

THIS PRINT COVERS CALENDAR ITEM NO. : 12

**SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY**

DIVISION: Transit Services

BRIEF DESCRIPTION:

Authorizing the Director of Transportation to execute Modification No. 3 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles (LRV4), with Siemens Industry, Inc., to provide enhancements to passengers, enable full systems integration, and reduce the life-cycle costs of the light rail vehicles, for an amount not to exceed \$19,596,728, with no increase in the total contract price and no increase in the overall term of the contract.

SUMMARY:

- On July 15, 2014, the SFMTA Board of Directors approved Contract No. 2013-19 with Siemens Industry, Inc. (Siemens) to provide up to 260 Light Rail Vehicles (LRV), including two options for expansion LRVs (the contract).
- On September 3, 2014, the Board of Supervisors approved the contract in an amount not to exceed \$1.19 billion.
- During the design process, the SFMTA identified a number of changes to provide enhancements to passengers, to accommodate changes to related systems, and to reduce life-cycle costs of the LRVs.
- The proposed changes will add value to the LRV4 Project in terms of improving customer service, facilitating proper systems integration, and aiding future maintenance. Changes include enhancing the destination signs, adding an independent front step operation for easier access at key stops, and providing enhanced maintenance diagnostic tools.

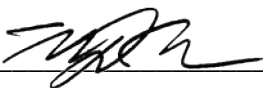
ENCLOSURES:

1. SFMTAB Resolution
2. Modification No. 3 to LRV4 contract
3. <http://centralsubwaysf.com/FSEIS-SEIR> (Central Subway Final SEIS/SEIR)
4. Light Rail Vehicle Procurement Statutory Exemption (Case No. 2014.0929E)

APPROVALS:

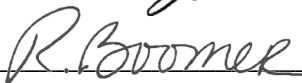
DATE

DIRECTOR _____



8/9/16

SECRETARY _____



8/9/16

ASSIGNED SFMTAB CALENDAR DATE: August 16, 2016

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PURPOSE

The purpose of this item is to obtain authorization for the Director of Transportation to execute Modification No. 3 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles (LRV4), with Siemens Industry, Inc., to provide enhancements to passengers, enable full systems integration, and reduce the life-cycle costs of the light rail vehicles, for an amount not to exceed \$19,596,728, with no increase in the total contract price and no increase in the overall term of the contract.

GOAL

The goal of this project is to improve equipment availability and reliability in order to meet the following goals and objectives of the SFMTA's Strategic Plan:

Goal 1: Create a safer transportation system for everyone

Objective No. 1.3: Improve safety of the transportation system

Goal 2: Make transit, walking, bicycling, taxi, ridesharing and carsharing the preferred means of travel

Objective No. 2.1: Improve customer service and communications

Objective No. 2.2: Improve transit performance

Goal 3: Improve the environment and quality of life in San Francisco

Objective No. 3.4: Reduce capital and operating structural deficits

DESCRIPTION

The SFMTA has a fleet of 151 Light Rail Vehicles (LRVs). These vehicles went into service beginning in 1996 and are scheduled for retirement starting in 2021. In addition, the SFMTA has identified a need to procure up to 260 new light rail vehicles to serve all of the Agency's LRV needs for the next 25 years, including the Central Subway Project and projected ridership increases. The contract includes acquisition of 24 LRVs for near-term service expansion, replacement of 151 LRVs, and two options for up to 85 vehicles for service expansion. The scope of work of the contract includes the design, manufacture, delivery and testing of the LRVs, together with associated services, spare parts, special tools, training and documentation.

On July 15, 2014, the SFMTA Board of Directors approved Contract No. 2013-19 with Siemens to provide up to 260 LRVs, including two options for expansion LRVs. On September 3, 2014, the Board of Supervisors approved the contract in an amount not to exceed \$1.19 billion, subject to the condition that the contract contain Option 1 for 40 LRVs and Option 2 for 45 LRVs, and that the SFMTA obtain approval from the Board of Supervisors prior to exercising Option 2.

On March 31, 2015, the City 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 to exercise options for additional spare parts and equipment.

On October 30, 2015, the City approved Modification No. 2 to the contract to update the list of approved major sub-suppliers and specify the payment structure for changes to the LRVs paid under Item 1.1.

During review of the LRV4 vehicle design, six design changes were identified that necessitate changes to the contract. The LRV4 procurement project team worked with Siemens and Agency stakeholders to agree on the changes to the contract, which will add value to the LRV4 Project in terms of improving customer service, facilitating proper systems integration, and aiding future maintenance. Each of the changes is discussed briefly below.

Independent Front Right Step Operation - This change will allow the vehicle operator to raise and lower the steps at the front right side doorway of the first vehicle independent of the other steps on the vehicle. This change allows more efficient servicing of wheeled mobility devices at key stops located throughout the system. This change will also improve the life-cycle cost of the steps, as operation of other steps will not be necessary during such stops.

Color Block for Destination Sign - This change adds a block of colored light at the left of the destination signs; the color depends on the selected route. Additionally, the route letter will appear within the color block. This change provides better service by producing an additional visual cue, making it easier for passengers to quickly determine the vehicle's route.

