

1.1.4.4. Activity Resource and Cost Loading Submittal (Step 4)

No later than the deadline specified in the Baseline Schedule Submittal Schedule, the Contractor shall resubmit for SONO the updated and corrected Baseline Schedule that addresses the comments received from the Authority together with Cost Loading to the lowest level of activities. The cost loaded activities shall be coded with the Federal Rail Authority (FRA) Standard Cost Categories (SCC). The resource and cost loading submittal for SONO shall include the following:

- (a) Electronic schedule file. This shall include PDF print outs as well as Primavera P6 and TILOS files (xer and hsp file format);
- (b) Activity Budget Report;
- (c) Identification and explanation of all logic changes since the logic submittal;
- (d) The cost loaded schedule activities coded to the Cost Account Structure, which roll up to a summary cost for each Quality Milestone as well as the Cost Account Structure;
- (e) Rules of credits (earning rules) for accruing activity percentage complete and earned value for payment;
- (f) Labor hours and major quantity loaded to the entire schedule for all the Work; and
- (g) Activities representing provisional sums and Hazmat allowances.

1.1.4.5. Baseline Schedule Submittal (Step 5)

No later than the deadline specified in the Baseline Schedule Submittal Schedule, the Contractor shall complete the Baseline Schedule submittal for acceptance representing all Work required by the Contract. The Baseline Schedule submittal shall include the following:

- (a) Narrative Report including productivity assumptions used; a quantity, labor, and an equipment resource report; and Contractor's detailed plan and methodology for carrying out Works;
- (b) Electronic schedule files. This shall include PDF print outs as well as Primavera P6 files (xer file) and TILOS linear schedule (hsp file);
- (c) PDF print outs shall include Activity ID, Activity Name, Original Duration, Remaining Duration, Start, Finish, Late Start, Late Finish, Total Float, and Budgeted Cost columns. This shall be organized using the WBS;
- (d) Cost Loading Report – a report detailing all costs loaded to the schedule by activities and per Cost Account Structure;



- (e) Rules of credits (earning rules) for accruing activity percentage complete and earned value for payment;
- (f) Labor Resource Report – a report detailing all resources assigned throughout the schedule;
- (g) Predecessor / Successor Report – a report detailing each activity's list of predecessors and successors;
- (h) Submittal Report – a report detailing all submittal, review and approval activities contained in the schedule per detail in Section 6.2.12;
- (i) Cumulative and monthly total project cost curves, reflecting the total contract amount. Similar curves shall also be furnished for each FRA Category/Subcategory;
- (j) Cumulative and monthly resource curves;
- (k) Planned production curves by craft for individual sections and the entire Project; and
- (l) Network Plots depicting CPM logic of the Critical Path and near critical paths in the project and the CPM logic for individual project segments.

1.1.4.6. Corrected Baseline Submittal (Step 6)

In the event that the Baseline Schedule submittal is not accepted, no later than the deadline specified in the Baseline Schedule Submittal Schedule for Step 6, the Contractor shall complete the corrected Baseline Schedule. The Contractor shall correct Step 5 Baseline Schedule submittal for acceptance by incorporating all the Authority's comments on the corrected Baseline Schedule submittal.

1.2. Interim Schedule Submittal

The Contractor shall submit, within 10 Working Days after NTP, an Interim Schedule detailing activity to be performed within the first 180 days after NTP. The Authority will review and may approve the Interim Schedule within 14 days of the submittal. The Authority may require the full Interim Schedule or parts thereof to be resubmitted throughout the review period.

The Interim Schedule shall include a separate proposed Schedule of Values for its duration, which upon written approval by the Authority shall be used by the Contractor for payment purposes during the Interim Schedule period. Once the Baseline Schedule is approved by the Authority, the approved Baseline Schedule replaces the Interim Schedule.

Approval of the Interim Schedule is a condition precedent for any payment under the Contract.



1.3. Schedule Requirements

For the purpose of enabling both the Authority and the Contractor to readily evaluate the Contract Schedules, including derived data and reports, the Contract Schedules shall be administered in accordance with the following requirements.

