices of the Contract currently includes a $10,000,000 allowance for "Regulatory-Mandated Changes, Requested Passenger Enhancements and System Modifications Resulting from Changes to Project Interfaces" (Exhibit 1A, Item 1.1). This $10,000,000 allowance will be applied to the applicable Modification No. 7 changes.

Staff has also re-evaluated the escalation allowance, considering various factors including early

exercise of Option 1, the accelerated delivery schedule for Phase 2 vehicles, and lower-than-anticipated escalation rates. The reduction in the escalation allowance, combined with the application of the Allowance Item 1.1 discussed above, allows the items in Contract Modification No. 7 to be added without increasing the overall not-to-exceed Contract amount, as shown in the updated table below. The SFMTA will calculate and finalize escalation for Phase 2 vehicles when the necessary indices are published later this year.

	Value	**Escalation Allowance**	**Total**
Base 175	$638,632,001	$99,786,142	$738,418,143
Option 1: 40 Cars (exercised in Mod. 1)	$161,134,617	$810,360	$161,944,977
Option 2: 45 Cars (not yet exercised)	$149,805,495	$53,230,995	$203,036,490
Modifications Nos. 2 - 6	$45,737,921		$45,737,921
Modification 7	$43,514,046		$43,514,046
Total	$1,038,824,080	$153,827,497	$1,192,651,577

Funding Plan
The current funding plan is provided in the table below.

Funding Source	**Amount**
Prop K Sales Tax	$191,885,171
Revenue Bond	$145,050,650
CCSF - Education Revenue Augmentation Fund (ERAF)	$19,247,904
Regional Measure 3	$7,122,556
Central Subway	$16,800,000
SFMTA Operating	$8,000,000
Federal Transit Administration (FTA)	$526,875,814
Bridge Tolls (Metropolitan Transportation Commission)	$79,838,236
Transit and Intercity Rail Capital Program (TIRCP)	$113,140,000
ERAF or SFMTA Fund Balance	$19,000,000
Total	**$1,126,960,331**

The total Contract amount, including Contract Modification No 6, will be $889,018,585. The funding plan above provides sufficient funding for the Siemens Contract up to and including Contract Modification No. 7, as well as other project administrative costs and sales taxes. Option 2 for 45 LRVs is not included in the funding plan above because the SFMTA has not decided whether to exercise that option.

ENVIRONMENTAL REVIEW

The proposed Contract Modification is subject to the California Environmental Quality Act (CEQA).

On June 19, 2014, the San Francisco Planning Department determined (Case Number 2014.0929E) that the Procurement of New Light Rail Vehicles is statutorily exempt from CEQA as defined in Title 14 of the California Code of Regulations Section 15275(a), which provides an exemption from environmental review for the institution or increase of passenger or commuter service on rail lines already in use.

The vehicles to be used for the Central Subway Project are within the scope of the Central Subway Final Supplemental Environmental Impact Statement/Supplemental Environmental Impact Report (Central Subway SEIS/SEIR), Case No. 1996.281E.

The vehicles to be used to provide enhanced Muni service to the Golden State Warriors Event Center Project are within the scope of the Golden State Warriors Event Center and Mixed Use Development at Mission Bay Blocks 29-32 Final Subsequent Environmental Impact Report (Event Center FSEIR), Case No. 2014.1441E.

The Contract Modification to enhance vehicle design and accelerate production is within the scope of the environmental review discussed above. No new significant effects have been identified, there is no substantial increase in significant effects already identified, and no new mitigation is required.

Copies of the CEQA determination are on file with the Secretary to the SFMTA Board of Directors, and may be found in the records of the Planning Department at 1650 Mission Street in San Francisco, and is incorporated herein by reference.

OTHER APPROVALS RECEIVED OR STILL REQUIRED

The City Attorney has reviewed this item.

RECOMMENDATION

Staff recommends that the SFMTA Board authorize the Director of Transportation to execute Contract Modification No. 7 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles, with Siemens Mobility, Inc., to enhance the vehicle design with passenger comforts and engineering refinements that improve fleet performance; and to advance Phase 2 Production Acceleration Activities for early fleet replacement, for an amount not to exceed $43,514,046, with no increase in the total Contract price, achieved through planned change allowances and a decrease in the escalation allowance; and no increase in the term of the Contract.

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY
BOARD OF DIRECTORS

RESOLUTION No. _____

WHEREAS, In 2014, the SFMTA Board of Directors approved Contract No. 2013-19 with Siemens Industry, Inc. (Siemens) to provide up to 260 Light Rail Vehicles (LRVs), including two options for expansion LRVs (the Contract), all for an amount not to exceed $1,192,651,577, and a term not to exceed 15 years; and,

WHEREAS, The Contract included the replacement of the SFMTA's 151 Breda LRVs, as replacing these older and less reliable vehicles is an established need in the Agency's Capital Plan and will have immediate impact on overall system performance; and,

WHEREAS, On March 31, 2015, the SFMTA Board approved Modification No. 1 to the contract to exercise Option 1 for 40 additional LRVs to be delivered after the Phase 1 delivery of 24 vehicles; and,

WHEREAS, On October 30, 2015, the Director of Transportation, approved Modification No. 2 to the Contract to update the list of approved major suppliers, and clarify Contract language; and,

WHEREAS, On August 16, 2016, the SFMTA Board approved Modification No. 3 to the Contract, which added design changes to provide enhancements to passengers, enable full systems integration, and reduce the life-cycle costs of the LRVs, in the amount of $19,596,728, with no increase in the total Contract price; and,

WHEREAS, On June 17, 2017, the SFMTA Board authorized the Director of Transportation to execute Modification No. 4 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles (LRV4), with Siemens Industry, Inc., to provide four additional LRV4 vehicles for an amount not to exceed $15,875,000, with no increase in the total Contract price and no increase in the overall term of the Contract; and,

WHEREAS, On November 28, 2018, the Director of Transportation approved the assignment of the Contract from Siemens Industry, Inc., to Siemens Mobility, Inc.; and,

WHEREAS, On October 22, 2019, the Director of Transportation, under his delegated authority, executed Contract Modification No. 5 to expedite the design and pilot installation of track brakes to the power trucks as a method to reduce frequency of flat spots on wheels caused by activation of the push button emergency brake in the amount of $466,505, with no increase in the total Contract price; and,

WHEREAS, On November 19, 2019, the SFMTA Board approved Contract Modification No. 6, to enhance the vehicle design with passenger comforts, updated operator cab features, and engineering refinements that improve fleet performance; and to advance Phase

2 long-lead activities to accelerate fleet replacement, for an amount not to exceed $9,799,688, with no increase in the total Contract price, achieved through a decrease in the escalation allowance, and no increase in the term of the Contract; and,

WHEREAS, The proposed Contract Modification No. 7 will further enhance the Phase 1 vehicle design with passenger comforts, including seating changes and engineering refinements that improve overall fleet performance, and will complete the installation of track brakes as a means to reduce flat wheels; and,

WHEREAS, Contract Modification No. 7 will also provide funding for continued production acceleration activities essential to eliminating known risks to future service through the early fleet replacement, and provide related benefits, including the reduction of operating and maintenance costs, minimizing further investments in the existing Breda fleet, and minimizing the complexity of operating a mixed fleet of vehicles; and,

WHEREAS, On June 19, 2014, the San Francisco Planning Department determined (Case Number 2014.0929E) that the Procurement of New Light Rail Vehicles is statutorily exempt from the California Environmental Quality Act (CEQA) as defined in Title 14 of the California Code of Regulations Section 15275(a), which provides an exemption from environmental review for the institution or increase of passenger or commuter service on rail lines already in use; and,

WHEREAS, The vehicles to be used for the Central Subway Project are within the scope of the Central Subway Final Supplemental Environmental Impact Statement/Supplemental Environmental Impact Report (Central Subway SEIS/SEIR), Case No. 1996.281E; and,

WHEREAS, The vehicles to be used to provide enhanced Muni service to the Golden State Warriors Event Center Project are within the scope of the Golden State Warriors Event Center and Mixed Use Development at Mission Bay Blocks 29-32 Final Subsequent Environmental Impact Report (Event Center FSEIR), Case No. 2014.1441E; and,

WHEREAS, The changes in the current Contract Modification are within the scope of the environmental review discussed above; no new significant effects have been identified, there is no substantial increase in significant effects already identified, and no new mitigation is required; and,