Radio Computer Aided Dispatch/Automatic Vehicle Location (CAD/AVL) Systems – The LRV4 vehicles are a new generation of vehicles, offering a great deal more technology than the current LRV fleet. This change allows full integration of the advanced technology communications systems including passenger information systems, automatic passenger counter, and voice/data radio services with the SFMTA's Radio CAD/AVL Replacement System currently being installed. This change greatly improves the SFMTA's ability to manage on-board technologies with a passenger-driven focus, while providing fully integrated LRV4 operations management with the fixed-end Radio CAD/AVL System to enhance and better manage service.

The LRV4 contract requires that the vehicle be compatible with SFMTA's existing systems and infrastructure. Siemens proposed a comprehensive, fully integrated, advanced technology system for all the communications aspects of the vehicle. At the same time that the LRV4 project was being bid, the SFMTA's entire radio system was being replaced, including a new Computer Aided Dispatch/Automatic Vehicle Location system (CAD/AVL). The CAD/AVL system provided by Xerox as part of the Radio Replacement Project was proprietary to Xerox, meaning Siemens would have to purchase the Xerox system and incorporate it into the solution contained in the original Siemens proposal. In addition, since LRV4 Notice to Proceed, there have been additional design changes to the CAD/AVL system to meet MTA's operational needs and these require extra design work and further complicate the LRV4 vehicle design integration.

In order to preserve most of the advanced technology communications system proposed for the LRV4, and yet be compatible with the proprietary Xerox CAD/AVL equipment being procured separately via the radio contract, Siemens had to contract with CAD AVL supplier Xerox for additional equipment. This proprietary Xerox equipment not only duplicates some of the Siemens system design already developed, but also complicates the systems integration aspects of the vehicle design. It is however required to allow full integration and interoperability with the wayside radio system.

The cost of this change order reflects the redesign necessary for installation and the complexity of the systems integration required. It includes both one-time engineering costs and per vehicle costs. The one-time costs include: Xerox software development and additional engineering costs for Siemens to redesign the vehicle to accommodate new, Xerox equipment and systems. The total cost of this change

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order is \$18,223,037, which comprises \$5,821,315 for one-time engineering costs and \$57,683 per vehicle for 215 vehicles.

We considered other alternatives but deemed this approach to be the most cost-effective solution that would not cause delays. The primary alternative of issuing a new contract to provide a suitable interface between the two systems would have been more expensive and time consuming. A functioning interface is required to test the cars and place them in service, so the additional time required for a new contract could delay the delivery of the LRV4 vehicles with the new Radio Replacement System.

Leading Cab Train Identification (ID) - When entering the subway under the Advanced Train Control System (ATCS), a train ID must be set in all the cabs of the LRV so that the ATCS equipment at Central Control can assign the proper route. This change will allow the operator to enter train IDs for all cabs in the train independent from the operating cab. This change will significantly reduce the required time for the operator to perform this task. Currently, the operator must physically move to each and every cab in the train to set the desired train ID. In addition, by enabling the train IDs to be set from a central location, maintenance troubleshooting will also be significantly streamlined.

Handheld Radio Charger - This change will add a charging caddy to each LRV4 cab for new handheld radios. This is required to ensure availability of a handheld radio at any time, and will facilitate safe operations and emergency communications.

Siemens Expert Diagnostic Software (SIBAS) – This change provides an enhanced maintenance diagnostic tool, which provides additional capability over and above the basic software included as part of Siemens' proposal. The Expert Diagnostic Software tool will allow more in-depth diagnostics for maintenance trouble-shooting and analysis, especially as it pertains to fleet-wide performance and the swift resolution of complex issues. We anticipate that this software will reduce overall life-cycle costs through reduced maintenance as a result of quicker, more precise diagnostics.

The LRV4 procurement project team has negotiated with Siemens the specified scope, as well as impact to cost and schedule. The proposed costs for the modifications were compared with independent cost estimates and staff believes they are fair and reasonable. These six changes represent all the design changes amassed during the design review process. The only schedule impact of these changes is that the delivery of the first two vehicles will be delayed by 60 days. The delivery rates of subsequent vehicles will be accelerated so that the schedule will be recovered by the 22nd vehicle. These changes will not increase the overall term of the contract. Execution of this modification now will minimize the impact to the vehicle delivery schedule as described in the revised Project Delivery Schedule (Exhibit 3), included in Modification No. 3.

STAKEHOLDER ENGAGEMENT

Throughout the project, the LRV4 team has worked with several stakeholder groups including maintenance, transit management, safety, accessible services, and communications as well as the Citizen's Advisory Committee, the Multimodal Accessibility Advisory Committee and the general public. As part of the outreach process, LRV4 conducted a public survey to gather input for the overall look of the vehicle. 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. Several of the changes included in Contract Modification No. 3 are the direct result of stakeholder outreach over the last 18 months. For example, the independent front step operation was

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requested by Accessible Services, and the color block inclusion in the destination signs was requested by the Communications team.

ALTERNATIVES CONSIDERED

The alternative considered was to continue design and production of the vehicles without the changes identified above and delay the changes to a later date. However, this alternative would have been costly, delayed production of the vehicles, and deprived passengers of the benefits of the changes for a long period of time.

