THIS PRINT COVERS CALENDAR ITEM NO. : 10.2

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY

DIVISION: Capital Programs & Construction

BRIEF DESCRIPTION:

Authorizing the award of San Francisco Municipal Transportation Agency (SFMTA) Purchase Order No. 4 to SFMTA Contract No. 1226, Automatic Train Control System (ATCS) Final Cutover Installation Phase project with Thales Transport & Security, Inc., located at 5700 Corporate Drive, Suite 750 Pittsburgh, PA 15237, as a sole source purchase order, in the amount of $2,511,850, for a term not to exceed 578 calendar days.

SUMMARY:

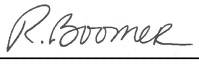
- The purpose of the contract is remove the last vestiges of the old Muni signaling system and transfer all rail signaling functions ("Cutover") to the Advanced Train Control System (ATCS) provided by Thales Transport & Security ("Thales" - formerly Alcatel Transport Automation (U.S.) Inc.).
- On April 21, 2009, the SFMTA Board approved Contract 1226 with Thales to allow the Director of Transportation to issue Purchase Orders to Thales to procure services and equipment necessary to maintain the ATCS.
- On January 5, 2010, the SFMTA Board delegated authority to the Director to approve contracts up to $500,000
- In July of 2011, design of the Final Cutover was completed under Purchase Order No. 2.
- On July 19, 2013, the Director of Transportation authorized sole source negotiations with Thales for installation services related to ATCS Final Cutover project since Thales is the only provider for this proprietary system.
- Federal and State sources are providing funds for the work.

ENCLOSURES:

1. SFMTAB Resolution
2. Purchase Order No. 4
3. Project Budget & Financial Plan

APPROVALS: **DATE**

DIRECTOR  9/29/14

SECRETARY  9/29/14

ASSIGNED SFMTAB CALENDAR DATE: October 7, 2014

PURPOSE

The purpose of this calendar item is to authorize the award of Purchase Order No. 4 to SFMTA Contract No. 1226 Automatic Train Control System Final Cutover Installation Phase project with Thales Transport & Security as a sole source purchase order, in the amount of $2,511,850, for a term not to exceed 578 calendar days.

GOAL

Purchase Order 4 will assist in the implementation of the following goals, objectives and initiatives in the SFMTA Strategic Plan:

Goal 1: Create a safer transportation experience for everyone.

- Objective 1.3 Improve the safety of the transportation system.

Goal 2: Make transit, walking, bicycling, taxi, ridesharing & car sharing the preferred means of travel.

- Objective 2.2 Improve transit performance.

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

- Objective 3.1 Reduce the Agency's and the transportation system's resource consumption, emissions, waste and noise.
- Objective 3.2 Increase the transportation system's positive impact to the economy
- Objective 3.3 Allocate capital resources effectively.
- Objective 3.4 Deliver services efficiently.

DESCRIPTION

Background

The ATCS was procured from Alcatel Transport Automation (since purchased by Thales Transport & Security) in 1998. The ATCS was implemented in the subway in 1998 in conjunction with the procurement of the Breda Light Rail Vehicle (LRV) fleet and the construction of the Muni Metro Turnback (MMT). At that time the Boeing LRV fleet was still in operation. Some Boeing LRVs were retrofitted to run under ATCS control, and some were left to operate with the conventional signal system. The Breda fleet was equipped with ATCS-only controls.

The ATCS was built as a "dual mode" system, so that both ATCS and non-ATCS trains could operate under train control between West Portal and Embarcadero. In the area from Embarcadero Station to Folsom Portal, train control was implemented as ATCS-only. The dual mode allows the conventional signal system and ATCS to continue to function. The conventional signal system also acts as a backup signaling system in case of unexpected ATCS failure. The dual mode

operation increases the frequency and complexity of system failures, however. By removing the old conventional signal system and placing the entire Metro Subway under ATCS control, overall system complexity, maintenance costs, and mean time between failures (MTBF) will be significantly reduced.

Contract No. 1226 with Thales (formerly Alcatel Transport Automation) is a master framework agreement under which the SFMTA may procure proprietary equipment and services to maintain the ATCS. Each purchase order under Contract No. 1226 must receive sole source approval from the Director of Transportation. The design of the Final Cutover was completed in July 2011 under Contract 1266, Purchase Order No. 2.

Scope of Work

Under Purchase Order No. 4, Thales, working with SFMTA staff, will provide systems integration, testing and commissioning services to cutover the Subway to full ATCS control. Construction work required for the cutover work, including procurement of electrical materials, installation of conduit and wiring, and removal of the old conventional system equipment, will be performed under separate SFMTA Contract(s). Thales will not perform any construction work, but will inspect the other contractors' work and will perform final connection and testing of the ATCS equipment. Thales will also decommission and remove residual elements of the old signaling system at five interlocking equipment rooms located at West Portal, Castro, Duboce, Van Ness, and Embarcadero Stations.

ALTERNATIVES CONSIDERED

The ATCS and its components, including software, are a proprietary technology of Thales Transport & Security, Inc. ATCS equipment, software, and specialized technical service can be procured only from Thales; there is no other supplier.

This procurement meets the single source requirements for sole source contracting under federal guidelines. This process is consistent and in compliance with FTA Circular 4220.1F regarding Procurement by Noncompetitive Proposals (Sole Source).

FUNDING IMPACT

Funding for the entire project comes from a combination of Federal and State funds. All funding for this project has been secured.

OTHER APPROVALS RECEIVED OR STILL REQUIRED

The City Attorney’s Office has reviewed this calendar item. No other approvals are required.

RECOMMENDATION

Staff recommends that the SFMTA Board of Directors authorize the Director of Transportation to award Purchase Order No. 4 for SFMTA Contract No. 1226, Automatic Train Control System (ATCS) Final Cutover Installation Phase project with Thales Transport & Security as a sole source purchase order, in the amount of $2,511,850, for a term not to exceed 578 calendar days.

SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY
BOARD OF DIRECTORS

RESOLUTION No. _____

WHEREAS, The Advanced Train Control System (ATCS) is a safety critical system that performs automated train control and signaling of light rail vehicles operating in the Muni Metro Tunnels, which has served to improve safety, increase speed and frequency of service, and reduce headway the subway; and

WHEREAS, The ATCS is proprietary to Thales Transport & Security ("Thales"), which is the only source for ATCS equipment and services necessary to maintain and expand the ATCS; and

WHEREAS, On April 21, 2009, the SFMTA Board of Directors approved Contract 1266 with Thales, under which the SFMTA is authorized to procure through purchase orders proprietary equipment and services; and

WHEREAS, To simplify the signaling system and thereby improve system reliability and reduce maintenance costs, the SFMTA desires to remove the last remaining parts of the old traditional signaling system and cutover all train control and signaling functions to the ATCS; and

WHEREAS, In July 2011, design of the Final Cutover was completed under Contract 1226, Purchase Order No. 2; and,

WHEREAS, On July 19, 2013, the Director of Transportation authorized sole source negotiations with Thales for a purchase order under Contract 1226 for system integration, testing, commissioning and installation oversight services for ATCS Final Cutover; and,

WHEREAS, Under SFMTA Board of Directors Resolution No. 10-008, contracts valued more than $500,000 require Board of Directors approval; now, therefore, be it

RESOLVED**,** That SFMTA Board of Directors authorizes the award of Purchase Order No. 4 for SFMTA Contract No. 1226, Automatic Train Control System Final Cutover Installation Phase project with Thales Transport & Security, Inc., located at 5700 Corporate Drive, Suite 750 Pittsburgh, PA 15237 as a sole source contract, in the amount of $2,511,850, for a term not to exceed 578 calendar days.

I certify that the foregoing resolution was adopted by the San Francisco Municipal Transportation Agency Board of Directors at its meeting of October 7, 2014.

_____
Secretary to the Board of Directors
San Francisco Municipal Transportation Agency

ENCLOSURE 2

Contract No. 1226 Purchase Order No. 4
ATCS Final Cutover
Project Budget and Financial Plan

PROJECT BUDGET

Category	Budget
Conceptual Engineering Phase Staff Support (SFMTA and Other Dept. Services)	$397,000
Detail Design Phase Staff Support (SFMTA and Other Dept. Services)	$2,686,000
Installation Phase Construction Contract, Contingency and Staff Support	$7,737,653
Total Cost	**$10,820,653**

FINANCIAL PLAN

Project Funding Source	Amount
FTA Section 5309	$8,656,522
State I-Bond (PTMISEA)	$2,164,131
Total	**$10,820,653**

PURCHASE ORDER FOR THE IMPLEMENTATION OF FINAL CUTOVER TO FULL ADVANCED TRAIN CONTROL SYSTEM (ATCS) CONTROL

CONTRACT No. 1226 – PURCHASE ORDER No. 4

This Purchase Order is issued by the San Francisco Municipal Transportation Agency ("SFMTA" or "City") under the Advance Train Control System Improvement Professional Services and Equipment Purchases Agreement between the SFMTA and Thales Transport & Security, Inc. ("Thales"), Contract No. 1226, dated April 21, 2009, (the "Master Agreement") for the Work, as defined below, to support the SFMTA's final cutover to full ATCS in MUNI Metro Subway from West Portal to Embarcadero described herein. The Master Agreement is incorporated by reference as if fully set out herein. All Appendices listed below are incorporated by reference as if fully set out herein.

1. Effective Date: This Purchase Order will become effective when executed by the SFMTA and Thales in accordance with Clause 47 of the Master Agreement.
2. Scope: See Appendix A for a description of the scope of work, deliverables and constraints (collectively the "Work") to be rendered under this Purchase Order.
3. Price: The total price payable by the City in respect of this Purchase Order for the Work hereunder is Two Million Five Hundred Eleven Thousand Eight Hundred Fifty United States Dollars ($2,511,850 U.S.) subject to adjustment only as otherwise set forth herein or in accordance with the provisions of the Master Agreement.
4. Delivery and Payment Schedule: See Appendix B for a schedule of the dates by which Thales is required to perform the Work and included Milestones under this Purchase Order, and the respective payment schedule for the Work.
5. Warranty and Responsibility for Design: Thales shall perform the Work under this Purchase Order with due care and diligence, in accordance with the terms and conditions of the Master Agreement.

   Thales warrants the professional quality, technical adequacy and accuracy of its updated Cutover Plan (as defined in Appendix A) as submitted by Thales for the Work. Thales warrants that its updated Cutover Plan shall conform to the technical specifications developed by Thales as part of the Design Phase for the Work hereunder (completed under Purchase Order No. 2 to the Master Agreement), and that its Work will be performed in a professional and workmanlike manner for a period of one (1) year following Substantial Completion (the "Warranty Period"). Thales shall at its own expense correct errors and omissions in its Detail Plans if notified in writing to Thales within such Warranty Period. Notwithstanding any provision of the Master Agreement or this Purchase Order to the contrary, Thales shall have no obligation or liability under this Article if:

   a. The Work has been modified or reworked by any party other than Thales, without Thales's prior written consent (but said warranty exemption is limited to the portion of the Work that was modified without authorization) ; or

b. City fails to implement any Detail Plans in accordance with the Thales's procedures, plans and/or specifications.