WHEREAS, Copies of the CEQA determinations are on file with the Secretary to the SFMTA Board of Directors, and may be found in the records of the Planning Department at 1650 Mission Street in San Francisco, and are incorporated herein by reference; now, therefore, be it

RESOLVED, That the SFMTA Board of Directors has subsequently reviewed the Central Subway SEIS/SEIR and the Event Center FSEIR and finds that since the certification of the two documents, no changes have occurred in the proposed project or in the circumstances under which the project would be implemented that would cause new significant impacts or a

substantial increase in the severity of impacts identified and analyzed in those documents, and that no new information has emerged that would materially change the analysis or conclusions set forth in the two documents; the actions approved herein would not necessitate implementation of additional or considerably different mitigation measures that those identified in those documents; and be it further

RESOLVED, That the SFMTA Board authorizes the Director of Transportation to execute Contract Modification No. 7 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles, with Siemens Mobility, Inc., to enhance the vehicle design with passenger comforts and engineering refinements that improve fleet performance; and to advance Phase 2 production acceleration activities for early fleet replacement, for an amount not to exceed $43,514,046, with no increase in the total Contract price, achieved through planned change allowances and a decrease in the escalation allowance; and no increase in the term of the Contract.

I certify that the foregoing resolution was adopted by the San Francisco Municipal Transportation Agency Board of Directors at its meeting of March 17, 2020.

_____

Secretary to the Board of Directors
San Francisco Municipal Transportation Agency

CITY AND COUNTY OF SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY
ONE SOUTH VAN NESS AVE, 7TH FLOOR
SAN FRANCISCO, CA 94103

MODIFICATION NO. 7 TO AGREEMENT BETWEEN SIEMENS MOBILITY, INC. AND THE CITY AND COUNTY OF SAN FRANCISCO FOR PROCUREMENT OF NEW LIGHT RAIL VEHICLES (LRV4) (SFMTA No. 2013-19)

This Modification No. 7 to Agreement is made and entered into on _____, by and between Siemens Mobility Inc. (Contractor), and the City and County of San Francisco, a municipal corporation (City), acting by and through its Municipal Transportation Agency (SFMTA).

RECITALS

A. On September 30, 2014, the City entered into an agreement with Contractor (Agreement) to provide 175 light rail vehicles (LRVs), together with associated equipment and spare parts, as well as Options for additional LRVs and parts.

B. On March 31, 2015, the City approved Modification No. 1 to the Agreement to exercise Option 1 in accordance with Section 64.1 of the Agreement for 40 additional LRVs to be delivered after the Phase 1 delivery of 24 Vehicles, and to exercise Options for additional Spare Parts and Equipment, in accordance with Sections 64.2, 64.3 and 64.4 of the Agreement.

C. On October 30, 2015, the City approved Modification No. 2 to the Agreement to update the list of approved major suppliers listed in Section 29, clarify the purpose of Item 1.1 (Allowance) in Exhibit 2 of Volume I, and specify the payment structure for changes to the LRVs paid under Item 1.1.

D. On August 16, 2016, the City approved Modification No. 3 to the Agreement to update the list of approved major suppliers, modify radio/CAD/AVL systems on the Vehicles, including related price and payment schedules, provide extra time for delivery of the Vehicles and other project submittals, add a new parent

company guarantee, and make miscellaneous changes to the Technical Specification.

E. On June 20, 2017, the City approved Modification No. 4 to the Agreement to procure four additional LRVs to be delivered after the 24th production LRV, which Vehicles shall be part of the production fleet, conform to all requirements of the Technical Specification, and all prior design approvals and Buy America audits.

F. On November 28, 2018, the SFMTA, through the Director of Transportation, approved an Assignment and Assumption Agreement, assigning the Contract from Siemens Industry, Inc., to Siemens Mobility Inc.

G. On October 22, 2019, the City approved Modification No. 5 to the Agreement to commence design of and expedite the addition of track brakes to the power trucks on eight LRVs as a method to reduce frequency of flat spots on wheels caused by activation of the push button emergency brake.

H. On December 6, 2019, the City approved Modification No. 6 to the Agreement to (i) update the Vehicles with multiple changes and enhancements to improve passenger comfort, operational functionality, and maintainability and fleet reliability; (ii) continue installation of the track brakes on the power trucks begun in Modification No. 5; and (iii) initiate activities in support of an accelerated Phase 2 delivery schedule with a goal for Phase 2 to be completed by 2025; and update parent company corporate guarantees.

I. The SFMTA now wishes to modify the Agreement to (i) further update the Vehicles with changes and enhancements to improve operational functionality and maintainability, including seating changes for increased passenger comfort; (ii) complete installation of the track brakes on the power trucks as planned and begun in Modification No. 5 and continued in Modification No. 6; (iii) complete activities in support of an accelerated Phase 2 delivery schedule to be completed by 2025 as planned and begun in Modification No. 6; and (iv) update parent company corporate guarantees.

Now, therefore, the parties agree that the Agreement shall be modified as follows:

1. *Section 59 (Production Acceleration Activities) of the Agreement is replaced in its entirety with a revised Section 59 to read as follows:*

59. Production Acceleration Activities

59.1. General. The Contractor shall deliver Phase 2 Vehicles on a compressed schedule in accordance with Exhibit 3B, including performing all activities required to lease and establish a second production facility (Satellite Facility), which will be used for

Phase 2 LRV4 carshell frame production and other related activities (Production Acceleration Activities). In the event Contractor uses the Satellite Facility for work for agencies or companies other than the SFMTA, the parties shall conduct an analysis to determine to what extent Price Item 22 may be reduced to account for work that does not benefit the SFMTA. Production Acceleration Activities shall include, but not be limited to:

59.1.1. Facility Lease and Tenant Improvements. The Contractor shall establish the Satellite Facility in the Sacramento Region within 50 miles of the Contractor's French Road facility (Existing Facility), and shall be responsible for all leasing costs, including rent and real estate costs, facility management, insurance, as well as all costs required to mechanically and electrical fit out the Satellite Facility for carshell production to support Phase 2. Any activities required to meet Phase 2 obligations not performed at the Satellite Facility will be performed at the Existing Facility.

59.1.2. Production Equipment. The Contractor shall provide all equipment necessary to support the Phase 2 activities, including, but not limited to, welding fixtures and equipment, cranes, an integration fixture, turning jigs, and other assembly line equipment.

59.1.3. Satellite Facility Management and Supervision. The Contractor shall staff, supervise, and manage the Satellite Facility. The Contractor also shall be responsible for any additional activities and costs resulting from managing dual sites (the Satellite Facility and Existing Facility), including managing the coordination between the two facilities. The Contractor shall provide 24-hour notice to SFMTA representatives for inspections to be performed at the Satellite Facility, consistent with the currently agreed inspection process.

59.1.4. Logistics and Materials Handling. The Contractor shall be responsible for all additional equipment and activities related to dual site receiving and inspection, parts selection, loading, and transportation between the Satellite and Existing Facilities.

59.1.5. Supplier Ramp-Up. The Contractor shall be responsible for all costs and activities related to

changes in supplier delivery location and schedules, including, but not limited to, acceleration costs and supply chain changes resulting from establishing the Satellite Facility.

59.1.6. All Other Associated Acceleration Costs. The Contractor shall be responsible for all industrial engineering or other costs related to the changes in production processes required by the accelerated schedule, including, but not limited to, any changes or additions to production resulting from establishment of the Satellite Facility, testing, and QA documentation.

59.2. Reimbursement. The City shall reimburse the Contractor for the preliminary activities of the Production Acceleration Activities in the amount set forth in Exhibit 1A, Item 21 (Initial Production Acceleration Activities) and Item 22 (Continued Production Acceleration Activities) according to the milestones in Exhibit 2, Item 21 and Item 22. Cost Items 21 and 22 represent the total amount payable to the Contractor in order to accelerate the Phase 2 Vehicle deliveries in accordance with Exhibit 3B (Vehicle Delivery Schedule).

