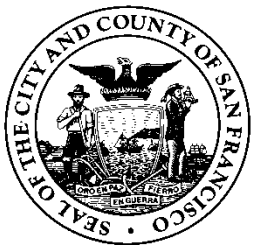

Agreement between the City and County of San Francisco

and

Thales Transport & Security, Inc.

for Design Review, Software, Implementation and Testing Services

for an Advanced Train Control System,

San Francisco Municipal Transportation Agency

Central Subway Project

(Third Street Light Rail Project, Phase 2)

Contract No. 1266-2

Second Amendment

February 19, 2021

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Second Amendment

This Second Amendment modifying the Agreement between the City and County of San Francisco and Thales Transport & Security, Inc. for Design Review, Software, and Implementation and Testing Services for an Advanced Train Control System for the Central Subway Project (Third Street Light Rail Project, Phase 2) ("Implementation Contract") is made between the City and County of San Francisco, acting by and through its Municipal Transportation Agency, a municipal corporation organized and existing under the laws of the State of California, whose principal place of business is at 1 South Van Ness Avenue, San Francisco, California 94102, U.S.A. (hereinafter referred to as “SFMTA” or "City"); and Thales Transport & Security, Inc., a corporation organized and existing under the laws of the State of Delaware, whose principal place of business is at 5500 Corporate Drive, Suite 500, Pittsburgh, PA 15237, U.S.A., (hereinafter referred to as “Thales” or "Contractor").

This Second Amendment is dated for convenience as February 19, 2021.

When appropriate herein, SFMTA and Thales are individually hereinafter referred to as “Party” and collectively referred to as “Parties”.

1. RECITALS.

1.1. Under the Central Subway Project, which is Phase 2 of the Third Street Light Rail Project, the SFMTA is constructing a new subway line in San Francisco, which runs approximately 1.6 miles from 4th and Brannan Streets, north under Fourth Street to Stockton Street, and north under Stockton Street into Chinatown.

1.2. Under SFMTA Contract CS-155-3, HNTB-B&C Joint Venture provided a preliminary ATCS design which Thales will develop into a final ATCS design for the Central Subway. The ATCS infrastructure will be constructed and installed in the Central Subway by Tutor Perini, the Construction Contractor engaged by the SFMTA to construct the stations, trackways and systems SFMTA Contract 1300.

1.3. The Advanced Train Control System (ATCS), further defined in Section 2.5, is a specialized and proprietary system that was first supplied to the SFMTA by Thales (formerly Alcatel Transport Automation (U.S.) Inc.) under San Francisco Municipal Railway contract MR-1034R, dated August 10, 1992, as modified by Thales under multiple subsequent contracts with the SFMTA.

1.4. The ATCS must operate as a single integrated system between the new Central Subway and the Existing ATCS that services the SFMTA's subway operations in the Market Street tunnels. Due to the proprietary nature of the Existing ATCS, no vendor other than Thales can provide the SFMTA necessary ATCS proprietary equipment, software, design review and implementation services for the Central Subway, and this Equipment Contract is necessarily therefore a sole source contract.

1.5. The SFMTA has procured certain Proprietary Equipment under SFMTA Contract 1266-1, a separate agreement with Thales. The Non-Proprietary Equipment will be furnished and installed by Tutor Perini, the Construction Contractor, under SFMTA Contract 1300 (the Construction Contract). Under this Implementation Agreement, as modified by this Amendment, Thales will provide review of existing ATCS designs, final ATCS engineering, and any additional as-needed oversight, inspection, and testing services to support ATCS installation and implementation. For the avoidance of doubt, the Construction Contractor will install all equipment supplied by Thales.

1.6. Approval for this Implementation Contract was obtained under Civil Service Commission Notice of Action for Contract Number 1266-2 on December 2, 2013.

1.7. On July 7, 2014, the parties assigned this Agreement to the Construction Contractor, Tutor Perini Corporation, to supplement a separate but related agreement related to equipment procurement under Contract No. 1266-1 that made Thales a subcontractor to the Construction Contractor under Contract No. CS-1300. That arrangement has proved to be unworkable, and the City is hereby exercising its rights under Contract No. CS-1300 to delete certain elements of ATCS Work that are within the Thales' scope of work under Contracts 1266-1 and 1266-2, which agreements the First Amendment to Contract 1266-2 re-assigned back to the SFMTA. .

Now, therefore, in consideration of the facts represented above, the premises and the mutual undertakings of the Parties herein contained, the Parties agree as follows:

2. DEFINITIONS.

For the purposes of this Implementation Contract, the following words and expressions shall have the meanings set forth herein below.

2.1. "**Additional Services**" means work requested by the City to be performed that is not included in the scope of the Work to be performed as Base Services or Optional Services.

2.2. "**Affiliate**" means an entity that controls, is controlled by, or is under the common control, but only for as long as such control exists; for the purposes of this Implementation Contract, control is deemed to exist when the company in question has the authority by equity ownership, debt or contract, directly or indirectly through one or more intermediaries, to direct the actions or policies of the affiliate company.

2.3. "**Article**" means a provision of this Implementation Contract designated by a number title before the decimal.

2.4. "**Assignment**" means the assignment by the City and assumption by the Construction Contractor of this Implementation Contract, by which Thales became a subcontractor to the Construction Contractor (Tutor Perini).

2.5. "**ATCS**" means the Advanced Train Control System which is the specialized and proprietary train control and signaling system that Thales (formerly Alcatel Transport Automation (U.S.) Inc.) supplied to the City under San Francisco Municipal Railway contract MR-1034R, dated August 10, 1992, as modified by Thales under multiple subsequent contracts with the SFMTA, including the Equipment Contract and this Implementation Contract.

2.6. **"ATCS Schedule"** means the agreed work schedule attached as Appendix I. which the parties anticipate will be amended in a future contract modification.

2.7. "**ATCS Start Date**" means the date by which the SFMTA will provide to Thales access to the Central Subway work sites where Thales will perform ATCS Static Testing and Dynamic Testing. See Section 13.3.

2.8. "**ATCS Substantial Completion**" means the SFMTA's written determination issued to Thales in accordance with this Implementation Contract and the Equipment Contract, confirming that the ATCS is fully operational and can be used for Revenue Service in the Central Subway and for other intended purposes. ATCS Substantial Completion does not include Reliability Testing that is performed after the Central Subway commences Revenue Service. ATCS Substantial Completion is separate and apart from substantial completion under the Construction Contract. If at any time, SFMTA operates ATCS in revenue service, ATCS Substantial Completion will be deemed to have been achieved.

2.9. "**ATCS Final Completion**" means the date at which the three-year warranty period expires. The Warranty Period commences at Substantial Completion, as described in Article 10.

2.10. "**ATCS Work**" means the equipment, software and services that Thales shall furnish, provide or perform for the SFMTA under this Implementation Contract and the Equipment Contract.

2.11. "**Base Services**" means the Work identified in this Implementation Contract for which the City shall pay Thales the agreed fixed-price listed in the Pricing and Milestone Payment Schedule in Appendix C.

2.12. "**Beneficial Use**" means the SFMTA's use of the ATCS in the Central Subway in Revenue Service, as further described in Section 6.2.

2.13. "**Book of Plan**" means the set of as-builts provided by Thales as described in Appendix H Tech Spec Section 34 42 35 Section 1.3. B.

2.14. "**Change Order**" or "**Contract Modification**" means a properly approved and executed written amendment of this agreement approved and executed by both parties.

2.15. "**City**" means the City and County of San Francisco, a municipal corporation organized and existing under the laws of the State of California.

2.16. "**Confidential Information**" means any and all information that is defined as such in the Mutual Nondisclosure Agreement, appended to this Implementation Contract as Appendix F.

2.17. "**Contract Amount**" means the total amount of compensation to be paid to Thales under this Implementation Contract, as stated at Article 4 and in the Pricing and Milestone Payment Schedule set out in Appendix C.

2.18. "**Construction Contract**" means the public works contract Agreement No. CS-1300, between the City and Tutor Perini (the Construction Contractor), for the construction of the surface, trackwork and systems elements of the Central Subway Project.

2.19. "**Construction Contractor**" means Tutor Perini (also referenced as "Tutor"), the contractor awarded the Construction Contract.

2.20. "**Construction Schedule**" or "**Project Schedule**" means the approved schedule for the performance and completion of the Construction Work under the Construction Contract (Contract CS-1300 with Tutor Perini Corp.)

2.21. "**Construction Work**" means the work performed or subcontracted by the Construction Contractor that is not work proprietary to Thales or otherwise within Thales' scope of Work under this Implementation Contract.

2.22. "**Days**" means consecutive calendar days, including weekends and holidays, unless otherwise specified.

2.23. "**Design Manager**" means the individual designated by City to be the primary liaison from the Designer to Thales for the purposes of this Implementation Contract.

2.24. "**Designer**" means HNTB-B&C Joint Venture, a joint venture of professional engineering firms obligated by SFMTA Contract CS-155-3 to draft the preliminary designs for the signaling and control systems for the Central Subway Project.

2.25. "**Designs**" means engineering documents, drawings and specifications created by the Designer which Thales shall review under both the Equipment and Implementation Contract.

2.26. "**Director**" means the Director of Transportation, who is the chief executive officer of the SFMTA.

2.27. "**Documentation**" means any user documentation, instruction manuals, warranty documentation, maintenance documentation and documentation for Software and Proprietary Equipment and any updates or revisions thereof licensed under this Implementation Contract.

2.28. "**Dynamic Testing**" means ATCS field testing that is conducted on Site with an ATCS build that has all functions available. (See Testing Requirements, Section 13.4.)

2.29. Not Used.

2.30. "**Effective Date of this Amendment**" See Section 5.5.

2.31. "**Engineering Testing**" means ATCS field testing that is conducted on site prior to Dynamic Testing. This is conducted with an ATCS build that does not yet have all functions available. (See Testing Requirements, Section 13.4.)

2.32. "**Equipment Contract**" means SFMTA Contract No. CS-1266-1, for the procurement of Proprietary Equipment for the ATCS for the Central Subway Project.

2.33. "**Existing ATCS**" means the Advanced Train Control System provided to the City by Alcatel under Agreement No. 1034R (1992), as subsequently modified by Alcatel and Thales under various contracts with the SFMTA.

2.34. "**Final Acceptance**" means the date and written notice of acceptance of the Work by the SFMTA to Thales, issued in accordance with Section 6.22(K) of the San Francisco Administrative Code, issued when the Work under this Implementation Contract and the Equipment Contract have been fully performed, including all Items on punch lists, and when all contractual and administrative requirements other than completion of warranty service have been fulfilled. Warranty may extend beyond Final Acceptance.

2.35. "**Force Majeure**" means any act of God or any other cause beyond a Party's control (including, but not limited to, any restriction, strike, lock-out, plant shutdown, material shortage, delay in transportation or any similar cause that delays the completion of the Work and that the Party could not have reasonably foreseen or mitigated.

2.36. "**Implementation Contract**" means this document, SFMTA Contract No. 1266-2, which is the agreement between Thales and the SFMTA under which Thales will provide ATCS engineering and design review, installation oversight and testing and safety certification support and systems integration support services for the Central Subway Project, as described herein.

2.37. "**Indemnitee**" or "**Indemnitees**" means those individuals and organizations listed in Section 7.1(a) to whom defense and indemnification of claim or action is owed.

2.38. "**Included Appendices**" means those documents attached to the Implementation Contract, identified herein and that are incorporated into this Implementation Contract by reference.

2.39. "**Mileston**e" means the date(s) set out in the ATCS Schedule by which Thales shall have completed identified portion(s) of the Work. (See Appendix I.)

2.40. "**Non-Proprietary Equipment**" means those elements of the ATCS that are not proprietary to Thales and will be supplied by the Construction Contractor as specified in this Implementation Contract or the Equipment Contract, or the Construction Contract.

2.41. "**Optional Service(s)**" means the Work identified in the Construction Contract and bid documents for the Construction Contract as options which if the City exercises an option and Thales performs the Work of that option, the City shall compensate Thales the amount listed for that Optional Service in the Pricing and Milestone Payment Schedule in Appendix C.

2.42. "**Paragraph**" means a provision of this Implementation Contract that is a subpart of a Section.

2.43. "**Proprietary Equipment**" means the proprietary ATCS hardware, computers, servers, configured work stations, and other ATCS components, diagnostic and simulation tools, spare parts and other parts and electronic, mechanical or electrical components that are proprietary to Thales and can only be supplied by Thales, including but not limited to the ATCS Equipment, Software and other ATCS elements listed in Appendix B to this Implementation Contract.

2.44. "**Reliability Demonstration Test**" means the testing to be conducted of the ATCS commencing at Revenue Service, as described in Specifications Section 34 42 31, Article 3.1 and Section 34 42 25, ATCS Functional Requirements confirming the availability of the ATCS meets requirement of applicable Specifications and design requirements referenced in Section 3.4, below.

2.45. "**Re-Assignment**" means the re-assignment and novation of this Agreement and the Equipment Contract from the Construction Contractor back to the SFMTA, so that Thales is no longer a subcontractor under the Construction Contract, and so that the only parties to this Agreement are Thales and the SFMTA.

2.46. "**Retention**" means funds held by the City or the Construction Contractor as provided in Section 14.2 of this Implementation Contract.

2.47. "**Revenue Service**" means the commencement of passenger service operations of the Central Subway as a public transit common carrier.

2.48. "**Section**" means a provision of this Implementation Contract that is a subpart of an Article.

2.49. "**SFMTA**" means the San Francisco Municipal Transportation Agency, a department of the City and County of San Francisco ("City"), whose principal place of business is at 1 South Van Ness Avenue, San Francisco, California 94102, U.S.A.

2.50. "**Site(s)**" means the location(s) where the Proprietary Equipment, Non-Proprietary Equipment, Software or other ATCS elements are installed.

2.51. "**Software**" means all or any part of the specific collection of computer programs and/or machine-readable instructions bundled with or embedded in the Proprietary Equipment (aka firmware) provided by Thales under this Implementation Contract and/or Equipment Contract, whether as a stand-alone code product or pre-installed on Proprietary Equipment (aka firmware). Software shall include any updates or upgrades to the original ATCS software that may be licensed to the SFMTA pursuant to this Implementation Contract, including but not limited to those listed in Appendix B to this Implementation Contract.

2.52. "**Specifications**" means the ATCS construction and function requirements listed in Article 3 and set out in Appendix H to this Implementation Contract.

2.53. "**Static Testing**" means field testing that is conducted to verify installation and configuration. (See Testing Requirements, Section 13.4.)

2.54. "**Term,**" "**Contract Term,**" or "**Contract Period**" means the period commencing on the Effective Date of this Agreement and terminating on the effective

date stated in any termination notice or the date when the SFMTA issues to Thales Final Acceptance of the ATCS Work.

2.55. "**Thales**" means Thales Transport & Security, Inc., a corporation organized and existing under the laws of the State of Delaware, whose principal place of business is at 5500 Corporate Drive, Suite 500, Pittsburgh, PA 15237, U.S.A.

2.56. "**Thales Affiliate**" means a legal entity that is under common control with Thales Transport & Security, Inc.

2.57. "**Warranty Period**" means the three-year period in which the warranty is in effect, commencing at Substantial Completion as described in Article 10.

2.58. "**Work**", as more specifically described in Article 3, below, means the performance of Base Services, approved Optional Services (if any), and approved Additional Services (if any) and provision of Software by Thales under this Implementation Contract (and any additional Proprietary Equipment that is not procured under the Equipment Contract) that are proprietary to, only available from, or otherwise appropriate to be procured under a sole source contract to Thales, and that are necessary for the design, installation, implementation, testing and certification of the ATCS. Said services include but may not be limited to performance of design review, engineering, software programming and configuration, system integration support, system testing, construction oversight and inspection services, and the provision of proprietary Software, firmware, servers, wayside and on-board ATCS, signaling equipment, and related Proprietary Equipment. The Work under this Implementation Contract is not Construction Work. In certain contexts the term "work" generally refers to the performance of tasks, duties and obligations by a Party. Any reference to work, whether or not capitalized, that due to its proprietary nature can only be performed or supplied by Thales, shall be considered an obligation of Thales under this Implementation Contract. Any reference to work, whether or not in lower case that is not proprietary to Thales or is not specified as Work assigned to Thales, shall be considered an obligation of the Construction Contractor.

3. SUMMARY OF AGREEMENT AND SCOPE OF WORK.

3.1. This Implementation Contract provides the legal and procedural framework for Thales' provision of Work as described in Section 2.50, above, as well as the procurement of said Proprietary Equipment and Software.

3.2. Due to the proprietary and unique nature of the Software, Proprietary Equipment other elements of the Work, and the SFMTA's requirement that the ATCS installed in the Central Subway be interoperational with the Existing ATCS, this Implementation Contract is necessarily a sole source contract.

3.3. The Construction Contractor is responsible for the installation of the Non-Proprietary Equipment and the Proprietary Equipment, and the PICO testing of all ATCS equipment it installs. Thales shall provide support to the Construction Contractor as necessary to install ATCS infrastructure and implement the ATCS. Said support includes oversight of installation activities and inspection of installed ATCS equipment, Proprietary Equipment, and other wayside and trackway infrastructure that interfaces with the ATCS. Thales shall provide information to the SFMTA that the Agency will

provide to the Construction Contractor to support the integration of the ATCS to other Central Subway systems.

3.4. Thales shall perform the Work as necessary to meet the ATCS Specifications requirements set out in the Specifications listed below (copies of which are appended to this Implementation Contract at Appendix H) as those Specifications may be amended and conformed:

a. ATCS General Requirements (Specifications Section 34 42 23)

b. ATCS Functional Requirements (Specifications Section 34 42 25)

c. ATCS Safety (Specifications Section 34 42 27)

d. ATCS System Assurance (Specifications Section 34 42 31)

e. ATCS Room Equipment (Specifications Section 34 42 35)

f. ATCS Wayside Equipment (Specifications Section 34 42 37)

g. ATCS Central Equipment (Specifications Section 34 42 39)

h. ATCS Testing (Specifications Section 34 42 41)

3.5. As more specifically set out in the Specifications, the Work includes, but is not limited to the following:

a. Review of Existing ATCS designs and specifications; confer with Project design and engineering consultants and recommend any necessary changes to the existing ATCS designs; review and approve final ATCS designs;

b. Supply of all Proprietary Equipment (including that which is provided under the Equipment Contract) and associated firmware and Software necessary for the installation, testing, and operation of the ATCS;

c. Incorporate and verify all CSP provided design input data;

d. Prepare ATCS infrastructure build specifications, and ATCS functional and performance requirements;

e. Prepare all Interface Requirements Specifications involving the ATCS;

f. Prepare all documentation needed to support the continuing operation and maintenance of the ATCS, including training SFMTA operators in its use;

g. Perform hazard analyses and provide mitigation measures and corrective actions;

h. Perform all necessary Reliability, Availability, Maintainability and Safety (RAMS) analyses and provide compliance reports with supporting data;

i. Identify spare and replacement parts including maintenance schedules;

j. Prepare the systems integration and ATCS Test Plans and all verification and validation procedures;

k. Submit Pre-Revenue and Turn Over Plan to SFMTA;

l. Coordination with SFMTA, City and Oversight groups;

m. Provide management, design review, and construction testing and oversight of:

(1) ATCS Design;

(2) Subcontractors, suppliers, vendors, installers;

(3) ATCS physical and operational interfaces;

(4) Transport and local storage of Proprietary Equipment;

(5) Installation, configuration, integration, testing, commissioning, and user training of the ATCS and its Proprietary Equipment and Software;

(6) Documentation (i.e., as-built engineering documents, configuration and testing records) of the ATCS as finally tested and approved;

(7) Training and maintainer qualification evaluation (new design plus any changes);

(8) All necessary oversight of work by the Construction Contractor that affects the ATCS and the certification of ATCS performance, including continuing support as required during revenue operations; and

(9) Provide warranty services for three (3) years following ATCS Substantial Completion.

3.6. The purpose of the Equipment Contract and this Implementation Contract are to procure an Advanced Train Control System for the Central Subway Project that meets the ATCS requirements and specifications referenced in those agreements; the two agreements are intended to be read together and are complementary. In case of conflict between the Equipment Contract and the Implementation Contract, the Implementation Contract shall take precedence and govern. The Proprietary Equipment procured and Work performed under the Equipment Contract, and Thales' obligations under that Agreement are incorporated into this Implementation Contract, so that the City may equally enforce here any obligation arising under the Equipment Contract.

Nothing in this provision shall be interpreted as limiting the Construction Contractor's responsibility for the ATCS installation work as provided in the Construction Contract.

4. COMPENSATION.

4.1. Thales shall be compensated for the Work it performs under this Implementation Contract, regardless of whether the Work was directed to be performed by the Construction Contractor or the SFMTA ,as provided in the Pricing and Milestone Payment Schedule set out in Appendix C to this Implementation Contract.

4.2. Except as specifically provided in this Implementation Contract or as provided under applicable law, the City's obligations to pay and liability for payment of compensation to Thales under this Implementation Contract shall be limited to the in the Pricing and Milestone Payment Schedule set out in Appendix C. Said limitation shall not preclude Thales from seeking additional compensation under a contract claim in accordance with the terms of this Implementation Contract or a legal claim made in accordance with the requirements of California Government Code section 900 et seq. and San Francisco Administrative Code Article 10.

4.3. Thales shall submit its payment applications to the SFMTA pursuant to the Pricing and Milestone Payment Schedule in Appendix C of this Agreement. Thales shall include and submit supporting documentation with each application for payment.

4.4. NOT USED.

4.5. The total cost to the SFMTA for the Work provided under this Implementation Contract commencing from the Effective Date of this Second Amendment shall not exceed **Fourteen Million Eight Hundred Ninety-Eight Thousand Five Hundred Fifty-Six and Eighty Cents ($14,898,556.80)** as more specifically set out in Pricing and Milestone Payment Schedule appended hereto as Appendix C.

4.6. No charges shall be incurred under this Implementation Contract nor shall any payments become due to Thales until reports, services, or both, required under this Implementation Contract are received from Thales and approved by the SFMTA as being in accordance with this Implementation Contract, such approval not to be unreasonably delayed or withheld. City may reasonably withhold payment in any instance in which Thales has failed or refused to satisfy any material obligation associated with the Work provided for under this Implementation Contract. The City shall provide Thales written notice by facsimile of suspension of payment and explanation of the suspension for Thales' non-performance no later than the date payment is due.

4.7. For Work performed under this Implementation Contract by a subcontractor other than a Thales Affiliate, the following shall apply:

a. The Controller is not authorized to pay invoices prior to Thales' submission of SFMTA Form No. 7 Subconsultant Payment Declaration (attached hereto as Appendix E). If Progress Payment Form is not submitted with Thales' invoice, the Controller will notify the SFMTA and Thales of the omission. If Thales' failure to provide SFMTA Form No. 7 Subconsultant Payment Declaration is not explained to the Controller’s reasonable satisfaction, the Controller will withhold 20% of the payment due pursuant to that invoice until SFMTA Form No. 7 Subconsultant Payment Declaration is provided.

b. Following City's payment of an invoice, Thales has ten (10) days to file an affidavit using HRC Payment Affidavit verifying that all subcontractors have been paid and specifying the amount.

4.8. The City will make a good faith effort to pay all undisputed invoices within thirty (30) days of receipt, but the City shall have no liability to Thales for interest due to late payment by City. In the event that City does not make payment within a reasonable amount of time after such thirty (30) day period or is unable to make payments after such thirty (30) day period, then Thales will have the right to suspend the Work until such payment arrangements are mutually agreed upon by the Parties.

4.9. Where Work or Additional Work is not paid on an agreed-lump sum basis (such as cost-reimbursement plus fixed-fee basis), reimbursement of costs and other payment arrangement shall be governed by 48 CFR Subparts 49.2 and 49.3 to the extent that those principles are in accord with the cost principles for local governments set out in the Office of Management and Budget Circular A-97.

4.10. Except as specifically provided for in the Equipment Contract or elsewhere in this Implementation Contract, the City shall not be obligated to pay for Proprietary Equipment or Software or other materials provided by Thales until said Proprietary Equipment or Software is incorporated into or otherwise used to benefit the Project. The SFMTA may in its discretion pay for certain Long Lead Items and other specifically identified materials that are stored as required under this Implementation Contract (or are stored as provided in the Equipment Contract at Section 4.8), on or off the Site only as set out herein. The City may make payment for such materials or Proprietary Equipment if it is: (i) unique to the Work and approved by the City for prepayment in advance; and (ii) either stored on the Site or at an off-Site location approved in advance and in writing by the Engineer. Should the City agree to make payment for such Long Lead Items, all of the following shall apply:

a. Thales shall submit to the City proof of purchase for approved Long-Lead Proprietary Equipment and Software procurement by bills of sale, invoices, or other documentation warranting that Thales has received such materials free and clear of all liens, charges, security interests, and encumbrances.

b. Title to stored materials (including but not limited to Proprietary Equipment and Software) shall be vested in the City upon payment by City to Thales for such materials. Thales shall provide written confirmation of the transfer of title as a condition of payment. If such materials to be stored are delivered to Thales free on-board manufacturer, then, upon payment by City to Thales pursuant to Paragraph 4.9.e below, title shall pass to City at the manufacturer's loading dock. Thales shall obtain a negotiable warehouse receipt, endorsed over to the City, for such materials stored in an off-Site warehouse. The City shall not make any payment for such materials until endorsed receipts are delivered to the City. Thales, at no additional cost to the City, shall insure stored materials against theft, fire, loss, vandalism, and malicious mischief covering said stored materials while in storage off-Site, in transit, and on-Site until incorporated into the Work. Thales shall deliver the policy or certificate of such insurance to the Engineer naming the City as additional insured or loss payee as applicable. Insurance shall not be cancelled without a minimum of 30 Days' notice to the SFMTA

as provided in the notice requirements of this Implementation Contract, and cancellation shall not be effective until such notice thereof is given to the City.

c. The maximum prepayment for Long Lead Items shall be 75 percent of the fair market value of the material prepaid. The City shall be the sole judge of fair market value.

d. Thales shall protect stored Proprietary Equipment and materials from damage. Damaged Proprietary Equipment and materials, even though paid for, shall not be incorporated into the Work

e. Upon reasonable notice to Thales, stored Proprietary Equipment and materials shall be available for inspection by the City.

f. Thales shall deliver stored Proprietary Equipment and materials from storage to the Site at no cost to the City.

g. After delivery of stored materials and Proprietary Equipment to the Site, if any inherent or acquired defects are discovered therein, such defective materials or Proprietary Equipment shall be removed and replaced with suitable materials at no additional cost to the City.

h. Thales shall be responsible for the loss or damage of the Proprietary Equipment and other materials provided to the Work by Thales under this Implementation Contract until said equipment and materials are delivered to the Site for installation. In the event of such loss of or damage of Proprietary Equipment and materials prior to delivery to the Site, Thales shall be responsible for replacing the lost or damaged Proprietary Equipment and materials at its own cost and shall be responsible for all delays incurred on the Project as a result of such loss or damage. The City will credit to Thales amounts subsequently recovered from an insurer for the loss of the materials.

i. Nothing in this Section shall relieve Thales of its responsibility for performing the Work, including provision of services, Proprietary Equipment and Software that conform to the requirements of the Implementation Contract.

5. TERM AND EFFECTIVE DATE OF AGREEMENT.

5.1. Term of the Agreement. Subject to Section 14.1 (Certification of Funds) below, the Term of this Implementation Contract shall commence from the Effective Date (as provided in Section 5.2, below), and unless terminated earlier in accordance with the terms of this Implementation Contract, will continue in force and effect until the expiration of the Warranty Period.

5.2. Effective Date of the Agreement and Assignment . ATCS Contract 1266-1 became effective on April 8, 2014 (1266-1) and ATCS Contract 1266-2 became effective on July 17, 2014 (1266-2). Both ATCS Contracts were re-assigned from Tutor Perini Corp. (Construction Contractor) to the SFMTA under Modification #93 to Contract

1300 on February 5, 2019 when the SFMTA Board of Directors approved Contract Modification #93.

5.3. Effective Date of this Second Amendment. The Effective Date of this Second Amendment to Contract 1266-2 is January 31, 2021.

6. RE-ASSIGNMENT OF THIS AGREEMENT TO THE SFMTA.

6.1. Terms and Conditions of Re-Assignment. The following terms and conditions shall apply to the novation and Re-Assignment of this Implementation Contract:

a. Re-Assignment and Novation. The Parties intend that this Amendment shall re-assign the Agreement (Contract 1266-2) from Tutor-Perini Corporation (TPC), the Construction Contractor, to the SFMTA, thereby reversing the previous assignment of that Agreement from the SFMTA to TPC. That re-assignment shall not be construed as a termination of the Agreement, but to the extent that any court or other entity with authority over the Agreement or its implementation may determine that this re-assignment of the Agreement effected a termination, this Amendment shall also be construed as the Parties' novation and affirmation of the validity of the Agreement.

b. Further Assurances. From and after the Effective Date of this Assignment, the City and Thales shall each do such things, perform such acts, and make, execute, acknowledge and deliver such documents as may be reasonably necessary or proper and usual to complete the novation of this Implementation Contract, the Equipment Contract, and the re-assignment of said agreements back to the SFMTA so that Thales and the SFMTA are the only parties to those agreements.

c. Successors. Subject to the terms of the Implementation Contract, this Re-Assignment shall be binding upon, and inure to the benefit of, the City and Thales and their respective successors and assigns. Nothing in this Re-Assignment, whether express or implied, shall be construed to give any person or entity other than City and Thales and their respective successors and assigns any legal or equitable right, remedy or claim under or in respect of this Re-Assignment or any covenants, conditions or provisions contained herein.

d. Reserved Rights. Following Final Acceptance of the Work performed under this Implementation Contract and the Equipment Contract, for any claim or action that may arise or otherwise become actionable after said Final Acceptance, the City and Thales shall each have the right to seek any legal remedy and shall have the right to enforce any provision of those agreements that survives the expiration or termination of those agreements (as provided in Section 14.44) against the other.

6.2. Beneficial Use. The City may have Beneficial Use of the ATCS prior to Final Completion and Final Acceptance of the Work under this Implementation Contract

and the Equipment Contract. But the City shall not be deemed to have Beneficial Use of the ATCS until the Work under this Implementation Contract and the Equipment Contract has reached ATCS Substantial Completion and Thales has issued to the SFMTA a safety certificate authorizing the SFMTA to commence Revenue Service.

7. INDEMNITY.

7.1. Obligation to Defend and Indemnity.

a. To the fullest extent permitted by law and except as specifically provided otherwise in this Implementation Contract, upon the City's providing notice to Thales as provided in Paragraph 7.1.b) as to any claim, administrative action, or lawsuit brought by a third party against the City for any loss of or damage caused by or arising from the negligent or intentional acts of Thales or its subcontractors arising from the Work. Thales shall assume the defense of said claim, administrative action, or lawsuit, indemnify and save harmless the City, its boards, commissions, officers, and employees (collectively "Indemnitees"). Subject to the requirements and limitations in Paragraph 7.3.b, said indemnification shall include any and all claims, suits, actions, losses, costs, damages, injuries (including, without limitation, injury to or death of an employee of Thales or its subconsultants), expense and liability of every kind, nature, and description (including, without limitation, direct, economic, indirect, incidental and consequential (special) damages incurred by said third parties, court costs, attorneys' fees, litigation expenses, fees of expert consultants or witnesses in litigation, and costs of investigation), that arise out of, result from, connected with, pertain or relate to, directly or indirectly, in whole or in part, the negligence, recklessness, or willful misconduct of Thales, any of its subconsultants or Affiliates, anyone directly or indirectly employed by them, or anyone that they control (collectively, "Liabilities") in the performance of the Work.

b. The indemnification contained herein is subject to the City: (i) providing Thales with prompt written notice of the claim; (ii) granting Thales sole control of the defense to the claim except that Thales may not enter into any settlement that would adversely impact the City’s rights or impose liability upon the City without its prior written consent; and, (iii) providing reasonable cooperation in the defense of the claim.

c. The terms, conditions, provisions, and failure to cover of any insurance policy covering Thales' performance under this Implementation Contract shall not operate to limit Thales' Liabilities under this Implementation Contract. Nor shall the amount of insurance coverage operate to limit the extent of such Liabilities.

d. Thales assumes no liability whatsoever for the sole negligence, active negligence, or willful misconduct of any Indemnitee.

7.2. Limitation of Liability.

a. The City's total liability to Thales for the Work shall be limited to the value of the Work completed in accordance with the requirements of this Implementation Contract, said amount not to exceed the Contract Amount stated in Article 4, as that amount may be modified by a properly approved and executed Change Order.

b. Except as provided herein, Thales' total liability to the City under this Implementation Contract and the Equipment Contract shall be limited to the aggregate sum of the Contract Amounts of those agreements, as those amounts are stated in the respective Article 4 and Appendix C of each of those agreements, as those amounts and the aggregate sum of those amounts may be modified by a properly approved and executed Change Order. Said limitation of Thales' liability shall not apply to:

(1) damages and other liability caused by Thales's willful, intentional acts or omissions;

(2) any applicable statute, City Ordinances, and Codes;

(3) damages that fall within the insurance coverages required under the Implementation Contract;

(4) Thales's warranty obligations under this Implementation Contract and the Equipment Contract ;

(5) damages and other liability arising under claims by third parties, including indemnity or contribution for claims brought by a third party (see Paragraph 7.1.a);

(6) liability for violation of regulations and laws;

(7) damages and other liability for infringement of any intellectual property right as provided in Section 7.5.