1.3.1. Oracle Primavera P6 (P6) Settings

P6 Settings shall be as follows:

- (a) Authority Work Breakdown Structure (AWBS)
 - (i) Upon issuing NTP, the Authority may issue AWBS for the Contractor to incorporate into the Contract Schedules. The Contractor can further extend this AWBS to provide further details.
- (b) P6 Project ID
 - (i) At Level 1 the Project ID will be *[under development]*, appended as described in the following Section titled “Project ID Suffix”, and the Project Name shall be “CHSR Construction Package CPXX”.
 - (ii) Project ID Suffix - Each schedule submittal shall have a unique identifier appended to the Project ID specified in the previous Section titled “P6 Project WBS”, in the form of:
 - (A) For Baseline Schedules, “-BLaa”, where aa is sequential number starting at 01.
 - (B) For Proposed Schedules, “-PSbb”, where bb is sequential starting at 01.
 - (C) For Revised Baseline Schedules, “-RBcc”, where cc is sequential starting at 01.
 - (D) For Schedule Progress Updates, “-Uyymm”, where yy and mm correspond to the year and month of the monthly submittal.
- (c) Resources
 - (i) The top level of the Resource hierarchy will consist of 3 Resource ID's – CPXXLABOR (Resource Type = Labor), CPXXEQPT (Resource Type = Nonlabor), and CPXXCOST (Resource Type = Nonlabor). The Contractor may populate the hierarchy under CPXXLABOR and CPXXEQPT with staff, craft, and construction equipment whereas CPXXCOST will have no subordinates.



- (ii) Activities shall be resource loaded with CPXXLABOR and CPXXEQPT (or subordinates as applicable), and all activities shall be resource loaded with CPXXCOST.
- (d) Cost Accounts
 - (i) The Cost Account hierarchy will correspond to the “Cost Account Structure” attached to this document as Appendix B. The Cost Account Structure elements associated with the whole CHSRA program and the Contractor shall adopt the relevant sections of the Cost Account Structure in the baseline Schedule. The bottom most level of the Cost Account Structure represents the FRA Standard Cost Categories for Capital Projects/Programs, thereby fulfilling a reporting requirement for this program. All Change Order activities shall also be coded with the Cost Account Structure.
 - (ii) For Cost Loading of all activities, Contractor will assign resource TS1COST to each activity along with a corresponding Cost Account per Paragraph (1.) above. The contract price for each activity will then be assigned as a Budgeted Cost. The resource may be assigned to an activity more than once if multiple Cost Accounts are warranted.
- (e) Activity Codes
 - (i) Activity Codes must be maintained at the Project level.
 - (ii) The following Activity Codes, at a minimum, shall be established and assigned to each activity as applicable to integrate into the program level schedules maintained by the Authority:
 - (A) “Location” with Code Value/Description “040 – Fresno to Bakersfield”.
 - (B) “Function” with Code Values/Descriptions “DD – Environmental”, “FF – Right-of- Way”, “GG – Project Management”, “JJ – Final Design”, “KK – Construction”, or “QQ – Professional Services-Other”.
 - (C) “Contract Segment” with Code Value/Description.
 - (D) “Phase” with a Code Value/Description of “1 – Phase 1” only.
 - (E) “Construction Element” with Code Values/Descriptions identifying major construction element categories such as Earthwork, Viaduct, etc.



“Responsibility” identifying the party responsible for the work including the Authority, third parties, subcontractors, etc.

- (iii) The Authority may require other additional activity code to facilitate filtering and reporting the schedule data and the Contractor shall incorporate such coding in the Contract Schedules.
- (f) TILOS Import and Export Requirements
 - (i) In order facilitate the schedule data import and export to TILOS, the Contractor should incorporate the following data fields and populate them in the P6 Project Schedules:
 - (A) TILOS Start Chainage – User Defined Field (Text)
 - (B) TILOS Finish Chainage – User Defined Field (Text)
 - (C) TILOS Task Template – User Defined Field (Text)
 - (D) TILOS Quantity – User Defined Field (Text)
- (g) Constraints
 - (i) Constraint Types, if approved for use in the schedule, shall be limited to “Start On or After” (Start-No-Earlier-Than) and “Finish On or Before” (Finish-No-Later-Than).
- (h) Calendars
 - (i) Calendars must be maintained at the Project level.
 - (ii) Calendars shall be created to account for all work scenarios in the Contract including seasonal restrictions, inclement weather allocations, river restrictions, CA State holidays, etc. The details of the calendars shall be included in the Schedule Narrative. Addition of inclement weather day activities to the end of the critical path is not allowed; such weather days shall be included within the calendars and assigned to the affected activities in the Contract Schedule.
- (i) P6 Settings
 - (i) Duration Type shall be “Fixed Duration & Units”.
 - (ii) Percent Complete Type shall be either “Physical” or “Duration”; however, the progress percentage entries shall be based on physical percentage complete.