2. *Exhibit 1A (Schedule of Prices) of the Agreement is replaced in its entirety with a new Exhibit 1A (Schedule of Prices), which is attached to this Modification.*

3. *Exhibits 2, 2.1, 2.2, 2.3, and 2.4 (Payment Schedules) of the Agreement are consolidated and replaced by a new Exhibit 2 (Payment Schedule), which is attached to this Modification.*

4. *Exhibit 3 (Project Delivery Schedule) of the Agreement is replaced in its entirety with a new Exhibit 3 (Project Delivery Schedule), which is attached to this Modification.*

5. *Exhibit 6 of the Agreement is modified such that the Contractor shall increase the existing Parent Company Guarantees to reflect the increase in the Contract Amounts for each one, respectively, as follows: The amount of the guarantees (or reduced amount, if applicable) shall be increased by $2,892,319 for the 24 Base Order Vehicles (Guarantee number 466742), $4,820,532 for the Option 1 Vehicles (Guarantee number 484678), $482,053 for the Phase W Vehicles (Guarantee number 556963) and by $35,319,221 for the Phase 2 Vehicles (Guarantee number 634590) until the work is complete. To facilitate increases to the existing Guarantees, Contractor shall execute amended Guarantees upon execution of this Modification.*

6. *A new Exhibit 8 (Modification No. 7 Change Orders) is added to the Agreement and is attached to this Modification*. Exhibit 8 lists all change orders that are incorporated into this Modification. Change Order Nos. 28, 33 and 34 require modifications to the Technical Specification (see Sections 8, 9, 10, and 12 of this Modification).

Change Order Nos. 29-32, 35-40 are changes requested by the SFMTA after the First Article Inspection (FAI) process in Section 20.9.3 of the Technical Specification (FAI Changes). The Contractor agrees to perform the following FAI Changes:

A. Change Order 29 (Passenger Information Signs (PIS)) – Multiple PIS enhancements that update the technology consistent with evolving performance needs and expectations.

B. Change Order 30 (Train Digital Recorder (TDR6) Hard Disk Drive (HDD) Unmounted) – The train operator display (TOD) shall display a message when the TDR6 HDD is unmounted to assist maintenance, troubleshooting, and verifying readiness for service.

C. Change Order 31 (Restrain Corner Hatch at the End of Travel) – The corner hatch shall be modified to prevent it from quickly opening when unlocked.

D. Change Order 32 (Replace Door Touch Strips with Push Button) – On Phase 2 Vehicles only, each doorway shall have "keep door open" push buttons instead of the touch strips installed on the Phase 1, Phase W, and Option 1 Vehicles.

E. Change Order 35 (Provisions for Ease of Tire Replacement) – Wheel hubs specified in this change will be designed with a hole pattern to be approved by the SFMTA, to facilitate use with shop equipment.

F. Change Order 36 (PIS-40 A-Pattern Change) – The PIS system and CAD/AVL system shall be modified to allow remote and manual changes to information displays at any time.

G. Change Order 37 (Track Brake Installation) – Install track brakes on power trucks on all Phase 2 Vehicles.

H. Seating Arrangement Changes

All interior passenger seating shall be changed on all Vehicles. Individual passenger seats shall replace bench seats and flip seats, and the interior of the Vehicle shall have both longitudinal passenger seating (facing the center of the Car) and transverse seating (forward-facing). Stanchions and other interior features shall also be reconfigured to provide more stanchions, hand-holds, and passenger stop request buttons.

- H1 - Change Order 38 (Interior Seating – Single Transverse Retrofit – 68 Vehicles) – The retrofit of Phase 1, Option 1, and Phase W Vehicles (Cars 1-68) shall consist of the

removal of current seating, and installation of new seats as described above. This layout shall have areas of single transverse seats, as approved by the SFMTA.

- H2 - Change Order 39 (Interior Seating – Single Transverse – 50 Vehicles) – The implementation of the redesigned seating configuration for the first 50 Vehicles of Phase 2 (cars 69-118) shall follow the same redesign as the retrofit of Phase 1, Option 1, and Phase W Vehicles described in Change Order 38.
- H3 - Change Order 40 (Interior Seating — Double Transverse – 101 Vehicles) – The implementation of the redesigned seating configuration to Phase 2 Vehicles after the first 50 Vehicles (Cars 119-219) shall include areas of double-wide transverse seats, as approved by the SFMTA.

These activities will be compensated according to the payment milestones shown in Exhibit 2. These activities shall be completed as provided in Exhibit 3A.

7. *Section 2.2.2 of the Technical Specification (Seating Arrangement), subsection 3 is replaced in its entirety to read as follows:*

3. A minimum of 60 passenger seats per LRV is preferred, to the extent feasible. Contractor shall provide a minimum of 12 transverse seats per Vehicle. The final seating arrangement of each LRV is subject to the approval of the SFMTA.

8. *Section 6.3.2.2 of the Technical Specification (Exterior Manual Emergency Door Release) is modified to add a new subsection 3 to read as follows*:

3. If the door release is located behind an access panel, the access panel shall lock when pushed closed.

9. *Section 6.3.4.2 of the Technical Specification (Crew Switches) is modified to add a new subsection 2 to read as follows*:

2. If the crew switch is located behind an access panel, the access panel shall be lock when pushed closed.

10. *Section 9.2.4 of the Technical Specification (Convenience Outlets) is modified to add a new subsection 3 to read as follows:*

3. Convenience outlets located within the passenger area shall be protected by means of a lockable cover.

11. *Section 22.2.6 of the Technical Specification (Training) is modified to add a new subsection 22.2.6.8 to read as follows* :

22.2.6.8 Contractor shall provide additional training to supplement and extend base training. Training modules and schedules will be mutually agreed to by the SFMTA and Contractor.

12. *Section 23.3.1 of the Technical Specification (Fare Collection) is modified to add a new subsection 2 to read as follows*:

2. Phase 2 Vehicles shall include prewiring for four additional Clipper® passenger devices, so that there is wiring for one passenger device at each doorway.

13. ***Release***. Contractor acknowledges and agrees that the amounts agreed for the work described in Modifications Nos. 1-6 and this Modification No. 7 shall be full accord and satisfaction for all past, current and prospective costs incurred in connection with Contractor's performance of all work for all executed Modifications up to and including the work covered under this Modification No. 7, without limitation, including any and all markups and overhead. If this modification involves the granting of an extension of time, with or without cost, Contractor releases the City from all claims and costs associated with such extension of time. Said costs may include, but are not limited to, costs for labor, materials, equipment, disruption, lost productivity, escalation, delay, extended overhead, administration and extended performance time. Contractor releases the City from all claims for which full accord and satisfaction is made, as set forth above. Notwithstanding the foregoing, this Release does not apply to work associated with change orders that are currently under discussion between Contractor and the City at the time of this Modification. This paragraph replaces the release paragraphs in Modification Nos. 1, 2, 3, 4, 5 and 6.

14. ***Effective Date.*** Each of the amendments set forth above shall be effective on and after all parties have signed the Amendment.

15. ***Legal Effect***. Except as expressly modified by this Modification No. 7, all other terms and conditions of the Contract remain unchanged and in full force and effect.

IN WITNESS WHEREOF, the parties hereto have entered into and executed this Modification No. 7 on the date set forth on page 1 above.

CITY

San Francisco Municipal Transportation Agency

_____
Jeffrey P.Tumlin
Director of Transportation

San Francisco Municipal Transportation Agency
Board of Directors
Resolution No.
Dated: March 17, 2020

Attest:

_____
Secretary

Approved as to Form:

Dennis J. Herrera
City Attorney

By: _____
Robin M. Reitzes
Deputy City Attorney

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Attachments
Exhibit 1A – Schedule of Prices
Exhibit 2 – Payment Schedule
Exhibit 3 – Project Delivery Schedules
Exhibit 8 – Modification No. 7 Change Orders

CONTRACTOR

Siemens Mobility, Inc.