FUNDING IMPACT

	Title	Total Cost of Change Orders
CO1	Independent Front Step Operation	\$273,480
CO2	Color Block for Destination Sign	\$516,430
CO3	Leading Cab Train ID	\$54,180
CO4	Radio CAD/AVL System Changes	\$18,223,037
CO5	Handheld Radio Charger	\$458,601
CO6	SIBAS Expert 2	\$71,000

The total cost of the six change orders comprising Modification No. 3 is \$19,596,728. The contract has a not-to-exceed value of \$1,192,651,577. This includes the Option for 45 additional vehicles which has not yet been exercised and therefore the maximum contract value with Siemens does not need to be increased to cover these Modification 3 costs. The cost for Modification No. 3 will come from the overall \$40M project budget contingency. The identified funds for this project include funding from FTA, Prop 1B, Prop K, TIRCP funds, future SFMTA revenue bonds, and other funds.

ENVIRONMENTAL REVIEW

The procurement of new light rail vehicles 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 Central Subway Final Supplemental Environmental Impact Statement / Supplemental Environmental Impact Report (Central Subway SEIS/SEIR) evaluated the environmental impacts of an increase in passenger rail service associated with the Central Subway project, which some of the Light Rail Vehicles will service. On August 7, 2008, the San Francisco Planning Commission certified the Final SEIR (Case No. 1996.281E). On August 19, 2008, the SFMTA Board of Directors approved Resolution 08-150 adopting Central Subway Project Alternative 3B as the Locally Preferred Alternative, the CEQA Findings, Statement of Overriding Considerations, and the Mitigation Monitoring and Reporting Plan.

The environmental review determinations are on file with 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.

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OTHER APPROVALS RECEIVED OR STILL REQUIRED

Contract Modification No. 3 does not require any other approvals.

The City Attorney's Office has reviewed this calendar item.

RECOMMENDATION

Staff recommends that the SFMTA Board authorize the Director of Transportation to execute Modification No. 3 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles (LRV4) with Siemens Industry, Inc., to provide enhancements to passengers, enable full systems integration, and reduce the life-cycle costs of the light rail vehicles, for an amount not to exceed \$19,596,728, with no increase in the total contract price and no increase in the overall term of the contract.

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY
BOARD OF DIRECTORS

RESOLUTION No. _____

WHEREAS, On July 15, 2014, the SFMTA Board of Directors approved Contract No. 2013-19 with Siemens Industry, Inc., to provide up to 260 LRVs, including two options for expansion LRVs; and

WHEREAS, On September 3, 2014, the Board of Supervisors approved the contract in an amount not to exceed \$1.19 billion, subject to the condition that the contract contain Option 1 for 40 LRVs and Option 2 for 45 LRVs, and that the SFMTA obtain approval from the Board of Supervisors prior to exercising Option 2; and,

WHEREAS, On March 31, 2015, the City 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 to exercise Options for additional spare parts and equipment; and,

WHEREAS, On October 30, 2015, the City approved Modification No. 2 to the contract 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; and,

WHEREAS, The SFMTA now wishes to modify the contract 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 guarantee, and make miscellaneous changes to the technical specifications, for a total cost of \$19,596,728; and,

WHEREAS, Contract Modification No. 3 does not increase the total contract amount or extend the term of the contract; 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 LRVs for the Central Subway Project were reviewed as part of the Central Subway Final Supplemental Environmental Impact Statement / Supplemental Environmental Impact Report (Central Subway SEIS/SEIR), certified by the San Francisco Planning Commission on August 7, 2008, and on August 19, 2008, the SFMTA Board of Directors approved Resolution 08-150 adopting Central Subway Project Alternative 3B as the Locally Preferred Alternative, the

CEQA Findings, Statement of Overriding Considerations, and the Mitigation Monitoring and Reporting Plan; and,

WHEREAS, On July 15, 2014, when the SFMTA Board of Directors adopted Resolution No. 14-12—incorporated herein by reference—to approve the contract to procure the LRVs, the Board found, based on its review of the Final SEIS/SEIR, that no additional environmental review was required under Public Resources Code section 21166; on April 5, 2016, when the SFMTA Board of Directors adopted Resolution No. 16-044—incorporated herein by reference—to issue Revenue Bonds, the Board further reviewed and considered the Central Subway Project Final SEIS/SEIR and the record as a whole, finding that there were no substantial project changes and no substantial changes in project circumstances that would require major revisions to the Central Subway Project Final SEIS/SEIR due to the involvement of new significant environmental effects or an increase in the severity of previously identified significant impacts, and there was no new information of substantial importance that would change the conclusions set forth in the Central Subway Project Final SEIS/SEIR; and,

WHEREAS, The environmental review determinations are on file with 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 authorizes the Director of Transportation to execute Modification No. 3 to SFMTA Contract No. 2013-19: Procurement of New Light Rail Vehicles (LRV4) with Siemens Industry, Inc., to provide enhancements to passengers, enable full systems integration, and reduce the life-cycle costs of the LRVs, for an amount not to exceed \$19,596,728, with no increase in the total contract price and no increase in the overall term of the contract.

I certify that the foregoing resolution was adopted by the Municipal Transportation Agency Board of Directors at its meeting of August 16, 2016.

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

This Modification No. 3 to Agreement is made and entered into this ____ day of ____ 2016, by and between Siemens Industry 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.** The SFMTA now wishes to modify 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 guarantee, and make miscellaneous changes to the Technical Specifications.