THALES DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY AND ALL IMPLIED WARRANTIES THAT MAY BE APPLICABLE UNDER THE UNIFORM COMMERCIAL CODE OR OTHER APPLICABLE STATUTES, INCLUDING IMPLIED WARRANTIES ARISING BY USAGE OR CUSTOM OF TRADE.

6. Subcontractors: Thales shall use the subcontractor(s) to accomplish the Work described in Appendix A of this Purchase Order, which subcontractor(s) is/are hereby acknowledged and approved by the SFMTA. Thales shall not substitute a subcontractor without written approval from the SFMTA, which approval shall not be unreasonably withheld or delayed.
7. This Purchase Order will terminate without cost to any party if the SFMTA does not issue Notice to Proceed (NTP) to Thales within 180 days following the approval and execution of this Purchase Order by signature of the parties' authorized representatives.

[Remainder of this page intentionally left blank.]

8. Authorization: By their signatures below, this Purchase Order is authorized by the SFMTA's Executive Director/CEO and the President or Corporate Counsel of Thales.

Authorized:

_____

Edward D. Reiskin
Director of Transportation
Municipal Transportation Agency
City and County of San Francisco

Date: _____

Authorized:

_____

John Brohm
President
Thales Transport & Security, Inc.
5700 Corporate Drive, Suite 750,
Pittsburgh, PA 15237

Date: _____

Approved as to Form:

Dennis J. Herrera
City Attorney

_____

Robert K. Stone
Deputy City Attorney

Date:_____

APPENDIX A TO CONTRACT 1226, PURCHASE ORDER No. 4

1. **BACKGROUND**

The purpose of the ATCS Final Cutover Project is to decommission the traditional legacy wayside train control system manufactured by Wismer-Becker (the "TWCC") in the Muni Metro subway, and provide for full ATCS control of trains in the subway using current technology provided by Thales. The original Muni Metro ATCS was built as a "dual mode" system so that both ATCS and non-ATCS trains could run under train control between West Portal and Embarcadero. Although non-ATCS trains no longer operate in the subway, the ATCS still interfaces with the TWCC to control signals and switches. This Project will re-configure the ATCS to directly control the signals and switches in "ATCS only" mode. A backup control system in case the main ATCS computer fails was installed in signal rooms under the ATCS SMC Upgrade Project. This replaces the backup functionality previously served by the TWCC. Thales will provide test and integration services for the transition to "ATCS only" operation, as well as isolation of the legacy train control system. The transition or "Cutover" to "ATCS only" operation will proceed region by region from West Portal signal room to Embarcadero signal room over several months. Thales created the plans for the Work to be performed to accomplish Cutover under Purchase Order No, 2 to the Contract. No interruption to Revenue Service to perform Cutover is anticipated.

2. **Reference DOCUMENTS**

A. The following documents and reports are available to Thales for its reference and information. Thales is responsible for confirming actual field and system conditions. The SFMTA does not warrant that these documents are complete or accurate, and the City shall not be liable for any loss or claim if Thales relies on these documents to its detriment.

B. ATCS Final Cutover Report developed by SYSTRA Consulting, Inc., dated July 14, 2006.

C. Cutover Plan developed by Thales Rail Signaling Solutions (U.S.) Inc.(now known as Thales Transport & Security, Inc.) ("Thales") dated November 13, 2007.

D. Muni Cutover Plan R2 dated May 7, 2012.

E. Muni Cutover Construction Documents R2 for Castro, Duboce, Embarcadero, Van Ness, and West Portal dated May 7, 2012.

F. Muni Site Acceptance Test documents for Castro, Duboce, Embarcadero, Van Ness, and West Portal.

G. Muni Commissioning Plan R2 dated May 7, 2012.

H. Muni Cutover Safety Assessment R2 dated May 7, 2012.

3. **Definitions**

1. Additional Work – Work that is not within the scope of Work described in the Contract Documents, is not incidental to the Work described in or required under the Contract Documents.

2. As-Built Schedule - Schedule incorporating all actual activity durations, actual start and finish dates of all activities as accomplished or incurred during performance of the Work. Thales shall submit this As-Built Schedule to SFMTA at the completion of the Work as a condition of Substantial Completion.

3. ATCS, Advanced Train Control System - The train control system provided to the San Francisco Municipal Railway by Thales under the 1992 Contract No. 1034R with Alcatel Transport Automation (U.S.) Inc., Thales' predecessor.

4. ATCS Documentation - Thales supplied documentation as to ATCS operation, installation, as-built diagrams and designs, maintenance requirements, and user instructions.

5. ATCS Only Operation - Mode of operation where ATCS provides full sensing and control of wayside equipment.

6. Baseline Schedule -A detailed CPM schedule, indicating Thales' plan for executing the Work. This schedule shall include the Thales's logic network diagrams and all schedule network reports. The Baseline Schedule shall conform to the requirements of the Contract Documents specifically related to the Baseline Schedule.

7. Business Days - Any calendar day (24 hour period commencing at 12:00 AM and terminating at 11:59 PM), except Saturday, Sundays, and holidays.

8. Codes - The latest (most recently enacted) versions of state, federal, and local regulations, ordinances, statutes, and other laws and requirements of regulatory agencies with jurisdiction of the Project that govern the design, means, and methods of construction, labor employed on the Work, the built structure, and safety and other mandates of law. Whatever reference is made to code, that reference shall be construed to mean the applicable codes, regulations, ordinances, statutes, laws and other legal requirements applicable to the Work, whether or not specified or otherwise referenced in the Contract Documents.

9. Construction Documents - Comprehensive, fully coordinated set of designs, drawings, material and installation specifications that were provided by Thales in Phase I of the Project (under Purchase Order No. 2 to the Contract) and more fully developed by the SFMTA that

the SFMTA will use as bid documents to contract for the Installation Work. Thales will review the SFMTA edits to the Construction Documents and advise whether any edit impacts the cutover design and ATCS signaling system. The Construction Documents include architectural, structural, mechanical, electrical, drawings and specifications as required to describe the Installation Work, phasing and staging of Installation Work, schedule for completion of the Installation Work, and hardware descriptions and quantities necessary to implement the Cutover.

10. Contract Documents - Purchase Order No. 4 and all Appendices to and documents incorporated by reference therein, and Contract 1226 (the Master Agreement).

11. Conventional Mode - Train control mode where regions of the subway are fully under control of the TWCC without ATCS.

12. CTC, Centralized Train Control System - Existing (installed in 1989) electrical overlay of fixed block train control system used to manage train movements in the subway at Lenox Control Center if there is no ATCS.

13. Cutover - Process by which sensing and control of interlockings and wayside equipment is fully transferred from the TWCC to ATCS.

14. Cutover Plans - The detail cutover design plan that Thales completed under Purchase Order No. 2 to the Master Agreement as updated to reflect the current cutover sequential scheme for this Project and as submitted by Thales for the Work.

15. Days - Consecutive calendar days except where expressly stated as otherwise, as in "Work Days."

16. Decommission - Series of actions taken at the end of the useful life of a piece of equipment or system to safely remove it from service.

17. DSRC, Destination Sign and Relay Control System - Non-functional overlay of fixed block train control system used to route trains and display destination signs. Installed in 1981.

18. Dual Mode Operation - Current mode of operation that can simultaneously support ATCS and TWCC controlled trains.

19. Electrical Isolation - The disconnection and separation of electrical equipment from sources of electrical energy in such a way that this disconnection and separation is permanent and secure.

20. Engineer - A contract manager or site representative of the SFMTA properly authorized by the SFMTA with regards to this contract. The engineer will manage this contract for the SFMTA and be the main point of contact with Thales for the performance of inspections and administration of this contract.

21. Final Acceptance – Written confirmation from the SFMTA's Director of Transportation that all Work under this Purchase Order is complete and accepting the Work. See Section 26.

22. Final Field Report - Report assembling PICO, test, and commissioning results. Report shall include narrative summary of Project, overall test findings, completed test forms, summary of test results, and missing, failed, not applicable, newly required, or postponed tests. Discuss non-passed test or test steps in the test documentation along with the reason for missing the test and the technical and safety consequences as well as traceable resolution.

23. Furnish - Purchase and deliver to the site, including proper storage only, no installation is included. The term "Furnish" also means to supply and deliver.

24. Installation Contractor - Provides the material, labor, and equipment, directly related to the installation of the Work. Allocates resources and performs the Work according to the Construction Documents, under the general direction of the SFMTA per SFMTA’s contract with Installation Contractor. SFMTA shall ensure that all Installation Contractor obligations and responsibilities as set forth in this Appendix A shall be provided directly to and incorporated in its contract with Installation Contractor.

25. Installation Work – The work of the Installation Contractor to install ATCS infrastructure and equipment, where such Installation Work may only be performed by a licensed construction contractor.

26. LSMC, Local System Management Center - Wayside equipment which provides local control of a station controller in the event of unavailability of a VCC. Depending on the circumstances, the LSMC can also be controlled from central control. Master Agreement - The Advance Train Control System Improvement Professional Services and Equipment Purchases Agreement between the City and Thales, Contract No. 1226, dated April 21, 2009.

27. Project - The Work described herein, including installation of the equipment and completion of Cutover, and all elements of that Work including incidental work necessary for the completion of the Work, in whole or part, and the end result of the Work.

28. Provide - Furnish and install, or supply and install, complete and in place, at the site.

29. Purchase Order No. 4 - This document and documents incorporated by reference describing the Project, the Work to be performed, the furnishing of labor, materials, and equipment to perform the Work, insurance, the terms and conditions of performance, and consideration, and any properly executed and certified Change Order to this Purchase Order No. 4.

30. Reference Documents - Documents that contain information relevant to the Work that the City believes may be useful to Thales but that are not part of the Contract.

31. Request for Information - A document prepared by Thales requesting information from the SFMTA regarding the Work, Project, or Contract Documents.

32. Revenue Hours: Hours during which trains carry fare paying passengers operate as defined by the current schedule and which may be modified by the Lenox Operations Control Center (OCC), also known as "Revenue Service."

33. Safety and Functional Requirements Memorandum - Memorandum from Thales that verifies that the Project satisfies functional and safety requirements for all Cutover locations.

34. SCS, Station Controller Subsystem - Equipment at wayside which provides control of signals and switches and sensing of wayside conditions over a specific area of the ATCS system.

35. Submittal - A document, design, schedule, shop drawings, sample, test report, certificates of compliance, manufacturer's instructions, or other Thales work product described herein that Thales must submit to the SFMTA for review and approval in accordance with the agreed upon Submittal Schedule prior to continuation of or acceptance of Work. A Resubmittal is a Submittal previously rejected by the SFMTA that Thales has resubmitted for SFMTA review and approval.

