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CONTRACT MODIFICATION No. 03

SFMTA Contract No. 1266-2, ATCS Implementation	**Consultant:** Thales Transport & Security, Inc. 5500 Corporate Drive, Suite 500 Pittsburgh, PA 15237

Contract Modification No. 03 – **ATCS Consolidated Changes and Acceleration**

Summary: This Contract Modification No. 3 modifies ATCS software, equipment and operations requirements to: (1) apply design changes to automate train movements in accordance with NFPA 130 Tunnel Ventilation requirements; (2) apply corrected track speeds according to TC-Series drawings (3) apply the final stationing of installed wayside equipment (4) reduce the number of Portal Intrusion Devices; (5) provide two independent circuits for Platform Emergency Stop Buttons; and (6) rearrange equipment in CTS Train Control Room to accommodate separate Local System Management Center (LSMC) and Axle Counter Evaluator (ACE) racks, and accelerate implementation of ATCS in CN1266-2 reaches ATCS Substantial Completion on or before April 29, 2022. This Contract Modification clarifies ATCS Work Milestones requirements and increases the Contract Amount $12,831,743.60 to compensate Thales for the changes to the Work described herein. The conditions provided in TTS-S1408-LTR-SF-210 (attached here as Appendix 9) will be supported by SFMTA as it applies to the contract modification associated with the Accelerated Testing and Commissioning activities.

The Contract is modified as follows:

1. Scope of Work

A. Automate Compliance with NFPA 130 Tunnel Ventilation. Thales shall revise ATCS operations and software as described in revised Specifications Section 34 42 25 Part 2.7 and 2.8 (attached here as Appendix 3) to include automated constraints that preclude more than one train in a tunnel ventilation zone and two trains in the crossover cavern. The compliance with NFPA 130 shall be done as described in the updated PDR presentation issued to SFMTA under TTS-S1408-LTR-SF-208 (attached here as Appendix 7). At FDR, these new functions shall only be demonstrated through an animated PowerPoint. Thales shall facilitate and coordinate with the SFMTA to review ATCS designs to confirm that the designs accord with SFMTA light rail operations requirements.

B. Controlling Documents for Track Speed. Thales shall conform its ATCS designs and modifications to the track speeds and gradients shown in the ATCS Drawings (Track Drawings TC-101 through TC-119 and AT-103, AT-104, AT-105 (attached here as Appendix 5). As noted in the SFMTA's response to Thales Letter 170 (attached here as Appendix 6), the TC-Series Drawings shall govern over the AT-Series Drawings in case of any conflict between the sets of Drawings.

C. Guideway Database Changes. Due to installation constraints, certain Axle Counter Rail Contacts and Wayside Signals have been relocated from the original contact locations. Thales shall make the necessary changes to the guideway database to include final stationing of wayside devices provided to Thales in RFI-070 response on February 2, 2021 (attached here as Appendix 6).

D. Miscellaneous Changes. Thales shall perform the following Additional Work to

modify the ATCS designs as described below:

1. Portal Intrusion Device (Task 10.10). Thales shall eliminate one Portal Intrusion Device at the entry to the tunnels on Fourth Street, and shall amend the hardware and software design interface to operate using a single PID. (Reference Specification 34 42 37 and Drawings AT-157.)

2. Platform Emergency Stop Button (Task 10.20). Thales shall modify the hardware Input/Output points and related software so that the northbound and southbound Platform Emergency Stop Buttons each independently control its assigned trackway. (Reference Specification 34 42 25 and Drawings AT-022.)

3. CTS Equipment Room Layout (Task 50). Thales shall modify the designs for equipment location and installation in the CTS Train Control Room to accommodate separate LSMC and ACE racks. (Reference Specification 34 42 35 and Drawings AT-251.)

2. Acceleration. The SFMTA will pay Thales $9,942,260.18 to accelerate remaining ATCS Work in order to ensure the ATCS has achieved ATCS Substantial Completion on or before April 29, 2022.