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

1. Section 29 (Subcontracting) is amended in its entirety to read as follows:

Contractor may subcontract portions of the Work only upon prior written approval of City. Contractor is responsible for its subcontractors throughout the course of the performance of the Work. City's execution of this Agreement constitutes its approval of the major subcontractors/suppliers listed below. Neither party shall, on the basis of this Agreement, contract on behalf of or in the name of the other party. Any agreement made in violation of this provision shall be null and void.

	COMMODITY	SUPPLIER
1	Automatic Passenger Counting System	INIT
2	Automatic Train Control System	Thales
3	CCTV System	Kratos
4	Communications - Radio	Harris
5	Doors	Ultimate Transportation N. America
6	Event Recorder	Hasler Rail
7	Friction Brake System	Tec Tran Brakes (Wabtec)
8	Heating, Ventilation and Air Conditioning	Thermo King Corp.
9	Passenger Information System, Infotainment	Televic
10	CAD/AVL	Xerox
11	Couplers	Voith
12	Lighting (exterior)	TDG
13	Lighting (interior)	TDG
14	Pantograph	Schunk
15	Sanders	Knorr
16	Seats (passenger)	Freedman Seating Company
17	Seats (driver)	Seats Incorporated
18	Steps	Vapor Stone Rail Sys (Wabtec)
19	Train to Wayside Communication System	Vecom

2. A new Exhibit 1A.A (Schedule of Prices-Modification No. 3 Work) is added to the Agreement and is attached to this Modification.

3. *A new Exhibit 2.1 (Payment Schedule–Modification No. 3 Work) is added to the Agreement and is attached to this Modification.*
4. *Exhibit 3 (Project Delivery Schedule) is replaced with a new Exhibit 3 (Delivery Schedule), which is attached to this Modification.*
5. *Exhibit 6 is modified by adding after Exhibit 6.2 a new Exhibit 6.3, which is attached to this Modification.*
6. *Subsection 1 of Section 2.9.2 (Maintenance Plan) of the Technical Specification is modified in its entirety to read as follows.*
 1. The Contractor's maintainability program shall include a detailed plan outlining all schedules and activities for vehicle preventive maintenance.
(CDRL 63)
7. *Section 6.3.7 (Step System) of the Technical Specification is modified by adding a new subsection 12 to read as follows:*
 12. The front right step shall be capable of being operated in UP and DOWN position independently from the other steps by using a switch on the operator control panel in the cab. This operation shall be available in the leading Vehicle only; the trailing Vehicle shall be unaffected.
8. *Section 13.3.2 (Information Signs) of the Technical Specification is modified by adding new subsection 4 to read as follows:*
 4. The destination signs (front destination and exterior side of the side destination signs) shall have a red green blue (RGB) LED color-block beside the amber LED that shows the destination. The color-block RGB shall visualize the letter designating the line on a background color defined by the Digital Voice Communication System (DVCS) automatic announcement and display database.
9. *Section 13.4 (Interface with Radio CAD AVL System) of the Technical Specification is modified in its entirety to read as follows:*

13.4 INTERFACE WITH RADIO, CAD/AVL SYSTEM

The following interfaces shall be furnished between the radio, CAD/AVL system and other vehicle systems. All the software shall be installed to SFMTA latest version at the time of delivery:

1. Farebox – The radio vehicle logic unit and farebox shall exchange the information through SAE J1587 messaging protocol over the SAE J1708 physical connection.
2. Destination Sign – Destination signs shall be controlled by radio vehicle logic unit through the interface between the Digital Vehicle Communication System (DVCS) and the CAD/AVL System.
3. EA switch (each cab) shall be interfaced with radio vehicle logic unit.
4. GPS signal information shall be provided from the CAD/AVL System to the CCTV System (Surveillance Camera system).
5. Critical Control Point Speakers (CCP Speakers), Destination signs, stop request, doors status shall interface with the Digital Vehicle Communication System (DVCS). The DVCS is connected to the radio vehicle logic unit through cable connection.
6. Speed Sensors - Speed sensor information shall be provided to radio vehicle logic unit.
7. Mobile Access Router – Router shall be connected to radio vehicle logic unit via 4 port Ethernet switch. The Surveillance camera system is connected to the CCTV router.
8. Door Status – Door status signal shall be connected to radio vehicle logic unit.
9. Stop Request – Stop request shall be connected to radio vehicle logic unit

Details of the required integration are provided in Appendix C.

10. *The Technical Specification is modified by adding a new section 14.1.5 to read as follows:*

14.1.5 Train ID

1. Each train shall have the capability to set the Train ID for each cab in the train consist from the lead cab.

11. *Section 20.10 (CDRL List) of the Technical Specification is modified by adding CDRL Nos. 61 – 63 to Table 20-1 as follows.*

61	Hazard Mitigation Traceability Matrix	21.3.7.6
62	Reliability Demonstration Plan (RDP)	21.3.11
63	Maintenance Plan	2.9.2

12. *Section 21.3.7.6 (Hazard Mitigation Traceability Matrix) of the Technical Specification is modified in its entirety to read as follows.*

21.3.7.6 Hazard Mitigation Traceability Matrix

The Contractor shall develop and maintain a matrix of all Category I and II hazards. The matrix shall describe each hazard and its ultimate resolution, and identify current status. The resolution of each hazard must be verified by identifying a specific drawing, procedure, analysis, or report. **(CDRL 61)**

13. *Subsection 1 of Section 21.3.11 (Reliability Demonstration) of the Technical Specification is modified to read as follows.*

1. The Contractor shall submit a Reliability Demonstration Plan (RDP) 90 Days before delivery of the first car that defines the following for a demonstration to prove compliance with the specified MDBTD and MDBC requirements and failure definitions in Section 2.8. **(CDRL 62)**

14. *Subsection 2 of Section 22.1 (General) of the Technical Specification is modified by adding item g. to read as follows:*

- g. SIBAS Expert 2 Software.