36. Substantial Completion - The state in progress of the Work and point of time, as confirmed in writing by the SFMTA's Director of Transportation that Thales has implemented a fully functional ATCS, completed the test and commissioning process, resolved all issues and open Work items to the SFMTA's satisfaction for each station Equipment Room, delivered equipment, documentation and workshop deliverables as specified in the Contract Documents (excluding manuals and as-built documentation that will be submitted before (as a condition of) Substantial Completion in accordance with the agreed upon Submittal Schedule), and delivered the Cutover modifications to the ATCS

approved for Revenue Service in accordance with the requirements and specifications set out in this Purchase Order. See Section 25.

37. Technical Specifications - Directions, provisions, and requirements including any plans or drawings pertaining to the performance of the Work herein required and to the furnishing of material.

38. Test Day - Calendar day on which SFMTA is required to mobilize staff and resources to support Thales' testing and commissioning.

39. TWCC, Traditional Wayside Control Circuits - Existing fixed block train control system, including Wismer-Becker fixed block signaling equipment, CTC and DSRC overlays.

40. VCC, Vehicle Control Center - Computer system at central control which provides vital automatic control of train movement in ATCS.

41. Weekly Plan - A detailed bar chart plan of the Work to be accomplished in the coming three (3) weeks. All activities and sub-task activities in the Weekly Plan shall be referenced with the activity numbers in the Current Schedule or schedule in effect.

42. Work - The performance by Thales of its responsibilities and obligations as specified or otherwise set forth in the Contract Documents, and the results of Thales's efforts. Work shall include, but not be limited to, providing all labor, services, materials, equipment, and documentation required by the Contract Documents as pertaining to the signaling system of the ATCS.

43. Work Day – (a) Any calendar day (24 hour period commencing at 12:00 AM and terminating at 11:59 PM) scheduled for performing Work on-site including Saturdays, Sundays and holidays; or (b) Any calendar day (24 hour period commencing at 12:00 AM and terminating at 11:59 PM) scheduled for performing Work off-site, except Saturday, Sundays, and holidays. Separate activities shall be used in the schedule to identify other than a normal work schedule such as weekends, holidays and multiple shifts per day or extended hours (more than a normally scheduled work shift).

44. Workshop - Meetings between SFMTA and Thales Project teams to discuss overall project scope; installation instructions to the Installation Contractor, and SAT and Commissioning processes. See Section 14.

4. GENERAL Description of Scope

A. Thales will provide designs, plans, equipment, software, inspection, testing, and commissioning support to implement Cutover from the TWCC system to the ATCS. Thales will not perform Installation of equipment or construction of support or infrastructure elements (such as conduits, wiring, and wayside equipment platforms); Installation will be performed by an Installation Contractor under separate contract with the SFMTA.

B. In implementing Cutover, Thales will not make any changes to the existing ATCS software. References to the TWCC may still be in the software, but will not be functional once Cutover is complete. Accordingly, SFMTA shall be responsible for implementing any necessary Site Operation Procedures with recommendation from Thales as addressed during the Workshops.

C. The commands to fall back to conventional mode from VCC, SCS, and LSMC will no longer be functional. If a command is sent to fall back to the TWCC, the ATCS equipment will relinquish control. However the TWCC will not be functioning, therefore Muni Central Control will not have any indications of trains and switches for that section of track. The ATCS manuals will be updated to reflect the system actions when the conventional modes are requested, as addressed during the Workshops.

D. Conduct survey with Installation Contractor of ATCS and TWCC equipment to be modified and removed and update construction documents with results of site survey.

E. Provide technical support to SFMTA during Installation Contractor Installation Work. Perform inspection and tests of wiring of the Installation Contractor necessary to prove the adequacy and acceptability of the Installation Work as it relates to the ATCS signaling system.

F. Review ATCS documentation listed in Section 15 to determine whether the documentation accurately reflects the current condition of the ATCS at Substantial Completion of the Project and update as required.

G. Develop and conduct the site acceptance and commissioning test program to Cutover the ATCS and verify that modified ATCS subsystems meet all operational, functional, safety, and performance requirements. See Section 10.

H. Provide Workshops for Project for SFTMA staff and Installation Contractor staff during various phases of Project.

I. Provide full time on-site technical support during Cutover test and commissioning phases, continuing until Final Acceptance.

J. Support SFMTA’s communications with the California Public Utilities Commission (CPUC).

K. Thales shall be responsible for performing all Work described in this Purchase Order, except where responsibility for portions of the Work are specifically assigned to the SFMTA or the Installation Contractor. For avoidance of doubt, where the party responsible for performing any part of the Work is not specifically identified, it shall be presumed that Thales is responsible for the performance of that Work, except if that work qualifies as Installation Work or a SFMTA responsibility, which, in case of ambiguity, shall be determined by the SFMTA, subject to Master Agreement's Dispute Resolutions process.

5. Overall Project Responsibilities

A. The following table details specific responsibilities for different scope areas of the Project:

Scope	Responsible Party
Perform electrical Installation Work to Cutover ATCS	Installation Contractor
Construction documents for Cutover of ATCS	Thales
Supply and install electrical materials and equipment (that are not proprietary to Thales)	Installation Contractor
Full time on-site technical support during Cutover testing	Thales
Testing of Installation Work	Thales
Testing and commissioning of ATCS Cutover	Thales
Scheduling and management of regular progress meetings with SFMTA management, operations and maintenance and other stakeholders to review Project progress	Thales
Project oversight	SFMTA

6. PROJECT PLANNING, PROJECT MANAGEMENT AND Technical Support

Thales shall provide and perform the following services and tasks:

A. Project Management Plan. Provide and implement a Project management plan that addresses Project terms and acronyms; Project scope; resumes and qualifications for Thales's staff, Project organizational structure; interfaces among contractors; Project team responsibilities and reporting relationships; work breakdown structure for implementation of

the Project; Project communications; and regular reviews by stakeholders. Provide detailed, narrative description of Project scope, activities, and responsibilities written in non-technical language that serves as the definitive high-level description of Project scope. Terms, acronyms, and definitions in the plan shall be comprehensive and be the basis for description of the Work during the execution of the Project. Update and maintain current the plan when the Project scope, schedule, or activities deviate from the original plan.

B. Baseline Schedule. Develop a critical path-based Baseline Schedule in Microsoft Project based on the Project management plan. Review schedule format and Project activities indicated in the schedule and with the SFMTA before releasing the first Project schedule. Review and analyze design and Installation Contractor's construction schedules for compliance with Thales's contractual and Project requirements. Update the schedule to include current information regarding progress of the Project every week. Provide current information regarding critical and near-critical activities, milestones, Work progress, and issues affecting the schedule, and develop corrective action plans with each schedule update. Integrate Installation Contractor construction activities in each schedule update, and indicate delayed activities. Explain delays in accompanying memorandum that discusses relevant facts and causes of the delay and identifies the party responsible for schedule delay. Thales will track all delays and delay responsibilities.

C. Technical Review Meetings. Lead Project technical review meetings every two weeks with the Installation Contractor, the SFMTA, and other stakeholders. Report at each meeting issues concerning to technical, construction, and test issues. Prepare meeting agenda before each meeting and meeting minutes after each meeting for SFMTA's review and approval. Distribute meeting agenda to meeting participants three (3) Business Days before meeting. Distribute draft meeting minutes within three (3) Business Days of each meeting. SFMTA will review and provide comments to meeting agenda no later than 1 Business Day before the meeting. SFMTA will provide comments to draft meeting minutes within five (5) Business Days of receipt. Thales will amend the draft meeting minutes and distribute final meeting minutes within three (3) Business Days of receipt of completion of SFMTA review.

D. Project Progress Meetings. Lead Project management progress review meetings every two weeks with the Installation Contractor, the SFMTA, and other stakeholders. Report on issues related to schedule, scope, and Project risks, workshop activities, document status. Review Thales activity during past two weeks, currently occurring on site, and provide three week look ahead of Project activity. Prepare meeting agenda before each meeting and meeting minutes after each meeting for SFMTA's review and approval. Distribute meeting agenda to meeting participants three (3) Business Days before meeting. Distribute draft meeting minutes within three (3) Business Days of each meeting. SFMTA will review and provide comments to

meeting agenda no later than one (1) Business Day before the meeting. SFMTA will provide comments to draft meeting minutes within five (5) Business Days of receipt. Thales will amend the draft meeting minutes and distribute final meeting minutes within three (3) Business Days of receipt of completion of SFMTA review.

E. Inspection and Testing of Installation Work. Inspect and Test the Installation Work and provide technical support to the SFMTA. Submit template of installation checklist as relating to the signaling portion of Installation Work to SFMTA for approval. Review and evaluate Installation Work as it relates to signaling. Meet with SFMTA and Installation Contractor staff as required to identify and resolve signaling problems. Identify areas where the Installation Work has deviated from the Construction Documents relating to signaling and recommend corrective action. When requested by the engineer, Thales will review the Installation Contractor's work at the Site with the Engineer during Thales' normally scheduled work hours.

F. Work Plan Review. Review Installation Contractor's Installation Work plan and schedules and submit written recommendations to the SFMTA. Review Installation Contractor's schedules for conformity to the specifications, logic, task duration, critical activities, and Submittal review periods set out in the Contract Documents. Update the Thales (master) schedule to reflect the Installation Contractor's progress when Installation Contractor's schedule changes. Review Installation Contractor's requests for time extensions and analyze and submit written recommendations for action. Assist in developing alternative work plans and schedules to facilitate the progress of the Project beyond roadblocks and issues.

G. System Engineering Plan. Provide and implement a system engineering plan. Discuss whether any requirements of the system are changing, which requirements, and why they are changing. Update requirements documents as necessary. Requirements relevant to the project shall be traceable and type of verification identified.

H. Submit and implement a written Project Safety Program plan in accordance with Appendix B that: (1) describes the process by which project-specific safety requirements are selected; (2) describes the process by which requirements are tracked and tested; (3) assigns appropriate responsibilities for the safety program to Thales and the SFMTA. Review ATCS safety documentation to determine whether updates are necessary to reflect final as-built system. . The Safety Program Plan will concern only ATCS safety matters and will not address work site safety and OSHA requirements.

I. QA/QC Compliance. Comply with the Federal Transit Administration's Quality Assurance and Quality Control guidelines, and develop and submit for SFMTA's review and

approval a Quality Assurance and Quality Control Program for the Project. Integrate Project activities into document and relate the Project to specific phases of the Quality Assurance program.

7. **Facilities survey and design work**

Thales shall provide and perform the following services and tasks in accordance with Appendix B:

A. Site Survey and Construction Documents

1. Conduct site survey of ATCS facilities to identify differences between ATCS documentation and conditions as they exist in the field at the time of the site survey. SFMTA shall be responsible for the existing conditions of the ATCS facilities and equipment therein. Should Thales identify any facility or equipment that is in poor repair, not service ready, or out of calibration, SFMTA shall be responsible for making all needed repairs or corrections to said facility or equipment prior to Thales's Cutover work. If additional site surveys are required after SFMTA's corrective actions, they shall be considered Additional Work.