_____
Michael Cahill
President

_____
Christopher Halleus
Vice President, FBA

City vendor number: 50009
Federal Taxpayer ID No.13-2762488

EXHIBIT 1A
Schedule of Prices

BASE

ITEM	ORIGINAL CONTRACT/ MOD NO.	DESCRIPTION	UNIT PRICE	QUANTITY	EXTENDED PRICE [4]
Item 1	Original	Engineering Design, Project Management and Design Qualification Testing	Lump Sum		$37,541,102
Item 1.1	Original, Mod 2, Mod 7 adjustment	Allowance for (a) regulatory mandated changes, (b) passenger enhancements, and (c) system modifications in order for Vehicle to interface with other SFMTA projects (e.g., radio project)	Lump Sum		$0[1]
Item 2.1	Mod 1	Vehicle Price for Base Order Phase 1	$3,327,250	24 Cars	$79,854,000
Item 2.2	Mod 1	Vehicle Price for Base Order Phase 2	$3,327,250 [2]	151 Cars	$502,414,750
Item 3	Original	Operating, Maintenance and Parts Manuals	Lump Sum		$809,478
Item 4.1	Original	Training	Lump Sum		$361,557
Item 4.2	Original	Train Simulator (1) (In accordance with Section 22.2.8 of Technical Specifications)	Lump Sum		$1,704,650
Item 5.1	Mod 1	Spare Parts (Total of Exhibit 1.B, Phase 1)	Lump Sum		$14,153,840
Item 5.2	Mod 1	Spare Parts (Total of Exhibit 1.B, Phase 2) [2] [5]			
Item 6	Original	Special Tools, Test and Diagnostic Equipment (Total of Exhibit 1.D)	Lump Sum		$1,792,624
Item 7.1	Mod 1	Option 1 for 40 Additional New Light Rail Vehicles	$3,349,270 [3]	40 Cars	$133,970,800

Item 8.1	Mod 1	Additional Spare Parts (Exhibit 1.C Phase 1) [5]	Lump Sum		$11,269,527
Item 8.2	Mod 1	Additional Spare Parts (Exhibit 1.C Phase 2) [25]			
Item 9	Mod 1	Spare parts for Option Cars[2] [5]	Lump Sum		$15,000,000
Item 10	Mod 1	Train Simulator (2) (In accordance with Section 22.2.8 of Technical Specifications) [2]	Lump Sum		$1,704,650
Item 11	Mod 3	Modification No. 3 (Non-Recurring Costs)			
Item 11.1	Mod 3	Engineering	Lump Sum		$6,128,416
Item 11.2	Mod 3	SIBAS Expert 2 Monitoring and Diagnostic Software	Lump Sum		$71,000
Item 12	Mod 3	Modification No. 3 (Base Recurring Costs)			
Item 12A	Mod 3	Base Phase 1	$62,313 [6]	24 Cars	$1,495,514
Item 12B	Mod 3	Base Phase 2	$62,313 [2] [6]	151 Cars	$9,409,275
Item 13	Mod 3	Modification No. 3 Option 1 (Recurring Costs)	$62,313 [6]	40 Cars	$2,492,523
Item 14	Mod 4	Modification No. 4 (Vehicle Price for Phase W)	$3,968,750[3]	4 Cars	$15,875,000
Item 15	Mod 5	Track Brakes Phase 1			
Item 15.1	Mod 5	Non-recurring Costs for track brake, including engineering, testing, and updates to manuals.	Lump Sum		$286,617
Item 15.2	Mod 5	Installation of track brakes on 8 Phase 1 Cars.	$22,486	8 Cars	$179,888
Item 16	Mod 6	Weight Incentives	TBD	TBD	TBD
Item 17	Mod 6	Non Recurring Engineering Costs			
Item 17.1	Mod 6	Phase 1, Option 1, Phase W Engineering Costs for Changes 8 – 25	Lump Sum		$492,738

Item 17.2	Mod 6	Phase 2 Preliminary Design Work, Single Transverse Seat	Lump Sum	1	$714,694
Item 17.3	Mod 6	Phase 2 Preliminary Design Work, Double Transverse Seat	Lump Sum	1	$159,140
Item 18	Mod 6	Recurring Costs Phase 1, Option 1, Phase W			
Item 18.1	Mod 6	Modifications Performed at Siemens Facility (Change Orders 8 - 11)	$11,179	68 Cars	$760,172
Item 18.2	Mod 6	Modifications Performed at SFMTA (Change Orders 12 - 24)	$2,284	68 Cars	$155,312
Item 19	Mod 6	Recurring Costs for Phase 2 (Change Orders 9 - 24)	$4,172 [2]	151 Cars	$629,972
Item 20	Mod 6	Track Brake Installation on 60 Phase 1, Option 1, Phase W Cars	$21,411	60 Cars	$1,284,660
Item 21	Mod 6	Initial Production Acceleration Activities	Lump Sum	1	$5,603,000
Item 22	Mod 7	Continued Production Acceleration Activities	Lump Sum	1	$19,899,553
Item 23	Mod 7	Engineering Costs for Modification 7 (Change Orders 28-36, 38-40)	Lump Sum	1	$2,809,279
Item 24	Mod 7	Phase 1, Option 1, and Phase W Recurring Costs Modifications Performed at SFMTA (Change Orders 28, 30, 31, 33)	$3,472	68 Cars	$236,096
Item 25	Mod 7	Phase 1, Option 1, and Phase W Vehicle Interior Redesign Modification Performed at SFMTA (Change Order 38)	$109,998	68 Cars	$7,479,864
Item 26	Mod 7	Recurring Costs for Phase 2	$67,552	50 Cars	$3,377,600

		Modification 7 (50 LRVs 69-118) (Change Order 28, 31, 32, 33, 34, 35, 37, 39)			
Item 27	Mod 7	Recurring Costs for Phase 2 Modification 7 (101 LRVs 119-219) (Change Order 28, 31, 32, 33, 34, 35, 37, 40)	$86,254	101 Cars	$8,711,654
Item 28	Mod 7	Additional Training Allowance	Lump Sum	1	$1,000,000
				SUBTOTAL	**$889,828,945**

Option

ITEM	CONTRACT MOD.	DESCRIPTION	UNIT PRICE	QUANTITY	EXTENDED PRICE [4]
Item 7.2	Mod 1	Option 2 for 1 to 45 Additional New Light Rail Vehicles	$3,329,011[2]	45 Cars	$149,805,495

Escalation

ITEM	CONTRACT MOD.	DESCRIPTION	UNIT PRICE	QUANTITY	EXTENDED PRICE [4]
Allowance	Original, Mod 6, Mod 7 adjustment	Allowance for Escalation in accordance with Agreement, Section 7.5	n/a	n/a	$ 153,017,137

Not to exceed CONTRACT LIMIT	**$1,192,651,577**

Notes:
[1] Allowance used and incorporated into Contract Modificaton No. 7, Items 26 and 27.
[2] This price does not include escalation. Escalation will be applied in accordance with Section 7.5 of the Agreement.
[3] Price includes escalation.
[4] Prices do not include sales taxes.
[5] The prices of Spare Parts (recorded in Exhibits 1B and 1C Nominal Spare Parts) which are affected by the changes (Trucks, Wheels, Seats) in Modification 7 will be adjusted to reflect the cost of those changes as presented in the Change Orders.
[6] Extended price reflects the Change Order, unit price is rounded.

Exhibit 2
PAYMENT SCHEDULE

(All Item references are to Exhibit 1.A)

Item 1 - Engineering Design, Project Management and Design Qualification Testing

	Milestone	Percent of Bid Item
A	Submittal and Approval of Test Program, System Safety, Reliability, Maintainability and other plans as negotiated with SFMTA	2%
B	Completion and Approval of Preliminary Design Review	2%
C	Completion and Approval of Final Design Review	35%
D	Completion and Approval of Vehicle Performance Qualification Testing	30%
E	Completion and Approval of Test Program as specified	26%
F	Completion and Approval of all Contract Requirements (Retention)	5%
	Total for Item 1	100%

Item 2 – Vehicle Price for Base Contract

Item 2A – Vehicle Price for Base Contract (Cars 1 - 24)

	Milestone	Percent of Bid Item
A	Placement of contracts with the following major subcontractors (Cars 1 - 24).* • Propulsion • Friction Brake • Air Comfort • Door Operators & Controls • Carbody • Train Control • Coupler • Communication	2%
B	Delivery of complete set of subsystems to site of installation.	20%/Vehicle
C	Vehicle structure complete and ready for shipment to final assembly site	20%/Vehicle

	Milestone	Percent of Bid Item
D	SFMTA Acceptance for shipment of Vehicle from final assembly site to SFMTA property	25%/Vehicle
E	Conditional Acceptance of Vehicle by SFMTA	30%/Vehicle
F	Completion and Approval of all Contract Requirements for Phase 1 (Retention)	3%
	Total for Item 2A	100%

* Payment will be made only to the extent that deposits have been paid to suppliers and up to the amount of the deposits or 2%, whichever is the lesser value; in addition Contractor must provide security for payment under Section 7.3 of the Agreement.