- (iii) Schedule calculation mode shall be “Retained Logic”. All the out of sequence activities in the Schedule Progress Updates shall be corrected and explained in the narrative.

1.3.2. Activity Data

1.3.2.1. Activity Identification

Each activity in the Project Schedules shall have a unique activity identifier (Activity ID). The Contractor shall utilize an Activity ID that is simple and allows space between existing activities for the future addition of activities for continuing sort and display capability. The Activity ID of an existing activity shall not be modified or assigned to another activity, nor should any Activity ID be deleted from the Project Schedule. Any Activity ID that is no longer required should be marked as “DELETED” within the activity description and moved to a section of the schedule marked as ‘Deleted Activities.’ The scope of work or description of an activity shall not be changed once the Baseline Schedule is approved since this would result in re-use of the Activity ID for a different scope of work.

1.3.2.2. Activity Description

The activity description shall identify the unique scope of the activity. There shall not be any two activities with the same activity description. It shall not be necessary to investigate activity code assignments or logic relationships to identify the scope of an activity. For example, the description "POUR FOOTING" will not be acceptable; the description “POUR FOOTING RAMP RT-Sta. 42+00-42+50 will be acceptable. At the same time the Activity Description shall be concise enough so as to not require excessive column width in the P6 layout. The terms “Miscellaneous,” “Misc.” or other vague adjectives shall not be used as an activity description. The Contractor shall standardize the use of terms and their spelling in all activity descriptions. Abbreviations used in activity descriptions shall be consistent with the abbreviations used throughout the Contract and the Contractor’s design drawings. Activity descriptions shall not be modified, except at the direction or with the consent of the Authority.

1.3.2.3. Activity Duration

Unless otherwise differently by the Authority, construction activities shall have duration from five (5) to thirty (30) working days. The Contractor shall substantiate the need for specific activities having shorter or longer durations than stated herein. After approval of the Baseline Schedule, changes in activity durations shall be addressed exclusively using the Remaining Duration data field.

1.3.2.4. Activity Dates

Early and Late start and finish dates of activities shall be calculated for each activity based upon the schedule data date, actual dates, schedule logic, schedule constraints, calendars, and



original duration or remaining duration, in accordance with the scheduling parameters defined in this specification.

1.3.2.5. Activity Predecessors and Successors

Every activity shall have logically assigned predecessors and successors in conformance with the requirements of this section. The logical predecessors for each activity will be limited to those activities whose scope of work necessarily must be completed in order to perform the current activity. The Contract Schedules shall not contain discretionary logic that suppresses the TF. Unless otherwise agreed differently by the Authority, NTP shall be the only activity in the Contract Schedules without predecessors and Final Acceptance Deadline shall be the only activity in the Project Schedules without a successor.

1.3.2.6. Activity Constraints

Activity Constraints can affect activity float calculations and shall not be used unless approved by the Authority. Unless otherwise authorized by the Authority, constraint types shall be limited to Start-On-Or-After, and Finish-On-Or-Before. The imposition of a date constraint on any activity other than the Completion Deadlines will only be permitted when the Contractor substantiates the need for the constraint to the satisfaction of the Authority. All date constraints shall be reviewed and corrected as part of the monthly update procedure, which includes review during the joint monthly update meeting.

1.3.2.7. Activity Percent Complete

Activity remaining durations and percent complete shall be entered in the Contract Schedules by the Contractor as appropriate to indicate activity progress and status as of the current Data Date for the update. The Contractor is to ensure that progress is based on a current estimate of remaining duration to complete the Work and not the activity's percent complete which calculates the remaining duration based on the original estimated duration.

1.3.3. Activity Codes and Work Breakdown Structure (WBS)

The Project Schedules shall contain activity code classifications and code values. The coding shall also incorporate the appropriate Authority provided WBS data elements to allow reporting by any individual element or a combination thereof. These WBS codes shall be the first codes defined for the activities, followed by any other codes, and shall use the values in the WBS to be provided by the Authority following award. The Contractor may add additional levels of WBS or activity codes to satisfy its own requirements.