7.3. Limitations on Special Damages. The City and Thales's respective liabilities to each other for special, incidental, consequential, and indirect damages are hereby limited as follows:

a. The City, its boards and commissions, and all of their officers, agents, members, employees, and authorized representatives shall have no liability to Thales for any type of special, consequential, indirect or incidental damages, including but not limited to losses of use, data, profit, revenue, income, business, anticipated savings, reputation, and more generally, any losses of an economic or financial nature, whether these may be deemed as consequential or arising directly and naturally from the incident giving rise to the claim, arising under or related to this Implementation Contract or under any cause of action related to the subject matter of this Implementation Contract, whether in contract, tort (including negligence), strict liability, or otherwise. This limit of liability applies under all circumstances including, but not limited to, the breach, completion, termination, suspension, cancellation or recession of the Work or this Implementation Contract, negligence or strict

liability by the City, its boards and commissions, and their representatives, consultants or agents.

b. Except as specifically provided in this Implementation Contract, Thales, and its Affiliates, employees, officers, directors and shareholders, shall not be liable to the City for any special, consequential, indirect or incidental damages, including but not limited to losses of use, data, profit, revenue, income, business, anticipated savings, reputation, and more generally, any losses of an economic or financial nature, whether these may be deemed as consequential or arising directly and naturally from the incident giving rise to the claim arising under or related to this Implementation Contract or under any cause of action related to the subject matter of this Implementation Contract, whether in contract, tort (including negligence), strict liability, or otherwise. Except as provided herein, this limit of liability applies under all circumstances including, but not limited to, the breach, completion, termination, suspension, cancellation or recession of the Work or this Implementation Contract, negligence or strict liability by Thales. Under no circumstances shall this limit of liability apply to or limit Thales's liability with respect to any of the following:

(1) Thales's obligation to pay liquidated damages as defined by the requirements and dollar limitations as set forth in Paragraph 13.3.a of this Implementation Contract;

(2) damages and other liability caused by Thales's willful, intentional acts or omissions;

(3) liability (statutory damages) imposed on Thales by law, including any applicable statute, City Ordinances, and Codes;

(4) damages and other liability arising under claims by third parties for loss or damage to property or personal injuries, including death;

(5) liability for violation of environmental regulations and laws;

(6) damages and other liability for infringement of any intellectual property right as provided in Section 7.4.a.

7.4. Indemnity for Infringement of Intellectual Property Rights.

a. Thales shall indemnify, defend, and hold City harmless from all loss and liability, including attorneys' fees, court costs and all other litigation expenses for any infringement of the patent rights, copyright, trade secret or any other proprietary right or trademark, and all other intellectual property claims of any person or persons in consequence of the use by City of the Proprietary Equipment or Software to be supplied in the performance of this Implementation Contract. Thales shall at its sole expense and election, provided any such election does not result in any cost to the City arising from the claim, either: (1) indemnify the City; or (2) obtain the right to use

the infringing item; or (3) modify the infringing item so that it becomes non-infringing; or (4) replace the infringing item with a non-infringing item, subject to the requirements of Paragraph d., below.

b. Thales shall have no obligations hereunder with respect to intellectual property infringements caused by: (1) Thales' compliance with the City's designs; (2) City's use or combination of the Software or Proprietary Equipment with products or data of the type for which the Proprietary Equipment and Software was neither designed nor intended; or (3) the modification of the Software or Proprietary Equipment without Thales' prior written consent.

c. The provisions of this Section 7.4 shall be the City's sole remedy for infringement claims and is conditional upon City: (1) giving prompt notice in writing to Thales of any claim or proceeding being made or threatened; (2) allowing Thales to defend and settle under its responsibility any proceedings or claims through counsel chosen by Thales at Thales' own expense and (3) affording all reasonable assistance in connection therewith.

d. Thales shall be entitled to modify or replace any infringing item so that it becomes non-infringing, or in the event that such modification or replacement is not possible using reasonable technical efforts, to replace the item concerned with another item that meets the performance requirements relevant to the replaced item.

7.5. Responsibility for Equipment. City shall not be responsible for any damage to persons or property as a result of the use, misuse or failure of any equipment or tools provided by and used by Thales, or by any of its employees, for the purposes of performing any services hereunder, irrespective of whether Thales, the City or the Construction Contractor provided, rented or loaned said equipment or tools to Thales.

7.6. Release of Hazardous Materials. Thales acknowledges that any claims, demands, losses, damages, costs, expenses, and legal liability that arise out of, result from, or are in any way connected with the release or spill of any legally designated hazardous material or waste or contaminated material as a result of the Work performed under this Implementation Contract are expressly within the scope of the indemnity set out in this Article, and that the costs, expenses, and legal liability for environmental investigations, monitoring, containment, removal, repair, cleanup, restoration, remedial work, penalties, and fines arising from the violation of any local, state, or federal law or regulation, attorney's fees, disbursements, and other response costs are expressly within the scope of this indemnity.

7.7. Joint and Several Liability. If Thales is a joint venture partnership, the requirements of this Article shall apply jointly and severally to each joint venture partner.

8. INSURANCE.

Thales shall maintain in full force and effect, from the Effective Date of this Implementation Contract and the Equipment Contract through Final Acceptance of all ATCS Work under those Agreements, the insurance as described in this Article, with the minimum specified coverages or coverages as required by laws and regulations,

whichever is greater, as set out below. Contractor may use the same insurance policies to satisfy the aggregate insurance requirements of this Implementation Contract and the insurance requirements of the Equipment Contract.

8.1. Worker's Compensation Insurance. Thales shall provide workers compensation insurance in statutory amount, including Employers' Liability coverage with limits not less than Two Million Dollars ($2,000,000) each accident, injury, or illness, including coverage, as applicable, for U.S. Long Shore and Harbor Workers' Act benefits and Jones Act benefits, and Federal Employers Liability Act. The Worker's Compensation policy shall be endorsed with a waiver of subrogation in favor of the City for all work performed by Thales, its employees, agents and subcontractors.

8.2. Commercial General Liability insurance. Thales shall provide commercial general liability insurance with aggregate coverage limits not less than Fifty Million Dollars ($50,000,000) each occurrence combined single limit for bodily injury and property damage, including coverage for Contractual Liability, independent Thales, Explosion, Collapse, and Underground (XCU), Personal Injury, Broadform Property Damage, products, and completed operations. Thales may meet this requirement with one or more primary, umbrella, and/or excess general liability insurance policies that generally cover its corporate projects and operations, provided that should a claim or claims be paid by said policy or policies that total in the aggregate more than Five Million Dollars ($5,000,000 US), Thales shall within ten Days of receipt of such claim(s) provide notice of same to the SFMTA and obtain additional insurance so that Thales' Work under this Implementation Contract and the Equipment Contract is at all times fully covered in the amount of Fifty Million Dollars ($50,000,000 US), as provided herein.

8.3. Commercial Automobile Liability Insurance. Thales shall provide commercial automobile liability insurance with limits not less than Two Million Dollars ($2,000,000) each occurrence combined single limit for bodily injury and property damage, including owned, hired or non-owned vehicles, as applicable.

8.4. Risk of Loss Coverage for Proprietary Equipment and Software. Thales shall insure Proprietary Equipment against loss prior to City's acceptance, as required by Section 14.14 of this Implementation Contract.

8.5. Forms Of Policies And Other Insurance Requirements.

a. Before commencement of the Work of this Implementation Contract, certificates of insurance and policy endorsements in form acceptable to the City and with insurers acceptable to the City, evidencing all required insurance and with proper endorsements from Thales's insurance carrier identifying as additional insureds the Indemnitees, shall be furnished to the City, with complete copies of policies to be furnished to the City promptly upon request. Thales shall deliver appropriate bond and insurance certificates and endorsements acceptable to the City within five Working Days of the date the Implementation Contract is awarded.

b. Approval of the insurance by the City shall not relieve or decrease the extent to which Thales or subcontractor of any tier may be held responsible for payment of any and all damages resulting from its operations. Thales shall be responsible for all losses not covered by insurance , excluding damage caused by earthquake and flood (whether caused by storm or tidal wave) consistent with section

7105 of the California Public Implementation Contract Code in excess of 5 percent of the Implementation Contract Sum, including the deductibles. All policies of insurance and certificates are subject to review by the City and shall be satisfactory to the City.

c. Thales and its subcontractors shall comply with the provisions of California Labor Code section 3700. Prior to commencing the performance of Work, Thales and all of its subcontractors shall submit to the awarding department a certificate of insurance against liability for workers compensation or proof of self-insurance in accordance with the provisions of the California Labor Code.

d. Liability insurance, except for professional liability insurance, shall be on an occurrence basis, and said insurance shall provide that the coverage afforded thereby shall be primary coverage (and non-contributory to any other existing valid and collectable insurance) to the full limit of liability stated in the declaration, and such insurance shall apply separately to each insured against whom claim is made or suit is brought, but the inclusion of more than one insured shall not operate to increase the insurer's limits of liability.

e. Except for professional liability insurance and general liability insurance, should any of the required insurance be provided under a form of coverage that included an annual general aggregate limit or provides that claims investigation or legal defense costs be included in such annual general aggregate limit, such general aggregate limit shall be two times the occurrence limits stipulated.

f. Should any of the required insurance be provided under a claims-made form, Thales shall maintain such coverage continuously throughout the Term of this Implementation Contract, and without lapse, for a period of five (5) years beyond the Implementation Contract Final Completion date, to the effect that, should occurrences during the Implementation Contract Term give rise to claims made after expiration of the Implementation Contract, such claims shall be covered by such claims-made policies.

g. If a subcontractor will be used to complete any portion of this agreement, Thales shall ensure that the subcontractor shall provide all necessary insurance and shall include the City and County of San Francisco, its officers, agents and employees and Thales listed as additional insureds.

h. All insurance policies required to be maintained by Thales hereunder shall be endorsed to provide for thirty (30) Days prior written notice of cancellation for any reason, intended non-renewal, or reduction in coverage to the City. All notices shall be made to:

Deputy, Contract Administration
Capital Programs and Construction
SFMTA
1 South Van Ness Avenue, 3rd Floor
San Francisco, CA 94103

and to:

Program Director
Central Subway Project
SFMTA
1 South Van Ness Avenue, 3rd Floor
San Francisco, CA 94103

and to:

Risk Management Division
City and County of San Francisco
25 Van Ness Avenue, Suite 750
San Francisco, CA 94102

i. Thales, upon notification of receipt by the City of any such notice, shall file with the City a certificate of the required new or renewed policy at least 10 Days before the effective date of such cancellation, change or expiration, with a complete copy of new or renewed policy.

j. If, at any time during the life of this Implementation Contract, Thales fails to maintain any item of the required insurance in full force and effect, all Work of this Implementation Contract may, at City's sole option, be immediately suspended, and all Implementation Contract payments due or that become due will be withheld, until notice is received by the City as provided in the immediately preceding Paragraph 7 that such insurance has been restored to full force and effect and that the premiums therefore have been paid for a period satisfactory to the City.

8.6. Joint and Several Liability. If Thales is a joint venture partnership, the liability of each partner of the joint venture shall be joint and several. No insurance policy providing coverage under this Implementation Contract shall contain any provision prohibiting coverage of a joint venture partnership or otherwise limiting coverage any joint venture partner.

8.7. Indemnitees.

a. For general liability insurance, Thales shall include as additional insureds the City and County of San Francisco, its board members and commissions, and all authorized agents and representatives, and members, directors, officers, trustees, agents and employees of any of them.

b. With the exception of professional liability insurance, Thales shall include as additional insured or exclusive loss payee on all policies the City and County of San Francisco, its board members and commissions, and all authorized agents and representatives, and members, directors, officers, trustees, agents and employees of any of them.

8.8. Insurer Qualifications. Insurance companies providing coverage for this Implementation Contract shall be legally authorized to engage in the business of furnishing insurance in the State of California. All insurance companies shall have a current A.M. Best Rating not less than "A-,VIII" and shall be satisfactory to the City.

9. NOT USED.

10. WARRANTY AND RELIABILITY TESTING.

a. Thales warrants that the Work will be performed in a professional and workmanlike manner. Thales warrants that all Proprietary Equipment and Software supplied under this Implementation Contract and the Equipment Contract shall be free from defects in material and workmanship for a period of three (3) years (the "Warranty Period") commencing upon ATCS Substantial Completion. The Work Thales provides under this Implementation Contract and the Proprietary Equipment procured under the Equipment Contract are covered under a unified warranty that applies to the operations of the ATCS and its constituent parts, including but not limited to the Proprietary Equipment and Software.

b. Pursuant to the Specifications Section 34 42 31, Article 3.1, testing for the Reliability Demonstration Test (“RDT”) shall commence when Revenue Service has begun. Successful completion of RTD is a prerequisite for determination of Final Completion of the Work under this Implementation Contract. The SFMTA shall not commence Revenue Service (and Thales therefore shall not commence the RTD) until the Work under this Implementation Contract has reached ATCS Substantial Completion and Thales has provided the SFMTA a safety certificate verifying that the ATCS is operational, meets Specifications requirements, and is safe to use in Revenue Service.

c. Thales’s obligation under this warranty shall be limited to the correction, repair or replacement of the nonconforming Proprietary Equipment or Software, or any part thereof. The City acknowledges that the Software may contain open source software or other software not developed by Thales. If during the Warranty Period such open software, firmware or other software not developed by Thales should malfunction or otherwise fail to operate in such a way that the ATCS does not meet the performance specifications of this Implementation Contract, Thales shall at no cost to the City replace or modify said software so that the ATCS meets said performance specifications. It is the intent of the Parties that the warranty shall guarantee the utility and performance of the ATCS; the choice of software and other constituent elements of the ATCS implemented to meet the ATCS performance specifications are wholly within the control of Thales.

d. This warranty is conditioned on the City notifying Thales in writing of any defect within the warranty period. The warranty shall not apply to wear and tear, consumable items and to defects arising from or connected with: (i) The City’s or any third party’s improper receipt, transport, handling, storage, maintenance, testing,

installation, operation and use of the Proprietary Equipment or Software; (ii) Such Proprietary Equipment or Software having been operated beyond its rated capacity or not having been operated and maintained in all respects in a normal and proper manner in accordance with the instructions or manuals provided by Thales or having been subject to neglect or abuse after delivery to the City or third parties; and/or (iii) an alteration, modification, maintenance, overhaul or repair made on the Proprietary Equipment or Software by anyone other than Thales or those specifically authorized by Thales; provided further that this warranty shall not apply to third party products or services that were not provided by Thales, third party Software, including, but not limited to, Open Source Software, but which may be required for the operation of the Proprietary Equipment or Software.

e. Contractor disclaims and the City waives 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.

11. SOFTWARE AND ATCS DOCUMENTATION LICENSE.

11.1. The City is hereby granted a non-exclusive, non-transferable, perpetual, restricted license to use the Software from the date of full payment for same for the operation, monitoring, and maintenance of the ATCS. The City is hereby granted a non-exclusive, non-transferable, perpetual, restricted license to use the ATCS Documentation from the date of full payment for same for the operation, monitoring, maintenance of the ATCS and for purposes of confirming the safe operation and safety certification of the ATCS to the Federal Transit Administration, the California Public Utilities Commission and other regulatory agencies. The City has no right to grant sublicenses to the Software or Documentation. Thales warrants that it has the title to and/or authority to grant said license(s) and sublicenses(s) to the City.

11.2. Notwithstanding anything to the contrary contained in this Implementation Contract, the City does not under this agreement obtain any title or ownership rights to the Software or Documentation, and all such rights shall remain with Thales or its suppliers.

11.3. The Software, Documentation or any renewals, extensions or expansions hereof shall, as between the Parties, be treated as proprietary and a trade secret of Thales or its suppliers and be subject to the provisions of the Mutual Nondisclosure Agreement appended hereto as Appendix F.

11.4. The City agrees that the license to use the Software may contain freely available Software (referred to hereafter as “Open Source Software”) obtained by Thales from a third-party source. No license fee has been paid by Thales for the inclusion of any such Open Source Software, and no license fee is charged to City for its use. City acknowledges and agrees that neither Thales, nor the third-party source, provides any warranties for the Open Source Software, other than stated in Section 10.b.

11.5. The City shall not:

a. Make any copies of the Software or parts thereof, except for archival back up purposes and when making copies as permitted herein, shall transfer to the copy/copies any copyright or proprietary legends or other marking on the Software; or

b. Use the Software for any other purpose than permitted in this Article 11; or

c. Translate, reverse engineer, adapt, arrange or error-correct or make any other alterations to the Software.

11.6. The City may as necessary for the continued maintenance and certification of the ATCS, provide copies of ATCS System Documentation to regulatory agencies with jurisdiction over the SFMTA and to consultants engaged by the SFMTA to assist in the maintenance, operation and certification of the ATCS. The City may release System Documentation and provide access to ATCS Software to City consultants only under a confidentiality agreement that imposes on City consultants the same obligations as to confidentiality of Thales' intellectual property as is placed on the City under this Implementation Contract.

11.7. The SFMTA waives Software Escrow requirements for this Contract 1266-2. .

11.8. SFMTA shall make available to Thales as needed a copy of all the Software installed and related Documentation, and a copy of certificates of the software licenses provided by third-parties for integration of those products to the ATCS to other systems or other purpose necessary for the Work.

11.9. Thales shall supply two printed copies and an electronic printable version of the Documentation to the City for Proprietary Equipment and Software purchased under this Implementation Contract. The City may make copies of the Documentation to the extent necessary to maintain one (1) archive version and as required to train its employees in the operation and maintenance of the ATCS provided always that all copyright, confidentiality or proprietary legends or other markings shall be transposed onto such permitted copies. The Documentation and all permitted copies thereof shall at all times be treated as proprietary and a trade secret of Thales or its subcontractors and be subject to the provisions of this Implementation Contract for Confidential Information.

11.10. The City shall not have the right to make any modifications to the Documentation.

12. PROTECTION OF CONFIDENTIAL AND SECURITY SENSITIVE INFORMATION.

12.1. Proprietary or Confidential Information. The Parties' respective obligations as to proprietary and confidential information are set out in the Mutual Nondisclosure Agreement attached hereto as Appendix F, which is incorporated by reference as if fully set out here. The City shall be entitled to disclose Confidential Information on a need to know basis to consultants engaged by the Agency to assist in the design, testing, certification, and maintenance of the ATCS and the integration of ATCS data to other SFMTA systems, provided that said consultant(s) abide by the confidentiality terms of this Implementation Contract.

12.2. Security Sensitive Information.

a. Design Documents are Security Sensitive Information.

(1) The Drawings and related design documents that are provided to Thales to perform the Work under the Implementation Contract are Security Sensitive Information ("SSI Documents"), as that term is defined under applicable federal law and federal Department of Transportation security policies. 49 CFR 15 and 1520.

(2) The SSI Documents are identified by the markings printed on individual drawings and exterior covers of drawing sets that indicate that they are SSI Documents.

(3) The SSI Documents show detailed designs of the Central Subway Project. Thales recognizes that access to the SSI Documents by unauthorized persons or organizations would pose significant risk of grave harm to the Central Subway Project and public safety.

b. Use of SSI Documents.

(1) Thales shall use the SSI Documents only for the purposes of performing the Work under the Implementation Contract, and for no other purpose.

(2) Thales shall guard the SSI Documents safe and secure at all times from disclosure to unauthorized personnel, and shall only allow access to the SSI Documents to persons with a "need to know" for performing the Work. When the SSI Documents are not being used to perform the Work, Thales shall keep the SSI Documents in a locked, secure area so that the SSI Documents are not physically or visually accessible to persons who are not directly involved in the preparation of Thales' Proposal for the Implementation Contract. When unattended, the SSI Documents must be secured in a locked container, office, or other restricted access area with access to the keys or combination limited to those with a need to know.

(3) Thales shall not copy, publish, circulate or use any of the SSI Documents for any purpose other than performing the Work under this Implementation Contract, without first obtaining the SFMTA's written approval to do so.

c. Disposal of the SSI Documents. After Final Acceptance of the Work or earlier termination of the Implementation Contract, Thales may keep one set of the SSI Documents for its internal use only, but shall return all other sets of SSI Documents or destroy them, as follows:

(1) SSI Documents shall be returned to:

San Francisco Municipal Transportation Agency
Capital Programs and Construction

Attention: Shahnam Farhangi
1 South Van Ness, 3rd floor
San Francisco, CA 94103

(2) If not returned to the SFMTA, the SSI Documents must be destroyed in a manner that ensures recovery of the information contained therein would be difficult, if not impossible. Any means approved for the destruction of national security classified material such as machine shredding, may be used to destroy the SSI Documents. If no such means is available, the SSI Documents may be destroyed by cutting or tearing them into small pieces and assimilating it with other waste material. Compact discs or other physical electronic media containing the SSI Documents shall be broken to pieces. Electronic files containing the SSI Documents or any portion of them shall be deleted. Thales shall certify to the SFMTA in writing that the SSI Documents have been destroyed as required herein.

d. Liability for Failure to Secure or Misuse of the SSI Documents. Thales shall be fully liable for any and all harm and damages that may arise from unauthorized persons or entities gaining access to the SSI Documents due to or arising from Thales' failure to adhere strictly to the requirements of this Article 12. In addition to civil liability, Thales is cautioned that violation of applicable laws and regulations concerning protection and use of Security Sensitive Information may subject Thales to federal penalties.

e. Subcontractors. Thales shall include the provisions of this Article 12 in any agreement with Subcontractor or Supplier that will require access to the SSI Documents, and Thales shall be responsible for its Subcontractors' and Suppliers' adherence to the requirements of this Article.

f. Reference Documents Designated as Security Sensitive Information. The Reference Documents and other materials designated Security Sensitive Information shall be handled in accordance with the requirements set forth in this Section.

13. SCHEDULE, DELAY AND LIQUIDATED DAMAGES.

13.1. Time Is of the Essence; ATCS Schedule. Time is of the essence for the completion of the Work under this Implementation Contract. Thales shall devote sufficient resources and personnel to complete its Work.

13.2. Commencement of Services. Thales' obligation to provide the services hereunder shall begin on the Effective Date of the Re-Assignment of this Implementation Contract to the SFMTA.

13.3. ATCS Start Work Dates. The SFMTA will provide Thales access to Central Subway work sites, including access to installed trackway, installed Proprietary Equipment, and other wayside equipment, and as otherwise may be required to perform the ATCS Work described in Specification 34 42 41 (ATCS Start Up and Testing Activities). The SFMTA will provide Thales access to Central Subway work sites to

perform Static Testing on or before April 1, 2021. The SFMTA will provide Thales access to Central Subway work sites to perform Dynamic Testing on or before June 1, 2021. If work sites become available earlier than those dates and are Site Ready, the SFMTA will provide Thales two weeks' notice to mobilize its resources to commence testing. Thales shall complete Dynamic Testing within nine (9) months of the Dynamic Testing start date. This section does not waive or compromise Thales' right to seek compensation for delays arising prior to April 1, 2021.

13.4. Testing Requirements.

Testing requirements will be confirmed and/or detailed in a subsequent Contract modification.

a. Static Testing occurs prior to either Engineering Testing and Dynamic Testing and requires a minimum of one (1) month for completion.

b. In order to advance field activities, Thales will use a pre-SAT software release to conduct a final verification of asset placement, communication signal strength, and base ATCS functionality. This Engineering Test is planned to occur prior to Dynamic Testing and commence once Static Testing is completed.

c. Dynamic Testing occurs after Static Testing is completed and SAT software release is ready.

d. To begin Engineering testing, the following conditions must be met:

(1) All conditions required for the start of Static Testing as set forth in (2.51)

(2) No physical impediment to the ATCS system that would impact ATCS testing nor ongoing work that would impede ATCS testing.

e. To begin Static Testing, the following conditions must be met:

(1) All electrical wiring installed and capable of being powered through circuit breaker activation.

(2) All physical guideway, wayside, and central equipment must be fully installed.

(3) Any other work being undertaken during a test shift must not interfere with Thales effort.

13.5. Delays.

a. **Delay Due to Thales**. By entering into this Implementation Contract, Thales agrees that in the event the Proprietary Equipment, Software or services Thales will provide under this Agreement or the Equipment Contract are delayed the City will suffer actual damages that will be impractical or extremely difficult to determine. Thales agrees to complete its Work and achieve ATCS Substantial Completion in accordance with the ATCS Schedule. Requirements for ATCS Testing are described in

Specification Section 34 42 41. Thales shall be liable for Liquidated Damages when delay solely and directly attributable to Thales delays the ATCS Substantial Completion (as that term is defined in Section 2.7). For each Day of said delay, Thales shall pay to the SFMTA liquidated damages in an amount not to exceed Fifty Thousand Dollars ($50,000) for every Day of such delay. Said liquidated damages are not a penalty, but are a reasonable estimate of the losses that the City will incur based on the delay, established in light of the circumstances existing at the time the City and Thales executed the Implementation Contract and Equipment Contract, and in light of the circumstances existing when said agreements were re-assigned to the City and novated. The City shall subtract said amounts of liquidated damages from amounts that are due Thales. For the avoidance of doubt, notwithstanding any other provision of this Implementation Contract, Thales's liability for liquidated damages for delay to the ATCS Substantial Completion shall not exceed the aggregate sum of the Contract Amounts of the Implementation Contract and the Equipment Contract, as those amounts are stated in the respective Article 4 of each of those agreements, and as those amounts and the aggregate sum of those amounts may be modified by a properly approved and executed Change Order.

b. **Delay Not Due to Thales.** Except as provided in subsection d, below, if Thales is delayed in the performance or completion of the ATCS Work due to (1) any act, omission or delay of the SFMTA with respect to its obligations under this Implementation Contract; (2) any circumstance not solely and directly attributable to Thales; or (3) Construction Contractor interfering with the Work or unreasonable denying Thales access to the Site, and Thales cannot avoid or mitigate the delay, the SFMTA shall compensate Thales its reasonable costs for those Days that Thales has personnel in San Francisco ready and able to perform Work, which amount shall include all direct costs, indirect costs, profit and overhead, and other costs of every kind. Thales shall make every reasonable effort to avoid or mitigate the impact of such delays by redirecting staff to perform other SFMTA Work, and the SFMTA shall make reasonable efforts to provide Thales additional access to the Central Subway Work Sites to complete the ATCS Work. The SFMTA will provide Thales time extension as needed to complete ATCS Work that is delayed through no fault of Thales or that is necessary to complete Additional Services.

c. **Mutual Waiver of Claims for Delay.** The re-assignment from the Construction Contractor to the SFMTA of the Equipment Contract and Implementation Contract is the parties' attempt to mitigate damages caused by delays arising from or incurred up to the Effective Date of this Amendment. The SFMTA and Thales each respectively waive any claim for compensation or liquidated damages against the other arising from or related to delays to the ATCS Work or the Central Subway Project that precede September 1, 2019, which is the date on which both Thales and the SFMTA have approved the amendments to the Equipment Contract and the Implementation Contract effecting the Re-Assignment of those

agreements. SFMTA and Thales reserve all rights regarding Thales' claims for compensation for delay arising after September 1, 2019 including but not limited to those claims already submitted to SFMTA prior to the Effective Date of this Amendment.

d. **Delay Due to Regulatory Disapproval**. **..** Where ATCS Substantial Completion is caused by a regulatory agency's delay in approving the ATCS for revenue service, and that delay is not due the ATCS failing to meet the requirements of applicable regulations, the relevant Milestone dates of the ATCS Schedule shall be modified accordingly such that the Milestones and ATCS Schedule shall be extended for a period not less than the period of delay.

14. GENERAL PROVISIONS.

14.1. Certification of Funds; Budget and Fiscal Provisions; Termination in the Event of Non-Appropriation.

a. This Implementation Contract is subject to the budget and fiscal provisions of the City's Charter. This Implementation Contract shall not come into force and effect and Thales shall have no obligation to perform hereunder until such time as City has provided prior written authorization certified by the Controller confirming the availability of funds to compensate the services, Software or Proprietary Equipment contemplated hereunder. The full amount of the City's payment obligations and Thales' performance obligations under this Implementation Contract shall not at any time exceed the amount certified for the purpose and period stated in such advance authorization. The certification of funds for this Implementation Contract shall be included in the certification of funds for the Construction Contract.

b. This Implementation Contract will terminate without penalty, liability or expense of any kind to City at the end of any fiscal year if funds are not appropriated for the next succeeding fiscal year. If funds are appropriated for a portion of the fiscal year, this Implementation Contract will terminate, without penalty, liability or expense of any kind at the end of the Term for which funds are appropriated.

c. City has no obligation to make appropriations for this Implementation Contract in lieu of appropriation for new or other agreements. City budget decisions are subject to the discretion of the Mayor and the Board of Supervisors. Thales' assumption of risk of possible non-appropriation is part of the consideration for this Implementation Contract.

d. The City shall pay charges under this Implementation Contract, exclusively from legally available funds, to Thales or, in the event of an authorized assignment by Thales to its assignee, according to the terms of this Implementation Contract.

e. Except as may be provided by laws governing emergency procedures, officers and employees of the City are not authorized to request, and the City is not required to reimburse Thales for

services, Software or Proprietary Equipment beyond the agreed upon contract scope unless the changed scope is authorized by amendment to this Implementation Contract and approved as required by law. The Parties accept and agree that any change or variation to this Implementation Contract shall be null and void unless the Parties have mutually agreed to the terms and conditions of such change or variation and it has been authorized by amendment and approved as required by law.

f. Officers and employees of the City are not authorized to offer or promise, nor is the City required to honor, any offered or promised additional funding in excess of the maximum amount of funding for which the contract is certified without certification of the additional amount by the Controller.

g. The Controller is not authorized to make payments on any contract for which funds have not been certified as available in the budget or by supplemental appropriation. The Controller is not authorized to make payments on any contract for which funds have not been certified as available in the budget or by supplemental appropriation. The City's obligation hereunder shall not at any time exceed the amount certified by the Controller for the purpose and period stated in such certification.

h. This Section 14.1. controls against any and all other provisions of this Implementation Contract.

14.2. Payment.

a. Invoice Format. Invoices furnished by Thales under this Implementation Contract shall be in the form attached as Appendix D (Sample Invoice) and must reference this Implementation Contract and the tasks or deliverables provided for which payment is sought.

b. Retention. The City shall withhold ten percent (10%) of amounts due under each invoice, as provided in San Francisco Administrative Code section 6.22.J. When Thales has completed fifty percent (50%) of the Work under this Implementation Contract, the City shall release fifty percent (50%) of funds held in retention to Thales, but shall withhold the remainder until the ATCS has passed the Reliability Demonstration Test ("RDT").

14.3. Submitting False Claims; Monetary Penalties. Pursuant to San Francisco Administrative Code §21.35, any Thales, subcontractor or consultant who submits a false claim shall be liable to the City for the statutory penalties set forth in that section. The text of Section 21.35, along with the entire San Francisco Administrative Code is available on the web at http://www.municode.com/Library/clientCodePage.aspx?clientID=4201. A Thales, subcontractor or consultant will be deemed to have submitted a false claim to the City if Thales, subcontractor or consultant: (a) knowingly presents or causes to be presented to an officer or employee of the City a false claim or request for payment or approval; (b) knowingly makes, uses, or causes to be made or used a false record or statement to get a false claim paid or approved by the City; (c) conspires to defraud the City by

getting a false claim allowed or paid by the City; (d) knowingly makes, uses, or causes to be made or used a false record or statement to conceal, avoid, or decrease an obligation to pay or transmit money or property to the City; or (e) is a beneficiary of an inadvertent submission of a false claim to the City, subsequently discovers the falsity of the claim, and fails to disclose the false claim to the City within a reasonable time after discovery of the false claim.

14.4. Disallowance and Certification to Non-Disbarment.

a. If Thales claims or receives payment from City for a service, reimbursement for which is later disallowed by the State of California or United States Government, Thales shall promptly refund the disallowed amount to City upon City's request. At its option, City may offset the amount disallowed from any payment due or to become due to Thales under this Implementation Contract, but City shall provide Thales with no less than 30 Days' notice prior to effecting such offset.

b. By executing this Implementation Contract, Thales certifies that it is not suspended, debarred or otherwise excluded from participation in federal assistance programs. Thales acknowledges that this certification of eligibility to receive federal funds is a material term of this Implementation Contract.

14.5. Taxes.

a. Prior to Assignment, payment of any taxes, customs duties, fees, levies or charges of any kind, including possessory interest taxes and California sales and use taxes (hereinafter collectively referred to as "Taxes") levied upon or as a result of this Implementation Contract, or the services, Software or Proprietary Equipment delivered pursuant hereto, shall be the obligation of Thales. Following Assignment, payment of any taxes, customs duties, fees, levies or charges of any kind, including possessory interest taxes and California sales and use taxes (hereinafter collectively referred to as "Taxes") levied upon or as a result of this Implementation Contract, or the services, Software or Proprietary Equipment delivered pursuant hereto, shall be the obligation of the Construction Contractor. Thales shall provide such information as may be reasonably requested by the City to enable the City to comply with any tax reporting requirements imposed by applicable law.

b. Thales recognizes and understands that this Implementation Contract may create a "possessory interest" for property tax purposes. Generally, such a possessory interest is not created unless the Implementation Contract entitles Thales to possession, occupancy, or use of City property for private gain. If such a possessory interest is created, then the following shall apply:

(1) Thales, on behalf of itself and any permitted successors and assigns, recognizes and understands that Thales, and any permitted successors and assigns, may be subject to real property tax assessments on the possessory interest;

(2) Thales, on behalf of itself and any permitted successors and assigns, recognizes and understands that the creation, extension, renewal, or assignment of this Implementation Contract may result in a "change in ownership" for purposes of real property taxes, and therefore may result in a revaluation of any possessory interest created by this Implementation Contract. Thales accordingly agrees on behalf of itself and its permitted successors and assigns to report on behalf of the City to the County Assessor the information required by Revenue and Taxation Code section 480.5, as amended from time to time, and any successor provision.

(3) Thales, on behalf of itself and any permitted successors and assigns, recognizes and understands that other events also may cause a change of ownership of the possessory interest and result in the revaluation of the possessory interest. (see, e.g., Rev. & Tax. Code section 64, as amended from time to time). Thales accordingly agrees on behalf of itself and its permitted successors and assigns to report any change in ownership to the County Assessor, the State Board of Equalization or other public agency as required by law.

(4) Thales further agrees to provide such other information as may be requested by the City to enable the City to comply with any reporting requirements for possessory interests that are imposed by applicable law.