Item 2B – Vehicle Price for Base Contract (Cars 25 - 175)

Item 2B.1 – Vehicle Price for Base Contract (applies to 107 of 151 Phase 2 Vehicles)

	Milestone	Percent of Bid Item
A	Placement of contracts with the following major subcontractors (Cars 25 - 175).* • Propulsion • Friction Brake • Air Comfort • Door Operators & Controls • Carbody • Train Control • Coupler • Communication	2%
B	Delivery of complete set of subsystems to site of installation.	20%/Vehicle
C	Vehicle structure complete and ready for shipment to final assembly site	20%/Vehicle
D	SFMTA Acceptance for shipment of Vehicle from final assembly site to SFMTA property	25%/Vehicle
E	Conditional Acceptance of Vehicle by SFMTA	30%/Vehicle
F	Completion and Approval of all Contract Requirements for phase 2 (Retention)	3%
	Total for Item 2B.1	100%

Item 2B.2 – Vehicle Price for Base Contract (applies to 44 accelerated Vehicles of 151 Phase 2 Vehicles) **

	Milestone	Percent of Bid Item
A	Placement of contracts with the following major subcontractors (Cars 25 - 175).* • Propulsion • Friction Brake • Air Comfort • Door Operators & Controls • Carbody • Train Control • Coupler • Communication	2%
B	Delivery of complete set of subsystems to site of installation.	35%/Vehicle
C	Vehicle structure complete and ready for shipment to final assembly site	20%/Vehicle
D	SFMTA Acceptance for shipment of Vehicle from final assembly site to SFMTA property	20%/Vehicle
E	Conditional Acceptance of Vehicle by SFMTA	20%/Vehicle
F	Completion and Approval of all Contract Requirements for phase 2 (Retention)	3%
	Total for Item 2B.2	100%

* Payment will be made only to the extent that deposits have been paid to suppliers and up to the amount of the deposits or 2%, whichever is the lesser value; in addition, Contractor must provide security for the payment, as required under Section 7.3 of the Agreement.

** 44 of 151 Phase 2 Vehicles are classified as “accelerated” and shall apply to every other Vehicle to be delivered after the 63rd Vehicle of Phase 2 (Phase 2 Cars 65, 67, 69, etc.) unless otherwise agreed between the Parties.

Item 3 - Operating, Maintenance and Parts Manuals

	Milestone	Percent of Bid Item
A	Acceptance of Draft Manuals	5%
B	Delivery and Acceptance of Operating, Maintenance and Parts Manuals	90%
C	Completion and Approval of all Contract Requirements (Retention)	5%
	Total for Item 3	100%

Item 4 – Training and Train Simulator

Item 4.1 – Training

	Milestone	Percent of Bid Item
A	Completion of Training Program and delivery and acceptance of all deliverables	95%
B	Completion and approval of all Contract Requirements (Retention)	5%
	Total for Item 4	100%

Item 4.2 – Train Simulator

	Milestone	Percent of Bid Item
A	Delivery and Acceptance of Train Simulator	95%
B	Completion and Acceptance of all Contract Requirements (Retention)	5%
	Total for Item 4.2	100%

Item 5 - Spare Parts

	Milestone	Percent of Bid Item
A	Delivery and acceptance of spare parts. Delivery and payment will be on a line-item basis.	95%
B	Completion and approval of all Contract Requirements (Retention)	5%
	Total for Item 5	100%

Item 6 – Special Tools, Test and Diagnostic Equipment

	Milestone	Percent of Bid Item
A	Delivery and acceptance of Diagnostic Test Equipment, Special Tools, Bench Test Equipment	95%
B	Completion and approval of all Contract Requirements (Retention)	5%
	Total for Item 6	100%

Item 7 - Option for 1 to 85 Additional New Light Rail Vehicles

Item 7.1 - Option 1 for 40 Additional New Light Rail Vehicles
Progress payments will be made in accordance with Item 2A

Item 7.2 – Option 2 for 1 to 45 Additional New Light Rail Vehicles
Progress payments will be made in accordance with Item 2B.1

Item 8 – Additional Spare Parts
Progress payments will be made in accordance with Item 5.

Item 9 – Spare Parts for Options
Progress payments will be made in accordance with Item 5.

Item 10 – Train Simulator
Progress payments will be made in accordance with Item 4.2.

Item 11 - Modification No. 3 Work (Non-Recurring Costs)

Item 11.1 – Engineering

	Milestone	Percent of Bid Item
A	Conceptual Design Review / Preliminary Design Review / Plan	20%
B	Final Design Review	40%
C	First Article Inspection	20%
D	System Acceptance Test	15%
E	Completion and Approval of all Contract Requirements (Retention)	5%
Total for Item 11.1		100%

Item 11.2 – SIBAS Expert 2 Monitoring and Diagnostic Software

	Milestone	Percent of Bid Item
A	Delivery and acceptance of SIBAS Expert Software	62%
B	Completion by SFMTA of two SIBAS Expert Training Sessions	33%
C	Completion and Approval of all Contract Requirements (Retention)	5%
Total for Item 11.2		100%

Item 12 - Modification No. 3 (Base Recurring Costs)

Item 12A – Base Phase 1

	Milestone	Percent of Bid Item
A	Delivery to site of installation of equipment required by Modification No. 3	42%
B	SFMTA Acceptance for shipment from final assembly site to SFMTA property of Vehicle with equipment Installed as required for Phase 1	25%
C	SFMTA Conditional Acceptance of Vehicle with equipment installed as required for Phase 1	30%
D	Completion and Acceptance of all Contract requirements for Phase 1 (Retention)	3%
Total for Item 12A		100%

Item 12B – Base Phase 2

	Milestone	Percent of Bid Item
A	Delivery to site of installation of equipment required by Modification No. 3	42%
B	SFMTA Acceptance for shipment from final assembly site to SFMTA property of Vehicle with equipment installed as required for Phase 2	25%
C	SFMTA Conditional Acceptance of Vehicle with equipment installed as required for Phase 2	30%
D	Completion and Acceptance of all Contract requirements for Phase 2 (Retention)	3%
Total for Item 12B		100%

Item 13 – Option 1 (Recurring Costs)

	Milestone	Percent of Bid Item
A	Delivery to site of installation of equipment required for Option 1	42%
B	SFMTA Acceptance for shipment from final assembly site to SFMTA property of Vehicle with equipment installed as required for Option 1	25%
C	SFMTA Conditional Acceptance of Vehicle with equipment installed as required for Option 1	30%
D	Completion and Acceptance of all Contract requirements for Option 1 (Retention)	3%
Total for Item 13		100%

Item 14 - Contract Modification 4: Vehicle Price for Phase W

	Milestone	Percent of Bid Item
A	Placement of contracts with the following major subcontractors (Cars 25 – 28).* • Propulsion • Friction Brake • Air Comfort • Door Operators & Controls • Carbody • Train Control • Coupler • Communication	2%
B	Delivery of complete set of subsystems to site of installation.	20%/Vehicle
C	Vehicle structure complete and ready for shipment to final assembly site	20%/Vehicle
D	SFMTA Acceptance for shipment of Vehicle from final assembly site to SFMTA property	25%/Vehicle
E	Conditional Acceptance of Vehicle by SFMTA	30%/Vehicle
F	Completion and Approval of all Contract Requirements for Phase W (Retention)	3%
Total for Item 14		100%

* Payment will be made only to the extent that deposits have been paid to suppliers and up to the amount of the deposits or 2%, whichever is the lesser value; in addition Contractor must provide security for payment under Section 7.3 of the Agreement.