In addition to the Authority's WBS codes the Contractor shall propose a coding structure for the Authority's review and acceptance. The activity code structure combined with the activity identification number shall provide the capability to organize information by location, road or ramp, structure, work type, subcontractor, discipline, etc., as deemed necessary by the Authority.



1.3.4. Activity Calendar

The planning unit for the Work shall be working days. The use of other calendars may be used as required with a clear definition within the calendar description and/or the Baseline Schedule Narrative as to what the calendar is intended to be used for and/or what specific non-working periods they include. Shifts and shift hours shall be discussed in the narrative with each Project Schedule submittal.

1.3.5. Resource and Quantity Loading

All Contract Schedules shall be resource and major quantity loaded with labor hours for both the Contractor and all of its sub-contractors.

1.3.6. Work Interfaces with Railroads

The Contractor shall coordinate with any interfacing railroad companies with respect to working near or within the railroad property and allow in the Contract Schedules any constraints and nonwork periods associated with working near or within the railroad property and any Third-Party facilities. The Contractor price shall also include any costs associated with this including any flagging requirements.

1.3.7. Cost Loading

Contractor shall allocate the total Contract Amount to lowest level of the activities scheduled in the Baseline Schedule such that each activity has a value which accurately shows the amount payable to Contractor for such activity. The overhead and indirect costs shall be distributed to all the activities and added to each activity as a percentage. The identified percentage for overhead and other indirect costs shall be the same for all activities within each bid classification and shall not be changed without the authority prior written approval, which may be withheld at the authority sole discretion. For Work, which is the subject of a Change Order, the schedule shall show the identified percentages set forth in the approved Change Order. The sum of the prices of all activities in the Baseline Schedule shall be equal the total Contract Amount. Once the Baseline Schedule has been approved, no changes to any allocated amount will be initiated without the Authority's approval.

1.3.8. Mobilization Payments and Recovery

The Contract may allow mobilization payments to the Contractor and these amounts shall not be included in the Contract Schedules and handled separately in the payment applications and certifications. Any mobilization or advance payments paid to the Contractor shall be deducted from the subsequent payment certifications using a percentage of the payment due to the Contractor until the mobilization or advance payment amount is fully recovered. This percentage is based on the mobilization payment divided by the Contract Amount. This mobilization payment or advance payment shall not be an addition to the schedule of payments but a portion of each schedule of payment.



1.3.9. Unincorporated Materials

Payment for storage of any materials shall not be made unless the material is stored on site within a secured facility acceptable to and accessible by the Authority. The payment for such material is only be made at [30%] of the schedule of payments associated to it. The activities in the Contract Schedules shall not be progressed based on the stored material but only based on the actual work done on site.

All stored material brought to the site and paid for is the property of the Authority and shall not be removed from site without a written approval from the Authority.

1.3.10. CPM Logic

The Contractor shall be responsible for developing the CPM logic of the Baseline Schedule and for updating that CPM logic each month to accurately reflect the progress of the Work and the Contractor's current plan for the timely completion of the Work.

- (a) Activity Relationships - The schedule CPM logic for each activity shall be constructed in conformance with the following requirements:
 - (i) Determine predecessors - Activities that must be completed before the activity can start.
 - (ii) Determine parallel activities - Activities that can occur concurrently with the activity.
 - (iii) Determine successors - Activities that cannot start until the activity is complete.

Determine the impact of all resource limitations on activity sequencing, activity durations and activity dates.

All paths through the Contract Schedules shall proceed in the direction representing the progression of time. Activity lag and lead durations shall not have a negative value. Activity lags and leads shall not be used in lieu of activities.

All the lags included in the Baseline Schedule shall be explained in the narrative and are subjected to the Authority's approval. Redundant ties to preceding activities in a sequential series of activities will not be permitted. For example, if activity C is the successor in a Finish-Start relationship to activity B, and activity B is the successor in a Finish-Start relationship to activity A, then activity A shall not have a redundant Finish-Start relationship to activity C. A tie representing a different constraint will not be considered redundant. For example, a logic tie showing that the completion of the work scope of a predecessor is required before the successor can start is different from a logic tie representing a resource limitation and will not be considered redundant.