15. *Section 23.3.3 (Radio [Voice and Data]) of the Technical Specification is modified by adding No. 3-12 to Table 23-3. Radio as follows:*

3-12		Handheld Radio Charger	2	One in each cab
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16. *The Technical Specification is modified by adding Appendix C (Radio/CAD/AVL Onboard and Wayside Systems) thereto, which Appendix is attached to this Modification.*

17. **Release.** Contractor acknowledges and agrees that the amounts agreed for the work described in this Modification No. 3, and/or any extension of time granted herein, with or without cost, shall be full accord and satisfaction for all past, current and prospective costs incurred in connection with Contractor's performance of all work under the contract up to and including the work covered under this Modification No. 3, without limitation. 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 hereby made, as set forth above.

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

19. **Legal Effect.** Except as expressly modified by this Modification No. 3, 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. 3 on the date set forth on page 1 above.

CITY

CONTRACTOR

San Francisco Municipal Transportation Agency

Edward D. Reiskin
Director of Transportation

San Francisco Municipal Transportation Agency
Board of Directors

Resolution No. _____

Dated: _____

Attest:

Secretary

Approved as to Form:

Dennis J. Herrera
City Attorney

By _____
Robin M. Reitzes
Deputy City Attorney

Michael Cahill
President
Mobility Division
Siemens Industry, Inc.
7464 French Road
Sacramento, CA 95828

Christopher Halleus
Vice President, FBA
Mobility Division
Siemens Industry, Inc.
7464 French Road
Sacramento, CA 95828

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

Attachments

- Exhibit 1A.1 – Schedule of Prices – Modification No. 3 Work
- Exhibit 2.1 – Payment Schedule
- Exhibit 3 – Project and Vehicle Delivery Schedules
- Exhibit 6 – Parent Company Guarantee
- Appendix C – Radio/CAD/ Onboard and Wayside Systems

EXHIBIT 1A.1
Schedule of Prices – Modification No. 3 Work

ITEM	DESCRIPTION	UNIT PRICE	QUANTITY	EXTENDED PRICE
Item 11	Modification No. 3 (Non-Recurring Costs)			
Item 11.1	Engineering	Lump Sum	x 1	\$6,128,416
Item 11.2	SIBAS Expert 2 Monitoring and Diagnostic Software	Lump Sum	X1	\$71,000
Item 12	Modification No. 3 (Base Recurring Costs)			
Item 12A	Base Phase 1	\$62,313	x 24 cars	\$1,495,514
Item 12B	Base Phase 2	\$62,313*	x 151 cars	\$9,409,275
Item 13	Modification No. 3 Option 1 (Recurring Costs)	\$62,313	x 40 cars	\$2,492,523
TOTAL Items 11-13				\$19,596,728

Note: *The price does not include escalation. Escalation will be applied in accordance with Section 7.5 of the Agreement.

Exhibit 2.1
PAYMENT SCHEDULE

(All Item references are to Exhibit 1A.1)

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%

**EXHIBIT 3
PROJECT AND VEHICLE DELIVERY SCHEDULES**

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
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	4/17/2017
Delivery of Additional Spare Parts (Exhibit 1 C)	TBD
Delivery of Spare Parts for Option Vehicles	TBD
Delivery of Training Simulator 2	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)	12/13/2016	8/15/2017
LRV 2002	2/28/2017	9/21/2017
LRV 2003	5/2/2017	9/28/2017
LRV 2004	8/17/2017	10/27/2017
LRV 2005	8/31/2017	11/3/2017
LRV 2006	9/15/2017	11/13/2017
LRV 2007	10/3/2017	11/30/2017
LRV 2008	10/13/2017	12/12/2017
LRV 2009	10/27/2017	12/27/2017
LRV 2010	11/7/2017	1/5/2018
LRV 2011	11/16/2017	1/22/2018
LRV 2012	12/4/2017	1/31/2018
LRV 2013	12/13/2017	2/9/2018
LRV 2014	12/22/2017	2/27/2018
LRV 2015	1/10/2018	3/7/2018
LRV 2016	1/19/2018	3/16/2018
LRV 2017	1/30/2018	3/27/2018
LRV 2018	2/8/2018	4/5/2018
LRV 2019	2/20/2018	4/13/2018
LRV 2020	2/27/2018	4/23/2018
LRV 2021	3/6/2018	4/30/2018
LRV 2022	3/13/2018	5/7/2018
LRV 2023	3/20/2018	5/14/2018
LRV 2024	3/27/2018	5/21/2018
Delivery of 1st Option 1 Vehicle to SFMTA (LRV 2025)	4/10/2018	6/4/2018
LRV 2026	4/24/2018	6/18/2018
LRV 2027	5/8/2018	7/2/2018
LRV 2028	5/22/2018	7/16/2018
LRV 2029	6/5/2018	7/30/2018
LRV 2030	6/19/2018	8/13/2018
LRV 2031	7/3/2018	8/27/2018
LRV 2032	7/17/2018	9/10/2018
LRV 2033	7/31/2018	9/24/2018