Item 15 - Modification No. 5 Work

Item 15.1 – Non-Recurring Costs

	Milestone	Percent of Bid Item
A	Submittal and approval of engineering submittals and test documentation and manuals for additional track brakes on power trucks	100%

Item 15.2 – Vehicle Installation

	Milestone	Percent of Bid Item
A	Installation, testing, and Acceptance of track brakes on power trucks on 8 LRVs	100%

Item 16 – Weight Incentives – *Actual amount will be determined according to Section 19.2 of the Agreement.*

Item 16.1 – Phase 1, Option 1, and Phase W Weight Incentives

	Milestone	Percent of Bid Item
A	SFMTA Acceptance for shipment of Vehicle 2068 from final assembly site to SFMTA	100%

Item 16.2 – Phase 2 Weight Incentives

	Milestone	Percent of Bid Item
A	SFMTA Acceptance for shipment of Vehicle from final assembly site to SFMTA	100%

Item 17 – Non-Recurring Engineering Costs for Modification No. 6 Work

Item 17.1 – Phase 1, Option 1, and Phase W Non-Recurring Engineering

	Milestone	Percent of Bid Item
A	Submittal and Approval of Design Documentation for Change Orders 8 – 11	55%
B	Submittal and Approval of Field Modification Instructions and/or Design/Software Documentation for Change Orders 12 – 24	45%

Item 17.2 – Phase 2 Preliminary Design Work, Single Transverse Seat

	Milestone	Percent of Bid Item
A	Submittal and Approval of Preliminary Design Review for Change Order 26 - Single Transverse Arrangement	75%
B	Submittal and Approval of Final Design Review for Change Order 26 - Single Transverse Arrangement	25%

Item 17.3 – Phase 2 Preliminary Design Work, Double Transverse Seat

	Milestone	Percent of Bid Item
A	Submittal and Approval of Carshell Analysis for Change Order 27 - Double Seat Arrangement	100%

Item 18 – Recurring Costs for Modification No. 6 – Phase 1

Item 18.1 – Modifications Completed at Siemens Facility

	Milestone	Percent of Bid Item
A	Completion of Installation of Modifications for Change Orders 8 -11 Phase 1, Option 1, and Phase W Cars	100%

Item 18.2 – Modifications Completed at SFMTA

	Milestone	Percent of Bid Item
A	Completion of Installation of Modifications for Change Orders 12 - 24 for Phase 1, Option 1, and Phase W Cars	100%

Item 19 – Recurring Costs for Modification No. 6 – Phase 2

	Milestone	Percent of Bid Item
A	Completion of Installation of Modifications for Change Orders 9 - 24 for Phase 2 Cars	100% per Vehicle

Item 20 – Track Brake Modifications

	Milestone	Percent of Bid Item
A	Completion of Installation of Modifications for Track Brakes in 28 Cars (Change Order 25)	33%
B	Completion of Installation of Modifications for Track Brakes in 48 Cars (Change Order 25)	33%
C	Completion of Installation of Modifications for Track Brakes in 68 Cars (Change Order 25)	34%

Item 21 – Initial Production Acceleration Activities

	Milestone	Percent of Bid Item
A	Occupation and Fit Out of Satellite Facility	50%
B	Completion of Installation of Major Equipment Items (Crane, Integration and Lifting/Turning Equipment) at Satellite Facility	50%

Item 22 – Continued Production Acceleration Activities

	Milestone	Percent of Bid Item
A	Commencement of Carshell Production	20%
B	Completion of First Carshell	10%
C	Vehicle Assembly Readiness – Paint Booth, Test Pit Installed	10%
D	Shipment of First Phase 2 Vehicle	10%
E	Recurring Amounts paid evenly in quarterly increments June 2020 to December 2025	50%

Item 23 – Non-Recurring Engineering Costs for Modification No. 7 Work

	Milestone	Percent of Bid Item
A	Approval of Field Modification Instructions for Vehicle Interior Retrofit and Reconfiguration, Single Transverse, Change Orders 38 and 39	20%
B	Approval of Final Design Review and Testing for Vehicle Interior Redesign, Double Transverse, Change Order 40	40%
C	PIS Software releases (Change Orders 29, 36) and Field Modification Instructions, Software Releases, or Engineering Documentation for all other (non-interior) Change Orders (Change Orders 28, 30-35)	40%

Item 24 – Recurring Costs for Modification No. 7 – Phase 1, Option 1, Phase W

	Milestone	Percent of Bid Item
A	Completion of Installation of Modifications in 34 Cars for Change Orders 28, 30, 31, 33 Phase 1, Option 1, Phase W Cars	50%
B	Completion of Installation of Modifications in 34 Cars for Change Orders 28, 30, 31, 33 Phase 1, Option 1, Phase W Cars	50%

Item 25 – Recurring Costs for Modification No. 7 – Vehicle Interior Redesign Phase 1, Option 1, Phase W

	Milestone	Percent of Bid Item
A	Completion of Retrofit of Vehicle Interior for Change Order 38 Phase 1, Option 1, Phase W	100% per Vehicle

Item 26 – Recurring Costs for Modification No. 7 – 50 Phase 2 Vehicles, 69-118 (Change Orders 28, 31-35, 37, 39)

Progress Payment will be made in accordance with Exhibit 2, Item 2B.1

Item 27 – Recurring Costs for Modification No. 7 – 101 Phase 2 Vehicles, 119-219 (Change Orders 28, 31-35, 37, 40)

Progress Payments will be made in accordance with Exhibit 2, Item 2B.1 and 2B.2 according to Vehicle number.

Item 28 – Additional Training Allowance

	Milestone	Percent of Bid Item
A	Delivery and Acceptance of Training – Payment will be on a per module basis	100% per Module

EXHIBIT 3
PROJECT DELIVERY AND VEHICLE DELIVERY SCHEDULE

A. Project Delivery Schedule

Item	Date
Notice To Proceed	9/30/2014
Project Plan	11/29/2014
Training Start	4/17/2017
Training Complete	8/15/2017
Special Tools / Diagnostic Test Equipment	4/17/2017
Delivery of Publications (Manuals, Parts Book, Drawings) - Prelim	2/16/2017
Delivery of Publications (Manuals, Parts Book, Drawings) - Final	11/13/2017
Delivery of Spare Parts (Phase 1)	8/15/2017
Contract Mod 5, Item 15.1 Completion of Engineering for Additional Track Brakes	9/30/2019
Contract Mod 5, Item 15.2 Installation of Additional Track Brakes on 8 Vehicles	10/31/2019
Contract Mod 6, Item 17.1 A – Phase 1, Option 1, Phase W Non-Recurring Engineering, Submittal of Design Documentation for Change Orders 8 – 11	5/31/2017
Contract Mod 6, Item 17.1 B – Phase 1, Option 1, Phase W Non-Recurring Engineering, Submittal of Field Modification Instructions and or Software/ Design Documentation for Change Orders 12 – 24	1/3/2020
Contract Mod 6, Item 17.2 A - Phase 2 Preliminary Design Work, Single Transverse Seat, Completion of Preliminary Design Review for Change Order 26 - Single Transverse arrangement	1/24/2020
Contract Mod 6, Item 17.2 B - Phase 2 Preliminary Design Work, Single Transverse Seat, Completion of Final Design Review for Change Order 26 - Single Transverse arrangement	3/15/2020
Contract Mod 6, Item 17.3 A – Phase 2 Preliminary Design Work, Double Transverse Seat, Submittal of Carshell Analysis for Change Order 27 - Double Seat Arrangement	2/28/2020
Contract Mod 6, Item 18.1 A – Modifications Completed at Siemens Facility, Completion of Installation of modifications for Change Orders 8 -11 Phase 1, Option 1, Phase W Cars	10/8/2019
Contract Mod 6, Item 18.2 A – Modifications Completed at SFMTA, Completion of Installation of modifications for Change Orders 12 - 24 for Phase 1, Option 1, Phase W Cars	10/1/2020
Contract Mod 6, Item 19 A – Recurring Costs for Modification\6 – Phase 2, Completion of Installation of modifications for Change Orders 8 - 24 for Phase 2 Cars	Per Phase 2 Vehicle Delivery
Contract Mod 6, Item 20.1 A – Retrofit Track Brakes in 60	2/15/2020