14.6. Payment Does Not Imply Acceptance of Work or Effect Waiver. The granting of any payment by City, or the receipt thereof by Thales, shall in no way lessen the liability of Thales to replace Work, Software, or Proprietary Equipment provided by Thales that does not meet the requirements of this Implementation Contract, although the nonconforming character of such Work, Software or Proprietary Equipment may not have been apparent or detected at the time such payment was made. Proprietary Equipment, Software, materials, components, or services that do not conform to the requirements of this Implementation Contract may be rejected by City prior to ATCS Substantial Completion or as provided in the Warranty provisions of Section 10 herein and in such case(s) Thales shall without delay replace/reperform or otherwise make such Work conform to the applicable requirements of this Implementation Contract.

14.7. Thales Personnel.

a. Services under this Implementation Contract shall be performed by competent personnel under the supervision of and in the employment of Thales, its Affiliates or its approved subcontractors. Thales will comply with City's reasonable requests regarding assignment and reassignment of its personnel, but Thales shall be solely responsible for the supervision of its personnel, including those assigned at City's request. Thales shall commit adequate resources to perform the services and provide the Proprietary Equipment and Software described in this Implementation Contract within the ATCS Schedule.

b. Thales shall assign for the term of this Agreement the following Key Personnel: **Ray Gaffoor.** Thales shall not assign to other projects or otherwise remove from performing the Work under this Implementation Contract those persons identified as Key Personnel in Thales's Proposal, without the express written permission of the Engineer such consent not to be unreasonably withheld. If a person who is identified as Key Personnel leaves Thales's employment or becomes unavailable due to circumstances beyond Thales's control, Thales shall immediately provide notice to the Construction Contractor and to the SFMTA and shall within 15 Days of said notice, propose qualified replacement personnel for the Engineer's review and approval. Persons replacing Key Personnel must have equivalent experience and expertise as the Key Personnel they replace.

c. Thales shall through the Engineer seek the SFMTA's prior approval if it wishes to reassign to another project any person identified in its Proposal as Key Personnel. The SFMTA shall not unreasonably deny such request, as long as such reassignment does not delay, cause a loss or reduction in productivity, or otherwise impair the Work.

14.8. Independent Contractor; Payment of Employment Taxes and Other Expenses.

a. Independent Contractor. Thales and/or any agent or employee of Thales shall be deemed at all times to be an independent contractor and is wholly responsible for the manner in which it performs the services and work under this Implementation Contract. Thales or any agent or employee of Thales shall not have employee status with City and shall not be entitled to participate in any plans, arrangements, or distributions by City pertaining to or in connection with any retirement, health or other benefits that City may offer its employees. Thales and/or any agent or employee of Thales is liable for the acts and omissions of itself, its employees and its agents. Thales shall be responsible for all obligations and payments, whether imposed by federal, state or local law, including, but not limited to, FICA, income tax withholdings, unemployment compensation, insurance, and other similar responsibilities related to Thales' performing services and work, or any agent or employee of Thales providing same. Nothing in this Implementation Contract shall be construed as creating an employment or agency relationship between City and Thales or any agent or employee of Thales. Any terms in this Implementation Contract referring to direction from City shall be construed as providing for direction as to policy and the result of Thales' work only, and not as to the means by which such a result is obtained. City does not retain the right to control the means or the method by which Thales performs work under this Implementation Contract. Any terms in this Implementation Contract referring to direction from City shall be construed as providing for direction as to policy and the result of Thales' services only, and not as to the means or methods by which such a result is obtained. Thales shall control the means or the

method by which Thales performs services under this Implementation Contract.

b. **Payment of Employment Taxes and Other Expenses.** Should City, in its discretion, or a relevant taxing authority such as the Internal Revenue Service or the State Employment Development Division, or both, determine that Thales or any employee of Thales is an employee for purposes of collection of any employment taxes, the amounts payable under this Implementation Contract shall be reduced by amounts equal to both the employee and employer portions of the tax due (and offsetting any credits for amounts already paid by Thales which can be applied against this liability). City shall then forward those amounts to the relevant taxing authority.

c. **Remittal**. Should a relevant taxing authority determine a liability for past services performed by any employee of Thales for City, upon notification of such fact by City, Thales shall promptly remit such amount due or arrange with City to have the amount due withheld from future payments to Thales under this Implementation Contract (offsetting any amounts already paid by Thales which can be applied as a credit against such liability).

d. **Limited Employment Status.** A determination of employment status related to tax status shall be solely for the purposes of the particular tax in question, and for all other purposes of this Implementation Contract, Thales and any of its employees shall not be considered (an) employee(s) of City. Notwithstanding the foregoing, should any court, arbitrator, or administrative authority determine that Thales is an employee for any other purpose, then Thales agrees to a reduction in City's financial liability so that City's total expenses under this Implementation Contract are not greater than they would have been had the court, arbitrator, or administrative authority determined that Thales was not an employee.

14.9. Default; Remedies; Right to Injunctive Relief.

a. **Events of Default.** Each of the following shall constitute an event of default ("Event of Default") under this Implementation Contract:

(1) Either Party, where applicable, fails or refuses to perform or observe any term, covenant or condition contained in any of the following Sections of this Implementation Contract and such failure or refusal materially affects the performance of the Implementation Contract:

a. Article 4 - Compensation

b. Article 8 - Insurance

c. Article 11 - Software and ATCS Documentation License

d. Section 12.1 - Proprietary or Confidential Information

e. Section 14.3 – Submitting False Claims; Monetary Penalties

f. Section 14.6 – Payment Does Not Imply Acceptance of Work or Effect Waiver

g. Section 14.16 - Assignment by Thales

h. Section 14.20 – MacBride Principles – Northern Ireland

i. Section 14.40 - Compliance with Laws

(2) Either Party, where applicable, fails or refuses to perform or observe any other material term, covenant or condition contained in this Implementation Contract, and such default continues for a period of thirty (30) Days after written notice thereof from the other Party.

(3) Thales fails or refuses to perform or observe any term, covenant or condition contained in any of the following Sections of this Implementation Contract:

a. Article 8 - Insurance

b. Section 12.1 - Proprietary or Confidential Information

c. Section 12.2 –Security Sensitive Information

d. Section 14.3 - Submitting False Claims; Monetary Penalties

e. Section 14.5 - Taxes

f. Section 14.22 - Compliance with Americans with Disabilities Act

g. Section 14.30 – Resource Conservation

h. Section 14.40 - Compliance with Laws

(4) Thales (a) admits in writing that it is not paying its debts as they become due, (b) files, or consents by answer or otherwise to the filing against it of a petition for relief or reorganization or arrangement or any other petition in bankruptcy or for liquidation or to take advantage of any bankruptcy, insolvency or other debtors' relief law of any jurisdiction, (c) makes an assignment for the benefit of its creditors, (d) consents to the appointment of a custodian, receiver, trustee or other officer with similar powers of Thales or of any substantial part of Thales' property or (e) takes action for the purpose of any of the foregoing.

(5) A court or government authority enters an order (a) appointing a custodian, receiver, trustee or other officer with similar powers with respect to Thales or with respect to any substantial part of Thales' property, (b) constituting an order for relief or approving a petition for relief or reorganization or arrangement or any other petition in bankruptcy or for liquidation or to take advantage of any bankruptcy,

insolvency or other debtors' relief law of any jurisdiction or (c) ordering the dissolution, winding-up or liquidation of Thales.

b. Remedies.

(1) All remedies provided for in this Implementation Contract may be exercised individually or in combination with any other remedy available hereunder or under applicable laws, rules and regulations. The exercise of any remedy shall not preclude or in any way be deemed to waive any other remedy. Nothing in this Implementation Contract shall be construed to restrict or prevent a Party from applying or obtaining injunctive relief before any competent court under any competent jurisdiction, in case of effective or threatened breach or infringement in respect of Confidential Information or intellectual property rights.

(2) On and after any Event of Default, City shall have the right to exercise its legal and equitable remedies, including, without limitation, the right to terminate this Implementation Contract or to seek specific performance of all or any part of this Implementation Contract. In addition, City shall have the right (but no obligation) to cure (or cause to be cured) on behalf of Thales any Event of Default; Thales shall pay to City on demand all costs and expenses incurred by City in effecting such cure, with interest thereon from the date of incurrence at the maximum rate then permitted by law.

14.10. Termination for Cause. A Party may terminate this Implementation Contract for cause with written notification to the other Party upon occurrence of the following events:

a. If the other Party shall commit any material breach of its obligations under this Implementation Contract and fails to take action to remedy such breach within thirty (30) Days from the date of receipt of the notifying Party's written notice to the Party in default, such notice specifying the nature of the breach.

b. In case of any action or proceeding against the other Party relating to insolvency, bankruptcy, receivership or relief towards creditors, dissolution or winding-up, which are not discharged or in which assets are otherwise not available for completion of the Work within sixty (60) Days therefrom.

14.11. Termination for Convenience.

a. The City may terminate this Implementation Contract, in whole or in part, at any time during the Term hereof, for convenience and without cause by giving Thales written notice of termination, which shall specify the date on which termination shall become effective. Upon any termination for convenience, Thales shall commence and perform, with diligence, all actions necessary on the part of Thales to effect the termination of the Implementation Contract on the date

of termination specified in said notice and to minimize the liability of Thales and City to third parties as a result of termination. Such actions shall include, without limitation:

(1) Halting the performance of all services and other work under this Implementation Contract on the date(s) and in the manner specified by City.

(2) Not placing any further orders or subcontracts for materials, services, Proprietary Equipment or Software other items.

(3) Terminating all existing orders and subcontracts.

(4) Completing performance of any services or work that City designates to be completed prior to the date of termination specified by City.

(5) Taking such action as may be necessary, or as the City may direct, for the protection and preservation of any property related to this Implementation Contract which is in the possession of Thales and in which City has or may acquire an interest.

b. Within thirty (30) days after the specified termination date, Thales shall submit to the SFMTA an invoice, which shall set forth each of the following as a separate line item and the SFMTA shall pay to Thales within thirty (30) days of the date of such invoice or delivery of the materials listed below, as applicable, whichever is later:

(1) The unpaid balance of the price of Proprietary Equipment and Software delivered and services performed up to the date of giving notice of termination that conform to requirements and specifications of this Implementation Contract; and

(2) The unpaid balance of the Proprietary Equipment and Software in manufacture on the date of giving notice of termination or, if less, the costs of modifying the same for reuse or resale; and at City's option, be delivered to City; and

(3) The unpaid portion of the price of Proprietary Equipment and Software manufactured or purchased from third parties prior to the date of the notice of termination, but not yet delivered on the date of giving notice of termination (which Proprietary Equipment and Software shall, at City's option, be delivered to the City);

(4) Costs and expenses resulting from any legally unavoidable commitments due or to become due in respect of sub-contracts and orders entered into and obligations incurred prior to the date of notice of termination, including demobilization costs and similar expenses, and if termination

for convenience is at the City's election, an amount of ten per cent (10%) on such costs and expenses; and

(5) Thales's demobilization costs associated with such termination by the City.

c. City's payment obligations under this Section shall survive termination of this Implementation Contract.

d. In no event shall City be liable for costs incurred by Thales or any of its subcontractors after the termination date specified by City, except for those costs specifically enumerated and described in the immediately preceding Paragraph (b).

14.12. Conflict of Interest. Through its execution of this Implementation Contract, Thales acknowledges that it is familiar with the provision of Section 15.103 of the City's Charter, Article III, Chapter 2 of City's Campaign and Governmental Conduct Code, and Section 87100 et seq. and Section 1090 et seq. of the Government Code of the State of California, and certifies that it does not know of any facts which constitutes a violation of said provisions and agrees that it will immediately notify the City if it becomes aware of any such fact during the Term of this Implementation Contract.

14.13. Notices to the Parties. Notices. All notices, consents, directions, approvals, instructions, requests and other communications to Thales and/or to the SFMTA regarding the interpretation application, suspension, termination breach or other provision of Implementation Contract shall be in writing, shall be addressed to the respective persons and addresses set forth below. All notices shall be (a) deposited in the U.S. mail, first class, certified with return receipt requested and with appropriate postage, (b) hand delivered or sent via facsimile or email PDF (to the facsimile number and/or email address provided below). All communications sent in accordance with this Section shall become effective on the date of actual receipt or as provided in the California Civil Code, whichever is provides the shorter notice period. From time to time SFMTA, or, Thales may designate a new address for purposes of this Section by notice to the other Party. Unless otherwise indicated elsewhere in this Implementation Contract, all formal written notices sent by a Party shall be signed by an authorized representative of the sending Party, or by facsimile immediately confirmed in writing. All notices under this Section of the Implementation Contract shall be considered as validly served if mailed in the form of pre-paid registered letter, return receipt requested, and shall be addressed as follows:

To City: Municipal Transportation Agency
1 South Van Ness Avenue, 3rd floor
San Francisco, CA 94102
Fax No. 415-701-4300
Attention: Nadeem Tahir,
Program Director
Central Subway Project
E-mail: albert. hoe@SFMTA.com

with a copy to: Municipal Transportation Agency
1 South Van Ness Avenue, 3rd floor
San Francisco, CA 94102
Fax No. 415-701-4300
Attention: Lisa Walton

To Thales: Central Subway Project Director
Thales Transport & Security, Inc.
5500 Corporate Drive, Suite 500
Pittsburgh, PA 15237

with a copy to: Thales Transport & Security, Inc.
Attn: Legal & Contracts
5500 Corporate Drive, Suite 500
Pittsburgh, PA 15237

This Section shall only apply to formal legal notices between the Parties, not to the Parties' communications made in the course of performing the Work.

Any notice of default must be sent by registered mail.

14.14. Delivery, Title and Risk of Loss in Shipping and Storage.

a. Thales shall bear all risk of loss of Proprietary Equipment, including loss during shipping to a storage facility (as provided in Section 4.8.c), transport to the Site, and other times in which Thales has control of said Proprietary Equipment. Thales shall for its full replacement value insure the Proprietary Equipment against loss or damage occurring while Thales has possession and/or control of the Proprietary Equipment.

b. Thales shall bear all risk of loss of Software, including loss during shipping, transport, integration and installation, until the work under the Construction Contract is completed and accepted by the City. Except as specifically provided in Appendix B to this Implementation Contract, payment for Software shall not be due until the Software or approved portion thereof has been installed and incorporated into the ATCS.

c. Title to the Work performed under this Implementation Contract shall vest in the SFMTA upon payment by SFMTA to the Construction Contractor or to Thales, as applicable.

d. Title to any Software, Documentation and other confidential information or data delivered to the City under this Implementation Contract shall remain vested solely in Thales or its licensors.

14.15. Subcontracting. Thales is prohibited from subcontracting this Implementation Contract or any part of it unless City first approves such subcontracting in writing, which shall not unreasonably be withheld, provided that Thales will continue to be liable for the obligations of the subcontractor under this Implementation Contract. Neither Party shall, on the basis of this Implementation Contract, contract on behalf of or in the name of the other Party. An agreement made in violation of this provision shall confer no rights on any Party and shall be null and void. Notwithstanding all of the foregoing, Thales is hereby granted authority to subcontract all or any portions of the Work under this Implementation Contract to Thales Affiliates.

14.16. Assignment by Thales. The Work to be performed by Thales under this Implementation Contract is proprietary in nature (and therefore not available from any other vendor), and except as provided in this Implementation Contract, neither this Implementation Contract nor any duties or obligations hereunder may be assigned or delegated by Thales unless first approved by City by written instrument lawfully executed and approved. Notwithstanding the foregoing, Thales may assign any or all of its rights and obligations under this Implementation Contract to a Thales Affiliate with the prior consent of the SFMTA, such consent not to be unreasonably withheld.

14.17. Non-Waiver of Rights. The omission by either Party at any time to enforce any default or right reserved to it, or to require performance of any of the terms, covenants, or provisions hereof by the other Party at the time designated, shall not be a waiver of any such default or right to which the Party is entitled, nor shall it in any way affect the right of the Party to enforce such provisions thereafter.

14.18. Nondiscrimination; Penalties.

a. Thales Shall Not Discriminate. In the performance of this Implementation Contract, Thales agrees not to discriminate against any employee, City and County employee working with such Thales or subcontractor, applicant for employment with such Thales or subcontractor, or against any person seeking accommodations, advantages, facilities, privileges, services, or membership in all business, social, or other establishments or organizations, on the basis of the fact or perception of a person's race, color, creed, religion, national origin, ancestry, age, height, weight, sex, sexual orientation, gender identity, domestic partner status, marital status, disability or Acquired Immune Deficiency Syndrome or HIV status (AIDS/HIV status), or association with members of such protected classes, or in retaliation for opposition to discrimination against such classes.

b. Subcontracts. Thales shall incorporate by reference in all subcontracts the provisions of §§12B.2(a), 12B.2(c)-(k), and 12C.3 of the San Francisco Administrative Code (copies of which are available from the SFMTA) and shall require all subcontractors to comply with such provisions. Thales' failure to comply with the obligations in this Section shall constitute a material breach of this Implementation Contract. Thales' failure to comply with the obligations of this Section shall constitute a material breach of this Implementation Contract.

c. Nondiscrimination in Benefits. Thales does not as of the date of this Implementation Contract and will not during the term of this Implementation Contract, in any of its operations in San Francisco, on real property owned by San Francisco, or where work is being performed for the City elsewhere in the United States, discriminate in the provision of bereavement leave, family medical leave, health benefits, membership or membership discounts, moving expenses, pension and retirement benefits or travel benefits, as well as any benefits other than the benefits specified above, between employees with domestic partners and employees with spouses, and/or between the domestic partners and spouses of such employees, where the domestic partnership has been registered

with a governmental entity pursuant to state or local law authorizing such registration, subject to the conditions set forth in §12B.2(b) of the San Francisco Administrative Code.

d. Condition to Agreement. As a condition to this Implementation Contract, Thales shall execute the "Chapter 12B Declaration: Nondiscrimination in Contracts and Benefits" form (form HRC-12B-101) with supporting documentation and secure the approval of the form by the San Francisco Human Rights Commission.

14.19. Incorporation of Administrative Code Provisions by Reference. The provisions of Chapters 12B and 12C of the San Francisco Administrative Code are incorporated in this Section by reference and made a part of this Implementation Contract as though fully set forth herein. Thales shall comply fully with and be bound by all of the provisions that apply to this Implementation Contract under such Chapters, including but not limited to the remedies provided in such Chapters. Without limiting the foregoing, Thales understands that pursuant to sections 12B.2(h) and 12C.3(g) of the San Francisco Administrative Code, a penalty of $50 for each person for each calendar day during which such person was discriminated against in violation of the provisions of this Implementation Contract may be assessed against Thales and/or deducted from any payments due Thales.

14.20. MacBride Principles - Northern Ireland. Pursuant to San Francisco. Administrative Code §12F.5, the City and County of San Francisco urges companies doing business in Northern Ireland to move towards resolving employment inequities, and encourages such companies to abide by the MacBride Principles. The City and County of San Francisco urges San Francisco companies to do business with corporations that abide by the MacBride Principles. By signing below, the person executing this Implementation Contract on behalf of Thales acknowledges and agrees that he or she has read and understood this Section.

14.21. Drug-Free Workplace Policy. Thales acknowledges that pursuant to the Federal Drug-Free Workplace Act of 1989, the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited on City premises. Thales agrees that any violation of this prohibition by Thales, its employees, agents or assigns will be deemed a material breach of this Implementation Contract.

14.22. Compliance with Americans with Disabilities Act. Thales acknowledges that, pursuant to the Americans with Disabilities Act (ADA), programs, services and other activities provided by a public entity to the public, whether directly or through a Thales, must be accessible to the disabled public. Thales shall provide the Services specified in this Implementation Contract in a manner that complies with the ADA and any and all other applicable federal, state and local disability rights legislation. Thales agrees not to discriminate against disabled persons in the provision of services, benefits or activities provided under this Implementation Contract, and further agrees that any violation of this prohibition on the part of Thales, its employees, agents or assigns will constitute a material breach of this Implementation Contract.

14.23. Sunshine Ordinance. In accordance with San Francisco Administrative Code §67.24(e), contracts, Thales' bids, responses to solicitations and all other records of communications between City and persons or firms seeking contracts, shall be open to inspection immediately after a contract has been awarded. Nothing in this provision requires the disclosure of a private person or organization's net worth or other proprietary financial data submitted for qualification for a contract or other benefit until

and unless that person or organization is awarded the contract or benefit. Information provided which is covered by this paragraph will be made available to the public upon request.

14.24. Limitations on Contributions. Through execution of this Implementation Contract, Thales acknowledges that it is familiar with section 1.126 of the City's Campaign and Governmental Conduct Code, which prohibits any person who contracts with the City for the rendition of personal services, for the furnishing of any Proprietary Equipment, Software or other materials or supplies, for the sale or lease of any land or building, or for a grant, loan or loan guarantee, from making any campaign contribution to (1) an individual holding a City elective office if the contract must be approved by the individual, a board on which that individual serves, or the board of a state agency on which an appointee of that individual serves, (2) a candidate for the office held by such individual, or (3) a committee controlled by such individual, at any time from the commencement of negotiations for the contract until the later of either the termination of negotiations for such contract or six months after the date the contract is approved. Thales acknowledges that the foregoing restriction applies only if the contract or a combination or series of contracts approved by the same individual or board in a fiscal year have a total anticipated or actual value of $50,000 or more. Thales further acknowledges that the prohibition on contributions applies to each prospective party to the contract; each member of Thales' board of directors; Thales' chairperson, chief executive officer, chief financial officer and chief operating officer; any person with an ownership interest of more than 20 percent in Thales; any subcontractor listed in the bid or contract; and any committee that is sponsored or controlled by Thales. Additionally, Thales acknowledges that Thales must inform each of the persons described in the preceding sentence of the prohibitions contained in Section 1.126. Thales further agrees to provide to City the names of each person, entity or committee described above.

14.25. Requiring Minimum Compensation for Covered Employees.

a. Thales agrees to comply fully with and be bound by all of the provisions of the Minimum Compensation Ordinance (MCO), as set forth in San Francisco Administrative Code Chapter 12P (Chapter 12P), including the remedies provided, and implementing guidelines and rules. The provisions of Sections 12P.5 and 12P.5.1 of Chapter 12P are incorporated herein by reference and made a part of this Implementation Contract as though fully set forth. The text of the MCO is available on the web at www.sfgov.org/olse/mco. A partial listing of some of Thales' obligations under the MCO is set forth in this Section. Thales is required to comply with all the provisions of the MCO, irrespective of the listing of obligations in this Section.

b. The MCO requires Thales to pay Thales' employees a minimum hourly gross compensation wage rate and to provide minimum compensated and uncompensated time off. The minimum wage rate may change from year to year and Thales is obligated to keep informed of the then-current requirements. Any subcontract entered into by Thales shall require the subcontractor to comply with the requirements of the MCO and shall contain contractual obligations substantially the same as those set forth in this Section. It is Thales' obligation to ensure that any subcontractors of any tier under this Implementation Contract comply with the requirements of

the MCO. If any subcontractor under this Implementation Contract fails to comply, City may pursue any of the remedies set forth in this Section against Thales.

c. Thales shall not take adverse action or otherwise discriminate against an employee or other person for the exercise or attempted exercise of rights under the MCO. Such actions, if taken within 90 days of the exercise or attempted exercise of such rights, will be rebuttably presumed to be retaliation prohibited by the MCO.

d. Thales shall maintain employee and payroll records as required by the MCO. If Thales fails to do so, it shall be presumed that Thales paid no more than the minimum wage required under State law.

e. The City is authorized to inspect Thales' job sites and conduct interviews with employees and conduct audits of Thales' payroll as authorized by applicable statutes and FTA requirements.

f. Thales' commitment to provide the Minimum Compensation is a Proprietary Equipment material element of the City's consideration for this Implementation Contract. The City in its sole discretion shall determine whether such a breach has occurred. The City and the public will suffer actual damage that will be impractical or extremely difficult to determine if Thales fails to comply with these requirements. Thales agrees that the sums set forth in Section 12P.6.1 of the MCO as liquidated damages are not a penalty, but are reasonable estimates of the loss that the City and the public will incur for Thales' noncompliance. The procedures governing the assessment of liquidated damages shall be those set forth in Section 12P.6.2 of Chapter 12P.

g. Thales understands and agrees that if it fails to comply with the requirements of the MCO, the City shall have the right to pursue any rights or remedies available under Chapter 12P (including liquidated damages), under the terms of the contract, and under applicable law. If, within 30 days after receiving written notice of a breach of this Implementation Contract for violating the MCO, Thales fails to cure such breach or, if such breach cannot reasonably be cured within such period of 30 days, Thales fails to commence efforts to cure within such period, or thereafter fails diligently to pursue such cure to completion, the City shall have the right to pursue any rights or remedies available under applicable law, including those set forth in Section 12P.6(c) of Chapter 12P. Each of these remedies shall be exercisable individually or in combination with any other rights or remedies available to the City.

h. Thales represents and warrants that it is not an entity that was set up, or is being used, for the purpose of evading the intent of the MCO.

i. If Thales is exempt from the MCO when this Implementation Contract is executed because the cumulative amount of agreements with this department for the fiscal year is less than $25,000, but Thales later enters into an agreement or agreements

that cause Thales to exceed that amount in a fiscal year, Thales shall thereafter be required to comply with the MCO under this Implementation Contract. This obligation arises on the effective date of the agreement that causes the cumulative amount of agreements between Thales and this department to exceed $25,000 in the fiscal year.

14.26. Requiring Health Benefits for Covered Employees. Thales agrees to comply fully with and be bound by all of the provisions of the Health Care Accountability Ordinance (HCAO), as set forth in San Francisco Administrative Code Chapter 12Q, including the remedies provided, and implementing regulations, as the same may be amended from time to time. The provisions of section 12Q.5.1 of Chapter 12Q are incorporated by reference and made a part of this Implementation Contract as though fully set forth herein. The text of the HCAO is available on the web at www.sfgov.org/olse. Capitalized terms used in this Section and not defined in this Implementation Contract shall have the meanings assigned to such terms in Chapter 12Q.

a. For each Covered Employee, Thales shall provide the appropriate health benefit set forth in Section 12Q.3 of the HCAO. If Thales chooses to offer the health plan option, such health plan shall meet the minimum standards set forth by the San Francisco Health Commission.

b. Notwithstanding the above, if Thales is a small business as defined in Section 12Q.3(e) of the HCAO, it shall have no obligation to comply with part (a) above.

c. Thales' failure to comply with the HCAO shall constitute a material breach of this agreement. City shall notify Thales if such a breach has occurred. If, within 30 days after receiving City's written notice of a breach of this Implementation Contract for violating the HCAO, Thales fails to cure such breach or, if such breach cannot reasonably be cured within such period of 30 days, Thales fails to commence efforts to cure within such period, or thereafter fails diligently to pursue such cure to completion, City shall have the right to pursue the remedies set forth in 12Q.5.1 and 12Q.5(f)(1-6). Each of these remedies shall be exercisable individually or in combination with any other rights or remedies available to City.

d. Any Subcontract entered into by Thales shall require the Subcontractor to comply with the requirements of the HCAO and shall contain contractual obligations substantially the same as those set forth in this Section 14.27. Thales shall notify City's Office of Implementation Contract Administration when it enters into such a Subcontract and shall certify to the Office of Implementation Contract Administration that it has notified the Subcontractor of the obligations under the HCAO and has imposed the requirements of the HCAO on Subcontractor through the Subcontract. Each Thales shall be responsible for its Subcontractors' compliance with this Chapter. If a Subcontractor fails to comply, the City may pursue the remedies set forth in this Section against Thales based on the Subcontractor's failure to comply, provided that City has first

provided Thales with notice and an opportunity to obtain a cure of the violation.

e. Thales shall not discharge, reduce in compensation, or otherwise discriminate against any employee for notifying City with regard to Thales' noncompliance or anticipated noncompliance with the requirements of the HCAO, for opposing any practice proscribed by the HCAO, for participating in proceedings related to the HCAO, or for seeking to assert or enforce any rights under the HCAO by any lawful means.

f. Thales represents and warrants that it is not an entity that was set up, or is being used, for the purpose of evading the intent of the HCAO.

g. Thales shall maintain employee and payroll records in compliance with the California Labor Code and Industrial Welfare Commission orders, including the number of hours each employee has worked on the City Implementation Contract.

h. Thales shall keep itself informed of the current requirements of the HCAO.

i. Thales shall provide reports to the City in accordance with any reporting standards promulgated by the City under the HCAO, including reports on Subcontractors and Subtenants, as applicable.

j. Thales shall provide City with access to records pertaining to compliance with HCAO after receiving a written request from City to do so and being provided at least ten business days to respond.

k. Thales shall allow City to inspect Thales' job sites and have access to Thales' employees in order to monitor and determine compliance with HCAO.

l. City may conduct random audits of Thales to ascertain its compliance with HCAO. Thales agrees to cooperate with City when it conducts such audits.

m. If Thales is exempt from the HCAO when this Implementation Contract is executed because its amount is less than $25,000 ($50,000 for nonprofits), but Thales later enters into an agreement or agreements that cause Thales' aggregate amount of all agreements with City to reach $75,000, all the agreements shall be thereafter subject to the HCAO. This obligation arises on the effective date of the agreement that causes the cumulative amount of agreements between Thales and the City to be equal to or greater than $75,000 in the fiscal year.

14.27. Prohibition on Political Activity with City Funds. In accordance with San Francisco Administrative Code Chapter 12.G, Thales may not participate in, support, or attempt to influence any political campaign for a candidate or for a ballot measure (collectively, “Political Activity”) in the performance of the Services provided under this Implementation Contract. Thales agrees to comply with San Francisco

Administrative Code Chapter 12.G and any implementing rules and regulations promulgated by the City's Controller. The terms and provisions of Chapter 12.G are incorporated herein by this reference. In the event Thales violates the provisions of this Section, the City may, in addition to any other rights or remedies available hereunder, (i) terminate this Implementation Contract, and (ii) prohibit Thales from bidding on or receiving any new City contract for a period of two (2) years. The Controller will not consider Thales' use of profit as a violation of this Section.

14.28. English Required. All data, documents, descriptions, diagrams, instructions and correspondence shall be in the English language.

14.29. Protection of Private Information. Thales agrees to comply fully with and be bound by all of the provisions of Chapter 12M of the San Francisco Administrative Code (the "Protection of Private Information Ordinance"), including the remedies provided. The provisions of the Protection of Private Information Ordinance are incorporated herein by reference and made a part of this Implementation Contract as though fully set forth. Capitalized terms used in this Section and not defined in this Implementation Contract shall have the meanings assigned to such terms in the Protection of Private Information Ordinance. Consistent with the requirements of the Protection of Private Information Ordinance, Thales agrees to all of the following:

a. Neither Thales nor any of its subcontractors shall disclose Private Information obtained from the City in the performance of this Implementation Contract to any other subcontractor, person, or other entity, unless one of the following is true:

(1) The disclosure is authorized by this Implementation Contract;

(2) Thales received advance written approval from the Contracting Department to disclose the information; or

(3) The disclosure is required by law or judicial order.

b. Any disclosure or use of Private Information authorized by this Implementation Contract shall be in accordance with any conditions or restrictions stated in this Implementation Contract. Any disclosure or use of Private Information authorized by a Contracting Department shall be in accordance with any conditions or restrictions stated in the approval.

c. Private Information means any information that: (1) could be used to identify an individual, including without limitation, name, address, social security number, medical information, financial information, date and location of birth, and names of relatives; or (2) the law forbids any person from disclosing.

d. Any failure of Thales to comply with the Nondisclosure of Private Information Ordinance shall be a material breach of this Implementation Contract. In such an event, in addition to any other remedies available to it under equity or law, the City may terminate this Implementation Contract, debar Thales, or bring a false claim action against Thales.

14.30. Resource Conservation. Chapter 5 of the San Francisco Environment Code ("Resource Conservation") is incorporated herein by reference. Failure by Thales to comply with any of the applicable requirements of Chapter 5 will be deemed a material breach of contract.

14.31. Tropical Hardwood and Virgin Redwood Ban. Pursuant to §804(b) of the San Francisco Environment Code, the City and County of San Francisco urges its vendors and contractors not to import, purchase, obtain, or use for any purpose, any tropical hardwood, tropical hardwood wood product, virgin redwood or virgin redwood wood product.

14.32. Preservative-treated Wood Containing Arsenic. Thales may not purchase preservative-treated wood products containing arsenic in the performance of this Implementation Contract unless an exemption from the requirements of Chapter 13 of the San Francisco Environment Code is obtained from the Department of the Environment under Section 1304 of the Code. The term "preservative-treated wood containing arsenic" means wood treated with a preservative that contains arsenic, elemental arsenic, or an arsenic copper combination, including, but not limited to, chromate copper arsenate preservative, ammoniacal copper zinc arsenate preservative, or ammoniacal copper arsenate preservative. Thales may purchase preservative-treated wood products on the list of environmentally preferable alternatives prepared and adopted by the Department of the Environment. This provision does not preclude Thales from purchasing preservative-treated wood containing arsenic for saltwater immersion. The term "saltwater immersion" means a pressure-treated wood that is used for construction purposes or facilities that are partially or totally immersed in saltwater.

14.33. Large Vehicle Driver Safety Training Requirements. .

a. Contractor agrees that before any of its employees and subcontractors drive large vehicles within the City and County of San Francisco, those employees and subcontractors shall successfully complete either (a) the SFMTA's Large Vehicle Urban Driving Safety training program or (b) a training program that meets the SFMTA's approved standards for large vehicle urban driving safety. The SFMTA's approved standards for large vehicle urban driving safety is available for download at www.SFMTA.com/largevehicletrainingstandards. This requirement does not apply to drivers providing delivery services who are not employees or subcontractors of the Contractor. For purposes of this section, "large vehicle" means any single vehicle or combination of vehicle and trailer with an unladen weight of 10,000 pounds or more, or a van designed to carry 10 or more people.

b. By entering into this Agreement, Contractor agrees that in the event the Contractor fails to comply with the Large Vehicle Driver Safety Training Requirements, the City will suffer actual damages that will be impractical or extremely difficult to determine; further, Contractor agrees that the sum of up to One Thousand Dollars ($1,000) per employee or subcontractor who is permitted to drive a large vehicle in violation of these requirements is not a penalty, but is a reasonable estimate of the loss that City will incur based on the Contractor's failure to comply with this requirement, established in light of the circumstances existing at the time this Contract was

awarded. City may deduct a sum representing the liquidated damages from any money due to Contractor. Such deductions shall not be considered a penalty, but rather agreed monetary damages sustained by City because of Contractor's failure to comply.