The Quality Milestones in the CPM schedule shall not be open ends. They will be tied to logical predecessor activities and shall be tied to an administrative activity or milestone such as contract close-out as a successor.

1.3.11. Narratives

1.3.11.1. Baseline Schedule Narratives

The Baseline Schedule narrative shall demonstrate a feasible approach to achieving or improving the planned schedule and contains the following information:

- (a) Identification of the Data Date and schedule file name;
- (b) Contractors' detailed methodology for carrying out Work;
- (c) Graphical illustration of construction sequence and plan;
- (d) The basis and assumptions for all the activity durations;
- (e) A description of the planned flow of work, identifying all key or driving resources. Identify key constraints and potential problems influencing the Contractor's approach to the work. Describe all construction interfaces with third parties at the Project site. Also, identify temporary Contractor plants, facilities or fixed equipment that the Contractor or subcontractor plan to use within the right-of-way. Include in this discussion the length of time the plant is to be used, any planned moves, and any potential conflicts that could arise, if the plan is not adhered to;
- (f) A summary of planned labor utilization for the Contract, identifying the average and maximum number of workers on site each month based on the resource loaded Contract Schedules. Identify actual and potential labor resource limitations;
- (g) A summary of planned equipment utilization for the Contract, identifying each type of operated equipment to be used on the Work, the planned quantity of each type of operated equipment utilized each month, and the criteria for mobilizing and demobilizing each piece of equipment to and from the site. Identify actual and potential equipment resource limitations;
- (h) An explanation of how adverse weather conditions have been addressed in the Baseline Schedule. Identify all activities, if any, that contain contingency days for adverse weather conditions and the duration of such contingency included for each;
- (i) An explanation of special calendars that only allow work to take place during a pre- defined window of time; and
- (j) The narrative shall address the Contractor's material and equipment procurement plan and identify the strategy for any long lead item(s). There shall



be no fabrication and delivery activities for concrete and asphalt concrete. Fabrication and delivery activities for short lead-time items shall not be included in the project schedules "Short lead-time" shall be defined as a period of two weeks or less from placement of order to delivery of material to the Project site.

1.3.11.2. Schedule Progress Update Narrative

All Schedule Progress Update submittals shall include a narrative containing the following information:

- (a) Identification of the update period, the Data Date, and the schedule file name;
- (b) A description of key issues in progress period, including delays, and activities undertaken to mitigate those delays, as well as progress achieved, and other issues faced.
- (c) Identification of activities with critical or near critical float (within 14 Days of the Critical Path) that were planned to occur during the update period, of which did not occur or occurred later than the scheduled Late Start or Late Finish date, and an explanation of these delays. Provide a listing of all activities which may overrun or have overrun their planned duration by more than 20 percent and any justification for maintaining original planned durations for future activities of like Work;
- (d) Identification of delays occurring to activities taking place off the Project site, e.g., submittal preparation, fabrication, and delivery activities;
- (e) A summary of planned labor utilization for the Contract, identifying the average and maximum number of workers on site each month. Identify actual and potential labor resource limitations. A summary of the actual labor utilization used over the past month;
- (f) A summary of planned equipment utilization for the Project, identifying each type of operated equipment to be used on the Work, the planned quantity of each type of operated equipment utilized each month, and all changes to the criteria for mobilizing and demobilizing each piece of equipment to and from the Project site. Identify actual and potential equipment resource problems. A summary of the actual equipment utilized over the past month;
- (g) Revisions to logic or duration(s) by the Contractor to effectively use labor and resources which have no adverse effect on Completion Deadlines or Contract Price shall be detailed in the update. These revisions shall contain the following information;
- (h) Identification of the activities changed;
- (i) A description of the scope of the logic change and identification of the advantages and disadvantages of implementing the change;



Except as otherwise designated by a Change Order, no Revised Baseline Schedule that extends performance beyond a Completion Deadline shall qualify as a Current Baseline Schedule, or schedule of record, allowing it to be used to demonstrate entitlement to an extension in a Completion Deadline. In no case, shall a Schedule Progress Update be construed as a Revised Baseline Schedule or schedule of record unless it is specifically submitted and approved as such by the Authority pursuant to this Schedule.