Cars Phase 1, Option 1, Phase W, Completion of Installation of modifications for Track Brakes in 28 Cars (Change Order 25)	
Contract Mod 6, Item 20.1 B – Retrofit Track Brakes in 60 Cars Phase 1, Option 1, Phase W, Completion of Installation of modifications for Track Brakes in 48 Cars (Change Order 25)	3/15/2020
Contract Mod 6, Item 20.1 C – Retrofit Track Brakes in 60 Cars Phase 1, Option 1, Phase W, Completion of Installation of modifications for Track Brakes in 68 Cars (Change Order 25)	4/15/2020
Contract Mod 6, Item 21 A – Production Acceleration, Occupation of Facility, Change Order 28	11/30/2019
Contract Mod 6, Item 21 B – Production Acceleration, Completed Installation of Major Equipment Items (Crane, Integration and Lifting/turning equipment) Change Order 28	3/31/2020
Delivery of Spare Parts (35% of Phase 2 Quantity)	5/15/2021
Delivery of Spare Parts (35% of Phase 2 Quantity)	With Delivery of 50th Vehicle (Phase 2)
Delivery of Spare Parts (30% of Phase 2 Quantity)	With Delivery of 100th Vehicle (Phase 2)
Acceptance of Training Simulator 1	5/31/2018
Delivery of Additional Spare Parts (Exhibit 1 C)	TBD
Delivery of Spare Parts for Option Vehicles	TBD
Delivery of Training Simulator 2	TBD
Contract Mod 7, Item 22 A – Commencement of Carshell Production	6/15/2020
Contract Mod 7, Item 22 B – Completion of First Carshell	9/15/2020
Contract Mod 7, Item 22 C – Vehicle Assembly Readiness – Paint Booth, Test Pit Installed	12/15/2020
Contract Mod 7, Item 22 D – Shipment of First Phase 2 Vehicle	5/15/2021
Contract Mod 7, Item 22 E – Recurring Amounts	Quarterly, June 2020 to December 2025
Contract Mod 7, Item 23 A – Approval of Field Modification Instructions for Vehicle Interior Retrofit and Reconfiguration, Single Transverse, Change Orders 38 and 39	9/15/2020
Contract Mod 7, Item 23 B – Approval of Final Design Review and Testing for Vehicle Interior Redesign, Double Transverse, Change Order 40	12/15/2020
Contract Mod 7, Item 23 C – PIS Software releases (Change Orders 29, 36) and Field Modification Instructions, Software Releases, or Engineering Documentation for all other (non-interior) Change Orders (Change Orders 28, 30-35)	9/15/2020
Contract Mod 7, Item 24 A – Completion of Installation of Modifications in 34 Cars for Change Orders 28, 30, 31, 33 Phase 1, Option 1, Phase W Cars	12/15/2020

Contract Mod 7, Item 24 B – Completion of Installation of Modifications in 34 Cars for Change Orders 28, 30, 31, 33 Phase 1, Option 1, Phase W Cars	5/15/2021
Contract Mod 7, Item 25 – Completion of Retrofit of Vehicle Interior for Change Order 38 Phase 1, Option 1, Phase W	12/15/2022
Contract Mod 7, Item 28 – Delivery and Acceptance of Training – Payment will be on a per module basis	TBD

Note: See Exhibit 3.B for Vehicle Delivery Schedule.

B. Vehicle Delivery Schedule*

Item	Vehicle Delivery Date	Completion of Acceptance Testing
Notice To Proceed	9/30/2014	
Delivery of 1st Vehicle (Phase 1) to SFMTA (LRV 2001)	1/10/2017	8/12/2017
LRV 2002	2/27/2017	9/20/2017
LRV 2003	3/29/2017	8/25/2017
LRV 2004	10/16/2018	12/26/2018
LRV 2005	5/31/2017	8/3/2017
LRV 2006	7/11/2017	9/8/2017
LRV 2007	7/31/2017	9/27/2017
LRV 2008	10/17/2017	12/16/2017
LRV 2009	11/14/2017	1/14/2018
LRV 2010	3/8/2018	5/6/2018
LRV 2011	1/10/2018	3/18/2018
LRV 2012	1/18/2018	3/17/2018
LRV 2013	2/1/2018	3/31/2018
LRV 2014	2/8/2018	4/16/2018
LRV 2015	5/3/2018	6/28/2018
LRV 2016	1/25/2018	3/22/2018
LRV 2017	2/15/2018	4/12/2018
LRV 2018	3/29/2018	5/24/2018
LRV 2019	4/19/2018	6/10/2018
LRV 2020	3/1/2018	4/25/2018
LRV 2021	4/26/2018	6/20/2018
LRV 2022	3/15/2018	5/9/2018
LRV 2023	5/10/2018	7/4/2018
LRV 2024	4/6/2018	5/31/2018
LRV 2025 (Delivery of 1st Phase W Vehicle to SFMTA)	5/17/2018	7/11/2018
LRV 2026	5/24/2018	7/18/2018
LRV 2027	5/21/2018	7/15/2018
LRV 2028 (Delivery of 4th Phase W Vehicle to SFMTA)	6/7/2018	8/1/2018
LRV 2029 (Delivery of 1st Option 1 Vehicle to SFMTA)	6/14/2018	8/8/2018
LRV 2030	7/9/2018	9/2/2018
LRV 2031	6/4/2018	7/29/2018
LRV 2032	6/21/2018	8/15/2018
LRV 2033	6/28/2018	8/22/2018
LRV 2034	7/12/2018	9/05/2018
LRV 2035	8/2/2018	9/26/2018

Item	Vehicle Delivery Date	Completion of Acceptance Testing
LRV 2036	7/26/2018	9/19/2018
LRV 2037	8/9/2018	10/3/2018
LRV 2038	7/23/2018	9/16/2018
LRV 2039	9/20/2018	11/14/2018
LRV 2040	9/27/2018	11/21/2018
LRV 2041	8/16/2018	10/10/2018
LRV 2042	8/23/2018	10/17/2018
LRV 2043	8/27/2018	10/21/2018
LRV 2044	8/30/2018	10/24/2018
LRV 2045	8/31/2018	10/25/2018
LRV 2046	9/17/2018	11/11/2018
LRV 2047	10/18/2018	12/12/2018
LRV 2048	10/25/2018	12/19/2018
LRV 2049	11/6/2018	12/31/2018
LRV 2050	11/12/2018	1/6/2019
LRV 2051	10/04/2018	11/28/2018
LRV 2052	11/20/2018	1/14/2019
LRV 2053	11/28/2018	1/22/2019
LRV 2054	12/13/2018	2/6/2019
LRV 2055	12/20/2018	2/13/2019
LRV 2056	1/10/2019	3/6/2019
LRV 2057	1/17/2019	3/13/2019
LRV 2058	1/31/2019	3/27/2019
LRV 2059	2/7/2019	4/3/2019
LRV 2060	2/15/2019	4/11/2019
LRV 2061	2/25/2019	4/21/2019
LRV 2062	3/7/2019	5/1/2019
LRV 2063	4/16/2019	6/10/2019
LRV 2064	05/02/2019	6/26/2019
LRV 2065	6/20/2019	8/14/2019
LRV 2066	7/11/2018	9/4/2018
LRV 2067	8/15/2019	10/9/2019
LRV 2068 (Delivery of Last Option 1 Vehicle to SFMTA)	10/8/2019	12/2/2019
LRV 2069 (Delivery of 1st Phase 2 Vehicle to SFMTA)	5/15/2021	9/26/2021
LRV 2070	6/30/2021	10/13/2021
LRV 2071	7/30/2021	11/5/2021
LRV 2072	8/30/2021	11/29/2021
LRV 2073	9/15/2021	12/8/2021
LRV 2074	9/30/2021	12/16/2021
LRV 2075	10/15/2021	12/24/2021

Item	Vehicle Delivery Date	Completion of Acceptance Testing
LRV 2076	10/30/2021	1/1/2022
LRV 2077	11/15/2021	1/10/2022
LRV 2078	11/30/2021	1/25/2022
LRV 2079	12/15/2021	2/9/2022
LRV 2080	12/30/2021	2/24/2022
LRV 2081	1/17/2022	3/14/2022
LRV 2082	1/31/2022	3/28/2022
LRV 2083	2/14/2022	4/11/2022
LRV 2084	2/28/2022	4/25/2022
LRV 2085	3/16/2022	5/11/2022
LRV 2086	3/31/2022	5/26/2022
LRV 2087	4/15/2022	6/10/2022
LRV 2088	4/30/2022	6/25/2022
LRV 2089	5/16/2022	7/11/2022
LRV 2090	5/31/2022	7/26/2022
LRV 2091	6/16/2022	8/11/2022
LRV 2092	6/30/2022	8/25/2022
LRV 2093	7/15/2022	9/9/2022
LRV 2094	7/30/2022	9/24/2022
LRV 2095	8/17/2022	10/12/2022
LRV 2096	8/31/2022	10/26/2022
LRV 2097	9/15/2022	11/10/2022
LRV 2098	9/30/2022	11/25/2022
LRV 2099	10/17/2022	12/12/2022
LRV 2100	10/31/2022	12/26/2022
LRV 2101	11/15/2022	1/10/2023
LRV 2102	11/30/2022	1/25/2023
LRV 2103	12/15/2022	2/9/2023
LRV 2104	12/30/2022	2/24/2023
LRV 2105	1/16/2023	3/13/2023
LRV 2106	1/31/2023	3/28/2023
LRV 2107	2/14/2023	4/11/2023
LRV 2108	2/28/2023	4/25/2023
LRV 2109	3/16/2023	5/11/2023
LRV 2110	3/31/2023	5/26/2023
LRV 2111	4/15/2023	6/10/2023
LRV 2112	4/30/2023	6/25/2023
LRV 2113	5/16/2023	7/11/2023
LRV 2114	5/31/2023	7/26/2023
LRV 2115	6/16/2023	8/11/2023
LRV 2116	6/30/2023	8/25/2023
LRV 2117	7/18/2023	9/12/2023