14.34. Audit and Inspection of Records. Thales agrees to maintain and make available to the City, during regular business hours, accurate books and accounting records relating to its work under this Implementation Contract. Thales will permit City to audit, examine and make excerpts and transcripts from such books and records, and to make audits of all invoices, materials, payrolls, records or personnel and other data related to all other matters covered by this Implementation Contract, whether funded in whole or in part under this Implementation Contract. Thales shall maintain such data and records in an accessible location and condition for a period of not less than five years after final payment under this Implementation Contract or until after final audit has been resolved, whichever is later. The State of California or any federal agency having an interest in the subject matter of this Implementation Contract shall have the same rights conferred upon City by this Section.

14.35. Dispute Resolution. For any dispute involving a question of fact, the aggrieved Party shall furnish the other Party with a notice of dispute within fifteen (15) Days of the determination of the dispute. The Party receiving a notice of dispute shall submit a written reply with fourteen (14) Days of delivery of the notice. The notice and response shall contain the following: (a) a statement of the Party's position and a summary of the arguments supporting that position, and (b) any evidence supporting the Party's position. Disputes arising in the performance of this Implementation Contract that are not resolved by negotiation between the Parties shall be decided by a competent court of jurisdiction in California. If agreed to by both Parties, disputes may be resolved by a mutually agreed to alternative dispute resolution process.

14.36. Modification of Agreement. This Implementation Contract may not be modified, nor may compliance with any of its terms be waived, except by as provided for herein by written instrument lawfully executed and approved. Any modification of this Implementation Contract must be signed by the City's Director of Transportation (chief executive of the SFMTA) and the President or Corporate Counsel of Thales.

14.37. Agreement Made in California; Venue. The laws of the State of California shall govern the formation, interpretation and performance of this Implementation Contract. Venue for all litigation relative to the formation, interpretation and performance of this Implementation Contract shall be in San Francisco.

14.38. Construction of Agreement.

a. All paragraph captions, headings and titles are for reference only and shall not be considered in construing this Implementation Contract.

b. This Implementation Contract has been drafted through a cooperative effort of the City and Thales, and each has had the opportunity to have the Implementation Contract reviewed and revised by legal counsel of its choosing. The Parties acknowledge and agree that neither of them shall be considered the sole drafter. The Parties further agree that any presumption or rule of interpretation or construction of contracts that a document or

ambiguities in a document shall be construed against the drafter of the document shall not apply to this Implementation Contract.

c. In the event of any inconsistency between the provisions of any Appendix or other document incorporated by reference and the provisions of this document, the provisions of this document shall prevail.

d. This Implementation Contract may be modified only as provided in Section 14.36.

14.39. Entire Agreement. This Implementation Contract, its Included Appendices, and any other documents incorporated by reference in this Implementation Contract constitute the entire agreement between the Parties as to the matters specifically set out herein. This Implementation Contract memorializes and sets out all intended rights and obligations and supersedes any and all previous agreements, correspondence, and understandings between them with respect to the subject matter hereof. This Implementation Contract and the Equipment Contract shall be read together and shall not be construed to conflict with each other. In case of irreconcilable conflict between the Equipment Contract and the Implementation Contract, the Implementation Contract (Contract 1266-2) shall take precedence and govern.

14.40. Compliance with Laws. Thales shall keep itself fully informed of the City's Charter, codes, ordinances and regulations of the City and of all state, and federal laws in any manner affecting the performance of this Implementation Contract, and must at all times comply with such local codes, ordinances, and regulations and all applicable laws as they may be amended from time to time.

14.41. Severability. Should the application of any provision of this Implementation Contract to any particular facts or circumstances be found by a court of competent jurisdiction to be invalid or unenforceable, then (a) the validity of other provisions of this Implementation Contract shall not be affected or impaired thereby, and (b) such provision shall be enforced to the maximum extent possible so as to effect the intent of the Parties and shall be reformed without further action by the Parties to the extent necessary to make such provision valid and enforceable.

14.42. Federal Agreement Requirements. Thales shall comply with all applicable federal contracting requirements, including but not limited to those set out in Appendix A to this Implementation Contract, which are incorporated by reference as if fully set out here. If there is any conflict between any federal contracting requirement and any provision of this Implementation Contract, the federal requirement shall prevail. The SFMTA has not adopted the contract requirements of the Federal Acquisition Regulations (FAR). As a department of the City and County of San Francisco, exercising its home rule authority granted by the California constitution, the SFMTA shall not be bound by any provision of the FAR.

14.43. Force Majeure.

a. Neither Party shall by reason of Force Majeure, be entitled to terminate this Implementation Contract nor shall either Party have any claim for damages against the other for any non-performance or delay under the Implementation Contract as a result of such Force Majeure. If the performance in whole or part of any obligation under this Implementation Contract is delayed by reason of any

such event of Force Majeure for a period exceeding three (3) months, the Parties shall discuss and review in good faith the desirability and conditions of terminating this Implementation Contract.

b. The prevented Party shall, as soon as it becomes aware of an event of Force Majeure, immediately inform the other Party of the nature and the beginning and the end of the Force Majeure circumstances preventing the performance of the Implementation Contract.

14.44. Surviving Rights and Duties. This Section 14.44 and the following Sections of this Implementation Contract shall survive Assignment, termination or expiration of this Implementation Contract: Article 7 (Indemnity), Article 11 (Software), Section 12.1 (Proprietary or Confidential Information), Section 12.2 (Security Sensitive Information),14.3 (Submitting False Claims; Monetary Penalties), Section 14.29 (Protection of Private Information)14.34 (Audit and Inspection of Records), Section 14.37 (Agreement Made in California, Venue).

14.45. Signatures, Execution by Counterparts. This Implementation Contract may be executed in any number of counterparts all of which taken together shall constitute one and the same instrument, and either of the Parties may execute this Implementation Contract by signing any such counterpart. Delivery may be completed by the Party concerned transmitting to the other Party a facsimile or electronic copy of the counterpart signed by such Party. Any Party delivering any executed counterpart of this Implementation Contract as provided herein shall confirm execution by delivering by first class mail or courier an original of such executed counterpart to the other Party.

15. INCLUDED APPENDICES.

The Appendices listed below are hereby incorporated by reference into the Implementation Contract as if fully set out therein:

Appendix A	Federal Contract Requirements
Appendix B	Description of Proprietary Equipment, Software and Services to be Provided by Thales
Appendix C	Pricing and Milestone Payment Schedule
Appendix D	Sample Invoice
Appendix E	SFMTA Form No.7 SUBCONSULTANT PAYMENT DECLARATION
Appendix F	Mutual Nondisclosure Agreement (in re Confidential Information)
Appendix G	Software Escrow Agreement
Appendix H	ATCS Specifications
Appendix I	ATCS Approved Schedule

IN WITNESS WHEREOF, the Parties hereto have executed this Implementation Contract on the day first mentioned above.

CITY	**CONTRACTOR**
San Francisco Municipal Transportation Agency RECOMMENDED: _____ Lisa Walton Chief Technology Officer APPROVED: _____ Jeffrey P. Tumlin Director of Transportation Approved as to Form: Dennis J. Herrera City Attorney By: _____ Robert K. Stone Deputy City Attorney	**Thales Transport & Security, Inc.** 5500 Corporate Drive, Suite 500, Pittsburgh, PA 15237 Fax No. 412-366-8817  _____ Alcino De Sousa General Manager <u>Acknowledgement of Large Vehicle Driver Safety Training Requirements</u>: By signing this Agreement, Contractor acknowledges that it has read and understands Section 14.33: Large Vehicle Driver Safety Training Requirements. City Supplier Number: 0000009815

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APPENDIX A

FEDERAL CONTRACT REQUIREMENTS

1. COMPLIANCE AND PRECEDENCE

Thales shall comply with all applicable federal contracting requirements. This Implementation Contract is subject to contract requirements imposed on contracts funded by the Federal Transit Administration ("FTA"), including but not limited to the contract requirements set out in this Appendix A of this Implementation Contract. If there is any conflict between any federal contracting requirement and any provision of this Implementation Contract, the federal requirement shall prevail. The SFMTA has not adopted the contract requirements of the Federal Acquisition Regulations (FAR). As department of the City and County of San Francisco, exercising its home rule authority under the California constitution, the SFMTA shall not be bound by any provision of the FAR.

2. DEFINITIONS

The following terms shall have the meanings stated in this Section for purposes of the requirements of this Appendix A.

A. **Agreement** means the Implementation Contract for the provision of design review, installation and integration oversight, testing, and safety certification support for the Central Subway ATCS.

B. **Approved Project Budget** means the most recent statement, approved by the FTA, of the costs of the Project, the maximum amount of Federal assistance for which the City is currently eligible, the specific tasks (including specified contingencies) covered, and the estimated cost of each task.

C. **Contractor or Thales** means the individual or entity awarded a third-party contract financed in whole or in part with Federal assistance originally derived from FTA.

D. **Cooperative Agreement** means the instrument by which FTA awards Federal assistance to a specific Recipient to support a particular Project or Program, and in which FTA takes an active role or retains substantial control.

D. **Federal Transit Administration (FTA)** is an operating administration of the U.S. DOT.

F. **FTA Directive** means any FTA circular, notice, order or guidance providing information about FTA's programs, application processing procedures, and Project management guidelines. In addition to FTA directives, certain U.S. DOT directives also apply to the Project.

G. **Grant Agreement** means the instrument by which FTA awards Federal assistance to a specific Recipient to support a particular Project, and in which FTA does not take an active role or retain substantial control, in accordance with 31 U.S.C. § 6304.

H. **Government** means the United States of America and any executive department or agency thereof.

I. **Project** means the task or set of tasks listed in the Approved Project Budget, and any modifications stated in the Conditions to the Grant Agreement or Cooperative Agreement applicable to the Project. In the case of the formula assistance program for urbanized areas, for elderly and persons with disabilities, and non-urbanized areas, 49 U.S.C. §§ 5307, 5310, and 5311, respectively, the term "Project" encompasses both "Program" and “each Project within the Program," as the context may require, to effectuate the requirements of the Grant Agreement or Cooperative Agreement.

J. **Recipient** means any entity that receives Federal assistance directly from FTA to accomplish the Project. The term "Recipient" includes each FTA "Grantee" as well as each FTA Recipient of a Cooperative Agreement. For the purpose of this Agreement, Recipient is the City.

K. **Secretary** means the U.S. DOT Secretary, including his or her duly authorized designee.

L. **Third Party Agreement** means a contract or purchase order awarded by the Recipient to a vendor or Thales, financed in whole or in part with Federal assistance awarded by FTA.

M. **Third Party Subcontract** means a subcontract at any tier entered into by Thales or third-party subcontractor, financed in whole or in part with Federal assistance originally derived from FTA.

N. **U.S. DOT** is the acronym for the U.S. Department of Transportation, including its operating administrations.

3. BUY AMERICA

A. The Parties agree that the ATCS is a "System" as that term is defined in 49 CFR § 661.3 and an "End Product" subject to Buy America "Rolling Stock" requirements and certification under 49 CFR § 661.3, Appendix A, ¶ (1). The ATCS is also a "Component" as that term is defined under Buy America regulations at 49 CFR 661.11, Appendix C. The Parties agree that the elements of the ATCS that Thales shall supply under this Agreement will not comprise an entire ATCS; Thales will only supply proprietary Subcomponents of the ATCS, as the term Subcomponent is defined in 49 CFR § 661.11(c). Thales shall comply with all provisions of Buy America requirements applicable to Subcomponents for an ATCS.

B. The parties agree that the nonproprietary subcomponents of the ATCS will be procured and installed under the Construction Contract, and the Construction Contractor will install the ATCS as a System (Component) of the Central Subway at the project site (that is, in the stations and tunnels of the project), in accordance with the definition of installation provided in 49 CFR §661.11(r).

C. Thales certifies that the ATCS as finally installed under the Construction Contract shall meet the Buy America requirements applicable to train control equipment under the Rolling Stock requirements set out in 49 CFR § 661.3, Appendix A, ¶ (1) and 49 CFR § 661.11, Appendix C. To the extent applicable, Thales agrees to comply with all Buy America requirements for a System, an End Product and a Component, as

provided in the authorities referenced in this Section 3. This Agreement and the Buy America certificate submitted by Thales as part of its Proposal shall serve as certification that Thales shall comply with the aforesaid Buy America requirements.

D. Thales shall be solely responsible for all costs related to its compliance with Buy America requirements. Failure to comply with these Buy America requirements shall constitute a material breach of this Agreement. See 49 CFR § 661.17. Thales acknowledges that contractors and vendors who intentionally or willfully fail to comply with the Buy America requirements may also be subject to debarment or suspension proceedings. 49 CFR §§ 661.18, 661.19.

4. NATIONAL ITS ARCHITECTURE POLICY.

If providing Intelligent Transportation Systems (ITS) property or services, Thales shall comply with the National ITS Architecture and standards to the extent required by 23 U.S.C. § 512, FTA Notice, "FTA National ITS Architecture Policy on Transit Projects," 66 FR 1455, et seq., January 8, 2001, and later published policies or implementing directives FTA may issue.

5. CARGO PREFERENCE REQUIREMENTS - Use of United States-Flag Vessels

Thales agrees: (a) to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying Agreement to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels; (b) to furnish within 20 Working Days following the date of loading for shipments originating within the United States or within 30 Working Days following the date of leading for shipments originating outside the United States, a legible copy of a rated, “on-board” commercial ocean bill-of-lading in English for each shipment of cargo described above to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through Thales in the case of a subcontractor’s bill-of-lading.); and (c) to include these requirements in all subcontracts issued pursuant to this Agreement when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

6. ENERGY CONSERVATION REQUIREMENTS

Thales agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in any state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

7. ACCESS TO RECORDS AND REPORTS

a. Thales agrees to provide the City and County of San Francisco, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of Thales which are directly pertinent to this Agreement for the purposes of making audits, examinations, excerpts and transcriptions. Thales also agrees, pursuant to 49 C.F.R. 633.17, to provide the FTA Administrator or his authorized representatives, including any PMO contractor, access to Thales' records and construction sites pertaining to a major capital

project, defined at 49 U.S.C. 5302(a)1, which is receiving Federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.

b. In all contracts between the City and County of San Francisco and Thales for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) entered into through other than competitive bidding, Thales shall make available records related to the to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

c. Thales agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

d. Thales agrees to maintain all books, records, accounts and reports required under this Agreement for a period of not less than three years after the date of termination or expiration of this Agreement, except in the event of litigation or settlement of claims arising from the performance of this Agreement, in which case Thales agrees to maintain same until the City and County of San Francisco, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. 49 CFR 18.36(i)(11).

8. CLEAN AIR REQUIREMENTS

a. Thales agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. Thales agrees to report each violation to the City and County of San Francisco and understands and agrees that the City and County of San Francisco will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

b. Thales also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

9. CLEAN WATER REQUIREMENTS

a. Thales agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. Thales agrees to report each violation to the City and understands and agrees that the City will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

b. Thales also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

10. RECYCLED PRODUCTS

Thales agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

11. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

a. Overtime requirements - No Thales or subcontractor contracting for any part of the Agreement Work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

b. Violation; liability for unpaid wages; liquidated damages - In the event of any violation of the clause set forth in paragraph a. of this Section Thales and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such Thales and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph a. of this section, in the sum of $10 for each Day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in paragraph a. of this section.

c. Withholding for unpaid wages and liquidated damages - The MTA shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by Thales or subcontractor under any such contract or any other Federal contract with the same prime Thales, or any other federally-assisted contract subject to the Agreement Work Hours and Safety Standards Act, which is held by the same prime Thales, such sums as may be determined to be necessary to satisfy any liabilities of such Thales or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph b. of this section.

d. Subcontracts - Thales or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs a. through d. of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Thales shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs a. through d. of this section.

12. NO GOVERNMENT OBLIGATION TO THALES OR THIRD PARTIES

a. The City and Thales acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this Agreement and shall not be subject to any obligations or liabilities to the City, Thales, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

b. Thales agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

13. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS

a. Thales acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. §§ 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of this Agreement, Thales certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to this Agreement or the FTA-assisted project for which this Agreement work is being performed. In addition to other penalties that may be applicable, Thales further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on Thales to the extent the Federal Government deems appropriate.

b. Thales also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on Thales, to the extent the Federal Government deems appropriate.

14. Thales agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

15. Not Used.

16. CIVIL RIGHTS REQUIREMENTS

a. Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 41 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, Thales agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, Thales agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

b. Equal Employment Opportunity - The following equal employment opportunity requirements apply to this Agreement:

(1) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, Thales agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Agreement Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project.

(2) During the performance of this Agreement Thales agrees as follows:

a. Thales agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Thales agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

b. Thales will, in all solicitations or advertisements for employees placed by or on behalf of Thales, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

c. Thales will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of Thales' commitments under this Section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. Thales will furnish all information and reports required by Executive Order 11246 of September 24, 1965, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

e. In the event of Thales' noncompliance with the nondiscrimination clauses of this Agreement or with any of the said rules, regulations, or orders, this Agreement may be canceled, terminated, or suspended in whole or in part and Thales may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

f. Thales will include the provisions of subsections 1 and 2 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor or vendor. Thales will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a Thales becomes involved in, or is threatened

with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, Thales may request the City and the United States to enter into such litigation to protect the interests of the City and the United States.

(3) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623 and Federal transit law at 49 U.S.C. § 5332, Thales agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, Thales agrees to comply with any implementing requirements FTA may issue.

(4) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, Thales agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, “Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act,” 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, Thales agrees to comply with any implementing requirements FTA may issue.

c. Equal Opportunity Clauses

(1) As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this Agreement resulted;

b. "Director" means Director, Office of Federal Agreement Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes persons who are:

(2) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(3) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(4) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(5) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

d. Whenever Thales, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice

which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Agreement resulted.

e. If Thales is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Thales must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Thales or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Thales or Subcontractors toward a goal in an approved Plan does not excuse any covered Thales' or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

f. Thales shall implement the specific affirmative action standards provided in paragraphs 7.a through p of these specifications. The goals set forth in the solicitation from which this Agreement resulted are expressed as percentages of the total hours of employment and training of minority and female utilization Thales should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction Contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Agreement Compliance Programs office or from Federal procurement contracting officers. Thales is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

g. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom Thales has a collective bargaining agreement, to refer either minorities or women, shall excuse Thales' obligations under these specifications, Executive Order 11246, as amended, or the regulations promulgated pursuant thereto.

h. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by Thales during the training period, and Thales must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

i. Thales shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of Thales' compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. Thales shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

(1) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which Thales' employees are assigned to work. Thales, where possible, will assign two or more women to each construction project. Thales shall specifically ensure that all foremen, superintendents, and other supervisory personnel assigned to the Work are aware of and carry out Thales' obligation to maintain such a working

environment, with specific attention to minority or female individuals working at such sites or in such facilities.

(2) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when Thales or its unions have employment opportunities available, and maintain a record of the organizations' responses.

(3) Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to Thales by the union or, if referred, not employed by Thales, this shall be documented in the file with the reason therefore, along with whatever additional actions Thales may have taken.

(4) Provide immediate written notification to the Director when the union or unions with which Thales has a collective bargaining agreement has not referred to Thales a minority person or woman sent by Thales, or when Thales has other information that the union referral process has impeded Thales' efforts to meet its obligations.

(5) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to Thales' employment needs, especially those programs funded or approved by the Department of Labor. Thales shall provide notice of these programs to the sources compiled under 7.b above.

(6) Disseminate Thales' EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting Thales in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

(7) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions, including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any the Site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(8) Disseminate Thales' EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing Thales' EEO policy with other Thales and Subcontractors with whom Thales does or anticipates doing business.

(9) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving Thales' recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, Thales shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(10) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the Site and in other areas of a Thales' work force.

(11) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

(12) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

(13) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and Thales' obligations under these specifications are being carried out.

(14) Ensure that all facilities and company activities are nonsegregated, except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

(15) Document and maintain a record of all solicitations of offers for subcontracts from minority and female Construction Contractors and suppliers, including circulation of solicitations to minority and female Thales associations and other business associations.

(16) Conduct a review, at least annually, of all supervisors' adherence to and performance under Thales' EEO policies and affirmative action obligations.

j. Thales are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (Paragraphs i(1) through i(16). The efforts of a Thales association, joint contractor -union, contractor-community, or other similar group of which Thales is a member and participant, may be asserted as fulfilling any one or more of its obligations under Paragraphs i(1) through i(16) of these Specifications provided that Thales actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in Thales' minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of Thales. The obligation to comply, however, is Thales' and failure of such a group to fulfill an obligation shall not be a defense for Thales' noncompliance.

k. A single goal for minorities and a separate single goal for women have been established. Thales, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, Thales may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though Thales has achieved its goals for women generally, Thales may be in violation of the Executive Order if a specific minority group of women is underutilized).

l. Thales shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

m. Thales shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

n. Thales shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Agreement Compliance Programs. Any Thales who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

o. Thales, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If Thales fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

p. Thales shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Thales shall not be required to maintain separate records.

q. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

17. DBE/SBE ASSURANCES.

Pursuant to 49 C.F.R. section 26.13, Thales is required to make the following assurance in its agreement with SFMTA and to include this assurance in any agreements it makes with subcontractors in the performance of this contract:

Thales or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. Thales shall carry out applicable requirements of 49 C.F.R. Part 26 in the award and administration of DOT-assisted contracts. Failure by Thales or subcontractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as SFMTA deems appropriate.

18. DRUG AND ALCOHOL TESTING

To the extent Contractor, its subcontractors or their employees perform a safety-sensitive function under the Agreement, Contractor agrees to comply with, and assure compliance of its subcontractors, and their employees, with 49 U.S.C. § 5331, and FTA regulations, "Prevention of Alcohol Misuse and Prohibited Drug Use in Transit Operations," 49 CFR Part 655.

19. SUBSTANCE ABUSE

Thales shall comply with U.S. DOT regulations, "Drug Free Workplace Requirements (Grants)" 49 C.F.R. Part 29, Subpart F, and other applicable U.S. DOT and FTA regulations and guidance pertaining to substance abuse (drugs and alcohol) that may be promulgated.

20. FALSE OR FRAUDULENT STATEMENTS AND CLAIMS

21. DEBARMENT AND SUSPENSION

See Certification Regarding Debarment, Suspension, and Other Responsibility Matters.

22. FLY AMERICA

Thales agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their Thales are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. Thales shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. Thales agrees to include the requirements of this Section in all subcontracts that may involve international air transportation.

23. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS

The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding Agreement provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA-mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. Thales shall not perform any act, fail to perform any act, or refuse to comply with any (name of grantee) requests which would cause (name of grantee) to be in violation of the FTA terms and conditions.

24. FEDERAL CHANGES

Thales shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between the City and FTA, as they may be amended or promulgated from time to time during the term of this Agreement. Thales' failure to so comply shall constitute a material breach of this Agreement.

25. FEDERAL RULES OF ACQUISITION NOT APPLICABLE

The City has not adopted the Federal Rules of Acquisition (FRA). Except as specifically stated in this Agreement: (1) this Agreement is not subject to the FRA; and, (2) for purposes of interpreting or enforcing the Agreement, the City shall not be bound by the FRA or any court decision interpreting the FRA.

26. TEXTING WHILE DRIVING; DISTRACTED DRIVING

Consistent with Executive Order 13513 “Federal Leadership on Reducing Text Messaging While Driving”, Oct. 1, 2009 (available at http://edocket.access.gpo.gov/2009/E9-24203.htm) and DOT Order 3902.10 “Text Messaging While Driving”, Dec. 30, 2009, SFMTA encourages Thales to promote policies and initiatives for employees and other personnel that adopt and promote safety policies to decrease crashes by distracted drivers, including policies to ban text messaging while driving, and to include this provision in each third party subcontract involving the Work.

27. SEAT BELT USE

In compliance with Executive Order 13043 “Increasing Seat Belt Use in the United States”, April 16, 1997 23 U.S.C. Section 402 note, the SFMTA encourages Thales to adopt and promote on-the-job seat belt use policies and programs for its employees and other personnel that operate company owned, rented, or personally operated vehicles, and to include this provision in each third-party subcontract involving the Work.

APPENDIX B

SCOPE OF WORK:

PROPRIETARY EQUIPMENT, SOFTWARE AND SERVICES TO BE PROVIDED BY THALES

Thales shall provide the Proprietary Equipment and Software listed below.

BILL OF QUANTITIES FOR ATCS SUBSYSTEM COMPONENTS

Item/Location	Current Thales Part Number (Subject to Change)	Quantity
Central Control		
Workstation (Simple)	300-3-01909	2
Workstation rack mountable rails	500-3-00652	1
Workstation Mouse	300-3-01875	3
Workstation Keyboard	300-3-01725	3
Workstations Monitors - 22" LCD (2 per Supervisor, Dispatcher w/s and 1 for all others)	300-3-01771	5
PBA - ADAPTER PRO/1000 GT 1-PT DSKTP CAT5	401-3-00334	3
PBA-GRAPHIC PCIE 124MB DUAL HEAD LP	401-3-00548	3
ADAPTER-DISPLAY PORT TO DVI-D 20CM	300-3-01871	3
DCS		
DCS Rack	500-3-0474	1*
Data CTF - Central	3CU10065EHAA	1*
Data CTF - Equipment Room	3CU10065DZAA	3*
CTF Mounting Hardware	3CU10031AHAA	4*
Feed In Devices (FID) - 2 channel	3CU10078CWAA	3*
Entry FID (EFID)	3CU10078BGAA	1*
Remote Loop Boxes	3CU10014AFAA	16*

Item/Location	Current Thales Part Number (Subject to Change)	Quantity
Optical Modem V1 29dB	3CU20217ADAA	13*
Optical Modem V2 29dB	3CU20217ABAA	13*
VCC:		
CAT 5 Patch panel	300-3-01264	3
MM Patch Panel	500-3-00477	3
SM Patch Panel	500-3-00475	3
Storage tray	500-3-00652	3
VCC Rack	3CU10360ABAA	2*
VCC I/O Rack	3CU70702ACAA	2*
VCC DT-13 LOOP/ 3 STC	3CU70703ABAA	2*
VCC CO Terminal PC	300-3-01690	3*
CL/RS232 Converter	300-3-00402	4*
RACK ASSEMBLY - INTERFACE	3CU10023EHAA	1*
RACK ASSEMBLY - VCC DCS INTERFACE	3CU70705AAAA	1*
STC and PDIU:		
3rd Gen Snooper Rack	3CU10187BJAAHA ZZA	1*
PSU Rack	3CU10028WFAA	1*
Relay Rack	3CU 10028 WFAA	1*
FEC based STC Relay Rack		1*
ACE Power Rack		1*
CTF Mounting Hardware	3CU10031AHAA	3*
STC ID Plug	300-2-00172-xxx	2*
STC Interconnect Cable	3CU30500AAAA	1*
Axle Counter Equipment		
Rail Contact 30K 8,0m cable (subst)	3JA84527AAAA	22*

Item/Location	Current Thales Part Number (Subject to Change)	Quantity
Pedestal, variable 400mm	7HA02204BAAA	22*
Electronic Unit Zp30K, 120V	7HA02212AABA	22*
Subrack ACE 3-32 without filter (2v3)	3CR01897AAAA	1*
Processor EPCM, 128 MB CF	3JA80325AABA	3*
DC/DC Converter ACE 60V	3CR31041AAAA	5*
Serial I/O for ACE 3 x	3CR01858PFAC	22*
Covering Plate (Blank Board)	3CR014390014	4*
Power Data Coupline Unit (PDCU)	3CR01892BAAB	22*
DC/DC Converter 48V-60V/100V (for DP)	--9754343224	8*
Test Unit incl. Dummy Wheel	--1998228201	1*
WAYSIDE Special Tools and Test		
FID Extender Card	5822201380	1*
SNOOPER	TBD	1*
Sniffer (w/s + software)	TBD	1*

SOFTWARE

1. Intersig (STC)
2. ACE Database
3. LCP Database
4. LCP Application
5. ACE
6. SPR (CPU-A)
7. PST (CPU-B)
8. VOBC Software
9. Schedule Regulation Subsystem (SRS)
10. Graphical User Interface and Line Overview (GUI)
11. Platform Data Distribution (PDD)
12. Track-Vehicle Simulator (TVS)
13. Snooper
14. VCC Software

15. SMC Pre-processors
16. TAS Platform
17. SMC Software

HARDWARE

1. ATCS Workstations
2. Axle Counters/EAK
3. Axle Counter Evaluators (ACE)
4. ATCS Cable Termination Frame (CTF)
5. ATCS Rack to Rack Cables in Train Control Room
6. ATCS Card Files and Extenders
7. ATCS Chassis Cabinets
8. Entry Feed-In Device (EFID)
9. Feed-In Device (FID)
10. ATCS Firmware (ROM, PROM, EPROM) for Furnished equipment
11. Local System Management Center (LSMC)
12. ATCS Operations Simulators
13. ATCS Power Supplies - Rack mounted for furnished equipment
14. ATCS Processors/Vital Processors/Relays
15. ATCS Remote Loop Box (RLB)
16. ATCS Loop Termination Box
17. ATCS Racks
18. Station Controller Subsystem
19. ATCS Communication Controller
20. System Management Center Hardware Upgrades
21. VCC Subsystem
22. VCC Snooper
23. VCC/CCOT
24. ATCS Vital Relays
25. Switch Control Electronics

APPENDIX B.1
Contract Modification No. 02

Portal Wayside Equipment Relocation and Station Controller Design Changes

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This Contract Modification No. 2 modifies the terms and conditions of Contract 1266-2, ATCS Implementation Contract (Contract) and revises the hardware and software design as follows:

1. Thales shall perform as Additional Work:

   a. Issued under PCC No. 2:

      - Revise design to relocate the following (4) axle counter heads to be clear of the street and crosswalk

        (1) CSS13

        (2) CSS12

        (3) CSN14

        (4) CSN15

      - Provide revised stationing for (2) EFID Loops based on the revised Start of ATCS territory at 168+35.

      - Provide updated stationing for starts and transitions of Inductive Loops LP-001 and LP-002.

      - Revise Specification Section 34 42 25 2.01 A. 17 as follows:

        The maximum length of a revenue service train will be two cars. 3-car and 4-car consists will utilize manual-move only. i.e., CCT or NCT train modes.

   b. Station Controller Input / Output Changes

      - Task 10.30. Switch Machine Power Logic – Provide separate power controls for each switch machine (4 total – S1A, S1B, S3A, S3B) instead of one per switch pair (2 total – S1A/B, S3A/B), and add two additional SCADA points to monitor status of AC and DC Surge Protection Devices (SPDs) from an external source.

      - Task 20.10. CTF changes from wall mount to floor mount with AAR and knife disconnect terminal block, including the associated material costs of modifying the CTF racks.

      - Task 30. DCS Rack investigation for a narrower rack

      - Task 40. Cable specifications – provide technical specifications external wayside power cables

2. This modification compensates the Contractor for PCC No. 2 and Tasks 10.30, 20.10, 30 and 40 of STC I/O. The total value of compensation is $498,555.80.

3. “Appendix C Pricing and Milestone Payment Schedule” is amended as shown in Attachment 2.

4. The following new Contract Pay Items are added to compensate for the additional work described above:

Pay Item	Description	Amount
CM02-01	PCC #2 – Wayside Equipment Relocation – Bryant Street	$135,300.00
CM02-02	STC I/O Task 10.30 – Switch Machine Power Logic	$160,418.80
CM02-03	STC I/O Task 20.10 – CTF changes from wall mount to floor mount with AAR and knife disconnect terminal block	$180,790.00
CM02-04	STC I/O Task 30 – DCS Rack investigation for a narrower rack	$10,478.00
CM02-05	STC I/O Task 40 – Cable specifications	$11,569.00

Total Net Amount of this Contract Modification Increase	$498,555.80
Previous Total of Amended Contract Amount	$14,400,001.00*
New Revised Total of Amended Contract	$14,898,556.80

* Total Amended Contract Amount includes $90,787.00 executed under CMOD73 of CN1300 for the following work:

a. At Lenox OCC, provide one (1) central emergency stop pushbutton at the control console, 2 vital relay switches in the existing ATCS equipment rack, and wiring from the control console to existing localized ATCS system equipment;
b. At TMC, provide two (2) central emergency stop pushbuttons (1 for controller and 1 for supervisor) and wiring from the control console to existing localized ATCS system equipment;
c. Program the additional central emergency stop pushbuttons for independent functionality.

5. This Contract Modification is made in accordance with Paragraph 14.36 of the Contract.

6. Except as specifically stated herein, all other terms and conditions of the Contract remain unchanged. Any modification of the Contract must be express and in conformance with Paragraph 14.36 of Contract No. 1266-2.