2. Review scope of Installation Work with Installation Contractor during Workshop #2, provide on-site review of equipment, and verify design documents listed in Section 15 herein are accurate and complete for Cutover.

3. Provide Construction Documents to be used by Installation Contractor for Installation of equipment and wiring sufficient for Thales to perform testing and commissioning of Cutover of ATCS.

4. Provide calculations for ATCS UPSs for revised power loads. Update ATCS documentation as required.

B. The SFMTA will direct the Installation Contractor to review the Construction Documents upon receipt and shall promptly notify the SFMTA (and Thales in the event of any impacts to signaling) of any discrepancies in the drawings, conflict between the drawings and the technical specifications, discrepancies with field conditions, or any issues concerning constructability. Notwithstanding the Installation Contractor's review of the Construction Documents, Thales shall be responsible for correcting any errors or ambiguities in the Construction Documents solely attributable to Thales. Thales will not be responsible for SFMTA's additions or revisions to the Construction Documents.

C. For site surveys, provide reports on a template approved by SFMTA describing Cutover activities, which shall include narrative summaries of site survey findings, schematic drawings of systems and interfaces, and discrepancy with the "as-built" drawings.

8. Review of ATCS Documentation

A. Thales shall as a condition of Substantial Completion review ATCS documentation listed in section 15. If said documentation refers to “dual mode”, “conventional system”, “SLRVs”, or related operating modes, Thales shall edit said documentation to accurately represent the final “as-built” ATCS as the ATCS exists as of Substantial Completion of the Work. Installed and implemented under this Purchase Order. Conduct on-site field investigations to assess the accuracy of existing ATCS documentation. Provide a narrative report that describes Thales’ findings from its review of ATCS documentation.

B. In accordance with Appendix B, Thales shall, inventory ATCS documentation to be updated and place in a tracking matrix. Maintain this tracking matrix separate from Submittal log. List ATCS documentation, organized by subsystem, and indicate document name, version, version date, and document status. Provide monthly update of tracking matrix to SFMTA. Review documentation matrix with Project stakeholders every month.

C. Based on the results of Thales's assessment and SFMTA's own internal assessment, the scope of each document update will be determined by the SFMTA before document modifications begin.

D. For Work described in this Section 8, updates shall include but not be limited to editing of existing text, addition of text, the removal of text, re-organization of documentation sections, addition of and edits of electronic document metadata, modification of filenames of electronic documents within Thales’s internal document control requirements, modification of existing illustrations and schematics or addition of illustrations and schematics for conceptual clarity, repair of invalid document references or formatting, changing of page layout attributes, and wholesale revision as determined by the SFMTA.

E. Thales shall coordinate ATCS related terms and acronyms within documentation according to the ATCS Glossary of Terms. Reconcile substantially similar concepts, issues, or equipment described by different terms or acronyms by substituting with correct term across revised documentation.

9. Post Installation Inspection of Installation Work

Thales shall provide and perform the following services and tasks:

A. Provide and implement a post Installation testing program and plan. Provide test procedures and perform tests to prove the adequacy and acceptability of the Installation Contractor's Installation Work. Commencement of inspection is contingent on SFMTA review and approval of all test plans and procedures, such approval not to be unreasonably withheld. Confirm that the Installation meets the specifications and requirements of the signaling design

by performing general field tests and inspection, including applicable tests prescribed by AREMA C&S Manual and other Codes, and as required by the SFMTA. Tests shall include:

1. Verify components are installed in accordance with manufacturer's recommendations, Code requirements, torqueing requirements, and signal industry installation standard practices, including but not limited NEC and AREMA standards;

2. Test ATCS vital relays for pick-up and drop-away values for all moved relays;

3. Compare wire gauges with those specified in the Contract Documents. Installation Contractor shall correct errors in installed wire sizes by replacing incorrect wiring with the size wire specified;

4. Verify wire count on each terminal and relay contact to ensure that only the number of wires specified in the Contract Documents are present at each terminal and relay contact. Installation Contractor shall correct errors in the installed wires;

5. Verify wire labels and tags for proper nomenclature and terminal location;

6. Inspect wiring for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition; and

7. Provide Test Reports with narrative summaries of inspection findings, recommendations to proceed, completed test forms, and missing, failed, newly required, or postponed tests. Note incomplete tests in the test documentation, and state reason that test was not completed, potential technical and safety consequences, and appropriate resolution. The SFMTA's decision to accept Installation Work and proceed with site acceptance testing and commissioning will be based on the results contained in this report. Thales shall submit a template of the test report for SFMTA approval per Appendix B.

B. Perform tests and inspections using Thales-provided test equipment. Provide evidence of equipment calibration in the test report.

10. Site Acceptance Testing (SAT) and Commissioning

Thales shall provide and perform the following services and tasks:

A. Provide and implement a site acceptance test and commissioning plan for a sequential SAT and commissioning test program. Provide a summary, narrative description of: (1) the strategy and assumptions behind the acceptance testing and commissioning program; (2) list of tests to be conducted, names and experience and qualifications of personnel involved in managing, coordinating and monitoring the testing program. Thales shall inform SFMTA immediately of changes to test staff and provide qualifications. The plan shall describe and provide schematics of electrical work required to maintain continuity of TWCC during each phase of sequential Cutover. The plan must include a Testing Summary Table describing test

activities anticipated for each distinct SAT and commissioning stage. Include in table, for each separate test stage:

1. Test stage name,
2. Test description in narrative form,
3. Test dates,
4. Test location,
5. Identify contingency plans, both technical and operational,
6. Test procedures verified (by test procedure number), and
7. SFMTA resources required.

B. Provide a Site Acceptance Test And Commissioning Plan in accordance with Appendix B and any updates to said plan at the commencement of site acceptance testing activities.

C. Provide SAT Test Procedures and Commissioning Test Procedures for Cutover of ATCS for SFMTA's review and approval in accordance with Appendix B. Provide detailed technical contingency plans including pre-test mitigations, failure mitigations during testing, possible post-test failure scenarios, and mitigations for post-test failures for SFMTA review and approval.

D. Perform Site Acceptance And Commissioning Tests to prove that functional and safety design requirements are met, including:

1. Verification of switch movement commands, correct detection of switch status, correct signal aspects, and routes for all cutover interlockings,
2. Confirmation that all routes can be aligned from the adjacent station and that ATCS functions properly without the control transfer relays (CXR),
3. Train test to confirm that the signal aspects change with train mode, and
4. Communications with adjacent TWCC signaling equipment as required to maintain safety and continuity of train movements.

E. For each SAT and Commissioning Test, provide a report which includes narrative summary of testing, recommendation whether to proceed to next stage, overall test findings, completed test forms, summary of test results, and missing, failed, newly required, or postponed tests. Provide traceable resolution for all non-passed tests and test steps. Discuss incomplete tests in the test documentation along with the reason for missing the test and the technical and safety consequences as well as appropriate resolution. Within five (5) Work

Days after completion of said tests, Thales will submit a report of the test results to SFTMA. Within five (5) Work Days of Thales's report submission, SFMTA shall complete its review and provide a written response.

F. The test engineer will provide to SFMTA an email report of test activities by 12:00 PM the following Work Day.

G. After SFTMA's approval and prior to placing a Cutover location into revenue service, Thales will, unless the Parties otherwise agree, conduct a final commissioning test to verify the approved Cutover implementation and proceed to place the Cutover location into revenue service.

11. Post Cutover Technical Support

Thales shall provide and perform the following services and tasks:

A. Following final location Cutover and SFMTA approval of the Safety And Functional Requirements report commence to provide post-Cutover support.

B. Thales shall assign one qualified person to provide full time continuous on-site technical support for one-month following final location Cutover.

C. Thales shall tag all TWCC equipment, wiring, conduit, and mounting hardware for later removal. SFMTA shall approve tagging methodology before Thales begins tagging.

12. General Test Requirements

Thales shall provide and perform the following services and tasks:

A. Include safety and special precautions, required equipment and tools, reference drawings and manuals, acceptance criteria, estimated time to perform the test, remarks and event recording area, and required SFMTA resources, in test procedures.

B. Submit a detailed Work Plan specific to each site to SFMTA for review and approval no later than twenty (20) Days in advance of proposed SAT and commissioning stage. Work Plan information shall be in narrative language with no outline or bullet point formatting outside of section formatting. The SFMTA's decision to proceed with testing will be based on review and approval of site specific work plan materials. Include:

1. Title page,
2. Brief executive summary describing overall purpose/goals of test and activities,
3. List of Thales staff involved with brief description of their roles in testing,
4. List of SFMTA resources required with brief description of their roles in testing,

5. Work plan in table format with each day listed separately. Indicate hours, location, trains required, minimal test area required, SFMTA staff required for each test day, and test procedures to be conducted per test day See example in attached Work Plan and Test Log. .

C. Provide Test Log to SFMTA including a summary of results of each test day, information regarding any test delay or cancellation, and reason for delay or cancellation. See example in attached Work Plan and Test Log. Update at the conclusion of each test day and forward to SFMTA for review.

D. Provide the SFMTA on-site assistance by technically qualified representatives for the duration of operational field testing, and operating of electrical equipment and systems. Each of the said representatives shall remain on the job site while testing is being performed.

E. Provide Submittals of test procedures in PDF format. Combine tests for each location into one PDF file and provide separate PDF files per location.

13. **SFMTA Inspection and Review**

A. The SFMTA may delegate to a consultant the review of Project documentation, including but not limited to: design drawings, construction documents, schematics, operations and maintenance documentation, test reports, test procedures, Installation Work and verify that they are complete, operable, fully documented, and compliant with specifications and contract provisions. Should the SFMTA or its consultant find the documentation or the Work deficient, Thales shall make the necessary changes to correct the deficiencies. The SFMTA's consultant will be required to sign appropriate non-disclosure agreements. The SFMTA consultant shall not be a competitor of Thales.

B. Thales's Work, as set forth in this Appendix A, shall be subject to inspection and tests by the SFMTA and by others authorized by the SFMTA. Inspectors that are not SFMTA employees will be required to sign a nondisclosure agreement to protect Thales's proprietary information. The SFMTA's tests, inspection, or review of the Work is only for the information and benefit of the SFMTA and shall not relieve Thales of its responsibility to provide quality control measures and ensure that the Work strictly complies with specifications and requirements of the Contract Documents. The SFMTA's review, inspection, or test of the Work or any part of the Work shall not constitute or imply acceptance of the Work or part of the Work. Inspections or tests shall not relieve Thales of responsibility for damage to or loss of the Work prior to acceptance or affect the continuing rights of the SFMTA after acceptance of the completed Work.

14. **Workshops**

Thales shall provide and perform the following services and tasks:

A. Project Scope Workshop. Develop and implement Workshop for SFMTA Project team. Provide detailed review of the Project scope, materials, traceability of safety and functional requirements, wiring methods, design assumptions, drawings, cutover plans, interfaces to TWCC during Cutover, and an on-site visit for those SFMTA personnel.