Item	Vehicle Delivery Date	Completion of Acceptance Testing
LRV 2118	7/31/2023	9/25/2023
LRV 2119	8/30/2023	10/25/2023
LRV 2120	9/30/2023	11/25/2023
LRV 2121	10/31/2023	12/26/2023
LRV 2122	11/15/2023	1/10/2024
LRV 2123	11/30/2023	1/25/2024
LRV 2124	12/16/2023	2/10/2024
LRV 2125	12/30/2023	2/24/2024
LRV 2126	1/16/2024	3/12/2024
LRV 2127	1/30/2024	3/26/2024
LRV 2128	2/8/2024	4/4/2024
LRV 2129	2/19/2024	4/15/2024
LRV 2130	2/28/2024	4/24/2024
LRV 2131	3/8/2024	5/3/2024
LRV 2132	3/19/2024	5/14/2024
LRV 2133	3/28/2024	5/23/2024
LRV 2134	4/10/2024	6/5/2024
LRV 2135	4/19/2024	6/14/2024
LRV 2136	4/30/2024	6/25/2024
LRV 2137	5/9/2024	7/4/2024
LRV 2138	5/17/2024	7/12/2024
LRV 2139	5/29/2024	7/24/2024
LRV 2140	6/10/2024	8/5/2024
LRV 2141	6/19/2024	8/14/2024
LRV 2142	6/28/2024	8/23/2024
LRV 2143	7/11/2024	9/5/2024
LRV 2144	7/22/2024	9/16/2024
LRV 2145	7/31/2024	9/25/2024
LRV 2146	8/12/2024	10/7/2024
LRV 2147	8/21/2024	10/16/2024
LRV 2148	8/30/2024	10/25/2024
LRV 2149	9/10/2024	11/5/2024
LRV 2150	9/19/2024	11/14/2024
LRV 2151	9/30/2024	11/25/2024
LRV 2152	10/8/2024	12/3/2024
LRV 2153	10/15/2024	12/10/2024
LRV 2154	10/22/2024	12/17/2024
LRV 2155	10/29/2024	12/24/2024
LRV 2156	11/5/2024	12/31/2024
LRV 2157	11/12/2024	1/7/2025
LRV 2158	11/19/2024	1/14/2025
LRV 2159	11/27/2024	1/22/2025

Item	Vehicle Delivery Date	Completion of Acceptance Testing
LRV 2160	12/12/2024	2/6/2025
LRV 2161	12/21/2024	2/15/2025
LRV 2162	12/30/2024	2/24/2025
LRV 2163	1/10/2025	3/7/2025
LRV 2164	1/17/2025	3/14/2025
LRV 2165	1/24/2025	3/21/2025
LRV 2166	1/31/2025	3/28/2025
LRV 2167	2/7/2025	4/4/2025
LRV 2168	2/14/2025	4/11/2025
LRV 2169	2/21/2025	4/18/2025
LRV 2170	2/28/2025	4/25/2025
LRV 2171	3/10/2025	5/5/2025
LRV 2172	3/17/2025	5/12/2025
LRV 2173	3/24/2025	5/19/2025
LRV 2174	3/31/2025	5/26/2025
LRV 2175	4/9/2025	6/4/2025
LRV 2176	4/16/2025	6/11/2025
LRV 2177	4/23/2025	6/18/2025
LRV 2178	4/30/2025	6/25/2025
LRV 2179	4/30/2025	6/25/2025
LRV 2180	5/9/2025	7/4/2025
LRV 2181	5/16/2025	7/11/2025
LRV 2182	5/23/2025	7/18/2025
LRV 2183	5/30/2025	7/25/2025
LRV 2184	5/30/2025	7/25/2025
LRV 2185	6/9/2025	8/4/2025
LRV 2186	6/16/2025	8/11/2025
LRV 2187	6/23/2025	8/18/2025
LRV 2188	6/30/2025	8/25/2025
LRV 2189	6/30/2025	8/25/2025
LRV 2190	7/9/2025	9/3/2025
LRV 2191	7/16/2025	9/10/2025
LRV 2192	7/23/2025	9/17/2025
LRV 2193	7/30/2025	9/24/2025
LRV 2194	7/30/2025	9/24/2025
LRV 2195	8/9/2025	10/4/2025
LRV 2196	8/16/2025	10/11/2025
LRV 2197	8/23/2025	10/18/2025
LRV 2198	8/30/2025	10/25/2025
LRV 2199	8/30/2025	10/25/2025
LRV 2200	9/9/2025	11/4/2025
LRV 2201	9/16/2025	11/11/2025

Item	Vehicle Delivery Date	Completion of Acceptance Testing
LRV 2202	9/23/2025	11/18/2025
LRV 2203	9/30/2025	11/25/2025
LRV 2204	9/30/2025	11/25/2025
LRV 2205	10/9/2025	12/4/2025
LRV 2206	10/16/2025	12/11/2025
LRV 2207	10/23/2025	12/18/2025
LRV 2208	10/30/2025	12/25/2025
LRV 2209	10/30/2025	12/25/2025
LRV 2210	11/9/2025	1/4/2026
LRV 2211	11/16/2025	1/11/2026
LRV 2212	11/23/2025	1/18/2026
LRV 2213	11/30/2025	1/25/2026
LRV 2214	11/30/2025	1/25/2026
LRV 2215	12/9/2025	2/3/2026
LRV 2216	12/16/2025	2/10/2026
LRV 2217	12/23/2025	2/17/2026
LRV 2218	12/30/2025	2/24/2026
LRV 2219	12/30/2025	2/24/2026
Delivery of 1st Option 2 Vehicle to SFMTA	TBD	TBD
Delivery Rate of Option 2 Vehicles	TBD	TBD
Delivery of the last Option 2 Vehicle	TBD	TBD

***** This schedule assumes that the SFMTA issues Notice to Proceed for Contract Modification 7 no later than April 17 2020.

Exhibit 8
Modification No. 7 Change Orders

Change Order No.	Description	Technical Specification (TS) Change vs. FAI Change	Total
28	Lockable Convenience Outlet	TS Change	$161,014
29	Passenger Information Signs (PIS)	FAI Change	$185,443
30	Train Digital Records (TDR6) Hard Disk Drive (HDD) Unmounted	FAI Change	$39,651
31	Restrain Corner Hatch at End of Travel	FAI Change	$253,485
32	Replace Door Touch Strips with Push Button	FAI Change	$269,440
33	Push to Close Locking Feature Addition to Exterior EDR Door	TS Change	$274,593
34	Pre Wiring for Additional Clipper Card Readers	TS Change	$208,410
35	Provisions for Ease of Tire Replacement	FAI Change	$413,041
36	PIS 40 A Pattern Change	FAI Change	$368,031
37	Track Brakes Installation	FAI Change	$2,944,192
38	Interior Seating – Single Transverse Retrofit 68 Vehicles	FAI Change	$7,646,262
39	Interior Seating – Single Transverse 50 Vehicles (2A)	FAI Change	$2,394,716
40	Interior Seating – Double Transverse 101 Vehicles (2B)	FAI Change	$7,456,215.00
		Change Orders Total	**$22,614,493**
n/a	Continued Acceleration Activities	n/a	$19,899,553.00
	Additional Training	n/a	$1,000,000
		Mod 7 Total	**$43,514,046**