APPENDIX C

PRICING AND MILESTONE PAYMENT SCHEDULE

1. "Appendix C Pricing and Milestone Payment Schedule" is amended as follows:

Milestone No.	Description	Components	CN1266-2 Contract Total under CN 1300	Payments to Thales under CN 1300	CN 1266-2 Contract Amount	Payment to Thales To-Date	Remaining Contract Value
1	Mobilization	NTP	$495,774.32	$495,774.32	$0.00	$495,774.32	$0.00
		Item 1 Total	**$495,774.32**	**$495,774.32**	**$0.00**	**$495,774.32**	**$0.00**
2	Initial Submittals	Preliminary Project Schedule Review with Tutor	$778,482.06	$778,482.06	$0.00	$778,482.06	$0.00
		Item 2 Total	**$778,482.06**	**$778,482.06**	**$0.00**	**$778,482.06**	**$0.00**
3	Preliminary Design	System Assurance Plan Documentation on	$2,075,952.15	$2,075,952.15	$0.00	$2,075,952.15	$0.00
		Item 3 Total	**$2,075,952.15**	**$2,075,952.15**	**$0.00**	**$2,075,952.15**	**$0.00**
4	Intermediate Design	AZLM Test Results	$896,983.22	$762,434.74	$134,547.48	$896,983.22	$0.00
		Interface Control Document	$643,942.97	$547,351.52	$96,590.45	$643,942.97	$0.00
		Safety Related Design Assumptions	$129,747.01	$88,226.97	$41,519.04	$129,747.01	$0.00
		Description Of Safety Assurance Concepts and Program	$247,411.00	$210,299.35	$37,111.65	$247,411.00	$0.00
		Description of Overall ATCS System	$129,747.01	$88,227.97	$41,519.04	$129,747.01	$0.00
		Standards use to design Vital ATCS Software	$129,747.01	$110,284.96	$19,464.05	$129,747.01	$0.00
		Preliminary Hazard Analysis	$518,988.04	$441,139.83	$77,848.21	$518,988.04	$0.00
		Intermediate Design Review Package	$417,361.97	$283,806.14	$133,555.83	$417,361.97	$0.00
		Item 4 Total	**$3,113,928.23**	**$2,531,770.48**	**$582,154.75**	**$3,113,928.23**	**$0.00**
5	Final Design	Recommended Spare Parts List	$129,747.01	$88,228.00	$41,519.01	$129,747.01	$0.00
		Testing and Startup Program Plan	$247,411.00	$168,239.00	$79,172.00	$247,411.00	$0.00

Milestone No.	Description	Components	CN1266-2 Contract Total under CN 1300	Payments to Thales under CN 1300	CN 1266-2 Contract Amount	Payment to Thales To-Date	Remaining Contract Value
		Standards used to design Class 1 Hardware	$129,747.01	$110,283.00	$19,464.01	$129,747.01	$0.00
		Fault Tree Analysis	$518,988.04		$518,988.04	$518,988.04	$0.00
		ATCS Reliability Analysis	$247,761.81	$168,478.00	$79,283.81	$247,761.81	$0.00
		Maintainability Analysis	$247,761.81	$168,478.00	$79,283.81	$247,761.81	$0.00
		Schematic Drawing of ATCS Room Equipment	$518,988.04	$0.00	$518,988.04	$518,988.04	$0.00
		Room Layout Drawings	$403,795.76	$0.00	$403,795.76	$403,795.76	$0.00
		Final Design Review Package	$150,739.71	$0.00	$150,739.71	$150,739.71	$0.00
		Item 5 Total	**$2,594,940.19**	**$703,708.04**	**$1,891,232.19**	**$2,594,940.19**	**$0.00**
6	Factory Acceptance Tests Complete	Release BOM for Procurements	$389,173.39	$0.00	$389,173.39	$389,173.39	$0.00
		Test Lab Available	$235,629.52	$0.00	$235,629.52	$235,629.52	$0.00
		Complete Flow Diagrams, Functional Block Diagrams	$494,274.32	$0.00	$494,274.32	$494,274.32	$0.00
		FMECA of Class 1 Hardware	$494,274.32	$0.00	$494,274.32	$494,274.32	$0.00
		FAT Test Results	$752,919.12	$0.00	$752,919.12	$752,919.12	$0.00
		Item 6 Total	**$2,366,270.67**	**$0.00**	**$2,366,270.67**	**$2,366,270.67**	**$0.00**
7	Hardware Procurement	Rack Layout Drawings	$235,629.52	$0.00	$235,629.52	$235,629.52	$0.00
		Equipment Arrangement Drawings	$394,271.74	$0.00	$394,271.74	$394,271.74	$0.00
		Power Distribution Drawings and Power Calculations	$394,274.32	$268,106.00	$126,168.32	$394,274.32	$0.00
		Wire Routing Diagrams	$389,173.39	$0.00	$389,173.39	$389,173.39	$0.00
		Equipment Plans and Installation Drawings	$494,274.32	$0.00	$494,274.32	$494,274.32	$0.00
		Circuit Plans for all I/O functions	$235,629.52	$0.00	$235,629.52	$235,629.52	$0.00
		Schematics of new Hardware Components	$298,271.23	$0.00	$298,271.23	$298,271.23	$0.00
		Shop Drawings for all Equipment	$235,629.52	$0.00	$235,629.52	$235,629.52	$0.00
		Foundation, Grounding Arrangements	$235,629.52	$200,285.00	$35,344.52	$235,629.52	$0.00
		Item 7 Total	**$2,912,783.08**	**$468,391.00**	**$2,444,392.08**	**$2,912,783.08**	**$0.00**
8	Deliver Hardware						

Milestone No.	Description	Components	CN1266-2 Contract Total under CN 1300	Payments to Thales under CN 1300	CN 1266-2 Contract Amount	Payment to Thales To-Date	Remaining Contract Value
	(Paid under 1266-1)	**Item 8 Total**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
9	Installation, Software Testing	Installation Procedures	$448,444.11	$0.00	$448,444.11	$381,178.00	$67,266.11
		Preventative Maintenance Plan	$212,066.57	$0.00	$212,066.57	$180,256.59	$31,809.98
		Guideway Correspondence Testing	$270,072.62	$0.00	$270,072.62	$0.00	$270,072.62
		PICO Test Results	$448,444.11	$0.00	$448,444.11	$0.00	$448,444.11
		Operating and Maintenance Manuals	$212,066.57	$0.00	$212,066.57	$0.00	$212,066.57
		ATCS Reliability Demonstration Test Plan	$132,066.57	$0.00	$132,066.57	$112,256.59	$19,809.98
		ATCS Maintainability Demonstration Test Plan	$157,195.20	$0.00	$157,195.20	$133,615.92	$23,579.28
		Book of Plans for each Train Control Room	$350,256.05	$0.00	$350,256.05	$297,718.00	$52,538.05
		Book of Plans for each Central Control Equipment Room	$350,256.05	$0.00	$350,256.05	$297,718.00	$52,538.05
		Item 9 Total	**$2,580,867.85**	**$0.00**	**$2,580,867.85**	**$1,402,743.10**	**$1,178,124.75**
10	Start up and Testing	As-built Drawings for train control rooms	$681,203.55	$0.00	$681,203.55	$0.00	$681,203.55
		As-built	$681,203.55	$0.00	$681,203.55	$0.00	$681,203.55
		Drawings for central control equipment room SAT test reports	$857,651.96	$0.00	$857,651.96	$0.00	$857,651.96
		Item 10 Total	**$2,220,059.06**		**$2,220,059.06**	**$0.00**	**$2,220,059.06**
11	Substantial Completion	System Integration Tests Completed	$494,274.32	$0.00	$494,274.32	$0.00	$494,274.32
		System Integration Tests Reports-Draft	$494,274.32	$0.00	$494,274.32	$0.00	$494,274.32
		SFMTA training completed	$247,137.16	$0.00	$247,137.16	$0.00	$247,137.16
		Item11 Total	**$1,235,685.80**	**$0.00**	**$1,235,685.80**	**$0.00**	**$1,235,685.80**
12	Final Acceptance	Final system integration test reports	$494,274.32	$0.00	$494,274.32	$0.00	$494,274.32
		Successful completion of reliability demonstration test plan	$494,274.32	$0.00	$494,274.32	$0.00	$494,274.32
		Item 12 Total	**$988,548.64**	**$0.00**	**$988,548.64**	**$0.00**	**$988,548.64**

Milestone No.	Description	Components	CN1266-2 Contract Total under CN 1300	Payments to Thales under CN 1300	CN 1266-2 Contract Amount	Payment to Thales To-Date	Remaining Contract Value
	TOTAL BASE CONTRACT:		**$21,363,292.05**	**$7,054,078.05**	**$14,309,214.00**	**$15,740,873.80**	**$5,622,418.25**
CM 073	CN 1300 MODIFICATION NO. 073 - Emergency Pushbutton Revision	CN 1300 Mod 73			$90,787.00	$90,787.00	$0.00
		CMOD 073 Total			**$90,787.00**	**$90,787.00**	**$0.00**
CM 2	CN 1266 PCC 2	Wayside Equipment Relocation - Bryant St			$135,300.00	$0.00	$135,300.00
	CN 1266-2 STC I/O	Task 10.30 Switch Machine Power Logic			$160,418.80	$0.00	$160,418.80
	CN 1266-2 STC I/O	Task 20.10 CTF Revisions & Materials			$180,790.00	$0.00	$180,790.00
	CN 1266-2 STC I/O	Task 30 DCS Rack Revisions			$10,478.00	$0.00	$10,478.00
	CN 1266-2 STC I/O	Task 40 Cable Specifications			$11,569.00	$0.00	$11,569.00
		CMOD 2 Total			**$498,555.80**	**$0.00**	**$498,555.80**
	TOTAL CONTRACT MODIFICATIONS:				**$589,342.80**	**$90,787.00**	**$498,555.80**
	CN 1266-2 GRAND TOTAL:		**$21,363,292.05**	**$7,054,078.05**	**$14,898,556.80**	**$15,831,660.80**	**$6,120,974.05**

**Note: Retention is not reflected in the Pricing and Milestone Payment Schedule and is withheld per Section 14.2.b of the contract.*

APPENDIX D

SAMPLE INVOICE

THALES

Invoice 90885344

Thales Transport & Security, Inc.
5700 Corporate Drive, Suite 750
PITTSBURGH PA 15237
USA

Telephone: 1-416-742-3900
Fax Number: 1-416-742-9977

Invoice Date: 20 AUG 2012
Payment Due Date: 19 SEP 2012
Page: 1 of 1

Bill To 1000013995	Ship To 1000013995
CITY AND COUNTY OF SAN FRANCISCO MUNICIPAL RAILWAY 1 SOUTH VAN NESS 3RD FLOOR SAN FRANCISCO CA 94103-1267 USA Attention: Accounts Payable	CITY AND COUNTY OF SAN FRANCISCO MUNICIPAL RAILWAY 1 SOUTH VAN NESS 3RD FLOOR SAN FRANCISCO CA 94103-1267 USA Attention: Receiving

Payment Terms: Due 30 days from invoice date
Print Date: 20 AUG 2012
Purchase Order: DPPT10000024A
Sales Order: 366203
Order Date: 19 JUL 2011

Sold To: 1000013995
IncoTerms: FOB
Complete Delivery: YES

LN	Item Number	Rev	Shipped	Backorder	UM	List Price	Discount	Net Price	Ext. Price
1	SERVICE-ENGINEERING		N/A	N/A	EA			436,436.00	436,436.00

Remarks: Service Engineering
Maintenance Agreement Extension
(July 1, 2012 - June 30, 2013)

Currency: USD
Tax Date: 20 AUG 2012

Line Total *436,436.00*

Total *436,436.00*

Wire Transfer: Bank: JP Morgan Chase Bank New York, NY
ABA#021000021 ACCT# 400-336995 SWIFT# CHASUS33 ACCT NAME: Thales Finance Corporation
Check remit to: Thales Transport & Security, Inc.
5700 Corporate Drive, Suite 750, Pittsburgh, PA 15237

The Terms and Conditions of the Contract between the parties shall apply unless otherwise mutually agreed and appended hereto.

APPENDIX E

SFMTA FORM No. 7
SUBCONSULTANT PAYMENT DECLARATION

(To be completed and submitted by Consultant, including all joint venture partners, if any, and submitted to the Contract Compliance Office within 5 working days following actual payment to subconsultant. Payments to subconsultant shall be made no later than 3 working days following receipt of progress payment from the City).

TRANSMITTAL TO: Contract Compliance Office

COPY TO: Project Manager

From: Prime Consultant: _____ Date Transmitted: _____

Provide the following information for each progress payment received from SFMTA. Use additional sheets to include complete payment information for all subconsultants and vendors utilized on this Contract including each joint venture partner. Failure to submit all required information may lead to partial withholding of progress payment.

Contract No.: _____ Contract Title: _____

Contract Awarding Department: _____

Progress Payment No.: _____Period Ending: _____

Amount Received: $_____ Date: _____ Warrant/Check No.: _____

Prime JV/Subconsultant/ Vendor Name	Business Address	Amount Paid	Payment Date	Check Number

I/We declare under penalty of perjury under the laws of the State of California that the above information is complete, and that the tabulated amounts paid to date are accurate and correct.

Prime Consultant, including each joint venture partner, must sign this form.

Prime Consultant, including each joint venture partner, must sign this form.

_____ _____

Owner/Authorized Representative (Signature) Owner/Authorized Representative (Signature)

_____ _____

Name (Please print/type) Name (Please print/type)

_____ _____

Title (Please print/type) Date Title (Please print/type) Date

_____ _____

Firm Name Firm Name

_____ _____

Telephone Fax Telephone Fax

APPENDIX F

MUTUAL NON-DISCLOSURE AGREEMENT

A. This Mutual Non-Disclosure Agreement ("**NDA**") is made and entered into as of the date last signed below ("**NDA Effective Date**") by and between the San Francisco Municipal Transportation Agency, a municipal corporation organized and existing under the laws of the State of California having its principal place of business at 1 South Van Ness Avenue, San Francisco, California 94102 ("**SFMTA**") and **Thales Transport & Security, Inc.**, a Delaware corporation, having offices at 5700 Corporate Drive, Suite 750, Pittsburgh, PA 15237. ("**Thales**").

B. Disclosures between the parties of Confidential Information (defined below) in furtherance of their discussions and activities relating to Thales review of existing Advanced Train Control Systems ("ATCS") designs for the Central Subway Project ("**Purpose**") will be governed by the terms and conditions as set forth in this NDA. The parties intend and anticipate that they will negotiate and execute a separate agreement for professional services for the completion of the design and oversight of the installation, testing and certification of the ATCS for the Central Subway. Confidential Information provided under this NDA may be used to accomplish the work under such agreement and to maintain and operate the completed ATCS, which activities are included under the Purpose of this NDA, but such Confidential Information may not be used for any other purpose:

1 CONFIDENTIAL INFORMATION

1.1 Confidential Information Defined - Each party possesses certain non-public proprietary information, which has economic value and is protected with reasonable safeguards to maintain its secrecy ("Confidential Information"). Examples of Confidential Information include, but are not limited to, trade secrets, technical data, know-how, software and software documentation, ATCS documentation, architectural and engineering documents including but not limited to lans, calculations, and drawings, development plans, business plans and processes, customer lists and financial data belonging to a party or the party's "Affiliate." (For the purposes of this NDA, an Affiliate is an entity other than a subcontractor or consultant that is engaged by a Party to perform Work under this Agreement and is under the control of that Party by contract or corporate subsidiary relation.)

1.2 Confidential Information Must Be Identified - To be subject to the terms and conditions set forth in this NDA, Confidential Information must be disclosed either (i) in writing and conspicuously marked with a restrictive legend identifying it as being a party's Confidential Information or (ii) orally or visually and identified at the time of disclosure as Confidential Information, confirmed in writing by the disclosing party within a reasonable time after such

disclosure, specifically identifying that portion of information that is Confidential Information. If the disclosing party fails to place a restrictive legend on Confidential Information disclosed in written form, it may reissue the Confidential Information with an appropriate legend and provide the receiving party with written notice of the oversight, the date in which it occurred and the names of the receiving party's representatives to whom the disclosure was made. Effective upon receipt of such notice, the information shall be considered Confidential Information. Notwithstanding the foregoing, information that is disclosed without a restrictive legend or without an identifying statement at the time of disclosure will nonetheless constitute Confidential Information if by virtue of the nature of the information itself, or the circumstances under which it is disclosed, a reasonable person familiar with the Purpose would understand that such information is Confidential Information.

1.3 Information Excluded From Confidential Information - Whether or not identified as "Confidential Information," no information shall be Confidential Information if the receiving party can establish that the information was: (i) generally available to the public without breach of this NDA by the receiving party; (ii) available to the receiving party on a non-confidential basis from a source that had the right to disclose such information; (iii) in the possession of the receiving party prior to receipt by the disclosing party; or (iv) independently developed without reference to any of the disclosing party's Confidential Information; (v) received by the recipient without any duty of confidentiality; or (vi) was approved in writing by the disclosing party for release by the receiving party.

2 OBLIGATIONS TO SAFEGUARD CONFIDENTIAL INFORMATION

2.1 Non-Disclosure Requirements - The receiving party shall only use the disclosing party's Confidential Information in conjunction with its activities relating to the Purpose. The receiving party shall not disclose the disclosing party's Confidential Information to any other company, corporation, legal entity or person without the disclosing party's prior written consent; provided, however, notwithstanding the foregoing, the disclosing party's Confidential Information may be disclosed without the disclosing party's prior written consent to the directors, officers or

employees of the receiving party and its Affiliates, Consultants, and Contractors (as defined herein) who have a need to know in connection with the Purpose and who are bound to protect the Confidential Information from unauthorized use and disclosure under the terms of a written agreement substantially similar in terms and conditions as this NDA. An Affiliate is a legal entity that is directly or indirectly controlled by, or controls the receiving party or is under common control with the receiving party. For purposes of this NDA, a Consultant is an independent third-party entity or person engaged to provide professional services to the Central Subway Project. For purposes of this NDA, a Contractor is an independent third-party entity engaged to provide construction services to the Central Subway Project.

2.2 Standard of Care - The receiving party shall protect and keep in strict confidence the disclosing party's Confidential Information using the same degree of care that it uses to protect its own Confidential Information, but in no case will it exercise less than a reasonable degree of care.

2.3 Unauthorized Disclosures - The receiving party shall promptly report any suspected or confirmed unauthorized disclosures of Confidential Information to the disclosing party.

2.4 Legally Required Disclosures - The receiving party and its representatives may make disclosures of Confidential Information to the extent that such disclosures are required by law (e.g. court order or other legal or administrative directive), subject to the receiving party providing the disclosing party with (i) prompt written notice of the requirement for disclosure and (ii) reasonable cooperation, as may be requested by the disclosing party to limit the scope of the disclosure and obtain assurances of confidential treatment.

2**.5 Obligation to Destroy** – If the parties are unable to reach a final agreement for professional services for the completion of the design and implementation of the ATCS for the Central Subway Project (as described as contemplated by the Purpose in Paragraph B on the first page of this NDA), then upon the expiration or earlier termination of this NDA, or upon the receipt of a written request from the disclosing party, the receiving party will within thirty (30) days promptly destroy any and all of the disclosing party's Confidential Information, including all

copies however made or obtained, and shall direct its Affiliates, Consultants and Contractors, if any, to do the same. Notwithstanding the foregoing, the receiving party is not required to return or destroy any Confidential Information if doing so would violate any applicable law, regulation, or applicable judicial or governmental order. Moreover, to the extent that the receiving party's computer back-up or archiving procedures create copies of the Confidential Information, the receiving party may retain such copies for the period it normally archives backed-up computer records so long as such copies are not readily accessible and are not used or consulted with for any other purpose, which copies shall be subject to this NDA until destroyed or no longer deemed Confidential Information.

2.6 Export Control Compliance - Certain Confidential Information or non-confidential materials or data anticipated to be disclosed under this NDA may be subject to the export control laws and regulations of the United States of America ("Export Control Laws"). If, at the time of disclosure, the disclosing party is aware that any Confidential Information or non-confidential materials or data is subject to the Export Control Laws, then the disclosing party shall make the receiving party aware that such information is subject to the Export Control Laws and whether the disclosing party has obtained the appropriate export licenses, if required. In addition to the foregoing disclosure requirement, the parties shall work together to identify whether certain Confidential Information or non-confidential materials or data may be subject to the Export Control Laws and to comply with any associated U.S. Government prior authorization or notification requirements, including without limitation the requirement to obtain appropriate export licenses, or approval of technical assistance or manufacturing license agreements. The receiving party, shall not, without first obtaining any legally required licenses or other approvals, export, reexport, or otherwise transfer any of the disclosing party's Confidential Information or non-confidential materials or data, directly or indirectly to (i) any country or person that is subject to Export Control Laws at the time of such export or reexport; (ii) any third party who the receiving party knows or has reason to know will utilize them in the design, development or production of nuclear, chemical or biological weapons; or (iii) any third party who has been prohibited from participating in transactions subject to Export Control Laws.

2.7 Remedies – The parties to this NDA each acknowledge and agree that Confidential Information is unique and valuable and disclosure in breach of this NDA may result in irreparable injury to the disclosing party for which monetary damages alone would not be an adequate remedy. Therefore, in the event of an actual or threatened unauthorized disclosure or unauthorized use of Confidential Information, the disclosing party shall be entitled to specific performance and injunctive or other equitable relief as a remedy without objection from the receiving party and without the necessity of posting a bond or proving damages. Any such relief shall be in addition to and not in lieu of any appropriate award of monetary damages.

2.8 Statute of Limitations – Notwithstanding anything contained in this NDA to the contrary, a disclosing party may not initiate an action for damages against the receiving party for an unauthorized disclosure of Confidential Information occurring ten (10) or more years after the date of the disclosing party's original disclosure of such Confidential Information to the receiving party.

3 DISCLAIMERS

3.1 Intellectual Property Rights – Except for the limited right to use the Confidential Information for the Purpose expressly authorized in this NDA, and except as the parties may agree under the professional services agreement contemplated by the Purpose, the disclosing party's disclosure of Confidential Information is not a grant to the receiving party of any rights, whether expressed or implied, by license or otherwise to use the disclosing party's Confidential information, including any inventions or discoveries contained therein and in no event does this NDA grant the receiving party any copyright, trademark or trade secret rights in the disclosing party's Confidential Information. In addition, the receiving party shall not reverse engineer, de-compile or disassemble any Confidential Information belonging to the disclosing party.

3.2 Representations and Warranties - Except for each Party representing itself to be a legal entity in good standing, and representing its right to disclose Confidential Information and to enter into this NDA, neither Party is making any representations or warranties to the other,

whether written, oral, express, implied, statutory or otherwise, regarding the use, accuracy or sufficiency of any confidential information. In addition, each party expressly disclaims the implied warranties of merchantability and fitness for an intended purpose and non-infringement as those legal concepts are established under the Uniform Commercial Code and derivative California law.

3.3 Development of Similar Confidential Information – Subject to compliance with the confidentiality obligations set forth in this NDA, and provided any development is not based on Confidential Information disclosed under this NDA, neither party is restricted from independently developing information that is similar to the other party's Confidential Information, including the development of technologies or products that are similar to or compete with technologies or products contemplated by or embodied in the other party's Confidential Information.

4 GENERAL PROVISIONS

4.1 Termination or Expiration of NDA - Either party, on thirty (30) days written notice to the other party, may terminate this NDA. If not terminated, then this NDA shall expire on the date that is five (5) years after the Effective Date ("**Expiration Date**"). Any information disclosed after the Expiration Date or the effective date of an earlier termination is not and shall not be considered Confidential Information; provided, however, notwithstanding anything contained in this NDA to the contrary, the receiving party's obligation to comply with the requirements imposed by this NDA with respect to the use and protection of Confidential Information received prior to the Expiration Date or the effective date of an earlier termination shall continue through and including the later to occur of **(i)** the date that is five (5) years after the Expiration Date of this NDA, **(ii)** the date that is five (5) years after the effective date of an earlier termination of this NDA, or **(iii)** if the parties enter into the professional services agreement contemplated by the Purpose, the date that is five (5) years after the termination date of such agreement.

4.2 Choice of Law - This NDA shall be governed by and in accordance with the laws of the State of California, without regard to its conflict of laws provisions.

4.3 Assignment - Neither party may assign, delegate, or otherwise transfer any of its rights, duties, or obligations under this NDA, in whole or in part, without the written consent of the other party; provided, however, that either party may transfer its interests in this NDA to a parent entity or successor-in-interest to its business (whether by merger, acquisition, consolidation or sale of all or substantially all of the assets and interests of such party) and provided further that such transferee assumes all of the obligations of the transferring party hereunder. Subject to the foregoing, this NDA shall be binding upon and inure to the benefit of the parties and their respective successors and permitted assigns. Any attempted transfer in violation of this section shall be null and void.

4.4 Notices - All notices, approvals, consents and other communications required or permitted under this NDA shall be in writing and delivered by courier or reputable international delivery service with written verification of receipt, or by registered mail, return receipt requested, postage prepaid, and in each instance shall be deemed given upon receipt. All such notices, approvals, consents and other communications shall be addressed to the address set forth in the introductory paragraph of this NDA or to such other address as may be specified by either party to the other in accordance with this Section or as more specifically provided in any subsequent professional services agreement entered between the parties to effect the Purpose.

4.5 Waiver - Failure by a party to enforce any provision of this NDA will not be deemed a waiver of future enforcement of that or any other provision. Any waiver, amendment or other modification of any provision of this NDA will be effective only if in writing and signed by the parties.

4.6 Modification - Any amendment or other modification of any provision of this NDA shall be effective only if in writing and signed by the parties.

4.7 Severability - If any provision of this NDA is found to be unenforceable, then that provision will be enforced to the maximum extent permissible so as to affect the intent of the parties and the remainder of this NDA will continue in full force and effect.

4.8 Counterparts - This NDA may be executed in one or more counterparts, each of which shall be deemed an original but all of which together shall constitute one complete instrument.

4.9 Entire Agreement - This NDA constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes and replaces all prior and contemporaneous understandings, communications or agreements, written or oral, regarding such subject matter

IN WITNESS WHEREOF, the parties' duly authorized representatives have executed this NDA.

San Francisco Municipal Transportation Agency	**Thales Transport & Security, Inc.**
By: _____	By: _____
Jeffrey Tumlin Director of Transportation	Alcino De Sousa General Manager
Date:	Date: March 23, 2021
Approved as to form: Dennis J. Herrera City Attorney by: _____ Robert K. Stone Deputy City Attorney Date:	

APPENDIX G

SOFTWARE ESCROW AGREEMENT

The SFMTA waives software escrow requirements for this Contract 1266-2

APPENDIX H

A. ATCS SPECIFICATIONS

ATCS CONSTRUCTION AND FUNCTION SPECIFICATIONS

The Proprietary Equipment and Software that Thales shall provide to the Central Subway Project under this Implementation Contract shall comply with the following Specifications:

a. ATCS General Requirements (Specifications Section 34 42 23)

b. ATCS Functional Requirements (Specifications Section 34 42 25)

c. ATCS Safety (Specifications Section 34 42 27)

d. ATCS System Assurance (Specifications Section 34 42 31)

e. ATCS Room Equipment (Specifications Section 34 42 35)

f. ATCS Wayside Equipment (Specifications Section 34 42 37)

g. ATCS Central Equipment (Specifications Section 34 42 39)

h. ATCS Testing (Specifications Section 34 42 41)

B. Thales is not responsible for infrastructure construction and equipment installation work, but that the Thales work must conform to the Contract 1300 Specifications listed above.

SECTION 34 42 23

ATCS GENERAL REQUIREMENTS ADDENDUM NO. 1, 2 CMOD 2

PART 1—GENERAL

1.1 DESCRIPTION OF WORK

A. Perform the work described in these Specifications, including the design, furnishing of proprietary equipment, and testing of an Advanced Train Control System (ATCS) that provides safe and efficient control of trains within the territory defined in these Specifications.

1. The ATCS Contractor, hereafter described as Thales, shall furnish installation instructions and documentation as required herein for the Owner's Construction Contractor to install the proprietary equipment.

2. The Owner Construction Contractor shall also install non-proprietary ATCS Infrastructure equipment, hereafter described as Construction Contractor-furnished, such as raceways, cable, wayside signals, UPSs and switch machines. Thales shall confirm the requirements of this equipment and design all required interfaces to the ATCS Equipment

B. This Amendment describes Work that Thales has not yet completed, and Work that Thales has completed and the SFMTA has accepted. This document does not modify the requirements for Work that Thales has completed and the SFMTA has accepted.

1.2 MANUALS AND DOCUMENTATION

A. All required documentation shall be delivered to the Engineer upon final approval of submittals. All documentation shall be delivered in the form of bound hardcopies and electronic copies on CD. Electronic text files shall be searchable. Refer to Section 01 33 00, SUBMITTAL PROCEDURES for number of copies to be submitted. ADD. NO. 1

B. For software that the ATCS Manufacturer allows the SFMTA to modify, deliver complete documentation of software development subsystems to allow the Engineer the facility for in-house modifications to the applications logic by personnel with a signal engineer classification. ADD. NO. 1

C. **Thales** shall maintain responsibility for circuit board obsolescence. If at any time during the operational life of the ATCS **Thales** can no longer supply replacement circuit boards, **Thales** must deliver complete integrated circuit drawings of all boards to a component level and supply trouble-shooting procedures to a component level. ADD. NO. 2

D. Deliver complete copies of all maintenance manuals for the installed system, including specialty component/module documentation, complete with troubleshooting procedures and detailed parts lists. These manuals shall consist of two types, manufacturer generic and application specific. Both types shall be written so that an average, qualified technician is enabled by the reading thereof to maintain, repair, test and adjust the equipment. The application specific manuals shall include a complete description of the system operation, installation, alignment and adjustment procedures, and troubleshooting tables/logic charts to assist in locating malfunctions and locating failed components.

1.3 SUBMITTALS

A. Comply with the requirements of Section 01 33 00, SUBMITTAL PROCEDURES.

B. Submit Conceptual, Typical, Site-specific, Equipment and Installation Design Submittals for the work described herein.

C. The following plans and information shall be submitted for approval prior to fabrication and factory wiring of the system. Equipment Procurement and fabrication shall be at Thales' risk until approval has been received from the Engineer.

1. System Safety submittals described in Section 34 42 27, ATCS SAFETY
2. Systems Assurance submittals as described in Section 34 42 31, ATCS SYSTEMS ASSURANCE,
3. Configuration Management Plan,
4. Product Data for all proprietary equipment and software. Use arrows to indicate specific product part number where multiple products are listed.
5. Complete schematic drawings for all systems and subsystems,
6. Complete circuit plans for all input and output functions,
7. Complete flow diagrams, functional block diagrams and program listings for the system;
8. A description of theory of operation for each subsystem including safe braking calculations;
9. Interface control documents including all drawings clearly indicating all interfaces to the ATCS;
10. Power distribution circuit drawings and schematics and Power calculations for all power sources;

11. Rack layout drawings;

12. Equipment arrangement drawings,

13. Equipment plans and installation drawings showing all components of the system. These drawings shall include complete keyed parts lists for all components of the system, circuit board layouts, keying methods, racks, terminal boards, plug connectors, other interconnecting devices, cable boots, mounting hardware, and all other rack-mounted equipment and hardware,

14. Wire routing diagrams showing power distribution, hardware interface, serial data link, and any other wire, fiber and cable associated with the system. Wire routing within instrument racks, between instrument racks, and from instrument racks to entrance racks, power racks, and any other destinations shall be shown in detail,

15. Shop drawings for all items including special fabrications. All shop drawings shall be prepared and submitted in compliance with Section 01 33 00, SUBMITTAL PROCEDURES.

D. Submit the following according to the relevant specification:

1. The Testing and Startup Program Plan, schedule, procedures, data sheets and results shall be prepared in accordance with Section 34 42 41, ATCS TESTING, and Section 01 80 00, FACILITY TESTING, START-UP AND COMMISSIONING.

2. O&M manuals in accordance with the requirements of Section 01 79 00, TRAINING PROGRAMS AND OPERATIONS AND MAINTENANCE MANUALS.

3. A training program plan for training SFMTA personnel, as described in Section 01 79 00, TRAINING PROGRAMS AND OPERATIONS AND MAINTENANCE MANUALS.

4. Installation procedures 30 days prior to installation,

5. Recommended spare parts list in accordance with Section 01 78 44, SPARE PARTS AND MAINTENANCE MATERIALS.

6. A Book of Plans for each Train Control Room (TCR) according to Section 34 42 35, ATCS ROOM EQUIPMENT.

7. A Book of Plans for each central control equipment room according to Section 34 42 39, ATCS CENTRAL EQUIPMENT

PART 2—PRODUCTS

2.1 GENERAL

A. The ATCS shall be fully compatible with the existing Vehicle On-Board Controller (VOBC) on each Light Rail Vehicle (LRV).

B. The ATCS shall interface with other Central Subway systems to perform the required functions in a fully integrated manner.

C. The ATCS shall be integrated into the Central Subway infrastructure defined by these Specifications.

D. The ATCS shall be fully compatible with the System Management Center (SMC) at the new Transportation Management Center (TMC) facility.

E. The ATCS shall be reliable, maintainable, and provide operational flexibility and safety of train movements.

F. The ATCS shall include subsystems for vital and non-vital processing. Thales may utilize one or more processors for the combined processing of vital or non-vital tasks. Functions or equipment of any non-vital processor shall not interfere with the safe operation of the vital functions.

G. The Thales shall advise the Authority immediately of any changes or upgrades to the system software and the reasons for such upgrades. Changes to the system software which affect train safety shall be provided immediately. If, during phased testing (factory and/or field), Thales upgrades the executive software, all locations shall receive an identical upgrade and be retested.

H. Demonstrate or provide proof of compatibility between the proposed ATCS equipment and existing SFMTA VOBC equipment.

I. Demonstrate operational system functions on the ATCS Operations Simulator prior to finalizing functional design.

J. The ATCS shall include:

1. An Operations Simulator;

2. Complete system documentation and user manuals;

3. Complete diagnostic system suited for field environments;

4. Licenses to use all furnished software;

5. Engineering including, but not limited to, all application, software, hardware and support engineering

K. Provide a system that is safe as defined in Section 34 42 27, ATCS SAFETY.

L. Provide a system that is immune to levels of internal and external electrostatic and electromagnetically conducted or radiated interference including SFMTA radio

system equipment and commercial broadcast frequencies such as used for television, radio, CB etc., that may have transmitters or other equipment operating in close proximity to SFMTA's right-of-way. Levels of EMI generated shall not adversely impact nor be impacted by existing SFMTA's electrical environmental conditions. Applicable FCC requirements shall apply.