Item	Vehicle Delivery Date	Completion of Acceptance Testing
LRV 2034	8/14/2018	10/8/2018
LRV 2035	8/28/2018	10/22/2018
LRV 2036	9/11/2018	11/5/2018
LRV 2037	9/25/2018	11/19/2018
LRV 2038	10/9/2018	12/3/2018
LRV 2039	10/23/2018	12/17/2018
LRV 2040	11/6/2018	12/31/2018
LRV 2041	11/20/2018	1/14/2019
LRV 2042	12/4/2018	1/28/2019
LRV 2043	12/18/2018	2/11/2019
LRV 2044	1/1/2019	2/25/2019
LRV 2045	1/15/2019	3/11/2019
LRV 2046	1/29/2019	3/25/2019
LRV 2047	2/12/2019	4/8/2019
LRV 2048	2/26/2019	4/22/2019
LRV 2049	3/12/2019	5/6/2019
LRV 2050	3/26/2019	5/20/2019
LRV 2051	4/9/2019	6/3/2019
LRV 2052	4/23/2019	6/17/2019
LRV 2053	5/7/2019	7/1/2019
LRV 2054	5/21/2019	7/15/2019
LRV 2055	6/4/2019	7/29/2019
LRV 2056	6/18/2019	8/12/2019
LRV 2057	7/2/2019	8/26/2019
LRV 2058	7/16/2019	9/9/2019
LRV 2059	7/30/2019	9/23/2019
LRV 2060	8/13/2019	10/7/2019
LRV 2061	8/27/2019	10/21/2019
LRV 2062	9/10/2019	11/4/2019
LRV 2063	9/24/2019	11/18/2019
LRV 2064	10/8/2019	12/2/2019
Delivery of 1st vehicle (Phase 2) to SFMTA	5/15/2021	TBD
Delivery Rate of Phase 2 Vehicles	1 car / 2 weeks	
Delivery of 151th vehicle (Phase 2) to SFMTA	2/27/2027	TBD
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

EXHIBIT 6.3 – PARENT COMPANY GUARANTEE

TO BE PROVIDED BY CONTRACTOR

APPENDIX C - RADIO/CAD/AVL ONBOARD AND WAYSIDE SYSTEMS

C.1 GENERAL

The work described in this section shall apply to the LRV4 Radio/CAD/AVL onboard and wayside systems, and shall be in addition to the work required by the original Contract No. SFMTA-2013-19.

C.2 SCOPE OF WORK

The scope of work is to provide a reliable and fully functional revenue service ready radio/CAD/AVL system with all supporting interfaces. This includes integration of the LRV4 on-board digital vehicle communication system (DVCS) equipment with SFMTA's wayside components and radio/CAD/AVL infrastructure. This also includes providing fully functional solutions and equipment to fulfill all of the functionalities in the operational needs (Table C-1). The scope of work also includes fitting of SFMTA defined Operator's Cab communications equipment, compliant with the ergonomic, arrangement, and visibility requirements of the TS.

Contractor is responsible for all aspects of the LRV4 vehicle design and system integration. Contractor is the primary contractor and is responsible for working with their sub-suppliers to make the vehicles ready for revenue service, including complete integration with the wayside and any required safety certification support. Execution of this scope of work shall not delay the progress of other non-related activities under this Contract. Specific requirements are defined elsewhere in this document.

C.3 GENERAL ENGINEERING DESIGN

Contractor' design shall comply with Contract No. SFMTA-2013-19, and the operational needs list provided as Table C-1 of this Appendix.

Within 21 days of the notice to proceed of Modification No. 3, Contractor shall update and resubmit all existing design submittals relevant to this scope of work. The revised submittals shall provide acceptable designs that are fully functional and revenue service ready.

Compliant with the Section 20.7.1, Contractor shall provide a design submittal for interfaces between the LRV4 on-board equipment and the respective wayside CAD/AVL components and software. For example, the interface between LRV4 automatic passenger counter or passenger information system equipment, and the wayside software supporting its functionality. The design submittals shall establish the data management amongst LRV4 equipment, between LRV4 equipment and wayside components, and how the end-to-end functionality is compliant with all operational performance requirements as defined in C.4.

The design submittals shall specify radio/CAD/AVL operations in multi-car consists and address redundancy under failure conditions.

C.4 OPERATIONAL NEEDS

Contractor shall deliver LRV4 vehicles with a fully functional and revenue service ready radio/CAD/AVL system in accordance with the performance requirements listed in Contract No. SFMTA-2013-19, and the operational needs provided in Table C-1.

C.5 WAYSIDE INTERFACES

The design shall provide integration between the LRV4 INIT APC system and the wayside components responsible for transfer, storage, and management of the LRV4 APC data within SFMTA's backend systems. This includes wayside APC software required to manipulate or manage the LRV4 APC data. The design shall provide real-time and bulk data APC reporting interfaces to the wayside CAD/AVL components including CAD stations, data interchange station, long term database, and reports servers.