B. Meeting with Installation Contractor. Develop and implement on-site Workshop to review Project scope with the Installation Contractor's staff to be assigned to the Project

C. SAT and Commissioning Review. Develop and implement Workshop(s) detailing the overall SAT and commissioning strategy and providing review of test and commissioning procedures for SFMTA capital projects, safety, operations and signal maintenance staff.

D. Minutes and Workshop Records. Prepare meeting minutes and provide supporting documentation for workshop records.

E. Workshop Results. Incorporate results of Workshops into design, construction, and test documents relevant to Workshop subject matter.

F. Workshop schedule:

	Workshop Description	Length	Size	Repetitions
1.	Project scope Workshop	8 hours	10	1
2.	Thales Meeting with Installation Contractor	8 hours	10	1
3.	SAT and commissioning review	8 hours	10	1

G. Provide detailed Workshop materials for the SFMTA's review and approval ten Work Days before each workshop. Develop notes indicating workshop goals, discussion topics, resources required, and activities on a half-hour level for the duration of the Workshop session. Provide materials for Workshop participants to review five Work Days before Workshops. The SFMTA's review and approval of Workshop materials may require editing of existing text, addition of text, the removal of text, re-organization of documentation sections, modification of existing illustrations and schematics or addition of illustrations and schematics for conceptual clarity, changing of page layout attributes, and wholesale revision as determined by the SFMTA. The SFMTA's decision to proceed with the Workshop will be based on review and approval of workshop materials.

H. All Workshop materials shall become the property of SFMTA but Thales shall continue to be the sole and exclusive owner of all intellectual property rights included in the materials. SFMTA shall have the right to use, release, disclose, copy, and reproduce the written

Workshop materials solely for the SFMTA's internal operations and purposes, and as may otherwise be required by law.

15. **Document Deliverables**

Thales shall perform the following services and tasks and provide the documents and deliverables listed below:

A. Provide document deliverables indicated below and as described in this Appendix A:

1. Project Management Plan
2. Submittal schedule including ATCS documentation update matrix
3. Site Survey Report
4. System Engineering Plan
5. QA/QC Plan
6. Safety Program Plan
7. SAT and Commissioning Test Plan
8. SAT and Commissioning Test Procedures
9. Technical contingencies for SAT and commissioning tests
10. Cutover construction documents
11. PICO Inspection and Test Final Report
12. Memorandum verifying that design and safety requirements are met
13. Final Field Report

B. Thales shall update the following ATCS documents :

1. Common Table Definition
2. ATCS Integrated Operations Plan
3. Central Control Operator Manual Vol. 1
4. Central Control Operator Manual Vol. 2
5. Central Control Operator Manual Vol. 3
6. System and Subsystem Requirements Documents - Station Controller Subsystem
7. System and Subsystem Requirements Documents - SMC
8. System and Subsystem Requirements Documents - VCC

9. Train Operator Instruction Manual
10. Central Equipment Maintenance Manual
11. Wayside Equipment Maintenance Manual
12. Illustrated Parts Catalog
13. Recommended Spare Parts List
14. ATCS Signal Drawings (Note: add the port names at inputs/outputs)
15. ATCS Plan Drawings
16. ATCS Single Line Diagrams

16. Design and Configuration Control

Thales shall provide and perform the following services and tasks:

A. Provide legend of symbols, acronyms, terms, and definitions to be agreed upon at the Project commencement. Place this information in the Glossary of Terms. Use these agreed terms and symbols in all Project communications, documentation, and drawings.

B. Provide final manuals as listed in Section 15.B (hereinafter "Manual(s)") printed on loose leaf 8 1/2 x 11 inch pages on presentation quality paper of at least 100 GSM and submitted in presentation standard four ring binders. Print schematic drawings and parts lists on 11 x 17 inch paper and neatly fold into binder. Provide white binders constructed from rigid and durable PVC covered heavyweight card with titles and the volume number applied in inlaid lettering on both the spine and front cover. Provide samples of paper, samples of layout of cover and spine, and samples of the binders for SFMTA's review and approval. SFMTA to approve list of Manuals to be printed.

C. Provide two copies of final record drawings on Arch D sized paper on presentation quality paper of at least 100 GSM and submitted bound with heavy duty waterproof covers and heavy duty binding. Provide separately bound set of drawings for each cut-over location separated into volumes for electrical power and signal. Provide samples of paper, sample of layout of cover, binding materials, and samples of the cover material for SFMTA review and approval.

D. Provide final record drawings, including reference drawings, in PDF format.

E. Provide Manual cover sheet for each Manual and record drawing giving the latest SFMTA logo, contract number, title, document number, volume number, the date of issue, and

the contractor name. If the document consists of more than one volume, shown the identity and number of the volume on the manual cover sheet.

F. Hard copies of Manuals must not be more than 70mm thick. Where a Manual requires more than one binder, indicate number of volume ('X of Y') on spine and cover.

G. Provide revision record pages for manuals detailing the change number, document number, author, checker, and issue date.

H. Submit one set of hard copy originals for review of each pre-final draft manual and two sets of hard copy originals of each final approval Manual. Concurrently submit electronic media samples.

I. For all Manuals, Thales shall submit a complete draft, and pre-final Manuals documentation deliverables for SFMTA's review and approval in accordance with the agreed upon submittal schedule.

1. Complete Draft – Submit for SFMTA review and approval in accordance with the agreed upon Submittal Schedule.

2. Pre-Final Manual - Provide in accordance with the agreed upon Submittal Schedule.

3. Final approval Manual – Provide in accordance with the agreed upon Submittal Schedule.

J. Incorporate information gathered during acceptance testing, workshops, and workshop courses to develop final versions of the manuals.

K. Provide final approval manuals in printed and electronic forms as described herein. Provide final electronic copies on ten labeled CD-ROMs, in labeled CD-ROM sleeves.

L. The native electronic file formats are the programs used to create operations and maintenance manuals:

1. Create text pages using MS Word 2010.

2. Create parts lists using MS Excel 2010

3. Create new illustrations, updated schematics, and updated drawings, including technical illustrations, using AutoCAD.

M. The file formats of electronic versions of document Submittals shall be Adobe Acrobat 10, unsecured PDF format. Provide table of contents hyperlinked to document sections and accessible via Acrobat bookmarks. Filenames for submitted documents shall be in the following format: documentName-documentNumber-documentDate.PDF.

17. **Submittals**

A. THALES'S RESPONSIBILITIES

1. Thales must furnish Submittals and Resubmittals as required by the agreed upon Submittal Schedule to the SFMTA sufficiently in advance to allow SFMTA time for review, discussion and resolution. Thales must maintain a Submittal Register as follows:

a. Maintain a Submittal register to show document deliverables requiring review and approval by SFMTA and listing the document name, version, version date, and document/review status.

b. Provide preliminary Submittal register of anticipated Submittals in accordance with Appendix B.

c. Update Submittal register for review at progress meetings to reflect status of Submittals, late Submittals, and upcoming due Submittals.

2. Thales must obtain written approval from SFMTA of any proposed contract changes and/or substitutions, as applicable, prior to submitting Submittals which involve alternative work methods or products.

3. Thales shall not start Work for which Submittals are required until the Submittals are approved by the SFMTA. Delays caused by substantially or materially incomplete or reasonably rejected Submittals or Resubmittals are Thales caused delays. Delays caused by SFMTA's unreasonable failure to respond, non-approvals or rejections of Submittals are SFMTA caused delays. Should SFMTA fail to respond within the Submittal response time limits set forth in Section 17.B.2., Thales shall notify the SFMTA's Director of Capital Projects

4. Where a Submittal is substantively acceptable but requires additional work to be accepted, the SFMTA may respond to the Submittal with an "Acceptance with Comments," in which case Thales may proceed with the Work of the Submittal but must resubmit the corrected Submittal within 10 Work Days.

5. SFMTA comments and responses to Thales' Submittals shall not constitute a change order or other modification of Contract Documents. The Contract Documents may only be amended by a properly executed written modification to this Purchase Order.

B. SFMTA REVIEW

1. Submittals will be reviewed by the SFMTA for conformance to requirements of the Contract Documents and marked with the date of review.

2. The SFMTA will diligently attempt to respond to a Submittal within fifteen (15) Work Days after receipt or as provided in the agreed Submittal Schedule. Should SFMTA fail to respond within those stated time periods, each day after the applicable time period shall be considered a SFMTA delay. Such delay shall not be eligible for and shall be considered outside of the sixty (60) hours referenced in Section 21 Schedule and Delay Management Paragraph A.6. .

3. Approval of a Submittal does not constitute an authorization for or a request for a contract modification or change order. Approval of a Submittal does not excuse Thales from correcting later discovered errors or problems in a Submittal or otherwise excuse any defect in the Work.

C. RE-SUBMITTALS

1. Thales shall revise and resubmit a Submittal as required in accordance with the SFMTA's review; all responses shall be on a form supplied by the SFMTA.

2. Assure that Resubmittals only contain items included in the original Submittal. Resubmittals shall be indicated by adding a sequential draft number to the original Submittal number.

3. Explain any additional changes to a Submittal (that is, changes other than those requested by the SFMTA) in an enclosed memo or where applicable notation on a design drawing or document that is easily identified as a change to be reviewed by SFMTA .

4. SFMTA will respond to Resubmittals in accordance with Section 17.B.2.

D. PRODUCT DATA

1. Product data shall include the manufacturer's standard illustrations, schedules, performance charts, instructions, brochures, diagrams, qualification test reports, and other information furnished by Thales to illustrate a material, product, or system for some portion of the Work. Thales shall modify data to delete information, which is not applicable to the contract.

2. Modify diagrams and catalog cuts to delete information not applicable to the Work.

3. Supplement standard information with specific information applicable to the Work.

4. Mark the product data with the following: contract title and number, Submittal number, and item number on each page.

E. TEST PROCEDURES, CERTIFICATES AND REPORTS

1. Thales shall provide SAT and Commissioning test procedures, reports and certificates.

2. Submitted test procedures and certificates shall:

a. Provide a concise statement of the test purpose and objective.

b. Clearly state the title(s) and procedure numbers of any prerequisite test(s) needed to be performed and provide a means to identify that those prerequisite tests were successfully completed. This requirement includes periodic calibration and re-calibration tests.

c. List all documents required to perform the test by name, document number and revision level. For example: schematics, wiring diagrams, configuration control lists, etc.

d. All required test equipment including model numbers, if applicable, shall be clearly specified in this section. All test equipment including sensors and transducers shall be calibrated before testing commences and certificates for the same shall be enclosed with the test data sheets. Provide space for witness certification of valid current calibration.

e. Clearly describe all necessary arrangements and the setup necessary for conducting the test, including the connections for wires and sensors.

f. Describe all the steps that must be taken to safely and effectively conduct the test, including all precautions, specific placement of personnel to witness results, etc. The test sequence shall be written in a step-by-step format. Data sheets shall be attached to the test report as described below.

g. For each test, describe and list specifically the criteria upon which the equipment, system, etc. can be judged to have passed the test. Criteria shall be traceable to Specification Requirements.

h. Include test notes section to record failures, substitutions, and other pertinent notes to document problems encountered and observations made during testing that may facilitate troubleshooting in the future.

i. Include section to record action taken on all discrepancies.

j. Identify the test, and shall be designed to include spaces to record test data, test date, and signatures of individuals performing and witnessing the tests. Data sheets shall be arranged in tabular form where practical. For each test procedure, provide general and specific data sheets.