3. Schedule and Milestones.

A. Background. Thales has been informed of the following information, and shall conform its schedule to perform the remaining ATCS Work accordingly:

Contract 1300 between the SFMTA and Tutor Perini Corporation (TPC) for the construction of the Central Subway Stations, Trackway and Systems was modified on March 2, 2021 (Contract Modification No. 137) to provide Substantial Completion on or before March 31, 2021, and Final Completion on or before September 27, 2021. TPC has committed to complete the installation of ATCS infrastructure, cabling and electricals power on or before March 31, 2021 as a condition of Substantial Completion, so that the SFMTA can commence operational systems and dynamic train testing in the Stations and Tunnels on April 1, 2021. Revenue service is expected to commence in the Summer of 2022.

B. Milestones. ATCS Accelerated Schedule is attached in Appendix 8.

C. Liquidated Damages

The Contract Modification, when executed will have the effect of deleting and replacing Section 13.5.a. of the Implementation Contract, “Delay Due to Thales” as follows:

1. By entering into this Implementation Contract, Thales agrees that in the event the ATCS Substantial Completion is delayed, the City will suffer actual damages that will be impractical or extremely difficult to determine. In light of the SFMTA’s intention to commence final systems testing on or before April 29, 2022 and commence revenue service in the Summer of 2022, Thales agrees to

achieve the ATCS Substantial Completion as defined in Section 2.7 of the Agreement on or before April 29, 2022 . Thales shall be liable for Liquidated Damages in the amount of $15,000 per Day commencing on April 30, 2022 for each Day of delay to ATCS Substantial Completion that is solely and directly attributable to Thales. After July 31, 2022, liquidated damages shall increase to $50,000 for each Day of Delay to ATCS Substantial Completion that is solely and directly attributable to Thales.

2. Said liquidated damages are not a penalty, but are a reasonable mutually agreed estimate of the losses that the City will incur based on the delay to ATCS Substantial Completion, 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, novated and/or amended. The City shall subtract said amounts of liquidated damages from amounts that are due Thales.

3. For the avoidance of doubt, notwithstanding any other provision of this Implementation Contract, Thales's liability for Liquidated Damages 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 Contract Modifications.

4. Project Delay. The SFMTA will pay Thales $2,491,394.00 (Delay Compensation) to compensate Thales fully for all delays, costs and impacts it incurred that arise or are related to Thales' inability to access the Central Subway work sites and related delays to its performance of ATCS Services from March 2019 to January 2021.

5. Compensation. This Contract Modification No. 3 increases the Contract Amount $12,831,743.60 to compensate Thales for the Additional Work described in Section 1, the Delay Claims described in Section 4, and the acceleration of completion of remaining ATCS Work in Section 3, for a modified Contract Amount of $27,730,300.40. The SFMTA shall pay Thales the amounts stated in the following table within 30 Days of completion of the listed Milestones Payment Schedule (Appendix 3).

6. Claims Release. The compensation set forth in this Contract Modification comprises the total compensation due to Thales for all costs for the Additional Work and described in this Contract Modification No. 3. The execution of this Contract Modification constitutes an accord and satisfaction of any and all claims for additional compensation for the Additional Work described in this Contract Modification No. 3. The Delay Compensation stated in Section 4, above, is full satisfaction and accord for all claims that Thales has brought or may ever bring concerning delay or interference with Thales performance of ATCS Services (Delay Claims), known and unknown, that arise up to and including the Effective Date of the Contract Modification No. 3, and Thales waives all such Delay Claims. The Delay Compensation fully compensates Thales for all costs and damages that it has incurred or may incur, including but not limited to all escalation costs for labor, materials, equipment storage costs, costs related to extension of warranties and licenses, labor inefficiencies, schedule impacts, overhead, and all other costs and impacts of every kind that directly or indirectly arise from or are related to delay to or interference with Thales' performance of ATCS Services up to and including the Effective

Date of this Contract Modification No. 3.

7. Changes Limited and Express. This Contract Modification is made in accordance with Paragraph 14.36 of the Contract. Except as specifically stated in this Contract Modification, all other terms and conditions of the Contract remain unchanged and are in full force and effect. Any modification of the Contract must be express and in conformance with the General Provisions and Special Provisions of the Contract.

8. Effective Date. The Effective Date of this Contract Modification shall be March 16, 2021, conditioned upon the approval of the SFMTA Board of Directors and the San Francisco Board of Supervisors.