M. Within the furnished system, like functions shall be performed by identical units. In no case shall the hardware or equipment used in one portion of the system be different from that used in another portion to perform the same function under identical operation and environmental conditions. The furnished system shall be employ the same types of equipment to those installed as part of the existing SFMTA ATCS, to the degree practical and as approved by the Engineer.

N. The application of special custom assemblies shall be confined to those required to comply with the Specification. Every effort shall be made to minimize custom design and minimize the number of unique chassis or modules.

O. Each system shall be wired to accommodate a ten percent expansion of inputs and outputs. The circuit plans shall show all spares. All wiring shall conform to approved practices. ADD. NO. 1

P. Each system shall be supplied with 25 percent spare memory and ten percent input and output circuit boards. All wiring shall conform to approved practices.

ADD. NO. 1

Q. All circuit boards shall have internal as well as external data and power surge protection, as required.

R. Thales shall provide all necessary special hardware and software tools that enable SFMTA to maintain the system.

2.2 DESIGN REQUIREMENTS

A. All interfaces shall be fully defined as part of the design work and shall be the same as those employed within the existing ATCS installation to the degree practical and as approved by the Engineer. Interfaces with Central Subway infrastructure and systems shall be analyzed and integrated into the ATCS design by Thales and all issues discovered or suspected shall be brought to the attention of the Engineer.

B. The ATCS design shall be based upon solid-state microprocessor technology and shall not require any offline storage devices for operation or start up. The processor proposed shall be a widely accepted design. The operation of the system shall be programmed in solid-state memory. In addition, other requirements as specified herein, shall be part of this system.

C. All software shall have complete identification on the individual ROMs or other storage devices stating the software number, revision number, location, and all

other information required to prevent the application of software to the wrong location.

D. Each unit shall have a unique site identification code. This code and any other site specific information shall be resident on the unit. Where hardware settings are required, the hardware shall be located where the unique ID code cannot be inadvertently changed.

2.3 SOFTWARE REQUIREMENTS

A. The Executive Firmware shall continuously test for a loss of control over the state of the hardwired outputs, inputs, a loss of control over RAM, a loss of vital data communications, and a spontaneous change in the application dependent firmware.

B. All functions required for system integrity evaluation, error logging, hardwire interface, timing, data communications, application logic execution, and the application of power to the vital controller shall be fully interleaved and executed by the Executive Firmware. Failure to pass any of the system integrity tests shall cause the system to cease all data communications and remove power, in a completely fail-safe manner, from the hardwire outputs.

C. PROMs and/or EPROMs used shall be checked to ensure they have been unaltered during microprocessor execution. Check words and/or check sums shall be created for blocks of memory and/or logic equations to implement these tests.

D. It shall be designed so as to make it impossible through the implementation of application software to overwrite or otherwise modify the executive software.

PART 3—EXECUTION

3.1 INSTALLATION

A. Equipment: Design to facilitate service, maintenance, and repair or replacement of components. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

B. Thales shall support the Owner's Construction Contractor by providing necessary installation instructions and documentation, providing assistance to SFMTA in responding to Construction Contractor's Requests for Information and reviewing the Construction Contractor's Submittals as they relate to ATCS.

3.2 NOT USED

3.3 PROTECTION OF MATERIALS

A. Provide for safety**,** good condition and protection of all materials and equipment until transfer to Owner's Construction Contractor. All damaged and defective work shall be replaced prior to final inspection.

3.4 WORKMANSHIP

A. Manufactured products, materials, equipment, and components to be provided, conditioned, applied, installed, connected, and tested in accordance with the manufacturer's specifications and printed instructions.

B. The installation of all system components shall be carried out **by the** Construction Contractor under the direction of qualified personnel. Workmanship shall meet or exceed industry standards.

3.5 ANCHORING

A. The Construction Contractor shall anchor and brace all equipment, cabling, and other materials as required by all codes, regulations, and standards. and provide the required supports, hangers, braces, straps, and other items to properly support equipment based on Thales' equipment requirements.

B. **NOT USED**

C. **NOT USED**

D. Thales to provide anchoring requirements for all proprietary equipment it provides.

3.6 TESTING

A. General test requirements are described in Section 34 42 41, ATCS TESTING.

3.7 CONFIGURATION CONTROL

A. Thales shall submit a Configuration Management plan for approval.

B. Thales shall follow revision control procedures for hardware and software.

C. All changes shall be updated with any changes and each update shall include a clearly worded reason for the change.

3.8 DELIVERY, STORAGE AND HANDLING

A. General requirements are given in Section 01 60 00, PRODUCT REQUIREMENTS.

B. Thales-provided ATCS Equipment shall not be shipped until the relevant Factory Test Reports have been approved, in writing, by the Engineer.

C. Each item of the Thales-provided ATCS shall be inspected by the Construction Contractor and Engineer for shipping damage prior to installation. Any equipment damaged during shipment shall be replaced by Thales at no cost to the Owner.

END OF SECTION

SECTION 34 42 25

ATCS FUNCTIONAL REQUIREMENTS ADDENDUM NO. 1, 2,3 Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION OF WORK

A. This section describes the functional requirements of the ATCS.

B. The ATCS shall perform the functions described in these Contract Specifications.

PART 2—PRODUCTS

2.1 TRAIN CONTROL FUNCTIONS

A. The ATCS shall perform the following train control functions:

1. Except as otherwise specified, the ATCS shall include all train control functional features that are performed by the ATCS in the SFMTA Market Street subway at the time the Central Subway system is released for revenue service. ADD. NO.1

2. The ATCS shall be fully bi-directional.

3. The system shall provide a moving block method of train control that is fully automatic with train routing, spacing and speed determined by wayside and central equipment and communicated to the vehicle on-board control system by means of a two-way inductive loop antenna. **Thales** shall modify the Vehicle On-board Controllers (VOBCs) as required to accommodate the new T Line Destination. ADD. NO.2

4. Dwell Times shall be configurable and adjustable as performed by the ATCS in the SFMTA Market Street subway at the time the Central Subway system is released for revenue service.

5. Headway shall be the minimum possible given the constraints of the Central Subway and the established safe braking model. Turnback headway shall not be increased above the minimum achievable by delays greater than nominal for routing and train configuration.

6. Trains under ATCS control shall travel at the maximum safe speed possible given the civil speed limits and other restrictions described in these Specifications.

7. The ATCS shall support four modes of train operation: AUTO Mode, ATCS Cab Signaling Mode (CABS), Cut-Out Mode, and Street Mode.

   a. Automatic mode (AUTO)

      1) Normal daily system operation in the subway shall be performed with all trains in Automatic mode. Full ATO and ATP functions are provided during Automatic operations.

      2) AUTO Mode can be entered directly from the ATCS CABS Mode without Central Control Operator action at any time provided the train is stationary, with the thrust lever in the full service brake position.

      3) Mode changes from Cut-out Mode to AUTO mode shall require CCO authorization with the VCC "Train Activate" command.

      4) Mode changes into AUTO Mode shall be recognized by the VCC, and the SMC logs the event and changes the train descriptor on the SMC Line Overview Display.

      5) In AUTO Mode there shall be three door control modes that may be selected by the Train Operator: Auto, Manual close, or Manual open and close.

   b. ATCS Cab Signaling Mode (CABS)

      1) ATCS CABS Mode of operation shall provide full ATP functions while train operation is under the control of the Train Operator.

      2) Trains enter ATCS CABS Mode automatically upon movement into ATCS territory provided that the selected train mode is CABS/STREET and that the onboard ATCS equipment is operating.

      3) Mode changes from Cut-Out Mode to ATCS CABS Mode shall require CCO authorization with the VCC "Train Active" command.

      4) Mode changes into ATCS CABS Mode shall be commanded by the VCC. The SMC logs the event and changes the color of the train descriptor on the SMC Line Overview.

      5) Train functions of acceleration, coasting, deceleration and stopping shall be under the direct manual control of the Train Operator and are supervised by the ATCS. The ATCS shall only intervene if the Train Operator performs an operation which the ATCS deems to be unsafe.

      6) A departure shall be permitted when the dwell expires or a dispatch route is set by the CCO. Permission to depart shall be indicated by

the “DEPART” message on the Driver’s Display.

7) The Driver Display Unit shall show the current target speed. When a velocity restriction is encountered, provide the Train Operator with a three second warning to start braking the train to the new restrictive velocity. If Train Operator does not keep the vehicle’s velocity within the required braking profile, the ATCS shall apply Full Service Brake (FSB) to a stop.

8) In CABS Mode, the Driver’s Control Box Door Mode Switch shall not have an effect. Doors are controlled by the Train Operator, with ATCS performing safety supervision.

c. Cut-Out Mode

1) Cut-Out Mode shall provide full bypass of the ATO and ATP functions of the train. ATCS shall continue to protect trains operating in Cut-Out Mode from trains operating in AUTO or ATCS CABS Mode.

2) Cut-Out is not a normal mode of operation. Operation in Cut-Out Mode is used in exceptional circumstances, such as failure recovery conditions, and the traversal of failed loops and failed track switches.

3) Train speed shall be limited to 30mph by a Cut-Out Mode Speed Limiter (CMSL).

4) Cut-Out Mode can be selected at any point on the track by placing the ATCS mode select switch on the Driver’s Control Box in the CUT OUT position, provided that the thrust lever is in the full service brake position and the train is stationary. Mode changes by communicating trains into Cut-Out Mode shall be recognized by the VCC, and the SMC shall log the event, update the train information on the SMC Workstation and send an alarm to the CCO.

5) If Cut-Out Mode is initiated by the Train Operator with no failed onboard equipment and the VOBC can still communicate with the VCC, this is referred to as a Communicating Cut-Out (CCT) train. The CCO can initiate a Full Service Brake of any CCT train by issuing the SMC “Consist Stop Now and Wait” command or the VCC “Set Full Service Brakes” command.

6) If a train is forced to enter Cut-Out Mode due to the failure of onboard equipment and there is no communication between the VOBC and the VCC, the train is considered a Non- Communicating Cut-Out (NCT) Mode train. The train shall be handled as a non-communicating train and tracking shall be performed using the axle

counter blocks.

d. Street Mode

1) Street Mode is the operational mode used outside the ATCS Territory.

2) Street Mode shall be in effect whenever the selected train mode is CABS/STREET, and there has been no communication established between the train's VOBCs and the VCC.

3) Street Mode shall be entered into automatically from ATCS CABS Mode when the train exits the ATCS Territory.

8. Provide entry on-the-fly such that trains may enter into ATCS without stopping.

9. Provide re-entry capability at each loop boundary.

10. Provide multiple safety distances such as K and Non-K.

11. Provide a VOBC recovery function that allows an individual VOBC in a consist to be restored to ATCS service on-the-fly. ADD. NO. 2

12. Provide double stopping such that two single car trains (uncoupled) can enter each subway station in AUTO mode and become berthed with all doors within the platform if stopping distance permits. Door functions for double stopping shall be the same as Market Street Subway. ADD. NO. 1

13. Use safe braking calculations consistent with the existing ATCS to ensure sufficient train stopping distance and safe train separation.

14. Axle Counter blocks shall be provided as shown. They shall be used for route and switch protection and to protect Non-Communicating Trains (NCTs). The axle counter blocks and wayside signals shall provide a means of absolute block control in the event of subsystem failure that causes loss of availability of the supervisory functions of the ATCS.

15. Provide wayside signals as shown. See Section 34 42 37, ATCS WAYSIDE EQUIPMENT, for wayside signal requirements.

16. Provide automatic interlocking control of Chinatown interlocking. Provide automatic routing and turnback. Provide the routes shown in Table 1 and routes shown on Contract Drawings as a minimum. ADD. NO. 2

Table 1 - ATCS Routes ADD. NO.2

Route No	Description (***bold italic*** text indicates a turnback location)
0	BPL ↔ ***CTR*** ↔ BPR
1	BPL ↔ ***CTL*** ↔ BPR
2	BPL ↔ ***CTL*** ↔ BPL
3	BPR ↔ ***CTR*** ↔ BPR
4	BPR ↔ ***CTR*** ↔ BPL
5	BPR ↔ ***CTL*** ↔ BPL
6	BPL ↔ STL
7	BPL ↔ STR
8	BPR ↔ STR
9	BPR ↔ STL
10	STR ↔ BPR
11	STR ↔ BPL
12	CTR ↔ BPR
13	CTR ↔ BPL
14	STL ↔ BPR
15	STL ↔ BPL
16	CTL ↔ BPR
17	CTL ↔ BPL

ABBREVIATIONS:

BPL	Bryant Portal Track Left
BPR	Bryant Portal Track Right
CTL	Chinatown Station Track Left Platform
CTR	Chinatown Station Track Right Platform
STL	Storage Track Left
STR	Storage Track Right
UML	Union Square/Market St Station Left Platform
UMR	Union Square/Market St Station Right Platform
YBL	Yerba Buena/Moscone Station Left Platform
YBR	Yerba Buena/Moscone Station Right Platform

17. The maximum length of a revenue service train will be two cars. However, the ATCS shall be capable of safely managing four communicating cars in a coupled consist. ADD. NO. 2

18. The Station Stop Handling function shall command trains operating in automatic mode to stop at the positions indicated at station platforms within +/- 18 inches. It shall prevent trains from opening doors unless they are safely positioned at station platforms. ADD. NO. 2

19. Non-communicating Train (NCT) Tracking functionality:

    a. Provide the capability to monitor the location of NCT's in the system.

    b. Provide protection for NCT's and unequipped trains from all ATCS supervised trains.

    c. Provide the capability to track NCT trains through disturbed axle counter blocks.

    d. Detect the presence of "unknown" trains in the system via the axle counter block subsystem. ADD. NO. 2

20. ATCS shall ensure the following:

    a. Safe separation between trains

    b. Flank Protection

    c. Validated routing through interlockings

    d. Switch locking during moves through interlockings

    e. Maximum allowed velocity determination for the consist related to its current guideway position, incorporating civil speed limits, equipment speed limits and any CO commanded speed restrictions. ADD. NO. 2

2.2 OPERATIONAL FUNCTIONS

A. The ATCS shall perform the following operational functions:

1. The ATCS shall include all operational functions that are performed by the ATCS in the SFMTA Market St. subway existing at the time the Central Subway system is released for revenue service.

2. Operational functions shall include Scheduled Mode operation, Headway Mode operation and Unscheduled Mode operation.

3. The ATCS shall be fully compatible with the upgraded SMC1 and SMC2, being implemented under a separate contract. Upgrade the SMC software so that it supports all functions required for the Central Subway. The behavior and response of the SMC with regard to the Central Subway shall be operationally consistent with that of the Market Street Subway.

4. Provide software, data, and system updates to make both SMC1(at Lenox) and SMC2 (at TMC)capable of controlling both the Market Street Subway and the Central Subway. The SMC2 shall be used during testing and startup of the Central Subway. SMC1 shall be used to control the Market Street Subway until satisfactory completion of the RAM Demonstration test. ATCS test and startup activities performed by Thales shall not disrupt

service in the Market Street Subway.

5. Provide hardware and software necessary to make each SMC capable of acting as a backup to the other. Provide a switching function to select which SMC has operational control. The backup failover function shall occur automatically without service disruption whenever the controlling SMC experiences a failure that reduces operational functionality. Provide the capability to switch the failover function to manual.

6. CCO shall have the capability to place a hold on the portal to prevent trains from entering.

7. CCO shall have the capability to hold trains at the next upstream platform.

8. Entry into ATCS Territory

    a. The ATCS entry location shall be at the Portal on both NB and SB tracks.

    b. Provide the correct number and placement of axle counters and entry loops to accomplish entry as shown on drawings. .

    c. The ATCS shall support the following operation:

        1) At entry, train shall pass over an entry loop which initiates vehicle/wayside communication. Upon reaching the mainline loop, data communication between the VCC and each VOBC shall be established.

        2) Upon successful completion of the entry checks, the train transitions from Street Mode to ATCS CABS Mode.

        3) Once the ATCS has accepted the train for operation in ATCS CABS Mode, the Train Operator will control the train based on the Driver Display Unit (DDU) commands which indicate speed restrictions and stopping points.

        4) AUTO Mode can be entered at any time thereafter provided the train is stopped.

9. Exit from ATCS Territory - The ATCS shall support the following operation:

    a. Trains can switch from AUTO Mode to ATCS CABS Mode while berthed at Yerba Buena/Moscone Station.

    b. Southbound trains can proceed in ATCS CABS Mode to the portal.

    c. Train shall automatically transition into Street Mode when the train exits the loop. This shall be indicated to the Train Operator by the “STREET MODE” message on the DDU. Street Mode shall be activated prior to reaching Bryant Street.

d. AUTO Mode Trains that exit the subway shall stop and transition to Street Mode automatically prior to reaching Bryant Street.

10. Re-Entry in ATCS Territory

    a. Bi-directional entry points shall be located between each of the three stations as shown.

    b. Provide automatic acquisition at each entry point by which the VCC re-establishes communications with an ATCS equipped train.

    c. Provide manual acquisition to re-establish communication with an ATCS equipped train at an entry point when one or more of the VOBCs on the train are not operational.

11. Provide **interface to and programming for the Construction Contractor-furnished** portal intrusion detection **system** that **will** stop~~s~~ trains in approach to the portal and holds southbound trains at YBM **in the event of activation**.

12. Provide **functionality for future use of** Platform Emergency Stop Buttons in each subway station as indicated that stop trains in approach to the associated platform.

13. Provide an interface at each subway station that can be used for future platform intrusion devices to be provided by others. Activation of these devices shall stop trains in approach to the associated platform. The interface shall be made available at a pair of terminals for each platform. ADD. NO. 3

14. The ATCS system shall have the capacity to handle future expansion beyond the tail tracks, including an extended guideway and additional portal entry/exit area.

15. A Local System Management Center (LSMC) shall be provided at CTS. The LSMC shall provide a separate connection to the Station Controller independent of the VCC. The LSMC shall allow the Chinatown interlocking to be controlled locally and from the SMC when the VCC is not operational.

16. ATCS shall provide the same Schedule Regulation Functionality for Central Subway as is provided for Market Street Subway. ADD. NO.2

17. ATCS shall provide an alert when a train is delayed more than a preset time period configurable by block. Time periods shall initially be set to 20 seconds. ADD. NO. 2

2.3 FAILURE RECOVERY MODES

A. SMC Failure – VCC shall continue to control trains in AUTO mode. LSMC shall provide automatic routing.

B. VCC Failure – SMC and station controller shall continue to control trains by

absolute fixed blocks using axle counter blocks and wayside signals. Absolute Block Mode will be enabled by the Central Control Operator when it has been determined that the VCC has experienced a failure from which it cannot recover automatically. Provide a means to easily enable Central Fallback to Absolute Block Mode that can be accomplished in less than 5 minutes. Absolute Block Mode shall govern train movement from station to station using axle counter blocks and wayside signals. Provide interlocking protection at the CTS crossover. Time locking shall be used to protect trains approaching signals that have been canceled. ADD. NO.2

C. Loop Failure – Train shall automatically re-enter at next loop boundary

D. Axle Counter Block Disturbed – Provide same response and recovery as Market Street Subway as a minimum.

E. NCT through System – Track the train through the Subway using axle counter blocks. Control the train using fixed blocks and **the Construction Contractor-furnished** Wayside signals. Protect the train from all other trains.

2.4 PASSENGER INFORMATION FUNCTIONS

A. The ATCS shall include all passenger information functional features that are performed by the ATCS in the SFMTA Market St. subway at the time the Central Subway system is released for revenue service.

B. Provide Public Mimic information for the Central Subway that can be used by SFMTA for display. Information shall be in the same format similar to the Market St. Subway. ADD. NO.2

C. Provide an interface to the Subway Location Server (SLS). The interface shall provide train location and predicted arrival information similar to the Market St. Subway. ADD. NO.2

2.5 MAINTENANCE FUNCTIONS

A. The ATCS shall include all maintenance functional features that are performed by the ATCS in the SFMTA Market St. subway at the time the Central Subway system is released for revenue service.

2.6 TAIL TRACK STORAGE

A. The ATCS shall perform all required safety and operational functions should the tail tracks be occupied for any reason. Terminal station headway performance may degrade in the event that vehicles are forced to remain in this area, but CTS station stopping shall be performed in AUTO in as little time as possible given

the stopping distance available.

B. Tail tracks shall be designated as automatic coupling areas.

PART 3—EXECUTION

NOT USED

END OF SECTION

SECTION 34 42 27

ATCS SAFETY ADDENDUM NO. 2 Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION

A. This Contract Specifications Section covers the safety requirements for the design of the ATCS. Safety of trains, passengers and personnel shall be the paramount design requirement.

B. All control methods, circuitry, equipment, appurtenances and operating procedures provided by Thales shall conform to the requirements of this Contract Specifications Section.

C. Thales shall provide support to SFMTA's effort in demonstrating compliance of the train control system with CPUC GO 164-D, Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems. Thales shall demonstrate to the California Public Utilities Commission that the ATCS system provided under this Contract continues to meet the intent of CPUC GO 127 in a similar way to the Market St ATCS and that it has not changed in any way that would compromise compliance. ADD. NO.2

D. This work shall include presentations, technical reports, attending meetings with the CPUC, and other necessary documentation to obtain CPUC approval. ADD. NO. 2

1.2 SUBMITTALS

A. Refer to Section 01 33 00, SUBMITTAL PROCEDURES for submittal requirements and procedures.

B. Submit the following for approval:

1. A high-level description of the overall design of the ATCS system and interfaces. Text shall be augmented with block diagrams showing the implementation of all vital functions and their interaction. Descriptions and drawings shall be in sufficient detail to clearly identify major software and hardware components. Descriptions and drawings shall clearly distinguish hardware components as CLASS I, II, or III and software components as vital or non-vital.

2. A description of new ATCS equipment (not previously employed by SFMTA in the existing ATCS) that is proposed and the analysis methods used to verify safe performance of individual items and as these are combined/interfaced with

the existing ATCS system.

3. A description of the safety assurance concepts and program showing how all ATCS implementation risks are adequately mitigated. The individual analysis methods proposed to be used to confirm the safety of the ATCS system shall each be described. Include a statement of the extent to which each analysis method is effective and verification of that effectiveness. The description shall also indicate the specific major hardware and software system components to which each analysis method is applied.

4. Detailed documentation describing the design of new (to SFMTA)ATCS system components:

    a. Include schematics of all new hardware components with complete descriptions of the functions served by the proposed components.

    b. Make available for review all new and modified vital application logic software.

    c. Annotated software listings shall be made available as printed copy and as electronic "txt" files. Annotated software listings shall be made available as printed copy and as electronic .txt files. Vital software that is not application logic software and is deemed proprietary shall be placed into escrow. The software shall be held in escrow by an approved independent third party such that the software is made available to the Engineer in the event **Thales** is no longer able or willing to support the software.

5. A listing of all safety related design assumptions.

6. An updated Preliminary Hazard Analysis (PHA) of the ATCS system identifying all new (to SFMTA) potentially hazardous conditions.

7. The standards used to design and implement CLASS I hardware.

8. The standards used to design and implement vital ATCS software.

9. A worst-case analysis of any new (to SFMTA)analog circuits in the ATCS system.

10. An ATCS "system" software analysis if the proposed "system" software is materially different from that installed on the existing SFMTA system.

11. A Fault Tree Analysis (FTA). The FTA shall form the basis for the calculation of the MTBHE for the ATCS system.

12. A worst-case analysis of all analog circuits in the ATCS system.

13. A FEMCA of ATCS system CLASS I hardware.

14. An analysis of ATCS system CLASS II hardware.

15. An analysis of ATCS system CLASS III hardware.

16. Documentation showing all steps in the calculation of MTBHE values for the ATCS system.

PART 2—PRODUCTS

2.1 DESCRIPTION

A. All vital functions required to be performed by the ATCS shall be implemented by the vital portion of the system. The vital functions shall be fail-safe and independent of other (non-vital) ATCS functions.

B. All ATCS system hardware and software that either performs vital functions or could affect the safe performance of the system shall comply with the safety design, implementation and analysis requirements contained in these Contract Specifications.

C. The final design and safety of the implemented ATCS system shall be the responsibility of Thales and shall be in conformance with the requirements of these Contract Specifications.

2.2 DEFINITIONS

A. Application Logic: Application Logic is the set of instructions or data that defines system operation to the implementing equipment. Application logic includes those primordial functions which are not inherent in the equipment used for implementing system functions but which vary from application to application. It also includes descriptions or values of functions and parameters required by the specific equipment to implement system functions.

B. Closed-loop Principle: System design adhering to the closed-loop principle requires that all conditions needed to permit a state or action must be verified to be present before the permissive state or action can be initiated, and be continuously present for the permissive state or action to be maintained.

C. Fail-Safety: Fail-safety in the context of this Contract Specifications Section is defined as the property of the system that assures the safe implementation of vital functions under all conditions including hardware failures or software errors.

D. Mean Time Between Unsafe Errors (MTBUE): MTBUE is defined as the mean time between the execution of software errors which adversely affect the safe implementation of a vital function (See Software Errors). MTBUE is the reciprocal of PEU.

E. Mean Time Between Hazardous Events (MTBHE): A hazardous event is defined

as the occurrence of an unsafe condition that exposes passengers, personnel or equipment to injury or damage, including the effects of software errors and hardware failures. MTBHE is the mean time between such events. MTBHE is calculated using the probabilities that a software error and a hardware failure would cause an unsafe condition; and is the reciprocal of the summation of PFU's and PEU's.

F. Mean Time Between Unsafe Failures (MTBUF): MTBUF is defined as the mean time between hardware failures that have an adverse effect on the safe implementation of a vital function. MTBUF is the reciprocal of PFU.

G. Non-Vital Software: Non-vital software is software whose normal operation has no effect on the implementation of any vital function.

H. Primordial Logic: Primordial logic defines the intended system operation independent of the implementing equipment. Primordial logic may define vital as well as non-vital system operations. An example of vital primordial logic is the set of logical constructs that represent the route and aspect requirements of an interlocking. This set of constructs represents routes through the interlocking and the associated aspects and provisions for prohibiting conflicting routes and aspects.

I. Probability of a Hardware Failure being Unsafe (PFU): Given a hardware failure, PFU is defined as the probability that the failure would have an adverse effect on the safe implementation of a vital function.

J. Probability of a Software Error being Unsafe (PEU): Given a software error, PEU is defined as the probability that the error would have an adverse effect on the safe implementation of a vital function.

K. Safe Implementation: Safe implementation requires that the system as designed and placed into service shall assure a state known to be safe regardless of the occurrence of failure.

L. Unsafe: Unsafe in the context of this Contract Specifications Section is defined as a characteristic that exposes passengers, personnel, or equipment to injury or damage.

M. Vital: A characteristic that defines software, hardware, systems, and functions as having known failure modes that can lead directly to a hazardous event.

2.3 GENERAL SAFETY REQUIREMENT

A. The ATCS system shall assure within acceptable limits as specified herein that there are no malfunctions that could result in a hazardous event.

B. Perform a comprehensive Fault Tree Analysis (FTA) for the ATCS system provided under this Contract. All safety considerations shall be included. The

results of this analysis shall be shown in a Fault Tree with the final result clearly indicated. If Thales has extant analyses and documentation that are equivalent to these requirements, they may be submitted for consideration and approval by the Engineer.

C. The FTA shall consider all aspects of the system including basic (primordial) logic of the design, the equipment used to implement the design, and the response of the operating system and operations and maintenance personnel.

D. The FTA shall consider the results of other analyses performed for the ATCS system including the FMECA as specified herein.

2.4 SAFETY DESIGN, IMPLEMENTATION, AND ANALYSIS REQUIREMENTS

A. Thales shall be responsible for the assurance of safety for the ATCS system as described in these Contract Specifications. Adhere to the following design, implementation, and analysis requirements.

B. System Primordial Logic Design Requirements: Translate the functional requirements of ATCS as defined in these Contract Specifications into a set of logical expressions that shall be the primordial logic of the ATCS system. Expand the primordial logic, if necessary, to achieve a complete set of expressions which when implemented by the ATCS system components, shall provide safe system operation.

1. The primordial logic shall be independent of the means of implementation and shall be expressed in Boolean form or ladder logic for vital functions and high level software code or equivalent pseudo code for non-vital functions.

2. The primordial logic shall be error free, that is, when implemented correctly, it shall not allow the system to reach an unsafe state or perform an unsafe action.

3. Vital primordial logic functions shall be made distinct from those that are not vital.

4. Vital primordial logic shall be designed in strict accordance with the closed-loop principle. Failure to perform a logical operation or absence of a logical input, output or decision shall not cause a hazardous event. System safety shall be independent of the occurrence of an action or logical decision.

C. ATCS System Design Requirements: The ATCS system shall meet the following design requirements:

1. Systems responsible for the safe implementation of vital functions shall be designed in accordance with the closed-loop principle.

2. All failures that can lead to a hazardous event shall be self-revealing. There shall be no combination of non self-revealing component or system failures that can cause a hazardous event.

3. Application logic and functions shall be executed as high-level logic and/or functions. Application logic affecting non-vital functions shall be kept separate and distinct from application logic affecting vital functions. Changes to non-vital application logic shall be performed without requiring re-verification of vital application logic or vital routine software.

4. The MTBHE for the ATCS system provided under this Contract shall be greater than 10^5 years.

D. ATCS System Software Design Requirements: System software design requirements shall be as follows:

1. Vital Software:

a. Vital software shall be designed such that it can be demonstrated to either be error-free or have a calculable PEU and, subsequently, a calculable MTBUE.

b. Vital software shall be identified as such in Thales' software system block diagrams and by individual routine in the software listings.

c. Submit vital software design and implementation standards for approval. Vital software shall be designed to conform to the approved standards.

2. Non-Vital Software: Software not identified in Thales' software listings and system software block diagrams as vital software shall be considered non-vital software.

E. ATCS System Implementation Requirements: Vital implementation requirements shall be as follows:

1. Hardware Implementation Requirements:

a. Hardware shall be implemented in a failsafe manner using approved vital hardware design and implementation standards.

b. Implementation of vital hardware shall include separation of PCB traces and components, detailed specification of components.

2. Software Implementation Requirements. Demonstrate that the coding of routines and the transformation of the software code into machine language by compilation, assembly, or interpretation is error-free or has a calculable probability of a software error being unsafe (PEU) and, subsequently, calculable mean time between execution of unsafe errors (MTBUE).

F. Safety Analysis Requirements:

1. Analyze each new (to SFMTA) portion of the ATCS system with regard to those factors in Thales' design upon which the safe implementation of vital functions is dependent.

2. Any number of simultaneous component or system failures attributable to the same cause or related causes shall be treated as a single point of failure in the safety analysis.

3. The minimum requirements of the analysis shall be as follows:

   a. Verify that the primordial logic design meets the ATCS system design requirements herein and produces safe system operation if implemented correctly.

   b. The analysis shall identify all vital functions performed by the ATCS system.

      1) Preliminary Hazard Analysis (PHA): Perform an update to the ATCS PHA it to identify all hazardous conditions and the faults that precipitate them. The faults identified in the PHA shall in turn be used to identify those functions, the incorrect performance of which, may cause a hazardous condition to exist, that may influence vital functions.

      2) Fault Tree Analysis (FTA): Perform an FTA on all safety related portions of the ATCS system using the faults identified in the PHA, arranged in hierarchical order, as initiation points. The FTA branches through all system hardware and software components to a level sufficient to identify those components that affect the safe implementation of vital functions associated with those faults.

   c. Analysis of Vital Software.

      1) The analysis shall show that the logic, structure, algorithms, and coding of all vital software, including its subsequent translation into machine-readable language, either:

         a) Contains no errors that can adversely affect the safe implementation of any vital function, or

         b) Has a calculable PEU and, subsequently, a calculable MTBUE.

   d. Analysis of Non-Vital Software. The analysis shall demonstrate that a non-vital software failure does not affect operation of vital software.

   e. Worst Case Analysis. The analysis shall show the effects of all analog components vital hardware at their worst-case tolerance.

2.5 REQUIREMENTS FOR THE FAILURE MODES, EFFECTS AND CRITICALITY ANALYSIS (FEMCA) OF NEW (TO SFMTA) VITAL HARDWARE

A. Analyze failure modes related to all new component types, such as self-oscillation, susceptibility to spurious signals, vulnerability to electrical or mechanical shock, and electronic phenomena that mimic signals that normally indicate safe conditions. Failure modes shall be classified as self-revealing or non self-revealing. The FMECA shall demonstrate that adequate controls are provided for all hazardous events resulting from combinations hardware failures in the ATCS system, and other factors originating in the ATCS system.

B. The FMECA shall include the effects of power supply fluctuations and ripple, switching transients, inductive coupling of circuits, and the potential for abnormal circuit configurations that could occur as a result of the opening of circuits where three or more components are connected to a common node.

C. The FMECA shall include the following:

1. How component failures within filters affect their ability to block passage of unwanted signals and pass desired signals.

2. Effects of component leakage.

3. Effects of components increasing in value towards open.

4. Effects of components decreasing in value towards short.

5. Effects of open components.
6. Effects of shorted components.

7. Effects of shorted turns, inter-winding shorts and open windings in transformers and inductors.

8. Effects of ground or combination of grounds on components or circuits.

D. Component failure modes shall be analyzed individually. Shorts between circuit traces and connector contacts on PC boards shall be analyzed. Adjacent PCB traces and connector contacts conforming to the following minimum requirements may be exempted:

1. Minimum spacing between traces or connector contacts not humisealed is 0.25 inch.

2. Minimum spacing between humisealed traces is 0.10 inch.

2.6 SAFETY ASSURANCE

A. Provide a description of the safety assurance concepts under which the ATCS

equipment is designed and implemented. The description shall indicate how vital functions are performed such that hardware failures or software errors will not result in a more permissive condition or action than the overall system conditions safely permit. The description of the safety assurance concepts shall include a statement of all fundamental assumptions made with regard to the assurance of system safety.

B. Provide a description of all factors upon which the safety assurance concepts depend. If any of the following factors are applicable, they shall be included in the description as a minimum.