3. Submitted test certificates shall:

a. Be typed or printed legibly.

b. Use nomenclature consistent with overall Project nomenclature.

c. Test results shall be stated in field test certificates and test reports as "passed," "failed" or "NA" ("Not Applicable") only. No other markings are acceptable.

d. Provide test certificate number and test date on each page.

e. Provide all detailed data required to be collected by test procedure steps. Information must be provided where indicated on the test forms; spaces on forms must not be left blank.

f. Provide written narrative justification for number of test cases performed if actual performed is less than total number of test cases planned.

g. Provide written narrative justification and traceable resolution for each field marked "failed" or "NA."

h. Provide written narrative justification for test prerequisites not met.

i. Provide written narrative justification for any deviation from test procedure including using data log analysis instead of visual inspection.

18. **Thales Inspection of INSTALLATION Work**

A. The SFMTA shall separately contract for with an Installation Contractor or shall self-perform installation of cabling and wayside equipment, electrical work, and other work that qualifies as "public work" (as defined in Chapter 6 of the San Francisco Administrative Code) necessary for the completion of the Project. Thales shall inspect and test such Installation Work to confirm that said Installation Work conforms to the Construction Documents regarding ATCS specifications and other requirements for the ATCS, as set out in the Construction Documents and as may otherwise be determined by agreement of the parties as necessary for the successful installation and implementation of the Work.

B. The SFMTA will provide staff support to provide site and equipment access, as agreed upon in approved site specific work plans.

C. The SFMTA Project Engineer is solely responsible for approving the design, coordinating Workshops, authorizing Work, approving Submittals, and clarifying technical issues, unless otherwise agreed upon by the parties. Thales shall communicate with the SFMTA through the SFMTA Project Engineer concerning all technical issues.

D. The SFMTA Project Manager shall be Thales' point of contact concerning issues of price, schedule, scope of work and change orders. Thales shall confirm with the Project Manager

any understandings and agreements Thales may make with SFMTA Operations and Maintenance, which must be memorialized in writing.

E. This Purchase Order may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one of the following ways: (1) Change Order agreed by the parties, or (2) Directive issued by the SFMTA

F. Change Orders must be in writing and signed by authorized persons of both parties. If an agreed Change Order affects the schedule and/or price for the Work, the Change Order will include any necessary changes to Project schedule and/or price.

G. Additional Work.

1. If the parties cannot agree on the scope, price or time required for Additional Work, the SFMTA may issue a Directive directing Thales to perform the Additional Work while the parties continue negotiating the final scope, price or time requirements. Thales shall perform said Additional Work, and shall maintain a careful accounting of its direct costs and labor, which the SFMTA shall compensate as allowed by FTA rules and regulations. No later than when the Additional Work is completed, the SFMTA and Thales shall negotiate a reasonable fixed fee that shall include reasonable profit and overhead for that Work performed under the Directive. A Directive must be signed by the Director of Transportation.

2. Except as may be provided by City ordinances governing emergency conditions and the foregoing provisions concerning Directives, the SFMTA and its employees and officers are not authorized to request Thales to perform services or to provide materials, equipment, and supplies that would result in Thales performing services or providing materials, equipment, and supplies that are beyond the scope of the services, materials, equipment, and supplies agreed upon in the Purchase Order or in excess of the amount certified by the City's Controller, unless said request is memorialized in a written Change Order and approved by the SFMTA in accordance with applicable City law and SFMTA policies.

3. The SFMTA is not required to reimburse Thales for services, materials, equipment, and supplies that are provided by Thales which are beyond the scope of the services, materials, equipment, and supplies agreed upon in the Purchase Order and which were not approved by a written modification to the Purchase Order executed by the SFMTA as required by law and SFMTA policy, except where so stated in this Appendix A. The provisions of this Section shall govern the SFMTA's obligation and liability to compensate Thales for Additional Work, notwithstanding any other provision of the Contract.

H. The requirements of this Purchase Order No. 4 may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways: (1) a Clarification, written interpretation or other bulletin issued by the SFMTA; or (2) the SFMTA's review and acceptance of a shop drawing or sample or other Submittal. A Clarification shall not constitute a modification of the Contract or Purchase Order but is only a statement of the SFMTA's interpretation of the Contract Documents upon which Thales may rely. The SFMTA's response to an RFI or Submittal, so long as it meets the requirements set forth in Section 17.B.2 shall not modify the Contract, but only clarifies the meaning of a Contract Document, upon which Thales may rely as to the specific matter addressed in the response.

I. SFMTA reserves the right during the Work to direct Thales to replace any key personnel, upon thirty (30) Days' notice, who the SFMTA reasonably determines is unqualified or an impediment to the timely and successful completion of this Project. Thales shall be solely responsible for any costs related to the replacement of such individual(s).

J. The Work to be performed under this Purchase Order is funded by a grant from the Federal Transportation Agency ("FTA"), and is subject to federal contracting rules and requirements imposed by the FTA. Thales shall comply with all applicable federal contracting requirements including, but not limited to, the provisions set forth in the document titled "FTA Requirements for Construction Contracts," which are incorporated into this agreement. If there is any conflict between any federal contracting requirement and any other provision of this Purchase Order, the federal requirement shall prevail.

19. Time Allowance For Completion of Work (SEE ALSO APPENDIX B – PERFORMANCE AND PAYMENT SCHEDULE)

A. Time, and minimum interference with SFMTA transit services and inconvenience to the public are of the essence in Thales' performance and completion of the Work.

B. Thales shall bring the Work to Substantial Completion within five hundred forty eight (548) calendar Days from and including the official date for commencement of the Work designated by the SFMTA in a Notice to Proceed ("NTP").

C. Thales shall complete all remaining Work within thirty (30) calendar days of the Substantial Completion date.

D. Thales shall continue to be responsible for maintenance and protection of the completed Work until the SFMTA acknowledges that the Work has reached Substantial Completion.

E. Thales shall warrant its Work as specified in Purchase Order No. 4

F. When performing testing or other Work in the tunnels, on trackway, or in equipment rooms, or performing other Work that disables train control, Thales shall set a checkpoint within the designated period to perform that Work at which time Thales will assess and confirm whether Thales can complete the Work or whether the Work must be suspended so that train control is timely returned to normal function and scheduled trains and transit service are not delayed.

G. Thales shall not schedule testing or otherwise interfere with Muni's transit operations on the following holidays and events:

1. Nike Women's Marathon
2. Halloween
3. New Year's Eve and Day
4. Chinese New Year Parade
5. Saint Patrick's Day Parade
6. Bay to Breakers Weekend
7. Cinco de Mayo Celebration and Carnival Parade
8. Pride Parade Weekend
9. July 4th
10. SF Marathon
11. All Giant's Baseball Home Games
12. Fleet Week
13. Other Official City Holidays

20. Construction Coordination Requirements

A. Thales is advised that there may be outside contractors or City employees working within areas to which Thales requires access. Thales shall be responsible for coordinating access to such areas through the SFMTA Project Manager.

21. schedule and delay management

A. Responsibility for delays concerning access to SFMTA resources

1. Thales shall provide a three week rolling look ahead work schedule, which it shall update weekly.

2. Delays to the Work arising from changes in availability of SMFTA personnel and equipment the SFMTA agrees are necessary for Thales to perform the Work (collectively "Resources") made by the SFMTA less than 21 Days from of a scheduled test date that could not be accommodated by Thales, shall be considered SFMTA caused delays. Delays to the Work solely arising from changes to Resources made by Thales less than 21 Days from of a scheduled test date that could not be accommodated by SFMTA, shall be considered Thales caused delays. For any change in Resources, Thales shall provide a revised test schedule within one Work Day of notice from the SFMTA of a change in Resource availability.

3. For all delays, Thales shall propose a recovery plan in writing to minimize delay to completion of Project Milestones.

4. For any change to the Project schedule milestone dates, whether caused by SFMTA or Thales delays, Thales shall provide a retrospective time impact analysis within five Work Days of the delay . This analysis shall include recovery plan, delay responsibility, and revised Project schedule.

5. Thales acknowledges and agrees that demands for SFMTA Resources by transit operations may cause delay to the Work. Therefore, Thales shall assume and include in the Project schedule 60 hours of delays attributable to SFMTA, for which Thales shall receive no additional compensation or extension in time to complete the Work. These 60 hours shall not be considered "float" available to either party, as described in Section 21.B2.e.

6. Any day where less than 50 percent of contractually mandated test time is available to Thales due to changes in SFMTA Resources is considered a cancelled test day and any resulting delay shall be deemed an SFMTA caused delay. Any day where less than 50 percent of contractually mandated test time is available to Thales due to changes in Thales' availability or resources is considered a cancelled test day and any resulting delay shall be deemed a Thales-caused delay. Any day in which more than 50 percent but less than 100 percent of contractually mandated test time is available, the percentage of non-available test time due to changes in SFMTA Resources shall be deemed a SFMTA-caused delay. Any day in which more than 50 percent but less than 100 percent of contractually mandated test time is available, the percentage of non-available test time due to changes in Thales Resources shall be deemed a Thales-caused delay.

7. SFMTA shall be responsible for Thales’s costs arising from delays to inspection or testing in excess of the 60 hours mentioned in Section 21.A.6 above, due to SFMTA delays, including but not limited to, other scheduled or unscheduled SFMTA maintenance activities, construction activities, testing activities regarding other SFMTA projects or

SFMTA's lack of available staffing or resources necessary to for Thales to perform a delayed test or inspection. For delays in excess of the 60 hours provided in Section 21.A.6 above or other SFMTA delays set forth in this Purchase Order No. 4, Thales reserves it right to assert a claim for additional time and/or expenses in accordance with Section 17.b of the Master Agreement.

8. With the exception of the 60 hours of delay described in Section 21.A. 6, any float identified in the Baseline or Current Schedule is jointly owned by SFMTA and Thales. Thales shall notify the Engineer of any use of float, which is subject to SFMTA review and approval through the scheduling update process.

9. Scheduling constraints such as start on dates, finish on dates, and sequencing other than finish to start, start to start, start to start with lag time, finish to finish, etc. shall be clearly identified and shown in the applicable CPM Schedule Submittal.

B. General Schedule Requirements

1. Description

a. This Section specifies the requirements for Project planning, scheduling, progress reporting, and the qualifications and requirements of Thales's Scheduler, which are to be performed by Thales.

b. Thales shall employ Critical Path Method scheduling (CPM) for planning, scheduling and reporting the Work.

2. Scheduling Software

a. Thales shall use Microsoft Project scheduling software for computer generated tabular reports and logic network graphics.