9. Included Appendices. The following appended documents are incorporated to this Contract Modification No. 3:

Appendix 1: Schedule of Price – current table
Appendix 2: Milestone Delivery & Payment Schedule
Appendix 3: Revised ATCS Specifications Section 34 42 25 Part 2.07
Appendix 4: As information only: Hazard Analysis, dated July 21, 2020
Appendix 5: ATCS Drawings AT-103, AT-104, AT-105 and Track Drawings TC-101 through TC-118
Appendix 6: SFMTA January 27, 2021 Response to Thales RFI-070 (2-2-2021)
Appendix 7: Thales Letter: TTS-S1408-LTR-SF-0208 “PCC006 PDR MoM and Follow-Up” Dated March 12th, 2021
Appendix 8: ATCS Schedule
Appendix 9: Thales Letter: TTS-S1408-LTR-SF-0210 “Revised Quote for Implementing Changes as per PCC 006 with Acceleration” Dated March 12th, 2021

Signatures are on the following page.

In Witness Whereof, the parties have executed this Modification in San Francisco, California as of this day April _____, 2021.

THALES TRANSPORT & SECURITY, INC.

By: _____

Alcino DeSousa
General Manager

CITY AND COUNTY OF SAN FRANCISCO

By: _____

Jeffrey Tumlin
Director of Transportation

Authorized By:

Municipal Transportation Agency Board of Directors

Resolution No: _____

Adopted: _____

Attest: _____
Secretary, Board of Directors

APPROVED AS TO FORM:

Dennis J. Herrera
City Attorney

By: _____

Robert K. Stone
Deputy City Attorney
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Appendix 1
Schedule of Price

Milestone No.	Description	Value
CM 3 -1	ATCS Consolidated Changes and Acceleration – Complete Preliminary Design Review	$1,988,452.04
CM3 - 2	ATCS Consolidated Changes and Acceleration - Delivery of Schedule	$1,988,452.04
CM3 - 3	ATCS Consolidated Changes and Acceleration - Final Design Review Workshop Complete	$1,988,452.04
CM3 -4	ATCS Consolidated Changes and Acceleration - Build 3.2 FAT Completion	$1,988,452.04
CM3 - 5	ATCS Consolidated Changes and Acceleration – Build 3.25 SAT Completion	$1,988,452.04
CM3 - CN 1266-2 STC I/O	Task 10.10 Portal Intrusion Device	$264,011.40
CM3 - CN 1266-2 STC I/O	Task 10.20 Platform Emergency Stop Button	$118,779.00
CM3 - CN 1266-2 STC I/O	Task 50 CTS Equipment Room Layout Placement	$15,299.00
CM3 -6	Delay Claim	$2,491,394.00
	Subtotal CMod 3	$12,831,743.60
	Awarded Contract Amount	$21,363,292.05
	ATCS Expenditures Paid Under Contract 1300	($7,054,078.05)
	CN1266-2 Contract Amount	$14,309,214.00
	Value of Contract Modifications 1 and 2	$589,342.80
	Modified Contract Value	$27,730,300.40

Appendix 2
Milestone Delivery & Payment Schedule

Description	Delivery Schedule	Payment Schedule
Preliminary Design	NTP + 1 Month	20% at Acceptance of Deliverable
Delivery of Schedule	NTP + 2 Months	20% at Acceptance of Deliverable
Final Design Review Workshop Completion	NTP + 2 Months	20% at Acceptance of Deliverable
BUILD 3.2 FAT Completion	NTP + 8 Months	20% at Acceptance of Deliverable
BUILD 3.2 SAT Completion	NTP+ 11 Months	20% at Acceptance of Deliverable
Task 10.10 Portal Intrusion Device	NTP + 1 Month	100% at Completion
Task 10.20 Platform Emergency Stop Button	NTP + 1 Month	100% at Completion
Task 50 CTS Equipment Room Layout Placement	NTP + 1 Month	100% at Completion
Delay Claim	NTP + 1 Month	100% at Completion

Appendix 3

SECTION 34 42 25

ATCS FUNCTIONAL REQUIREMENTS ~~ADDENDUM NO. 1, 2,~~ 3PCC 03

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 ContractSpecifications.

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 ~~Contractor~~ 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 Subwaysystem 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 possiblegiven 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 Modewithout 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 onthe 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 placingthe 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 changesby 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 serviceon-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 PlatformSTL
Storage Track Left
STR Storage Track Right
UML Union Square/Market St
Station Left Platform UMR Union
Square/Market St Station Right
PlatformYBL 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 ina 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 ATCSsupervised trains.