1.10. Short Term Schedule

Short Term Schedules shall be submitted by the Contractor upon request from the Authority and shall be provided for within the Contract Price. The Authority will specify the time frame the Short-Term Schedule shall encompass. The Contractor shall provide the Short-Term Schedule, electronically produced, in bar chart format, that details the daily work activities, including multiple shift work that the Contractor intends to conduct. The daily activities shall correspond to the Current Baseline Schedule activities but shall be at a greater level of detail. The Contractor shall be prepared to discuss the Short-Term Schedules, in detail, with the Authority to coordinate field inspection staff requirements, schedule of Work affecting any abutting and corresponding work with affected utilities.

1.11. Project Schedule Program Administration

The Contractor shall submit a Project Schedule Program Administration Plan consistent with Item 3 of Table 1: The Project Schedule Administration Plan should explain how the Contractor intends to meet the scheduling requirements of the Contract.

The Project Schedule Administration Plan submittal shall consist of a narrative explaining the Contractor's plan for providing a Project Schedule Program consistent with the requirements of the Contract. At a minimum the narrative shall address the following:

- (a) The Schedule Progress Update requirements, the Revised Baseline Schedule requirements, and the preparation of requests for time extensions including the following:
 - (i) Data input into the Project Schedules.
 - (ii) Verification that the Project Schedules accurately represent the progress of the Work to date.
 - (iii) Verification that the Project Schedules accurately represent the Contractor's current plan for the timely completion of the Work.
 - (iv) Preparation of schedule submittals.
 - (v) Internal quality control of schedule submittals prior to submission to the Authority.



E_{PAD} = Equipment Index as of the Price Adjust Date.

E_0 = Equipment Index as of the Close Date.

L_{PAD} = Labor Index as of the Price Adjust Date.

L_0 = Labor Index as of the Close Date.

2. Service Amount

Annual Escalation – The Mileage Incremental Service Amount and the Trainset Incremental Service Amount shall be adjusted on an annual basis on June 30 based on the following formula:

$$[P_i = P_0 \times [(W_M \times (M_i / M_0)) + (W_E \times (E_i / E_0)) + (W_L \times (L_i / L_0))]]$$

Where:

Metals Index = not seasonally adjusted Producer Price Index (PPI) Commodities for Metals and metal products – Fabricated structural metal products as published by the United States Bureau of Labor Statistics (BLS) – Series ID WPU107.

Equipment Index = not seasonally adjusted PPI Commodities for Machinery and equipment as published by the BLS – Series ID WPU11.

Labor Index = not seasonally adjusted Average Hourly Earnings of Production and Nonsupervisory Employees from the Current Employment Statistics survey (National) as published by the BLS – Series ID CEU3100000008.

P_i = Mileage Incremental Service Amount, or Trainset Incremental Service Amount, as applicable, at year i of the Contract Term.

P_0 = Mileage Incremental Service Amount, or Trainset Incremental Service Amount, as applicable, at Close Date.

W_M = Weight of the Metals Index (30%).

W_E = Weight of the Equipment Index (10%).

W_L = Weight of the Labor Index (60%).

M_i = Metals Index as of the most recent publication to June 30 of every year.

M_0 = Metals Index as of the Close Date.

E_i = Equipment Index as of the most recent publication to June 30 of every year.

E_0 = Equipment Index as of the Close Date.

L_i = Labor Index as of the most recent publication to June 30 of every year.

L_0 = Labor Index as of the Close Date.

3. Liquidated Damages

Annual Escalation – The liquidated damage amounts set forth in Articles 12.1, 12.2 and 12.3 of the General Provisions shall be adjusted on an annual basis on June 30 based on the following formula:



$$[P_i = P_0 \times (CPI-U_i / CPI-U_0)]$$

Where:

P_i = Liquidated damages at year i of the Contract Term.

P₀ = Liquidated damages at the Close Date as set forth in Articles 12.1, 12.2 and 12.3 of the General Provisions.

CPI-U_i = US CPI-U index as published by the US Bureau of Labor Statistics as of the most recent publication to June 30 of every year.

CPI-U₀ = US CPI-U index as published by the US Bureau of Labor Statistics as of the most recent publication at the Close Date.

4. Performance-Based Payment Reductions

Annual Escalation – The Performance-Based Payment Reduction amounts set forth in Schedule 6 to the General Provisions shall be adjusted on an annual basis on June 30 based on the following formula:

$$[P_i = P_0 \times (CPI-U_i / CPI-U_0)]$$

Where:

P_i = Performance-Based Payment Reductions at year i of the Contract Term.