The design shall provide integration of Televic software with the wayside CAD/AVL components for management and distribution of vehicle signage, audible messages, infotainment, and software and firmware updating for components under the DVCS scope.

The design shall provide for on-board Televic and INIT software to be remotely maintained and updated from wayside systems that are not part of SFMTA's core OrbCAD system.

C.6 OPERATOR'S CAB

The revised submittals for the design and ergonomics of the Operator's Cab shall provide a compliant design and demonstrate an integrated approach to fitting of equipment under this scope of work.

Additionally, Contractor shall provide an Operator's Cab forward visibility study with considerations made towards fitting of cab equipment consistent with frequency of use, while maximizing safety of the Operator, automobile drivers, and pedestrians. Contractor shall utilize the study to optimize cab space while avoiding direct placement of equipment within the area of the cab windows, potentially creating blind spots or otherwise obstructing the Operator's view (refer to Section 5.2).

C.7 TRAINING

Training is required for the additional scope of work covered by this Appendix which is above and beyond that already covered by the base Contract. All training required to operate, maintain, and update the on-board and wayside components shall be provided. Contractor shall provide software administrator training for the scope of work involving wayside components. All training shall comply with the Conformed Contract Documents.

Contractor shall include the training plan for all additional training required by this scope of work within CDRL 58 (Training Program Plan), for SFMTA's acceptance (refer to Section 22.2.6.1).

C.8 DOCUMENTATION

Documentation is required for the additional scope of work covered by this Appendix which is above and beyond that already covered by the base Contract. All manuals required to operate, maintain, and update the on-board and wayside components shall be provided. The radio/CAD/AVL wiring and cable assembly drawings shall be integrated into the vehicle wiring documentation. Manuals shall be provided for the Televic and INIT wayside application software. Contractor shall provide interface control documents for the Televic, INIT, and wayside software elements.

Documentation shall comply with the requirements of the original Contract No. SFMTA-2013-19 (refer to Section 22.2).

C.9 TESTING, COMMISSIONING, SAFETY CERTIFICATION

Design validation and safety certification support is required for the additional scope of work covered by this Appendix which is above and beyond that already covered by the base Contract. All existing terms of the Section 21 shall apply including but not limited to design verification, commissioning, and safety certification. Contractor shall submit qualification and routine test procedures relevant to this scope of work, and include the procedures into CDRL 40 (Requirements Traceability Matrix (RTM)).

Qualification testing shall encompass all on-board and wayside components involved with radio/CAD/AVL and DVCS. Testing shall reasonably account for all operational scenarios and failure modes.

Table C-1 Operational Needs

<u>No</u>	<u>Operational Need</u>
1	A Mobile Data Terminal (MDT) shall be provided in each Cab. The MDT provides the Train Operator interface to the CAD/AVL System. The MDT contains a covert Microphone.
2	Central Control Dispatcher shall be able to hear all conversations after Emergency Alarm (EA) Activation. When the EA button is activated an Event Marker will be activated on the CCTV system and a silent indication will be shown on the MDT.
3	The Public Address (PA) to the Train from the Central Dispatcher shall be heard in the Operator's Cab as well as in the passenger area.
4	<p>All of the onboard communications equipment shall be controlled by the VLU using the Radio and CAD/AVL System.</p> <p>Design documentation shall provide system description, and functionality of Televic/INIT/Xerox system.</p> <p>Wayside servers and software shall be provided as needed to support software/firmware updates/revisions to remotely maintain the on-board Televic/INIT/Xerox equipment.</p>
5	<p>Wireless Bulk Data Transfer (WBTD) shall support all necessary data transmission between the vehicle and the wayside.</p> <p>Design documentation shall provide system description, and functionality of Televic/INIT/Xerox system.</p> <p>Wayside servers and software shall be provided as needed to support software/firmware updates/revisions to remotely maintain the on-board Televic/INIT/Xerox equipment.</p>
6	The Mobile Access Router (MAR) shall support: system segregation through Virtual LANs (VLANs), IPSec, VPN tunneling (including a deep inspection firewall) and Gigabit Ethernet ports with backwards compatibility to 100 Megabit.
7	The Mobile Access Router (MAR) shall distribute Network Time Protocol (NTP) System time and Vehicle Health Monitoring.
8	NMEA GPS string from VLU shall be compatible with onboard equipment.
9	The Mobile Access Router (MAR) also shall provide 3G and Wi-Fi module.
10	The CAD/AVL system shall provide single point logon for all systems dependent upon vehicle/Block ID, including but not limited to: Destination Signs, Passenger Information Signs, VLU, MDTs, Farebox, CAD system, DVCS, and Radio.
11	The transition from "inactive" to "active" CAB shall be seamless and instantaneous.
12	The radio shall be compatible with OpenSky2 radio infrastructure.