1. Software is error-free.

2. Software functions, logic, or coding are present and not omitted.

3. Software data structures, expressions, or tabular application data are correct.

4. Defined hardware failure modes are absent in specific parts.

5. Hardware circuit or component failures are self-revealing.

6. A decision, condition, or action must be validated by comparing two independent processes; the validation comparison must occur at a minimum frequency; and the comparison must occur at a particular level in the decision-making process.

7. The degree of independence of two or more hardware or software systems or processes.

8. The set of anticipated hardware failure modes tested to reveal hardware failure modes is complete and accurate.

9. Electrical noise or disruption is absent in signals being measured or monitored, or in logical processing.

10. An action or function must be performed, a software component must be executed, or any positive action must be performed.

11. Equipment must be tested or maintained at specific intervals.

12. Message corruption must be detected.

C. Provide a description of the techniques to be used to assure that each safety assurance factor affecting the system is effectively and comprehensively satisfied. Include examples.

PART 3—EXECUTION

NOT USED

END OF SECTION

SECTION 34 42 31

ATCS SYSTEMS ASSURANCE ADDENDUM NO. 2 Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION

A. This Section defines the specific reliability, availability, and maintainability requirements for ATCS. Section 20 71 00, SYSTEMS ASSURANCE provides general requirements for Systems Assurance for other systems. ADD. NO.2

1.2 SYSTEMS ASSURANCE PLAN

A. Thales shall develop an ATCS Systems Assurance Plan (SAP) that clearly identifies and reflects its approach to incorporating reliability and maintainability into final design and construction of the Project. ADD. NO. 2

B. Thales shall ensure that the systems assurance requirements of these specifications are met. The requirements within these specifications shall apply to all Contractor supplied ATCS equipment including hardware, software, assemblies, components, parts, systems, and subsystems. ADD. NO.2

C. Thales' SAP shall incorporate a disciplined approach to effectively evaluate reliability, availability, and maintainability including preventative maintenance for systems and subsystems. ADD. NO. 2

D. The SAP shall clearly define tasks and responsibilities for accomplishing the specific systems assurance requirements. ADD. NO. 2

E. The SAP shall include the following: ADD. NO.2

1. Task descriptions and activities, related to design, calculations, prediction, construction, and demonstration ADD. NO. 2

2. Thales' project team organization including the identification of individuals who are responsible for the various systems assurance tasks. ADD. NO. 2

1.3 SUBMITTALS

A. The following plans and information shall be submitted for approval prior to fabrication and factory wiring of the system. Equipment Procurement and fabrication shall be at Thales' risk until approval has been received from the Engineer for all relevant submittal documents herein specified. ADD. NO. 2

1. Submit ATCS Systems Assurance Plan (SAP) within 30 days of Notice to

Proceed (NTP). Updates shall be provided to reflect changes in the program or design. ADD. NO.2

2. Submit ATCS Reliability Analysis (RA) for each system with calculated predictions of Mean Time Between Failures (MTBF) and Availability. ADD. NO. 2

3. Submit ATCS Maintainability Analysis with calculated predictions of Mean Time To Repair (MTTR) for each subsystem. ADD. NO. 2

4. Submit the following for ATCS Reliability Demonstration: ADD. NO. 2

   a. Reliability Demonstration Test Plan ADD. NO. 2

   b. Reliability Demonstration Test Reports ADD. NO. 2

5. Submit the following for ATCS Maintainability Demonstration: ADD. NO. 2

   a. Maintainability Demonstration Test Plan ADD. NO. 2

   b. Maintainability Demonstration Test Reports ADD. NO. 2

6. A Preventative Maintenance Plan as described herein prior to start of training. ADD. NO. 2

PART 2—PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Incorporate the following as part of the Systems Assurance process: ADD. NO.2

1. Use of standard equipment and service proven designs, ADD. NO.2

2. Use of interchangeable, modular equipment and components, ADD. NO.2

3. Extensive and prominent labeling of equipment, parts, conduits, and wires, ADD. NO. 2

4. Use of unique serial numbers for traceability of equipment, assemblies, and components, ADD. NO.2

5. Use of simplified tier numbering of systems, and corresponding components that will facilitate specific reliability calculations, ADD. NO. 2

6. Use of standard, pre-wired harnesses instead of wiring performed individually, where doing so improves maintainability, ADD. NO.2

7. Use of weatherproof seals and latches that promote access, while at the same time, preventing intrusion of the elements, ADD. NO.2

B. Provide a system that is immune to levels of internal and external electrostatic and electromagnetic conducted or radiated interference including commercial broadcast frequencies such as used for television, radio, CB, etc. that may have

transmitters or other equipment operating in close proximity to SFMTA's right-of-way. Levels of EMI generated shall not adversely impact, nor shall Systems be impacted by existing SFMTA's electrical environmental conditions. Applicable FCC requirements shall apply. ADD. NO. 2

C. To achieve a more uniform compliance, Thales shall recognize the inherent interrelationship and inseparability of reliability, maintainability, and safety (RM&S) principles and methods in many aspects of analysis, design, test, demonstration, and failure correction. Thales shall consider RM&S requirements and criteria as an integrated whole. ADD. NO.2

D. To address a problem of non-compliance with a given requirement, Thales shall employ an integrated RM&S approach to corrective action. This shall recognize that while there may be separate reliability and maintainability actions that could each solve the problem, either action might impact safety. In any such situation, **Thales** shall not, without SFMTA's approval, assume that the problem must be solved solely by a reliability action or a maintainability action. ADD. NO.2

E. The physical and mechanical configurations of equipment and rack assemblies shall give high priority to the ease with which the units may be inspected, maintained, and removed. Location of all equipment shall be as shown on the submitted arrangement drawings. ADD. NO.2

F. Labels shall be provided for each input and output that clearly denotes the respective function of each for ease of maintenance and troubleshooting. These shall be provided for all wiring and terminals and be complete with nomenclature and include a "to/from" designation. ADD. NO. 2

G. All hardware and systems must be industry proven, without sacrificing SFMTA's or Thales' ability to incorporate performance improvements. The SFMTA desires that spare parts and maintenance procedures be similar to or identical with those presently being used wherever practical, and whenever such similarity does not sacrifice performance, and does not incorporate use of obsolete equipment. ADD. NO.2

H. The maintainability program shall demonstrably minimize maintenance labor and material costs, and the need for specially trained or highly skilled repair and maintenance personnel. ADD. NO.2

I. Thales shall implement a maintainability program of sufficient depth and scope to assure attainment of and demonstrate compliance with all applicable maintainability requirements including a MTTR of 30 minutes or less. Features shall be incorporated into the design of Project elements to minimize repair time and preventive maintenance time. ADD. NO.2

J. Thales shall provide all necessary special hardware and software tools that enable SFMTA to maintain the system. ADD. NO. 2

K. Each vital processor unit shall be equipped with a non-vital communication port for event data and maintenance port communications. ADD. NO.2

PART 3—EXECUTION

3.1 RELIABILITY DEMONSTRATION TEST

A. The Reliability Demonstration Test (RDT) for the ATCS shall be conducted on the installed equipment. Equipment included in the RDT shall be in its final configuration. Equipment that is not in compliance with the designated configuration shall be replaced or repaired to meet the specified configuration prior to beginning the test.

B. Reliability testing shall commence when revenue service has begun and shall continue for up to 20 months or as modified by the RDT Committee as described on Section 3.3 A below. ATCS reliability requirements are specified in the following Table 1 - ATCS Reliability Requirements: ADD. NO.2

Table 1 - ATCS Reliability Requirements ADD. NO. 2

System	MTBF	
VCC	10,000 Hours	
SMC	10,000 Hours	
Station Controller and ACE	20,000 Hours	
Axle Counter	20,000 Hours	
Inductive Loop System	40,000 Hours	
Power Supply	8,000 Hours	

C. Conduct availability demonstration testing along with the RDT. The pass/fail criteria shall be based on downtime during a six month period. Downtime is the period during which one or more trains in the Subway are forced to operate in Cut-out mode or are immobilized due to ATCS malfunction. For each malfunction event, the downtime shall include the sum of downtimes for all non-concurrently affected trains. The total downtime during Revenue Service in a sliding six month window shall not be greater than 2 hours. ADD. NO.2

D. The availability demonstration test shall be repeated if a significant design change is made and if any ATCS hardware or equipment is replaced by a different make or model. ADD. NO.2

3.2 RELIABILITY DEMONSTRATION TEST REPORTING

A. During the Reliability Demonstration Test (RDT), data of each failure will be collected and recorded. A SFMTA-established RDT Committee will review incident reports and determine who is responsible for each incident on a monthly basis. If Thales is responsible, they shall propose a solution and follow up to ensure that the incidents are resolved.

B. Following each monthly RDT Committee review meeting, update the MTBF's of each system based on the chargeable incidents for each system and the elapsed RDT time. A Chi-squared methodology presented in Table 2 shall be used to calculate the MTBF for each system. The statistical formula to calculate the MTBF is specified below at the 90 percent confidence level:

$$MTBF = 2*T/X^2_{(2R+2,\ 1-\alpha)}$$

Where:

T = cumulative test time in hours

X = Chi-square value

R = number of observed failures

2R+2 = degree of freedom

α = confidence level – percent

Table 2

Chi-Square Values @ 90 Percent Confidence Level		
R	2R+2	X^2
0	2	4.605
1	4	7.779
2	6	10.645
3	8	13.362

C. Submit monthly RDT reports to the Engineer. ADD. NO.2

3.3 TERMINATION OF RELIABILITY DEMONSTRATION TESTS

A. At the end of each RDT period, if the associated MTBF requirements have been

met, the test is satisfactorily terminated. The RDT may, with the approval of the RDT Committee, be terminated before the expiration of the 20 month test period if the test data predicts that the MTBF requirements are highly likely to be met during the time remaining in the test period. The RDT may not be terminated if the MTBF requirements are not met. Implement whatever corrective actions are needed to resolve all reliability issues and to achieve the required reliability performance levels specified**.**

3.4 MAINTAINABILITY

A. Maintainability Analysis

1. Thales shall analyze the design to ensure that the objectives of the maintainability program are attainable in the areas of accessibility and mean time to repair. The MTTR requirements shall be compared to those actually being predicted and achieved by Thales. Thales shall identify and define the prediction techniques that have been used, and shall substantiate variances exceeding 10 percent of any requirements. The variances shall not exceed 15% for any equipment.
ADD. NO. 2

2. Identify each Lowest Line Replaceable Unit (LLRU). These are the replaceable units that Thales recommends be replaced to restore the system to service. The set of LLRUs so identified shall be complete, such that all hardware failures can be remedied by replacement of one or more LLRUs. The MTTR calculation shall be based on diagnosis, removal and replacement of the LLRUs, and restoration back to service from the arrival of maintenance technician at the site and not counting site protection. ADD. NO. 2

B. Thales shall plan and conduct a Maintainability Demonstration Test (MDT) to verify that maintainability requirements have been met. The MDT shall be planned and scoped to: ADD. NO.2

1. Disclose potential problem areas in design that could affect the maintainability and support of the installed system,

2. Validate maintenance concepts and repair procedures required to successfully operate the Project in a transit environment.

3. Validate removal and replacement times, ground-support equipment requirements, shop repair times, and number of personnel and special skills required for maintenance tasks.

4. Demonstrate that the MTTR for the ATCS is 30 minutes or less. ADD. NO.2

5. Demonstrate that each LLRU is replaceable within five minutes without disassembly other than obtaining access to jumpers or on-board switches.
ADD. NO. 2

C. An MDT shall be performed on each system and subsystem. Thales shall

prepare and submit a Maintainability Demonstration Test Plan for approval no less than 60 days prior to the test and a final report within 30 days after completion of the test. The test results shall be in narrative format including, but not limited to, the following: ADD. NO. 2

1. Test Objective
2. Test Location(s) and Dates or Period(s)
3. List of Equipment Under Test
4. Pass/Fail Criteria.
5. Data
6. Charts
7. Test Conclusion

D. The Pass/Fail criteria shall be quantifiable. ADD. NO.2

E. The Engineer must witness the MDT ADD. NO. 2

F. Preventative Maintenance Plan: Thales shall develop and submit a detailed Preventative Maintenance (PM) plan based upon the maintenance concepts and maintainability requirements established in the SAP. The plan shall refine and enhance the PM goals declared in Thales' Proposal. The PM plan shall include all servicing, inspections, scheduled overhaul, or any task required on a scheduled basis. The elapsed time to perform specific tasks shall be defined in the analysis, and also in maintenance and servicing manuals. Thales shall identify and define the prediction techniques that have been used, and shall substantiate variances exceeding 10 percent of any initial predictions. The variations shall not exceed 15 percent for any subsystem at any time. All tasks will be sorted and grouped by time interval (ex. daily, weekly, monthly, etc.), as well as by subsystem. ADD. NO. 2

END OF SECTION

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SECTION 34 42 35

ATCS ROOM EQUIPMENT ADDENDUM NO. 1, 2 Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION

A. This Contract Specifications Section specifies the design, furnishing of proprietary equipment and testing of signal system racks, mounted components, and utilities as described herein and as shown on the Contract Drawings.

B. The ATCS at Chinatown Station Train Control Room (TCR) shall include a Local System Management Center (LSMC) and a Station Controller.

C. The Station Controller shall include two Axle Counter Evaluators (ACE). One ACE shall control axle counters on the northbound track and the other shall control axle counters on the southbound track.

D. Provide all vital and non-vital circuitry and components required to obtain a safe and reliable system.

E. The Owner's Construction Contractor shall be responsible for arranging transport of the ATCS Room Equipment from the Thales Local Warehouse to their final field sites. Prior to transport, the Construction Contractor shall prepare each site for installation including cable entry, cable routing systems, communications, and electrical power service, etc.

F. Upon delivery and QC acceptance, the Construction Contractor shall commence with field installation. Field installation shall include, but not be limited to, termination of the wayside cables on the entrance rack, connection of electrical power from the ATCS Room's main electric panel, and interconnection with other locations. Thales shall provide all installation instructions and documentation, including the book of plans for each TCR as described in 1.3 B of this Section, for the Contractor's use in installing all proprietary equipment including required interface requirements.

G. The work to be done shall also include mark-ups by Thales for any revision and updating of the Book of Plans for the TCR, ATCS equipment, the rack arrangements, and equipment arrangement to reflect the actual "as-built" conditions.

H. Thales shall perform a site survey and confirm the adequacy of the Train Control rooms and submit a report to the Engineer noting concurrence or any discrepancy to specified requirements. The Construction Contractor shall assess and report on the means and methods for transporting the

ATCS components to their final locations. Thales shall review these reports for completeness and advise of any discrepancies with Thales Installation requirements.

1.2 QUALITY ASSURANCE

A. Factory test of the proprietary ATCS equipment shall be conducted in accordance with the Thales' Factory Test Procedures as approved

B. All electrical components, unless otherwise specified herein, shall be rated to operate at power, voltage, current and temperature levels twenty percent above that level which the components will be subject to in normal service.

C. The Construction Contractor shall inspect the TCR after the ATCS equipment and support systems have been installed and correct any deficiencies. This inspection shall be conducted in conformance with the requirements of Thales' Installation Inspection Procedures as approved by the Engineer.

1.3 SUBMITTALS

A. Comply with Section 01 33 00, SUBMITTAL PROCEDURES.

B. Submit a complete book of plans for each TCR for approval prior to fabrication and factory wiring of the equipment racks for the specific location. The book of plans for each TCR shall include, but is not limited to the following:

1. Room Layout Drawings
2. Rack Layout Drawings
3. Schematic drawings for all ATCS room equipment.
4. Detail drawings of the interface to the electrical service.
5. Construction drawings of the cable entrance, final arrangement of apparatus and details of wire ways and entry to the TCR.
6. Circuit plans for all input and output functions
7. Flow diagrams, functional block diagrams and program listings for the system
8. Wire routing diagrams showing power distribution, hardware interface, serial data link, and any other wire, fiber and cable associated with the ATCS. Wire routing within instrument racks, between instrument racks, and from instrument racks to entrance racks, power racks, and any other destinations shall be shown in detail,
9. The proposed mounting, layout, and grounding arrangement of all components.

PART 2—PRODUCTS

2.1 GENERAL DESIGN REQUIREMENTS

A. Within the furnished ATCS, like functions shall be performed by identical units. The hardware or equipment used in one portion of the system shall not be different from that used in another portion to perform the same function under identical operation and environmental conditions.

B. The application of special custom assemblies shall be confined to those required to comply with the Specification. Every effort shall be made to minimize custom design and minimize the number of unique chassis or modules.

C. All equipment shall be designed in a modular fashion to the greatest extent possible. Each rack, shelf, terminal board and other such items shall include twenty-five percent spare spaces for future additions. Spare space shall be arranged so that entire assemblies currently used can be added. ADD. NO. 1

D. Each system shall be wired to accommodate a ten percent expansion of inputs and outputs. The circuit plans shall show all spares. All wiring shall conform to approved practices. ADD. NO. 1

E. Each system shall be supplied with twenty-five percent spare memory capacity, and input and output circuit boards.

F. Equipment and software shall be the most recent proven versions.

G. All circuit boards shall have internal as well as external data and power surge protection.

H. Visual indications, such as LED lamps, shall be used to demonstrate that the system is functioning properly and to indicate faults, state of individual I/O ports, serial links, etc.

I. All microprocessor equipment shall be mounted complete with necessary accessories on standard 19-inch racks to accommodate equipment utilizing standard EIA hole spacing. Racks and/or cabinets shall be furnished with provisions for EMI mitigation and ventilation as required for optimum performance. No forced air ventilation shall be used.

J. The ATCS equipment shall be designed with convection cooling such that heat generating components, including but not limited to such items as transistors with heat sinks and large wattage resistors, and shall not be located next to other components that are affected by temperature.

K. Each unit shall have a unique site identification code. This code and any other site specific information shall be resident on the unit. Where hardware settings

are required, the hardware shall be located where the unique ID code cannot be inadvertently changed.

L. Labels shall be provided for each input and output that clearly denotes the respective function of each for ease of maintenance and troubleshooting. These shall be provided for all wiring and terminals and be complete with nomenclature and include a "to/from" designation.

M. The dielectric requirements of the equipment shall be designed and manufactured to comply with recommendations of the AREMA C&S Manual, Part 11.5.1.

2.2 POWER

A. Separate the power source for input and output functions from the one used for processor logic functions.

B. All connections to external circuits shall be double break and designed to interface to standard signal equipment operating at normal voltages as employed on SFMTA.

C. Provide all internal logic level power supplies. All Contractor supplied power supplies shall provide DC isolation and indicator LEDs.

D. Each sub-system shall have its own dedicated power supply. Provide all such devices, including, but not limited to, the power supply, power switches, fuses and surge protection.

E. The power supplies selected shall have a proven reliable record in the application within the transit environment.

F. All power supplies shall be designed for easy removal and replacement and not require any de-soldering to remove or replace.

G. Provide for indication fusing and surge protection as the power enters the rack. Separately fuse power to each CPU, normal and standby, and to each of normal and standby input and output boards. An individual fuse shall be supplied for the energy to individual input and output circuit boards.

2.3 FIELD DIAGNOSTIC SYSTEM

A. Provide a system that contains all required software that permits the diagnostic and debugging of the field systems both vital and non-vital, and associated application software. The Field Diagnostic System shall be capable of easily performing the following functions: ADD. NO.2

1. Not Used ADD. NO.2

2. Monitoring CPU status,

3. Real time diagnostic of each input/output port as to the status and condition,

4. Determining the version of software running,

5. Determining the status of any internal relay state or application logic state for both vital and nonvital systems.

6. Determining the system status.

7. Displaying error codes for all error detection software. All error codes should have a reference and provide detailed information associated with the probable reason for the error code displayed.

8. The Field Diagnostic System shall be capable of displaying dynamic real time data. The displays shall include the name of each internal relay (parameter) or input/output and the logic value for each. The system that is in service shall continue to operate on-line while the Field Diagnostic System is connected and operating. All screen displays shall be submitted to the Engineer for review and approval.

2.4 GENERAL HARDWARE REQUIREMENTS

A. The installed vital processor units shall have access from the rear.

B. All plug connectors, power supplies, power conditioning devices, terminal boards, wire connectors and other equipment required to achieve a complete, stand-alone subsystem shall be mounted on the instrument rack along with the associated processor units.

C. Each input, output and input/output printed circuit board shall be equipped with a lighted status indicator on each port. The indicator shall be lighted when the respective port is energized.

D. The use of external relays as interface devices between the vital processor units and external circuits shall only be as approved by the Engineer.

E. External apparatus and circuits controlled by the vital processor via the hardwire interfaces shall be double break for designs not protected by vital transmission protocol and include, but not be limited to, the following:

1. Switch and Lock Movements,

2. Signal Lighting,

3. Loop Feeds

4. Axle Counters

5. TCR to TCR communications

6. TCR to VCC communications

7. Vital Relays

F. Each vital processor unit shall be provided with vital communication ports as specified herein. The number of vital ports shall be sufficient to allow inter-connection of the vital processor units in accordance with the final design plus ten percent expansion. Number for expansion that have percentages shall be increased to the next whole unit. ADD. NO.1

G. Each vital processor unit cardfile shall contain printed circuit boards.

1. The printed circuit boards shall be housed within a cardfile and be of the plug-in type. Keys shall be provided on the cardfile to prevent insertion of improper circuit board types.

2. The cardfiles shall be factory mounted in a standard rack. All wire connections to the cardfiles shall be via plug connected cables.

3. No forced air ventilation shall be allowed.

H. The ATCS shall not use any custom or semi-custom integrated circuits.

I. The design shall provide that all cables or wiring leaving the instrument racks shall be routed with adequate protection at the top of the racks and be provided with means to be neatly routed and securely fastened.

J. The hardwire DC inputs of the vital processors shall not respond to AC of any voltage level or frequency. The hardwire inputs shall be biased and shall not, under failure condition, respond to any voltage of improper polarity. Hardwire inputs shall be optically isolated from the vital processors.

K. A hardware and firmware keying method shall be employed rendering it impossible for any vital processor to operate with firmware designed for any other vital processor.

L. All circuit boards and components shall be new. The use of refurbished material will not be permitted unless approved by the Engineer.

M. All circuit boards shall have a unique serial number clearly marked on each board. The board manufacturer's part number shall also be clearly marked on each board. All markings shall be of a permanent type.

N. Each circuit board shall have all components clearly identified by a silk screening process. All markings shall be clear and easily readable. The markings shall include, but not to be limited to, polarity, switch position numbers, resistor identifications or integrated circuit identifications.

O. Each circuit board shall be secured in the chassis in a manner such as captive

screws or latching ejector tabs. Both the top and bottom of each board shall be secured.

P. Each circuit board shall be coated with a moisture sealant after manufacture and testing.

Q. Supply a minimum of five each of any extender card required to match each type of circuit board.

R. The circuit boards shall be removable and be mounted on guide-ways or channels for ease of removal or insertion. To replace a circuit board the removal of any wire or cable shall not be required.

S. All circuit boards using any indicator LEDs shall have the LEDs mounted on the front edge of the board. The LEDs shall be labeled on the board in a permanent method.

T. Each differing type of circuit board shall be uniquely keyed. The chassis slots for circuit boards of the same type shall be keyed to match the board and reject others. The keying methods shall be modifiable and submitted for approval. Keying of circuit boards that are the same as those provided within the existing SFMTA ATCS shall match, allowing interchangeability of circuit boards.

U. Each circuit board and chassis slot shall be provided to withstand a minimum arc-over potential of SFMTA traction voltage between conductor and ground.

V. All circuit boards shall have internal surge and polarity protection for power, data, control and indication inputs and outputs.

W. The vital processor unit shall be equipped with vital lamp driver printed circuit boards. Contractor may submit alternate method utilizing interposing relays for approval of Engineer. The following requirements apply:

1. These shall be furnished and installed in sufficient number to accommodate all vital signal LED units within the Vital Processor's scope of control.

2. Energy shall be output directly to the signal units as described herein through the specified cables and termination points.

3. The allowable wattage outputs shall be adequate to handle the designed maximum lighting load, as approved by the Engineer.

X. All data communications between vital controllers shall conform to approved EIA Standards

2.5 CHASSIS CABINETS

A. Any unused chassis slots shall be fully covered by blank removable plates or by

a single piece cover made of the same material as used for the working circuit boards. All chassis shall have a solid protective cover on the front to protect the circuit boards and any switches or push buttons from accidental operation. The protective cover shall be removable. Provisions shall also be made to protect the backplane in a manner approved by the Engineer. The top portion of processor units shall be arranged so it prohibits its use as a shelf and having items such as tools, manuals, etc. placed upon it.

B. The chassis or cabinet material shall be steel or aluminum or other non- corroding material as approved by the Engineer. Chassis shall be supplied with hinged rear panels that permit easy access to rear edge connectors.

C. All chassis or cabinet internal edge connector to edge connector wiring shall be Tefzel wiring, unless approved otherwise.

1. All wiring shall be twisted pairs where required to provide maximum isolation to EMI noise.

2. All support devices and internal chassis or cabinet elements shall be protected with an approved material to prevent wires from being cut or damaged.

D. All chassis shall be flush mounted to the face of the rack unless otherwise approved.

E. Any ventilation screens shall be easily removable for cleaning.

F. All chassis or cabinets shall be completely covered or enclosed to prevent the entry of rodents. A complete detail of each chassis or cabinet shall be submitted for approval.

G. Each chassis shall be grounded to the rack with a #10 AWG stranded green wire. No ground loops or series ground wires are permitted.

H. A method, as approved by the Engineer, shall be used to mount a typed, or printed, name tag on a front plate of each rack or cabinet.

I. All wiring and wire terminals shall be tagged in a manner approved by the Engineer.

PART 3— EXECUTION

3.1 INSTALLATION

A. The Construction Contractor will confirm conduits and raceways in station are adequate for the ATCS prior to installation.

B. Instrument racks shall be arranged and mounted in the TCR as indicated on the Contract Drawings Each signal rack in the TCR shall be electrically insulated

from adjacent racks and associated components. Each rack will have a ground termination connected by cable to the room signal ground bus. All work shall be performed in accordance with the approved installation plans.

C. The cardfiles shall be mounted in shock mounted instrument racks. All wire connections to the cardfiles shall be via plug connected cables.

D. All cables or wiring leaving the instrument racks shall be routed through rubber boots at the top of the racks and shall be neatly routed and securely fastened.

E. The mounting of cardfiles and associated equipment shall provide for easy access to all test points, indicators, and adjustments.

F. The normal and standby units, if not on the same rack, shall be in the same row and shall be on adjacent racks.

G. Mounting height of microprocessor equipment shall be restricted to an area between 1.5 feet and 5.5 feet above the finished floor.

H. Provisions for EMI mitigation (shielding) shall be made as determined by results of the Contractor's investigation to ensure proper operation of equipment relative to the environment.

I. The TCR shall have a signal ground installed separately from the chassis ground.

3.2 DELIVERY, STORAGE AND HANDLING

A. General requirements for ATCS delivery, storage and handling are described in Section 01 60 00, PRODUCTREQUIREMENTS.

B. Proprietary ATCS Equipment shall not be shipped until the relevant Factory Test Reports have been approved, in writing, by the Engineer.

C. Each item of the ATCS shall be inspected by the Construction Contractor and Engineer for damage immediately prior to installation.

3.3 TESTING

A. General test requirements are given in Section 34 42 41, ATCS TESTING.

B. Where specific power ripple or regulation specifications exist for the vital controllers or associated equipment, compliance with such ripple or regulation specifications shall be demonstrated to the satisfaction of the Engineer,

END OF SECTION

SECTION 34 42 37

ATCS WAYSIDE EQUIPMENT ADDENDUM NO. 2 Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION

A. The work specified in this section includes designing, providing and testing the ATCS Wayside Equipment: complete with cabinets and foundations, painting, conduits, pull boxes, connection to 120/240V electric service, wires and cables, firmware, and all wayside materials necessary to provide a complete functional ATCS as specified herein.

1. Non-proprietary elements of the ATCS will be provided and installed by the Owner's Construction Contractor based on requirements provided by Thales.

2. Proprietary elements of the wayside ATCS will be designed and provided by Thales for the Construction Contractor to install in conformance with the Thales's installation instructions and documentation.

~~A.~~**B. NOT USED**

1.2 SUBMITTALS

A. Comply with Section 01 33 00, SUBMITTAL PROCEDURES.

B. Submit the following:

1. Drawings and Data: Manufacturer's catalog data, shop drawings, installation instructions for wayside equipment.

2. Layout Drawings: Detailed equipment layout plans for racks and cabinet.

3. Detailed wiring diagrams showing all connections for wayside equipment a minimum of 90 calendar days before delivery of the equipment.

4. Replacement and Spare Parts List: Listing original equipment manufacturer's (OEM) part number and cost if purchased under the Contract.

5. Installation plans and instructions for proprietary ATCS equipment furnished.

6. As-Built Drawings: Within 30 calendar days after installation and testing, completed as-built drawings including layout plans and diagrams that reflect

actual field conditions.

7. O & M Manuals: At least 30 days prior to operational testing of the installed system, the Operation and Maintenance manual for the **proprietary** wayside equipment shall be provided. The O&M manual shall be written to provide all necessary information to train technicians to service, troubleshoot, repair and modify the system and shall include as-built layout plans, wiring and schematic diagrams, customized cover and introduction, and shall reference and include standard manuals. Submit O & M Manuals in accordance with Section 01 7900, TRAINING PROGRAMS AND OPERATIONS AND MAINTENANCE MANUALS**.**

PART 2— PRODUCTS

2.1 GENERAL

A. The ATCS wayside equipment shall be fully compatible with the ATCS equipment currently installed on the LRVs.

B. All equipment shall operate reliably over an ambient temperature range of -25 degrees C to 75 degrees C.

C. Protective devices shall be provided to protect the system from EMI. All fuses shall have the correct voltage rating, current rating, interrupting rating and blowing times to provide the best obtainable protection for the given application without nuisance blowing.

2.2 TRACK SWITCHES

A. **NOT USED**

B. **NOT USED**

C. **NOT USED**

D. **NOT USED**

E. **NOT USED**

F. **NOT USED**

G. Track Switches will be provided and installed by the Construction Contractor. Switches will be dual controlled, 110V dc electrically operated. Switch and lock movement by Alstom, Model GM4000

2.3 WAYSIDE SIGNALS

A. Thales to provide signal interface at the cable termination frame to Construction Contractor furnished 6 aspect ATCS signals as shown on both northbound and southbound tracks at the Chinatown interlocking to control movement of Non-ATCS trains.

B. Thales to provide signal interface at the cable termination frame to Construction Contractor furnished signals as shown on both northbound and southbound tracks at the portal entry.

C. Thales to provide signal interface at the cable termination frame to Construction Contractor furnished station exit signals as shown for manual operations on both northbound and southbound tracks.

D. CCT and NCT trains shall receive the following Aspects and Indications:

Aspect	Indication
Red/Red	Absolute Stop. No Authority to proceed beyond the aspect**.**
Lunar White/Green	Clear to proceed on mainline at speed indicated by Cab Signal, or if Cab Signal is not available, following line of sight speed.
Lunar White/Yellow	Clear to proceed on diverging route at speed indicated by Cab Signal, or if Cab Signal is not available, following line of sight speed.
Lunar White/Red	Clear to proceed, with CCO authorization, on mainline in the reverse running direction, at speed indicated by Cab Signal or if Cab Signal is not available, following line of sight speed.

E. ATCS Trains shall receive the following Aspects and Indications:

Aspect	Indication
Red/Red	Absolute Stop. No Authority to proceed beyond the aspect.
Lunar White ‘A’	Proceed with move under ATCS control.

F. NCT and CCT trains which see an ATCS Lunar ‘A’ are required to treat the aspect as an absolute stop.

G. Wayside Signals will be furnished and installed by the Construction Contractor and will be LED 8 inches with round lenses, rated for 120 VAC with 20 watts maximum.

2.4 ATCS ENTRY TRACKSIDE EQUIPMENT

A. Entry into ATCS shall occur at the portal north of Bryant Street on both northbound and southbound tracks.

B. Portal shall have three axle counter blocks dedicated for entry handling:

C. Locate the stopping point for trains entering the tunnel at the signal located near the entrance to the tunnel. One axle counter demarking the inner end of the TMV Block shall be placed adjacent to the signal.

D. Locate the axle counter shared by the TMV Block and Boundary Block at the entrance to the portal.

E. Locate the outer Boundary Block axle counter to provide a nominal 22 feet Boundary Block.

F. Locate the 20-foot entry loop adjacent to the Boundary Block axle counter.

G. Construction Contractor will furnish and install portal intrusion detectors at the entrance to the tunnel portal. Sensitivity will be adjustable.

H. Enclosures shall be rust and rain proof and auxiliary hardware such as hinges and hasps shall be rust-proof metal.

2.5 INDUCTIVE LOOPS

A. Inductive loop cable will be furnished and installed by the Construction Contractor. The cable shall be suitable for applications that are both exposed on the track and embedded in the roadway.

B. Construction Contractor furnished loop cable will be terminated to the Thales-furnished Remote Loop Boxes (RLB).

2.6 AXLE COUNTERS

A. Axle counters shall be located to define blocks throughout the tunnel as shown in the Thales' installation documentation.

B. Axle Counters shall be furnished by Thales and shall be the latest model

meeting the requirements of these Specifications. ADD. NO. 2

2.7 EMERGENCY STOP BUTTONS

A. All station platforms shall be equipped with provisions for two Emergency Stop Buttons for passenger use as indicated on Contract Drawings. ADD. NO.2 **PCC 161**

B. NOT USED **PCC 161**

C. NOT USED **PCC 161**

2.8 INTRUSION DETECTION

A. Portal intrusion detectors will be provided and installed by the Construction Contractor at the portal using laser curtain technology similar to those at the existing SFMTA portal locations. Manufacturer shall be SICK Inc. or approved equal.

B. The ATCS system shall have the capability to support platform intrusion devices.

2.9 WAYSIDE SIGNS

A. The Construction Contractor will furnish and install "BEGIN ATCS" and "END ATCS" signs at ATCS entry/exit near the portal.