P₀ = Performance-Based Payment Reductions at the Close Date as set forth in Schedule 6 to the General Provisions.

CPI-U_i = US CPI-U index as published by the US Bureau of Labor Statistics as of the most recent publication to June 30 of every year.

CPI-U₀ = US CPI-U index as published by the US Bureau of Labor Statistics as of the most recent publication at the Close Date.



SCHEDULE 5
FORM OF CERTIFICATES OF ACCEPTANCE

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SCHEDULE 5-1

CERTIFICATE OF ACCEPTANCE FOR PRELIMINARY SUBMITTALS

Contract No.: [•] **Date of Contract:** _____

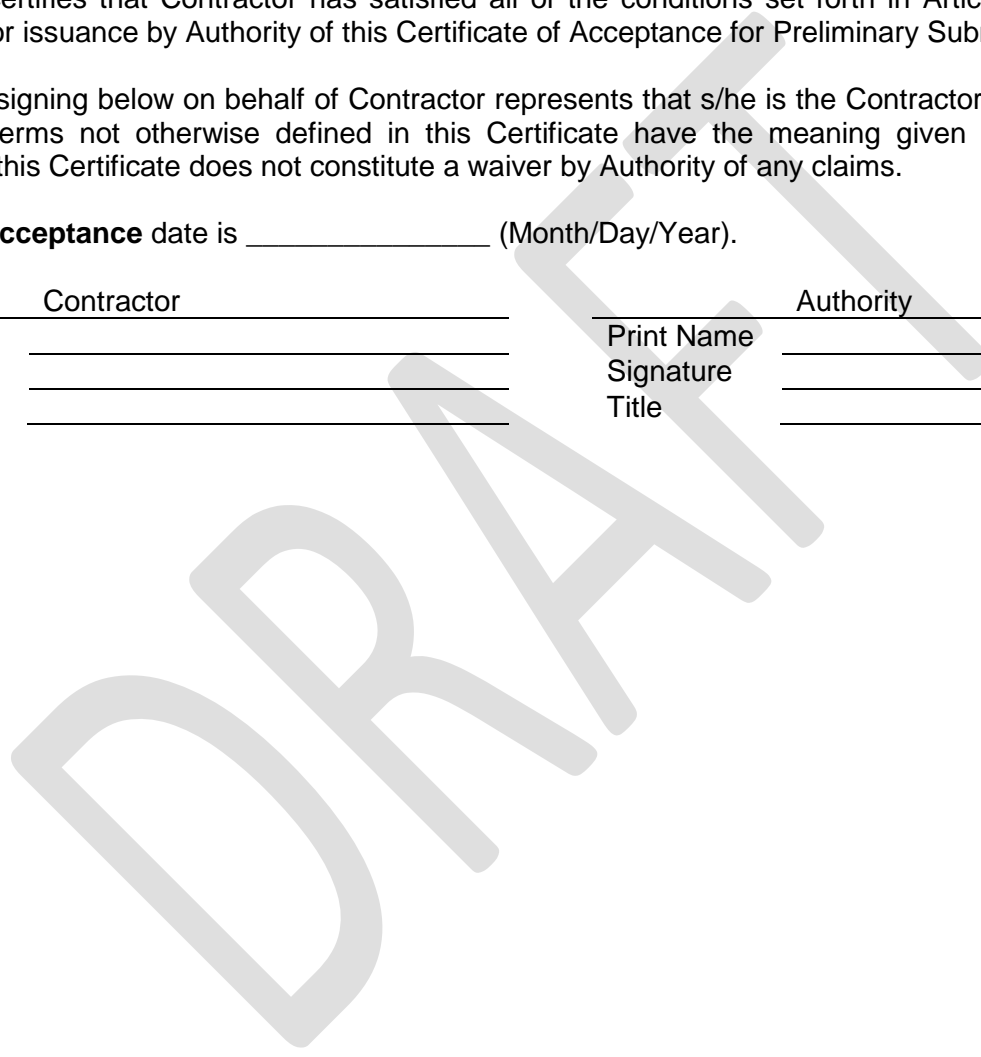
Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.1 of the General Provisions for issuance by Authority of this Certificate of Acceptance for Preliminary Submittals.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Submittal Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____