<u>No</u>	<u>Operational Need</u>
13	The Train Operator (TO) shall be able to communicate with the Central dispatcher from the active cab within a consist. Handling of voice communications in trailing cabs in the consist shall be functionally equivalent to LRV2/3 design.
14	The Mobile radio in the active cab shall be able to Request To Talk to the Central dispatch console. Handling of voice communications in trailing cabs in the consist shall be functionally equivalent to LRV2/3 design.
15	In multicar consists, the VLUs shall be functionally redundant. If the Master VLU fails, then another shall take control. The design documentation shall address DVCS fall back modes.
16	The voice and data via the MDT in each Cab shall be functionally equivalent to LRV2/3 design.
17	Harris XG-75 Portable Radio Chargers shall be installed in each Cab.
18	The APC data shall be compatible with SFMTA wayside system. Wayside servers and software shall be provided as needed to support handling/storage/processing of APC data on the wayside.
19	The data collected by the APC shall be compatible with the wayside database. Wayside servers and software shall be provided as needed to support handling/storage/processing of APC data on the wayside.
20	Positions of the steps (up or down) at each stop shall be logged and transmitted via VLU Wireless Bulk Data Transfer (WBDT). Wayside servers and software shall be provided as needed to support software/firmware updates/revisions to remotely maintain the on-board Televic/INIT/Xerox equipment.
21	APC real-time passenger loading data shall be provided to the VLU upon door close events.
22	APC data shall be uploaded daily via VLU Wireless Bulk Data Transfer (WBDT) infrastructure. Wayside servers and software shall be provided as needed to support software/firmware updates/revisions to remotely maintain the on-board Televic/INIT/Xerox equipment.
23	An exception notification shall be sent to the vehicle health monitoring system, if APC data is not being collected or is incomplete. Design documentation shall include the handling and processing of the diagnostic data from APC.
24	Interface with Radio and CAD/AVL System shall include the following systems: Farebox, Destination Signs, EA Switches, GPS, Critical Control Point Speakers (CCP Speakers), Speed Sensor, Mobile Access Router (MAR), Door Status, Stop Request, Accessible Stop Request, Passenger Information Signs and APC.

<u>No</u>	<u>Operational Need</u>
25	Speed sensors shall be connected to the VLU for “Dead Reckoning” in the event of the loss of GPS signal.
26	<p>The Mobile Access Router (MAR) shall be connected to the VLU. The MAR shall have sufficient ports for integration of all required onboard equipment provided.</p> <p>CCTV system uses its own wayside communication method and does not require interface with the MAR.</p>
27	<p>Wireless Bulk Data Transfer (WBBDT) shall perform the following: automatic uploading and downloading of data files at the Depot and push to corresponding equipment on the vehicle. These files will include: Audio Visual Annunciation (AVA), Destination Sign Image, Scheduling Data, Fare Collection Data, Logged Data, and Firmware for all subsystems. The logged Data shall include APC, Fare Collection, and Vehicle Location Logging. The onboard storage shall be sufficient to store all files and data for 7 days in the event of the unavailability of the WBBDT.</p> <p>Equipment required to perform WBBDT shall be provided.</p> <p>Design documentation shall provide system description, and functionality of LiveCom tool to generate audio and visual announcement data for PIS system.</p> <p>Design documentation shall describe process to update announcement data.</p>
28	System shall include 700/800 MHz and GPS Antennas.
29	Not applicable
30	Vehicle shall transmit location to the wayside every 60 seconds on the surface and every 20 seconds in subway, these transmissions are archived on the wayside.
31	<p>The Farebox will be connected to the VLU via J1708. The Farebox will dispense a Fare receipt.</p> <p>Farebox will be connected to VLU in the same method as on LRV2/3.</p> <p>Clipper® does not have bidirectional communication with VLU.</p>

Enclosure No. 4: Light Rail Vehicle Procurement Statutory Exemption (Case No. 2014.0929E)



SFMTA
Municipal
Transportation
Agency

Edwin M. Lee, Mayor

Tom Nelson, Chairman

Malcolm Henneke, Director

Joel Borjas, Director

Edward D. Weiss, Director of Transportation

2014.0929E

Cheryl Brinkman, Vice Chairman

Terry Lee, Director

Cristina Bucche, Director

LIGHT RAIL VEHICLE PROCUREMENT

As part of its regular daily passenger transit service, the SFMTA has a fleet of 151 light rail vehicles (LRVs). Vehicles in service operate 21 hours per day, 365 days a year, on the Muni Metro system. These vehicles typically have a lifespan of 25 years, and will be scheduled for retirement starting in 2021.

The planned procurement will provide up to 260 new LRVs, together with associated services, spare parts, special tools, training and documentation. The new LRVs are expected to have a 25-year life, which assumes that the cars will undergo a mid-life overhaul. SFMTA requires new LRVs for three purposes:

- (1) 24 LRVs for increased service demand for the Central Subway Project and Mission Bay, and system-wide growth along those corridors. These vehicles would be scheduled for delivery from 2016 through 2018;
- (2) the replacement of the existing fleet of 151 LRVs, with deliveries projected to start in 2021 and continue through 2028; and
- (3) Up to 85 LRVs to meet additional projected growth in ridership and system capacity expansion needs through 2040.

These cars will be housed at Muni Metro East Facility and Green Facility.

Statutorily exempt
under CEQA Guidelines
Section 15275(a) -
increase in service on
rail lines already in use.
New LRVs for Central
Subway covered under
Central Subway EIS/EIR
Final Supplemental
Case NO. 1996.281E

~~Categorically exempt from Environmental Review
CEQA Guidelines 15301 Class 1 (e): Additions to
existing structures provided that the addition will
not result in an increase of more than 50 percent
of the floor area of the structures before the
addition, or 2,500 square feet, whichever is less.~~

~~Gerald Robbins~~

~~Gerald Robbins Date~~

- Jeannie Poling 6/19/14