B. The Construction Contractor will furnish and install ATCS Entry "E" Signs at loop boundary locations as shown on the contract drawings.

PART 3—EXECUTION

3.1 GENERAL

A. Grounding shall be in accordance with AREMA and Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

B. The Construction Contractor will provide foundation and grounding arrangements for any trackside cases and cabinets in conformance with Thales Installation documentation.

C. All wires and cables entering/leaving racks or cabinets will be terminated on approved terminals by the Construction Contractor. All terminals shall be mounted on panel boards. Permanent labels shall be installed next to each terminal. Labels shall have indelible, 0.25 inch, black, and Helvetica letters on plastic of a contrasting color.

D. Sixty (60) days after SFMTA starts revenue service, Thales shall return and adjust

the proprietary equipment in the system as requested by the Engineer.

E. Wires and Cables:

1. The Construction Contractor shall install wires and cables in accordance with cable handling and pulling practice as defined by AREMA and Section 26 05 19,LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES, Section 27 15 00, COMMUNICATIONS COPPER AND OPTICAL FIBER HORIZONTAL CABLING, and the cable manufacturer's recommendations. All cable or wire shall be pulled into conduit by hand and installed in conduit runs in one operation.

2. Wires shall be terminated on terminal blocks. Terminals shall be installed only with tools and techniques recommended by the terminal manufacturer. Terminations on terminal blocks shall require two washers for one terminal, and three washers for two terminations. Terminations shall be completed with double nuts torqued to the rated value of the nuts.

3. All wires and cables shall be identified during the termination process. All single and multiple-conductor wires and cables shall be identified whenever they enter or leave a junction box, housing, or enclosure, and at all terminals. Permanent plastic labels fastened securely to the wires and cables shall be used for identification. Lettering for labels shall be indelible, black, Helvetica, protected from wear and dirt, and 0.25 inch for cables and 0.125 inch for wires. Wire and cable designations shall consistently conform to an overall scheme approved by the Engineer to indicate location, circuit, device, wire number, terminal branch, position, etc., in accordance with AREMA symbols, and nomenclature. Letters and numbers shall be used.

3.2 LRT SIGNALS

A. LRT signals will be furnished and installed by the Construction Contractor and shall be positioned and oriented for best visibility to provide Operators with non-conflicting visual feedback. Mounting shall be as indicated on the Contract Drawing and as directed by the Engineer.

3.3 INDUCTIVE LOOPS

A. The Construction Contractor will furnish and install loops throughout ATCS territory as shown in Thales-provided Installation documentation drawings. Loop antenna shall be installed between the rails with transpositions occurring approximately every 82feet. Loops shall be fastened to prevent sagging.

B. Loops in semi-exclusive right of way shall be embedded in roadway.

C. Provide a label at each loop transposition consistent with the SFMTA Market

Street installation.

3.4 INTRUSION DETECTION

A. The portal intrusion detection system shall allow rail vehicles to pass through without alarming but an intruder (person or large animal) entering the portal shall cause an annunciated alarm at the OCC. This equipment will be installed and initially adjusted by the Construction Contractor.

3.5 TESTING

A. Before the loops are permanently embedded within the tracks, the Construction Contractor will perform continuity test.

B. Thales shall make arrangements for the Engineer or the Engineers representative to witness factory tests on proprietary equipment. The factory tests shall comprise both hardware and software tests to determine the acceptability of each component and subsystem. Test results shall be traceable to requirements of these Specifications.

All tests shall be non-destructive. Any damage caused by the tests shall be corrected by Thales to the satisfaction of the Engineer.

C. Additional test requirements are described in Section 34 42 41, ATCS TESTING.

3.6 DELIVERY, STORAGE AND HANDLING

A. General requirements for delivery, storage and handling are provided in Section 01 60 00, PRODUCT REQUIREMENTS.

B. Equipment shall not be shipped until the relevant Factory Test Reports have been approved, in writing, by the Engineer.

C. Each item will be inspected by the Construction Contractor and Engineer for shipping damage prior to installation.

END OF SECTION

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SECTION 34 42 39

ATCS CENTRAL EQUIPMENT ADDENDUM NO. 1, 2 Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION

A. This section describes the requirements for ATCS equipment that will be located at Lenox OCC and the new Transportation Management Center (TMC).

B. The following equipment shall be located at Lenox OCC:

1. SMC1 – The SMC1, the hardware of which is furnished under a separate contract, shall be used for the Market Street Subway during testing and startup of the Central Subway. After ATCS commissioning, SMC1 shall be capable of controlling both Central Subway and the Market Street Subway as both a master and a backup (paired with SMC2). Provide two operator workstations to control the Central Subway ATCS from Lenox. ADD. NO. 1, 2

2. VCC for Central Subway, including Central Control Operator Terminal (CCOT) and connection to remote CCOT at TMC ADD. NO. 1

3. Target Simulator – Provide the following for the target simulator:

   a. A complete set of redundant VCC hardware

   b. Hardware and software necessary to incorporate the Central Subway into the track and vehicle simulator

   c. New workstation

   d. All other hardware and software necessary to upgrade the existing target simulator so that it can be used to simulate the Central Subway ATCS

4. Interface to existing emergency stop pushbutton system ADD. NO. 2

C. The following equipment shall be located at TMC:

1. SMC2 – The SMC2, the hardware of which is furnished under a separate contract shall be used for the Central Subway during testing and startup. After ATCS commissioning, SMC2shall be capable of controlling both Central Subway and the Market Street Subway as both a master and a backup (paired with SMC1). Provide two operator workstation computers to be incorporated into the Operations Room. ADD. NO. 1,2

2. Operations Simulator

3. Not Used ADD. NO.2

4. VCC CCOT to be incorporated into the Operations Room and all devices necessary to connect to the VCC at Lenox, including fiber modem. Fiber between TMC and Lenox will be provided by others. ADD. NO. 1

D. **Thales** shall upgrade the SMC and its interface with Subway Location Servers (SLS) to include Central Subway and new T Line Locations. Provide whatever hardware and software is necessary to communicate with the SLS. Conform to the latest version of the document "MUNI SMC UPGRADE THALES APPLICATION ON MUNI SUBWAY LOCATION SERVERS INTERFACE SPECIFICATION" as provided upon request. ADD. NO. 2

1.2 SUBMITTALS

A. In accordance with the requirements of Section 01 33 00,SUBMITTAL PROCEDURES, a complete book of plans for each location shall be submitted **by** Thales for approval prior to fabrication and factory wiring of the equipment racks for the specific location. A complete book of plans includes the following:

1. Schematic drawings for all systems and subsystems,
2. Complete circuit plans for all input and output functions performed by the system,
3. Complete flow diagrams, functional block diagrams and program listings for the system,
4. Complete power distribution circuit drawings and schematics.
5. Wire routing diagrams showing power distribution, hardware interface, serial data link, and any other wire, fiber and cable associated with the system. Wire routing within instrument racks, between instrument racks, and from instrument racks to entrance racks, power racks, and any other destinations shall be shown in detail,
6. Complete rack layout and arrangement of equipment.

PART 2— PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide software upgrades to existing SMC and Operations Simulators to make these subsystems fully operational for Central Subway.

B. Provide software and hardware updates to the existing target simulator at Lenox OCC that acts as a complete system simulator. Target simulator shall include all hardware necessary to emulate the VCC, station controllers and wayside

equipment. Simulator VCC hardware shall be identical to the VCC including redundancy.

C. Within the ATCS, like functions shall be performed by identical units. The hardware or equipment used in one portion of the system shall not be different from that used in another portion to perform the same function under identical operation and environmental conditions.

D. The application of special custom assemblies shall be confined to those required to comply with the Specification. Every effort shall be made to minimize custom design and minimize the number of unique chassis or modules.

E. All equipment shall be designed in a modular fashion to the greatest extent possible. Each rack, shelf, terminal board and other such items shall include twenty-five percent spare spaces for future additions. Spare space shall be arranged so that entire assemblies currently used can be added.

F. Each system shall be wired to accommodate a ten percent expansion of inputs and outputs. The circuit plans shall show all spare inputs and outputs. All wiring shall conform to approved practices. ADD. NO.1

G. Each system shall be supplied with ten percent spare memory and input and output circuit boards. ADD. NO.1

H. Equipment and software shall be the most recent proven versions.

I. All circuit boards shall have internal as well as external data and power surge protection.

J. Visual indications, such as LED lamps, shall be used to demonstrate that the system is functioning properly and to indicate faults, state of individual I/O, serial links, etc.

K. All microprocessor equipment shall be mounted complete with necessary accessories on standard 19-inch racks to accommodate equipment utilizing standard EIA hole spacing. Racks and/or cabinets shall be furnished with provisions for EMI mitigation and ventilation as required for optimum performance. No forced air ventilation shall be used.

L. The unit shall be designed with convection cooling such that heat generating components (e.g., transistors with heat sinks and large wattage resistors) shall not be located next to other components that are affected by temperature.

M. Each unit shall have a unique site identification code. This code and any other site specific information shall be resident on the unit. Where hardware settings are required, the hardware shall be located where the unique ID code cannot be inadvertently changed.

N. Labels shall be provided for each input and output that clearly denotes the respective function of each for ease of maintenance and troubleshooting. These

shall be provided for all wiring and terminals and be complete with nomenclature and include a “to/from” designation.

O. The dielectric requirements of the equipment shall be designed and manufactured to comply with recommendations as per AREMA C&S Manual, Part 11.5.1.

P. Provide a secure means by which an ATCS Administrator is identified and authorized.

Q. Provide a troubleshooting workstation (Snooper) that monitors ATCS network traffic and logs network telegrams.

2.2 POWER

A. The power source for input and output functions shall be separate from the one used for processor logic functions.

B. Provide all internal logic level power supplies. All **Thales** supplied power supplies shall provide DC isolation and indicator LEDs.

C. Each sub-system shall have its own dedicated power supply. Provide all such devices, including, but not limited to, the power supply, power switches, fuses and surge protection.

D. Power supplies shall have a proven reliable record in the application within the transit environment.

E. All power supplies shall be designed for easy removal and replacement and not require any de-soldering to remove or replace.

2.3 GENERAL HARDWARE REQUIREMENTS

A. The vital processor units shall have access from the rear.

B. All plug connectors, power supplies, power conditioning devices, terminal boards, wire connectors and other equipment required to achieve a complete, stand-alone subsystem shall be mounted on the instrument rack along with the associated processor units.

C. Each input, output and input/output printed circuit board shall be equipped with a lighted status indicator on each port. The indicator shall be lighted when the respective port is energized.

D. The use of external relays as interface devices between the vital processor units and external circuits shall only be as approved.

E. Each vital processor unit shall be provided with vital communication ports as specified herein. The number of vital ports shall be sufficient to allow inter-

connection of the vital processor units in accordance with the final design plus ten percent expansion capabilities. ADD. NO. 1

F. Each vital processor unit cardfile shall contain printed circuit boards.

1. The printed circuit boards shall be housed within a cardfile and be of the plug-in type. Keys shall be provided on the cardfile to prevent insertion of improper printed circuit board types.

2. The cardfiles shall be factory mounted in a standard rack designed to accommodate standard EIA hole spacing. All wire connections to the cardfiles shall be via plug connected cables.

3. No forced air ventilation shall be allowed.

G. The ATCS shall not use any custom or semi-custom integrated circuits.

H. The design shall provide that all cables or wiring leaving the instrument racks shall be routed with adequate protection at the top of the racks and be provided with means to be neatly routed and securely fastened.

I. The hardwire DC inputs of the vital processors shall not respond to AC of any voltage level. The hardwire inputs shall be biased and shall not, under failure condition, respond to any voltage of improper polarity. Hardwire inputs shall be optically isolated from the vital processors.

J. A hardware and firmware keying method shall be employed rendering it impossible for any vital processor to operate with firmware designed for any other vital processor.

K. All circuit boards and components shall be new. The use of refurbished material is not permitted.

L. All circuit boards shall have a unique serial number clearly marked on each board. The board manufacturer's part number shall also be clearly marked on each board. All markings shall be of a permanent type.

M. Each circuit board shall have all components clearly identified by a silk screening process. All markings shall be clear and easily readable. The markings shall include, but not to be limited to, polarity, switch position numbers, resistor identifications or integrated circuit identifications.

N. Each circuit board shall be secured in the chassis in a secure manner such as captive screws or latching ejector tabs. Both the top and bottom of each board shall be secured.

O. Each circuit board shall be coated with a moisture sealant after manufacture and testing. Any further work done using an approved process and shall not exceed eight components on any printed circuit board after which the board shall be re- coated.

P. Supply a minimum of one each of any extender card required to match each type of

circuit board for each location; OCC and TMC.

Q. The circuit boards shall be removable and be mounted on guide-ways or channels for ease of removal or insertion. The removal of any wire shall not be required to replace a circuit board.

R. All circuit boards using indicator LEDs shall have the LEDs mounted on the front edge of the board. The LEDs shall be labeled on the board in a permanent method.

S. Each differing type of circuit board shall be uniquely keyed. The chassis slots for circuit boards of the same type shall be keyed to match the board and reject others. Circuit boards that are common to those applied within the existing SFMTA ACTS shall be identically keyed. The keying methods shall be modifiable and submitted for approval.

T. Each circuit board and chassis slot shall be provided to withstand a minimum arc-over potential of SFMTA traction voltage between conductor and ground.

U. All circuit boards shall have internal surge and polarity protection for power, data, control and indication inputs and outputs.

V. The vital processor unit shall be equipped with vital lamp driver printed circuit boards. **Thales** may submit alternate method utilizing interposing relays for approval of the Engineer. The following requirements apply:

1. These shall be furnished and installed in sufficient number to accommodate all vital signal LED units within the Vital Processor's scope of control.

2. Energy shall be output directly to the signal units as described herein through the specified cables and termination points.

3. The allowable wattage outputs shall be adequate to handle the designed maximum lighting load, as approved by the Engineer.

W. All data communications between vital controllers shall conform to approved EIA Standards.

2.4 CHASSIS CABINETS

A. Any unused chassis slots shall be fully covered by blank removable plates or by a single piece cover made of the same material as used for the working circuit boards. All chassis shall have a solid protective cover on the front to protect the circuit boards and any switches or push buttons from accidental operation. The protective cover shall be removable. Provisions shall also be made to protect the backplane in an approved manner. The top portion of processor units shall be arranged so it prohibits its use as a shelf and having items such as tools, manuals, etc. placed upon it.

B. The chassis and cabinet material shall be steel or aluminum or other non-corroding material as approved. Chassis shall be supplied with hinged rear panels that permit easy access to rear edge connectors.

C. All chassis and cabinet internal edge connector to edge connector wiring shall be Tefzel wiring, unless approved otherwise.

1. All wiring shall be twisted pairs where required to provide maximum isolation to EMI noise.

2. All support devices and internal chassis and cabinet elements shall be protected with an approved material to prevent wires from being cut or damaged.

D. All chassis shall be flush mounted to the face of the rack unless otherwise approved.

E. Any ventilation screens shall be easily removable for cleaning.

F. All chassis and cabinets shall be completely covered or enclosed to prevent the entry of rodents. A complete detail of each chassis and cabinet shall be submitted for approval.

G. Each chassis shall be grounded to the rack with a #10 AWG stranded green wire. No ground loops or series ground wires are permitted.

H. A method, as approved by the Engineer, shall be used to mount a typed, or printed, name tag on a front plate of each rack and cabinet.

I. All wiring and wire terminals shall be tagged in an approved manner.

2.5 EMERGENCY STOP SYSTEM

A. Provide an Emergency Stop function using the existing Emergency Stop System that is safety critical and fully redundant. No failure mode shall result in the System being incapable of stopping trains. Failure modes that could have unsafe consequences are eliminated, prevented, or otherwise accounted for by design. The design shall also be fully redundant such that no single point failure within the System can result in a stop command being activated. ADD. NO. 1

B. Provide an interface to the existing emergency stop pushbutton system at Lenox OCC as indicated on the Contract Drawings. The existing pushbuttons shall function as an Emergency Stop System for the Central Subway as well as the Market St Subway. Interface for TMC pushbuttons shall be at the existing VCC1 interface rack. The interface for Lenox pushbuttons shall be at either the pushbuttons or the existing VCC1 interface rack. ADD. NO. 1

C. At Lennox OCC, provide one Central Emergency Stop Button at the Control console, 2 vital relay switches in the existing ATCS Equipment Rack and wiring

from the Control Console to the existing localized ATCS Equipment and provide required programming. PCC 0066

D. At TMC provide two Central Emergency Stop Buttons (one for Controller and one for Supervisor) and wiring from the control consoles to existing localized ATCS Equipment and provide required programming. PCC 0066

E. Equipment for the Emergency stop Systems shall be provided to the Construction Contractor for installation in these facilities.

PART 3— EXECUTION

3.1 INSTALLATION

A. The Construction Contractor will confirm conduits and raceways are adequate for the ATCS prior to installation based on Thales Book of Plans and cabling plans for these locations.

B. Instrument racks shall be arranged and mounted by the Construction Contractor as indicated on the Thales Book of Plans and related layout drawings in accordance with the approved installation plans.

C. The cardfiles shall be mounted in shock mounted instrument racks sized to accept standard 19 inch modular components. All wire connections to the cardfiles shall be via plug connected cables.

D. All cables or wiring leaving the instrument racks shall be routed through rubber boots at the top of the racks and shall be neatly routed and securely fastened.

E. The mounting of cardfiles and associated equipment shall provide for easy access to all test points, indicators, and adjustments.

F. The normal and standby units, if not on the same rack, shall be in the same row and shall be on adjacent racks.

G. Provisions for EMI mitigation (shielding) shall be made as determined by results of the **Thales'** investigation to ensure proper operation of equipment relative to the environment.

3.2 DELIVERY, STORAGE AND HANDLING

A. General requirements for delivery, storage and handling are provided in Section 01 60 00, PRODUCT REQUIREMENTS.

B. Proprietary ATCS Equipment shall not be shipped by Thales until the relevant Factory Test Reports have been approved, in writing, by the Engineer.

C. Each item of the ATCS will be inspected by the Construction Contractor and

Engineer for damage prior to installation.

3.3 TESTING

A. General test requirements are given in Section 34 42 41, ATCS TESTING.

3.4 WORK RESTRICTIONS

A. Refer to Section 01 12 17, WORK SEQUENCE AND CONSTRAINTS for work restrictions at the SFMTA control centers.

END OF SECTION

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SECTION 34 42 41

ATCS TESTING Amendment 1

PART 1—GENERAL

1.1 DESCRIPTION OF WORK

A. The work specified in this section includes requirements for the testing and start-up of an ATCS that is fully integrated with the Central Subway and all elements of the system meet the design, construction and installation specifications.

B. Factory Tests: Factory tests are the responsibility of Thales and may include Design Qualification Tests and Production Verification Tests. Design Qualification Tests verify the performance of new engineering designs. Production Verification Tests confirm that equipment and materials are manufactured in accordance with accepted workmanship standards, specifications and function as intended.

C. Installation Verification Tests: Installation Verification Tests, also referred to as Post-Installation Check Out Tests (PICO) are the responsibility of Thales, except as noted in 1.06 below, and are conducted at the subsystem or assembly level during and after the installation of each element. Installation Verification Tests may include static tests.

D. Functional Tests: Functional Tests are the responsibility of Thales and are conducted at the subsystem level to verify that the performance of each element and subsystem/assembly is in compliance with specification requirements. These tests are performed on-site and are pre- requisites to the System Integration Tests. Functional Tests may include dynamic tests.

E. System Integration Tests: System Integration Tests are the responsibility of Thales and are conducted to confirm that all elements of the facility will function properly as an integrated system. These tests include end-point-to-end-point verification of the system's functionality when more than one subsystem is involved.

F. System Performance Tests: System Performance Tests are the responsibility of-Thales and are conducted to verify the performance of ATCS. These tests include verification of:

1. ATCS can track and control trains throughout the Central Subway including all routes.

2. Failure recovery scenarios specified in Section 34 42 25, ATCS FUNCTIONAL REQUIREMENTS.

3. Turnback operation

4. Scheduled operation with multiple trains

G. Pre-revenue Operations: Pre-revenue Operations will be performed by SFMTA. Thales shall support Pre-revenue Operations by providing on- site technical personnel familiar with all operational aspects of ATCS.

1.2 SUBMITTALS

A. Pursuant to the provisions of Section 01 33 00, SUBMITTAL PROCEDURES, Thales shall submit the following:

1. Testing and Start-Up Program Plan.

2. Test Procedures.

3. Test Reports.

4. Monthly Progress Reports.

B. Submit an ATCS Testing and Startup Program Plan for Engineer and approval review within 30 calendar days of Notice to Proceed. Revise and resubmit the Test and Start up Program Plan within 20 calendar days after receiving Engineer comments. The Testing and Start up Plan shall include the following:

1. An organizational chart clearly showing lines of authority, and names and responsibilities for all noted personnel. It shall identify all participants necessary to perform and complete the testing and illustrate their reporting relationships to Thales management team.

2. The experience level and qualifications of personnel involved in managing, coordinating and monitoring the testing program.

3. The internal methods and communications to be used to control the program schedule, technical performances, program changes, subcontracts or purchase orders, material procurement, and field service support.

4. A master program schedule (Gantt chart) showing key milestones and events. Include sufficient detail to show when each type of testing begins and ends, including Factory Tests, Construction Inspection Tests, Installation Tests, Functional Tests, System Integration Tests, and Commissioning Tests. This master program schedule must be incorporated and be consistent with the Baseline Schedule.

5. A flow chart/critical path method (CPM) schedule of all project tasks indicating interaction of Testing and Commissioning of systems or subsystems from suppliers.

6. An inventory of the materials, equipment and systems subject to testing, as well as a listing of the permits and certifications required to complete the Work.

7. A list of test procedures (by test procedure number) to be submitted, preliminary submittal schedule, a preliminary schedule of tests, a brief description of each test, and who will be performing the test (e.g., independent testing agency, Contractor, manufacturer, etc.)

8. All ATCS tests required by these Specifications shall be included. In addition, other tests and requirements that are deemed necessary by the Contractor shall be included.

9. Organize listing of tests by test type, including Factory Tests, Installation Verification Tests, Functional Tests, System Integration Tests, and System Performance Tests.

10. An outline format of the procedure and test data sheets for each type of test.

11. Requirements and recommendations for witnessing by the Engineer.

C. Test procedures shall be submitted for approval at least 60 days in advance of each scheduled test, unless noted otherwise in the various sections of the Specifications. The test procedures shall include, as a minimum:

1. Objective: Provide a concise statement of the reason for conducting the test.

2. Prerequisite Tests: Clearly state the title(s) and procedure numbers of the prerequisite test(s) needed to be performed and provide a means to identify that they were successfully completed as prerequisites. Include requirements for periodic calibration checks/re-calibration.

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

4. Test Equipment Required: 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.

5. Test Equipment Setup: Clearly describe, with the aid of drawings or sketches, all necessary arrangements and the setup necessary for conducting the test, including physical location of instrumentation, the connections for wires, harness, sensors and firmware. All requirements

for periodic re-calibration or calibration checks during the test shall be highlighted in this section.

6. Personnel: Clearly identify all special assistance or support needed from SFMTA, including engineering, operation and maintenance personnel.

7. Test Sequence: 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.

8. Test Pass/Fail Criteria: 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.

9. Test Notes: Use this 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.

10. Action Taken: Use this section to record action taken on all discrepancies.

11. Estimated duration of the test.

12. Test Data Sheets. Test data sheets shall 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.

    a. General Test Data Sheets: General or generic test data sheets shall provide a template, or general layout, for all tests in a particular test category. General test data sheets can be prepared to apply in more than one test category. General data sheets shall include test identification, date or revision number, and spaces for check-off, discrepancies, and verification of the test's completion. Where applicable, general test data sheets shall include drawing numbers, test equipment and their respective model numbers, references to the applicable procedure number, allowable limits for certain entries, and corrective actions required.

    b. Site-Specific Test Data Sheets: Site-specific test data sheets shall contain all the information for each test category and each test condition for the site. Test data sheets incorporating site-specific information shall be submitted to the Engineer 10 days prior to conducting test. Data entries shall be referenced to the applicable procedure, and allowable limits for each entry shall be indicated on the data sheets.

D. Six (6) certified copies of each Test Report shall be submitted to the Engineer for acceptance within five (5) working days after completion of each test. Test Reports must contain all the data obtained during tests, and analysis of the data and conclusions relating to the test pass/fail criteria outlined in the test procedure. A test that fails must be repeated and all corrective actions taken to pass the re-test must be outlined in a new test procedure. Each Test Report shall include the following:

1. Type of test.
2. Date and place of test, duration of test, results of test.
3. Identify who conducted the test, who reviewed the test data and who witnessed the test.
4. Clearly identify all follow-up actions that may be required if the test needs to be re-done.
5. All supporting documentation shall be attached to each Test Report, including data sheets, sign-offs and certifications.
6. The data sheets shall use a checklist item format to indicate Pass/Fail, in accordance with the established measures, to demonstrate compliance with the technical specification requirements for each item tested or verified.
7. Each step number in the test procedure sequence shall have one-to-one correspondence with the step numbers in the corresponding data sheet.
8. The data sheet shall include a step-by-step format for data reduction, formulas used for calculations, acceptance criteria, and justification for the criteria set forth.
9. The results of each test step, as required, shall be recorded in checklist form. The data sheet shall include the applicable test procedure number, test step, parameter measured and pass/fail criteria (measure), and a column to indicate the result of each required test step.
10. All electronic data collected to verify the readiness of a system or specific piece of equipment shall be archived in electronic format and delivered to SFMTA on a single compact disc (CD) at the completion of the project.
11. Test Reports, including test certificates, shall directly support SFMTA's Safety Certification Program as outlined in the Safety Certification Program Manual.

E. During the performance of the Testing Program, **Thales** shall submit Monthly Progress Reports. The Monthly Progress Reports shall include a current assessment of progress against the approved program and production delivery and acceptance schedules. The assessment shall clearly show the state of the

test program relative to approved schedules and identify the critical paths to project completion. A printout of the schedules to show progress to date (in chart format) describing equipment or system test activities, assigning a test identification number, status of the test, start and finish dates, and comments shall be included. The Monthly Progress Reports shall provide a detailed narrative with information on each of the following:

1. Test Procedures submitted for approval.
2. Test Procedures approved for testing.
3. Tests in progress.
4. Tests completed.
5. Major problems (i.e., delays incurred) and action items.
6. Progress against the approved program schedule.
7. Technical performance variations from the technical specification requirements.
8. Organizational changes.
9. Subcontractor programs progress.

1.3 QUALITY ASSURANCE/QUALITY CONTROL

A. All testing shall be performed in conformance with the requirements of Thales' approved Quality Control Program.

B. Manufacture Quality - Ensure the quality of materials, fabrication and finish by in-process testing and inspection. Ensure the finished product by approved factory tests for their compliance with these specifications.

C. Component Quality – Individual components shall be 100 percent tested by Thales before incorporation in assemblies or subsystems to prove that the components meet the design requirements.

D. Installation Quality - System installation and construction quality shall be ensured through the performance of tests and inspections made during the progress of this Contract and after completing the installation of equipment.

1.4 SCHEDULING & COORDINATION

A. The Thales Baseline Schedule shall include all levels of testing prescribed in this Section.

B. Coordinate all testing and start-up activities such that they occur in logical, related sequences.

C. Coordination and progress meetings shall comply with Section 01 31 13, PROJECT COORDINATION and Section 01 31 19, PROJECT MEETINGS.

1.5 ENGINEER TO WITNESS TESTS

A. The Engineer, having been notified by Thales at least 72 hours in advance, must be present at each and every on-site test intended to demonstrate compliance with this Contract. No on-site test shall be considered valid unless it was witnessed by the Engineer and/or his/her designated staff.

1.6 TESTS PERFORMED BY OTHERS

A. A portion of the ATCS PICO tests shall be performed by the Owner's Construction Contractor to confirm all proprietary ATCS equipment has been installed in accordance with Thales' installation documentation and all non-proprietary ATCS equipment is operating correctly. These tests shall include, but are not limited to:

1. Cable Installation Verification Testing of all Construction Contractor-installed signal cables per AREMA Requirements.

2. Installation Verification of all low voltage cables and fiber optic cables including continuity tests of copper cables and OTDR and Power Meter tests of fiber optic cables.

3. Powered Switch Machine Testing including verification of manual operation, setting of locking and point detection in accordance with AREMA Requirements for Switch Machine Adjustments.

4. Wayside Signals testing including ring out of signal aspect cabling and verification of signal lighting.

5. Axle Counters Installation verification in accordance with Thales installation documentation.

6. Inductive loop installation verification, including continuity testing

7. Portal Intrusion installation and operation verification.

8. Train Control Room equipment installation verification including all

Thales-furnished equipment.

9. Central Equipment at Lennox and TMC installation verification including all Thales-furnished equipment.

10. Verification of TCR and wayside power and grounding.

11. Verification of UPS operation.

1.7 ACCESS TO WORK SITE LOCATIONS

A. The Construction Contractor shall make available to Thales access to the worksite for testing as follows:

1. Access to TCRs – CTS, YBM and UMS
   a. After completion of the Construction Contractor's TCR PICO Tests, Thales shall have 24 hours of access per day, seven days per week to each TCR

2. Access to Wayside tunnels and trackway
   a. The parties will negotiate Thales' post-PICO testing tunnel access in a subsequent contract modification.

3. Access to Lennox and TMC
   a. After completion of the Construction Contractor's PICO Tests, Thales will have access to Lennox and TMC for testing that does not impact SFMTA Operations for 24 hours per day, seven days per week. Any testing with the potential to impact any SFMTA operations shall be scheduled during non-revenue windows unless approved by the Engineer.

B. Thales shall provide detailed testing schedules with access and support requirements updated weekly to ensure coordination with other work activities and SFMTA Operations.

PART 2—PRODUCTS

NOT USED

PART 3—EXECUTION

NOT USED

END OF SECTION

Appendix I

ATCS APPROVED SCHEDULE

1. "ATCS APPROVED SCHEDULE" is amended as follows:

Milestone No.	Description	Components	Approval Date
1	Mobilization	NTP	Nov-2014
		Item 1 Total	
2	Initial Submittals	Preliminary Project Schedule Review with Tutor	Mar-2016
		Item 2 Total	
3	Preliminary Design	System Assurance Plan Documentation on	Jul-2015
		Item 3 Total	
4	Intermediate Design	AZLM Test Results	Dec-2015
		Interface Control Document	Feb-2016
		Safety Related Design Assumptions	Jun-2020
		Description Of Safety Assurance Concepts and Program	May-2016
		Description of Overall ATCS System	Jun-2020
		Standards use to design Vital ATCS Software	Feb-2015
		Preliminary Hazard Analysis	Dec-2015
		Intermediate Design Review Package	Jun-2020
		Item 4 Total	
5	Final Design	Recommended Spare Parts List	Oct-2016
		Testing and Startup Program Plan	Jun-2020
		Standards used to design Class 1 Hardware	Mar-2016
		Fault Tree Analysis	Jan-2021
		ATCS Reliability Analysis	Dec-2019
		Maintainability Analysis	Dec-2019
		Schematic Drawing of ATCS Room Equipment	Dec-2019
		Room Layout Drawings	Dec-2019
		Final Design Review Package	Jan-2021
		Item 5 Total	
6	Factory Acceptance Tests Complete	Release BOM for Procurements	Dec-2019
		Test Lab Available	Jun-2020
		Complete Flow Diagrams, Functional Block Diagrams	Dec-2019
		FMECA of Class 1 Hardware	Dec-2019
		FAT Test Results	Jun-2020
		Item 6 Total	
7	Hardware Procurement	Rack Layout Drawings	Dec-2019
		Equipment Arrangement Drawings	Dec-2019
		Power Distribution Drawings and Power Calculations	Dec-2019
		Wire Routing Diagrams	Dec-2019

Milestone No.	Description	Components	Approval Date
		Equipment Plans and Installation Drawings	Dec-2019
		Circuit Plans for all I/O functions	Dec-2019
		Schematics of new Hardware Components	Dec-2019
		Shop Drawings for all Equipment	Dec-2019
		Foundation, Grounding Arrangements	Oct-2016
		Item 7 Total	
8	Deliver Hardware **(Paid under 1266-1)**		Dec-2019
		Item 8 Total	
9	Installation, Software Testing	Installation Procedures	Dec-2019
		Preventative Maintenance Plan	Jun-2020
		Guideway Correspondence Testing	Mar-2020
		PICO Test Results	Dec-2019
		Operating and Maintenance Manuals	Jun-2020
		ATCS Reliability Demonstration Test Plan	Dec-2019
		ATCS Maintainability Demonstration Test Plan	Dec-2019
		Book of Plans for each Train Control Room	Dec-2019
		Book of Plans for each Central Control Equipment Room	Dec-2019
		Item 9 Total	
10	Start up and Testing	As-built Drawings for train control rooms	May-2020
		As-built	
		Drawings for central control equipment room SAT test reports	May-2020
		Item 10 Total	
11	Substantial Completion	System Integration Tests Completed	Aug-2020
		System Integration Tests Reports-Draft	Sep-2020
		SFMTA training completed	Sep-2020
		Item11 Total	
12	Final Acceptance	Final system integration test reports	Oct-2020
		Successful completion of reliability demonstration test plan	May-2022
		Item 12 Total	
CM 073	CN 1300 MODIFICATION NO. 073 - Emergency Pushbutton Revision	CN 1300 Mod 73	
		CMOD 073 Total	
CM 2	CN 1266 PCC 2	Wayside Equipment Relocation - Bryant St	
	CN 1266-2 STC I/O	Task 10.30 Switch Machine Power Logic	
	CN 1266-2 STC I/O	Task 20.10 CTF Revisions & Materials	
	CN 1266-2 STC I/O	Task 30 DCS Rack Revisions	
	CN 1266-2 STC I/O	Task 40 Cable Specifications	
		CMOD 2 Total	
	TOTAL CONTRACT MODIFICATIONS:		