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

    d. Detect the presence of "unknown" trains in the system via the axlecounter 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, equipmentspeed 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 softwareso 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 Lenox Control Room shall be used during testing and startup of the Central Subway. The TMC Control Room 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 disruptservice 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 trainsfrom 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 SBtracks.

b. Provide the correct number and placement of axle counters and entryloops 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 onthe 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 whileberthed 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 trains in approach to the portal and holds southbound trains at YBM in the event of activation.

12. Provide capability for future 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 expansionbeyond the tail tracks, including an extended guideway and additionalportal 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 recoverautomatically. 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 Note that Central Fallback is out of scope for Central Subway however LSMC Mode would still be available for use during a VCC Failure.

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

D. Axle Counter Block Disturbed – Provide same response and recovery as MarketStreet 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.

2.7 INTERACE WITH VENTILATION SYSTEM

A. To coordinate the train signal system automation in adherence to NFPA 130 in regard to ventilation in the case of a train fire, the ATCS logic shall be programmed to include constraints that preclude more than one train in the sametunnel ventilation zones, except as described in Section 2.8 below.

B. Implementation:

1. The Tunnel Ventilation Zones are defined as the tunnel between station platforms. Only one train may occupy a single ventilation zone at the onetime i.e.:
   - **A NB train at the Bryant St. Portal Pseudo Station must hold at least until the lead train hasarrived at YBM**
   - A NB train at YBM must hold at least until the lead train has arrived at UMS.
   - A NB train at UMS must hold at least until the lead train has cleared the ventilation zones between UMS and crossover cavern zone.
   - A SB train at CTS must hold at least until the lead train has cleared a track section between

crossover cavern zone and UMS (track section to be defined at Final Design Review stage)

- A SB train that has departed at CTS must hold in the crossover cavern if the lead train has not arrived yet at UMS (only applies to AUTO/CABS trains)
- A SB train at UMS must hold at least until the lead train has arrived at YBM
- A SB Train at YBM must hold at least until the lead train has arrived at the Bryant St. Portal Pseudo Station

2. In the event of a communication failure (time out) of a train OR a communicating train stopping unexpectedly while en-route to a destination (excluding trains waiting due to an obstruction), the train will be considered an Incident Train. Specific Alarms will be provided via the SMC to alert Operators as to any incident trains and impacted trains.

C. Route setting logic for NCT and CCT in Full Mode and Fallback Modes is not impacted by these tunnel ventilation zones constraints described in this Section and the Section 2.8 below, as this logic is already more restrictive than ventilation constraints.

D. ATCS detection of an Incident Train and the associated restrictions on train movements shall be implemented via SMC subsystem (non-vitally).

2.8 OPERATION IN THE CTS CROSSOVER CAVERN

A. To improve operational flexibility through the crossover, parallel moves of two trains shall be allowed in the crossover cavern provided the routes do not intersect, under certain conditions as agreed in the Appendix 7.

B. Ventilation related restrictions on train movements in and around the crossover cavern shall be implemented via SMC subsystem (non-vitally).

PART 3—EXECUTION NOT USED

END OF SECTION

END OF SECTION

Appendix 4

Hazard Analysis, dated July 21, 2020

Note this Appendix is included as information only.

See Attachment

Appendix 6

SFMTA January 27, 2021 Response to Thales RFI-070 (2-2-2021)

See Attachment

Appendix 7

Thales Letter: TTS-S1408-LTR-SF-0208 “PCC006 PDR MoM and Follow-Up” Dated March 12th, 2021