3. Schedule Submittal Procedure

a. Within 10 Days of NTP, Thales must submit for SFMTA review and approval a proposed Baseline Schedule. SFMTA shall review and provide comments within 10 Work Days of receipt thereof.

b. Every two weeks Thales shall submit a Current Schedule (as described in Section 21.B.5) in two successive parts:

i. A preliminary Current Schedule, which is an update of the previous month's Current Schedule, is submitted prior to schedule and progress review meeting to clearly show what is being changed from the previous month's schedule.

ii. The Current Schedule, which incorporates the comments from the schedule and progress review meeting, is submitted as the schedule in effect.

4. Schedule meetings

a. Initial Schedule Meeting

i. The initial schedule meeting will be held no later than ten Work Days after the SFMTA issues Notice to Proceed. At this meeting, Thales shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology. Thales shall assign a unique alphanumeric identifier for each Project activity and shall track each activity by that identifier in the Project Schedule.

b. Baseline Schedule Meeting

i. Beginning the week following the Initial Schedule Meeting, Thales shall meet with SFMTA weekly until the baseline schedule is accepted by SFMTA to discuss Thales' design logic, and durations and to resolve any questions or disagreements. After the meeting, all agreed upon corrections, changes or comments will be incorporated and the Baseline schedule shall be resubmitted for acceptance.

5. Current Schedule Meeting

a. Thales shall submit a Current Schedule showing relevant schedule updates and meet with SFMTA to review Project progress at the progress review meetings held every two weeks with a three (3) week look ahead. Thales shall provide printed copies of the schedule as part of each update as well as a P6-readable file. Prior to each meeting, Thales shall update the prior month's Current Schedule. Appropriate subcontractors, suppliers, utilities representatives and other City agencies may be asked to attend.

b. During the schedule and progress review meeting, the Preliminary Current Schedule including any required Supplemental Schedules and all relevant events affecting the schedule will be discussed in detail. SFMTA may request Thales to revise or correct the data for the Current Schedule due to any inaccuracies or conflicts with the Contract Documents, and also suggest ways to modify the schedule because of schedule activity delays. SFMTA's

participation in the schedule review process shall not relieve Thales from the approved completion dates in effect

6. Approval and Revision of Schedule

a. Failure by Thales to include any element of Work required for the performance of the Project shall not excuse Thales from completing all Work required within any applicable milestone completion date, notwithstanding the Engineer's approval of the CPM diagrams. Items not specifically stated in the schedule or description of a Milestone shall, if reasonably applicable, be deemed incidental Work and not critical activities. If activities are found to be missing from the schedule after the Engineer's approval, Thales shall submit a revised schedule to include those items. The revised schedule shall be subject to review and approval by the Engineer as described in "Revised Schedule" provisions of this Purchase Order. No extension of time must be granted because of errors or omissions on the schedule unless the Parties agree otherwise. Thales shall incorporate all necessary activities to complete the Work.

b. The CPM schedule and analysis when approved by the Engineer shall constitute the agreed Work Schedule throughout the construction period. No alteration of the logic, duration of activities, etc. will be allowed without the approval of the Engineer.

7. The Baseline Schedule shall comply with the following:

a. A maximum of twenty (20) work days duration shall be given to each CPM activity. Any activity in excess of the twenty (20) days shall be broken down in detail so that each detail activity will not exceed the twenty (20) work day maximum.

b. All activities shall have succeeding activities except Project Milestone #9 per Appendix B (Final Acceptance). Thales shall demonstrate the necessity of having any dummy activities.

c. The schedule shall include separate activities indicating:

i. Preparation and submittal of Submittals.

ii. SFMTA review and approval of Submittals.

iii. Installation by Installation Contractor

iv. Inspection and testing of Installation Work as it applies to signaling and the ATCS

v. Cutover plan

vi. Workshops for SFMTA personnel.

vii. SFMTA inspection of Work and review of documentation and certificates for Substantial Completion

viii. Punch list

d. Where the SFMTA is responsible for an activity, Thales shall discuss the preceding activities, succeeding activities, duration, and constraints of the activity with SFMTA during the Baseline Schedule review meeting.

e. Negative float will not be allowed on the CPM schedule on the initial Submittal. Initial CPM schedule with negative floats shall be rejected. Thales shall provide sufficient resources, personnel and hours (including extended hours) to perform the Work within the completion time and price stated in the Purchase Order.

f. The CPM schedule's critical activities shall not exceed fifteen percent (15%) of the number of activities. Critical activities are those that have less than five (5) days float.

22. **Time Allowance For Track Shutdowns During TESTING**

A. Thales shall complete all Work, including Work under allowances subject to the following shutdown periods:

1. Thales shall schedule all Work that requires a subway clearance such as wayside access, modification of signaling equipment, testing of wayside equipment, or requires use of a test train to be performed between the hours of 1:30 a.m. to 3:00 a.m. Monday thru Friday, 1:30 a.m. to 4:00 a.m. Saturday, and 1:30 a.m. to 6:00 a.m. Sunday. Any Work done during these windows must be completed and tested within these windows so that the Muni Metro lines can be returned safely to Revenue Service. The SFMTA will endeavor to extend the duration and frequency of the testing windows listed below as authorized by Muni Central Control and as the trackway is available, but additional testing time is not guaranteed.

a. The aggregate duration of field testing when the LRVs are in not service (as listed above), will not exceed 270 hours. The aggregate duration of revenue

field testing of the Work will be in accordance with approved work plans and schedules.

b. For the duration of non-revenue testing not requiring test trains, SFMTA will provide a minimum three (3) testing windows during weekday nights of 90 minutes each, and one (1) night of extended testing on a weekend night of at three hours duration. Total non-revenue field testing per week will be at least seven and one-half (7.5) hours per testing session.

c. For the duration of commissioning testing requiring test trains, SFMTA will provide a minimum two (2) testing windows per week of 90 minutes duration each during weekday nights (Monday AM through Friday AM), and one (1) night of extended testing on a weekend night (Saturday AM and Sunday AM), for the duration of the field testing. Extended testing on a weekend night will be at least 3 hours. Total aggregate non-revenue field testing per week will be at least six (6.0) hours.

d. Before the end of each phase of Work at each location, Thales must allow sufficient time to perform LRV testing so that Muni can resume normal rail operation as scheduled.

e. Thales shall design the Work to occupy minimum test area and subway resources.

2. Work not requiring subway clearances may occur during revenue hours.

23. **Liquidated Damages**

A. General

1. If the Work or the Project is delayed or if Thales otherwise fails to meet its obligation under the Agreement to perform the Work that will minimize interference with transit operations as set forth below, the City will suffer damages. The actual fact of the occurrence of damages and the actual amount of the damages, that the City will suffer if the Work is not completed within the specified time periods set forth in this Purchase Order are dependent upon many circumstances and conditions, which could prevail in various combinations. SFMTA and Thales agree that it would be impracticable and extremely difficult to fix the City's actual damages that might arise from Thales's delay.

2. Damages that the City would suffer in the event of Thales's delay include, but are not limited to, expenses of prolonged employment of architectural, engineering, public outreach and construction management staff comprised of both City representatives and consultants; delays to follow-on projects (including but not limited to rail replacement

projects), costs of administration, inspection, and supervision; and the loss of use suffered by the public by reasons of the delay in the construction of the Project.

3. Thales and City agree that the amount of liquidated damages set forth herein is not a penalty, but represents the parties' reasonable estimate of the approximate damages that the City will sustain for failure of Thales to complete the Work within the times specified.

B. Liquidated Damages for Delay in Completion of Milestone #5:

Thales shall pay the sum of Two Thousand Five Hundred Dollars ($2,500) per Day for each and every calendar day that it fails to complete the Work in Milestone #5 (or as subsequently agreed upon by the Parties due to any changes in the Work or Purchase Order). Liquidated damages under this Section B shall not be assessed for periods of delay for which liquidated damages are assessed under the following Section C.

C. Liquidated Damages for Delay in Substantial Completion are as follows:

Thales shall pay the sum of One Thousand Dollars ($1,000) per Day for each and every calendar day that it fails to bring the Work to Substantial Completion.

D. Liquidated Damages for Interference or Delay to Transit Operations:

Thales shall pay the sum of Five Hundred Dollars ($500) per hour for any delay or interruption of Muni operations caused solely by Thales. Liquidated damages under this Section E shall not be assessed for periods of delay for which liquidated damages are assessed under the following Section E.

E. Liquidated Damages for Delays in Return of Rail Service:

Thales shall pay the sum of Six Thousand Dollars ($6,000) per hour for each hour past the start-up time in which Thales delays returning the Metro line to service following non-revenue testing.

F. The Engineer will furnish Thales with the weekly progress report showing the date, period of time of violation, and the assessed liquidated damages. If Thales disagrees with the assessment liquidated damages or disagrees with the amounts assessed, Thales shall file a written protest within fifteen (15) Work Days from the issuance of the weekly progress report. Such protest shall explain the basis for disputing the assessment of the liquidated damages.

G. The amount of liquidated damages shall be deducted from the progress and/or final payments to be made to Thales.

H. To the extent that any delays are not solely attributable to Thales, including but not limited to delays due to the SFMTA, City, other contractors, or force majeure events, Thales shall not be subject to liquidated damage or any additional charge or liability.

I. Notwithstanding anything to the contrary, in no event shall Thales be liable for liquidated damages exceeding, in aggregate, twenty (20%) of the total value of this Purchase Order

over the term of the Contract. The liquidated damages contained in this article are the City's sole remedy for Thales's delay, and Thales's sole liability for delay.

J. The remedies stated in this Section 23 are cumulative and payment of liquidated damages for a delay does not exempt Thales from liability for other liquidated damages unless delays are wholly concurrent.

24. Retention

A. The SFMTA shall hold five percent (5%) in retention from each progress payment until Final Acceptance. An escrow agreement may be established at a bank chosen by Thales and approved by SFMTA for deposit of the retention payments. The retention amount for each invoice shall be deposited into the escrow account at the time of payment. Retained funds, including accrued interest, may be withdrawn by Thales upon Final Acceptance.

25. Substantial Completion

A. Thales shall notify the SFMTA in writing when Thales considers that the Work has reached Substantial Completion and request that the SFMTA inspect the Work and prepare a Notice of Substantial Completion. Completion of start-up services; close-out of all non-compliance reports; and Submittal of warranties, guarantees, and record documents shall be a condition precedent to requesting an inspection for and the SFMTA's issuing a notice of Substantial Completion. Thales shall attach to its request a preliminary punch list of items expected be completed or corrected before Final Acceptance.

B. Within ten (10) Work Days from receipt of Thales's written notification, the SFMTA will make an inspection to determine whether the Work is has reached Substantial Completion. If the SFMTA determines that the Work is not substantially complete, the SFMTA will provide Thales with a list of deficient Work (incomplete or non-conforming Work) that that Thales must correct or complete before the SFMTA may determine whether the Work has reached Substantial Completion.