See Attachment

Appendix 8

ATCS Schedule

Activity ID	Activity Name	Activity Status	Start	Finish
Total			01/Sep/2020 A	30/Apr/2025
PCC006 MUNI CS Schedule (inc. CMOD3)			01/Sep/2020 A	30/Apr/2025
PCC006.MM Milestones			01/Mar/2021 A	03/Jan/2024
A1250	Acceleration NTP	Completed		01/Mar/2021 A
A1290	EAK Grounding complete	Not Started		12/Mar/2021*
A1300	Fiber Install complete	Not Started		12/Mar/2021*
MS1050	Loop Cable Rework Complete	Not Started		09/Apr/2021*
MS1070	Installation Complete for Stand alone at TMC	Not Started		09/Apr/2021*
MS1010	Installation Complete at Lenox	Not Started		09/Apr/2021*
MS1060	LRV's able to Enter Subway	Not Started		09/Apr/2021*
A1310	CMOD3 NTP	Not Started		16/Apr/2021*
A1270	SFMTA FDR comments Received	Not Started		21/Apr/2021
MS1040	Installation Complete at TMC	Not Started		30/Apr/2021*
A1280	BUILD 3.2 design frozen	Not Started		30/Apr/2021*
A1330	Manuals Submission	Not Started		29/Oct/2021*
A1340	SFMTA Comments on Manuals	Not Started		23/Nov/2021
MS1020	Substantial Completion (Handover to SFMTA)	Not Started		29/Apr/2022
MS1030	SFMTA-Final Acceptance	Not Started		03/Jan/2024
PCC006.1 Site Support			01/Sep/2020 A	30/Apr/2021
A1000	Installation support	In Progress	01/Sep/2020 A	30/Apr/2021
PCC006.2 Static Test			19/Jan/2021 A	30/Apr/2021
A1010	Static SPICO	In Progress	19/Jan/2021 A	30/Apr/2021
A1020	DCS Configuration and Cutover-Site Prep	In Progress	01/Mar/2021 A	30/Apr/2021

PCC006.3	**Engineering Test**			01/Mar/2021 A	24/Dec/2021
A1050	BUILD 3.1 S/W Development and SWAT	In Progress	01/Mar/2021 A	31/May/2021
A1030	BUILD 3.0 (Existing) Field Test	Not Started	03/May/2021	30/Jul/2021
A1060	BUILD 3.1 FAT	Not Started	01/Jun/2021	30/Jul/2021
A1070	BUILD 3.1 Field Test	Not Started	03/Aug/2021	29/Oct/2021
A1080	BUILD 3.1 Trial and Integration	Not Started	01/Nov/2021	24/Dec/2021
PCC006.4	**Dynamic Test**			01/Mar/2021 A	29/Apr/2022
A1260	BUILD 3.2 FDR	Not Started	07/Apr/2021*	07/Apr/2021
A1100	BUILD 3.2 Design	In Progress	01/Mar/2021 A	30/Apr/2021
A1110	BUILD 3.2 S/W Development and SWAT	Not Started	03/May/2021	31/Aug/2021
A1160	BUILD 4.0 Design	Not Started	03/Aug/2021	30/Sep/2021
A1120	BUILD 3.2 FAT	Not Started	01/Sep/2021	29/Oct/2021
A1130	BUILD 3.2 SAT	Not Started	01/Nov/2021	24/Dec/2021
A1170	BUILD 4.0 S/W Development and SWAT	Not Started	01/Oct/2021	24/Dec/2021
A1140	BUILD 3.2 Trial and Integration	Not Started	04/Jan/2022	28/Feb/2022
A1180	BUILD 4.0 FAT	Not Started	04/Jan/2022	28/Feb/2022
A1190	BUILD 4.0 SAT	Not Started	01/Mar/2022	31/Mar/2022
A1200	BUILD 4.0 Trial and Integration	Not Started	01/Apr/2022	29/Apr/2022
PCC006.5	**BUILD 5.0 (Punchlist)**			01/Jun/2022	30/Oct/2023
A1220	BUILD 5.0 S/W Development and SWAT	Not Started	01/Jun/2022	31/Aug/2023
A1230	BUILD 5.0 FAT	Not Started	01/Sep/2023	29/Sep/2023
A1240	BUILD 5.0 SAT	Not Started	02/Oct/2023	30/Oct/2023
PCC006.6	**R Demonstration**			11/Mar/2022	03/Jan/2024
A1370	M-Demo	Not Started	11/Mar/2022*	24/Mar/2022
A1210	R-Demonstration Period	Not Started	02/May/2022	03/Jan/2024
PCC006.7	**Logistics**			04/Jan/2022	30/Apr/2025
A1350	Maintenance & Operations Training	Not Started	04/Jan/2022*	24/Mar/2022
A1360	Warranty Period	Not Started	02/May/2022	30/Apr/2025

Appendix 9

Thales Letter: TTS-S1408-LTR-SF-0210 “Revised Quote for Implementing Changes as per PCC 006 with Acceleration” Dated March 12th, 2021

See Attachment