C. When Thales has completed all items on the list of deficient Work, Thales shall request a second inspection by the SFMTA to verify that the Work has reached Substantial Completion. If the SFMTA determines that the Work is not substantially complete, the SFMTA will follow and repeat the same procedure as for first inspection until the Work has reached Substantial Completion or the SFMTA has determined that Thales cannot or will not complete the Work.

D. When the SFMTA determines that the Work has reached Substantial Completion, the SFMTA will issue a Notice of Substantial Completion, which shall establish the date of Substantial Completion.

E. At the time of delivery of the Notice of Substantial Completion, the SFMTA will deliver to Thales a written determination as to the division of responsibilities regarding close-out requirements including, but not limited to, security, operation, safety, maintenance, insurance, and warranties.

26. Final Acceptance; Final Estimate, and Payment

A. Within ten (10) Work Days from receipt of Thales's written notification that all Work has been completed according the requirements of this Agreement, the SFMTA will make an inspection to confirm whether the Work is has been fully completed. If the SFMTA determines that the Work is not complete, the SFMTA will provide Thales with a list of deficient Work (incomplete or non-conforming Work) that that Thales must correct or complete before the SFMTA may determine that the Work has reached Final Completion.

B. When all Work has been satisfactorily completed in accordance with the requirements of this contract, the SFMTA will pay to Thales the balance due as follows:

1. The SFMTA shall have no obligation to make final payment until Thales furnishes the SFMTA with the following: (a) All Drawings, records, documentation, information, Workshop materials and spare parts as required herein; (b) Original signed copy of an acknowledgment that, on condition of final payment, there are no outstanding claims and release or statement of claims related to the Purchase Order; (c) Evidence satisfactory to SFMTA to establish that Thales is not delinquent in payments to its employees and/or creditors for labor and materials included in the payments; (d) Releases for any unpaid or otherwise unresolved stop notices or other liens actions.

2. The remaining amount owed for Work completed under this Purchase Order, if unencumbered, shall be paid within 30 Days after the date of the Final Acceptance.

27. SAFETY CERTIFICATION

A. Safety Certification Support

1. SFMTA will contract with an outside consultant to manage the safety certification of this Project.

2. Per the parties' mutual agreement, Thales may provide support for the following activities:

a. Safety Analysis Review –review the original Preliminary Hazard Analysis (PHA) to evaluate the impact of the upgrade Project. The review should focus on safety critical issues including removal of the TWCC.

b. As part of the SAT and Commissioning Workshop, participate in a preliminary hazard analysis review with Muni and its representatives (4 hour Workshop) to discuss potential safety issues.

c. Update PHA - prepare an update to the original PHA documents to update the issues identified in safety analysis review and safety workshop.

d. Provide Design Support - provide design support to the certification program to verify functions have been incorporated into the software/hardware design. Thales to provide safety requirements, test certificates, test analyses, and related documentation for review by SFMTA during testing.

e. Participate in Safety Certification Process –participate in safety certification review committee meetings through Substantial Completion of Project. Safety certification review committee meetings will initially be held every 4 weeks and deemed necessary by the SFMTA's Project Manager.

f. Support SFMTA communications with CPUC to demonstrate adequacy of the Project safety testing, commissioning and certification procedures and results.

28. **Optional Additional Work IF AGREED UPON BY THE PARTIES**

The following tasks listed below in Section 28 are additional Work and not included in this Purchase Order. Should the Parties agree to proceed with any task outlined below, a Change Order including changes to Project schedule and price will be mutually negotiated by the Parties prior to the commencement of any below listed Additional Work.

A. TWCC Site Survey for Removal of TWCC Equipment. Conduct site survey of the existing TWCC and to the "as-built" drawings of the original TWCC installation, including CTC, DSRC as related to Cutover to identify TWCC equipment to be removed and method of removal. Where "as-built" drawings do not exist, provide documentation that describes interfaces to outside signal, power, and ground conductors.

B. Update of ATCS documents listed below:

1. System Design Overview - Main
2. System Design Overview - Wayside Signals
3. System Design Overview - VCC Control Mode
4. System Design Overview - Tracking Non-Communicating Trains
5. System Design Overview - Portal Entry
6. System Design Overview - Tracking NCTs

7. System Design Overview - Train Entry Within System

8. System Design Overview - Train Uncouple

9. System Design Overview - Coupling

10. Station Controller Software Level 1 Design

11. Intersig Software Level 2 Design

12. SMC Software Level 1 Design

13. VOBC EU Level 2 Software Design

14. YDTD O&M Manual

15. Site Survey Report

C. TWCC Decommissioning Construction Documents:

1. Review scope of electrical work, provide on-site review of equipment, and verify design documents for decommissioning in 8-hour workshop with Installation Contractor.

2. Provide construction documents for Installation Contractor to perform work to electrically isolate and remove the TWCC from the ATCS system and from other wayside systems. Include signal, ground, and electrical power isolation in the design. Provide construction documents for demolishment, removal, and disposal of TWCC power and signal equipment, conduit, and wiring; for removal of waste and debris from construction areas; for proper disposal of removed equipment; and for finishing of walls and floors of affected areas. All construction activities will be the responsibility of the Installation Contractor. Maintain the 100 Hz power distribution system functionality and functionality of the remaining 100 Hz powered equipment as part of the design.

3. Begin decommissioning support at conclusion of one month post cutover period.

4. Provide technical and inspection support to the SFMTA during the Installation Contractor's decommissioning, isolation, and removal of the TWCC.

5. Provide decommissioning plan that describes overall Project-specific decommissioning strategy in narrative form, list of decommissioning construction documents providing Project-specific tasks to be conducted, templates of decommissioning construction documents, and template of final test report for SFMTA review and approval.

6. The SFMTA's decision to proceed with decommissioning Installation Work will be based on SFMTA's approval of decommissioning plan, plan procedures, and decommissioning construction documents.

7. Perform tests to prove the adequacy and acceptability of the Installation Contractor's decommissioning, isolation, and removal according to the Construction Documents.

8. Provide final test report which includes narrative summary of findings, completed test forms, summary of test results, and missing, failed, newly required, or postponed tests. Discuss incomplete tests in the test documentation along with the reason for missing the test and the technical and safety consequences.

9. Document deliverables for decommissioning:

a. Decommissioning construction documents

b. Decommissioning test/inspection plan

c. Decommissioning test procedures

d. Decommissioning final report

D. ATCS software modification

Update the Station Controller Software and remove the CRX relay from the Station Controller cabinet. Update the SMC, VCC, and LSMC software to remove any function of the ATCS that relinquishes train control to the no longer functional TWCC.

APPENDIX B TO CONTRACT 1226 PURCHASE ORDER No. 4
DELIVERY AND PAYMENT SCHEDULE

PAYMENT MILESTONES AND DESCRIPTION OF WORK:

The City shall pay Thales according the following Payment Schedule for Work completed by Thales and accepted by the SFMTA under each of the Milestones described below.

PAYMENT SCHEDULE AND REQUIREMENTS:

1. Payment Schedule

#	Milestone Description	Payment Percentage
1	Site Survey Report	5%
2	Submission and acceptance of approved project management and work plans, systems designs, system and subsystem documents and testing and commissioning plans. (See breakdown below)	15%
3	Complete installation, testing, commissioning and Cutover for West Portal Interlock.	15%
4	Complete installation, testing, commissioning and Cutover for Castro Interlock.	15%
5	Complete installation, testing, commissioning and Cutover for Duboce Interlock.	20%
6	Complete installation, testing, commissioning and Cutover for Van Ness Interlock.	10%
7	Complete installation, testing, commissioning and Cutover for Embarcadero Interlock. This represents “Substantial Completion” for this work.	10%
8	Submission and acceptance of manuals and as-built documentation and Final Field Report (See breakdown below)	5%
9	Final Acceptance	5%

2. The Price for this Purchase Order is a firm fixed price for all Work described herein.

3. Payment will be made within thirty (30) days of SFMTA receipt of Thales's invoice for each of the aforementioned Milestones following SFMTA's review and acceptance of Thales's Work. Payment of progress payments does not constitute acceptance of the Work completed under any Milestone or Final Acceptance, and such payment does not relieve Thales of any obligation.

V. DESCRIPTION OF WORK AND SCHEDULE:

Milestone 1 Work:

Due: 30 calendar days from NTP
Deliverable: SFTMA acceptance of Site Survey Report

Milestone 2 Work:

Due: 60 calendar days from NTP
Deliverables: SFMTA acceptance of project initiation deliverables:

A. Project Management Deliverables

1. Project Management Plan
2. Submittal Schedule including ATCS documentation update matrix

B. Plans

1. System Engineering Plan
2. QA/QC Plan
3. Safety Program Plan

C. System and Subsystem Requirements Documents

1. System and Subsystem Requirements Documents – Station Controller Subsystem
2. System and Subsystem Requirements Documents – SMC
3. System and Subsystem Requirements Documents – VCC

D. Testing and Commissioning Deliverables

1. SAT and Commissioning Test Plan
2. SAT and Commissioning Test Procedures
3. Cut-over Construction Documents
4. Technical Contingencies for SAT and Commissioning Tests

E. Workshop #1 with SFMTA Project Team

Milestone 3 Work:

Due 180 calendar days from NTP

Deliverables:

- Successful Cutover into permanent revenue service for West Portal
- Approval of SAT test and commissioning results by SFMTA
- Workshop #2 with Installation Contractor and Workshop #3 – SAT and Commissioning Review

Milestone 4 Work:

Due 240 calendar days from NTP

Deliverables:

- Successful Cutover into permanent revenue service for Castro
- Approval of SAT test and commissioning results by SFMTA

Milestone 5 Work:

Due 270 calendar days from NTP

Deliverables:

- Successful Cutover into permanent revenue service for Duboce
- Approval of SAT test and commissioning results by SFMTA

Milestone 6 Work:

Due 390 calendar days from NTP

Deliverables:

- Successful Cutover into permanent revenue service for Van Ness
- Approval of SAT test and commissioning results by SFMTA

Milestone 7 Work:

Due 450 calendar days from NTP

Deliverables:

- Successful Cutover into permanent revenue service for Embarcadero
- Approval of SAT test and commissioning results by SFMTA

Milestone 8 Work:

Due 548 calendar days from NTP

Deliverables: Completion of the ATCS documents and drawings listed below to the satisfaction of the SFMTA:

A. ATCS Documents

1. Common Table Definition
2. ATCS Integrated Operations Plan
3. Central Control Operator Manual Vol. 1
4. Central Control Operator Manual Vol. 2
5. Central Control Operation Manual Vol. 3
6. Train Operation Instruction Manual
7. Central Equipment Maintenance Manual
8. Illustrated Parts Catalog
9. Recommended Spare Parts List

B. As-Built Drawings

1. ATCS Signal Drawings
2. ATCS Plan Drawings
3. ATCS Single Line Diagrams

Milestone 9 Work:

Due 578 calendar days from NTP

Deliverables: All punch list items completed and approved