SCHEDULE 5-2

CERTIFICATE OF ACCEPTANCE FOR BASELINE PROGRAM AND PMP TIERS 1 AND 2

Contract No.: [•] **Date of Contract:** _____

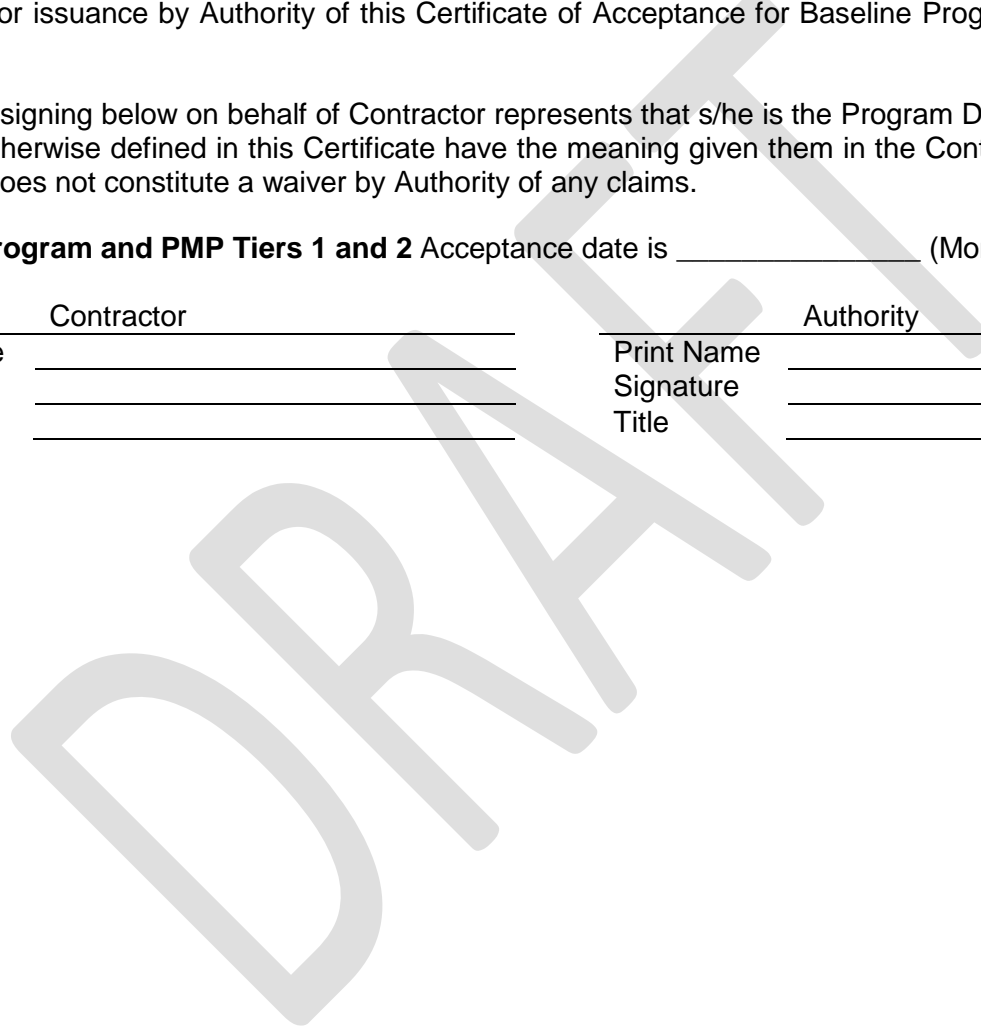
Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.2 of the General Provisions for issuance by Authority of this Certificate of Acceptance for Baseline Program and PMP Tiers 1 and 2.

The person signing below on behalf of Contractor represents that s/he is the Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Baseline Program and PMP Tiers 1 and 2 Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____



SCHEDULE 5-3

CERTIFICATE OF ACCEPTANCE FOR MOCK-UPS

Contract No.: [•] **Date of Contract:** _____

Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.3 of the General Provisions for issuance by Authority of this Certificate of Acceptance for Mock-Ups.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Mock-Up Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____

DRAFT

SCHEDULE 5-4

CERTIFICATE OF ACCEPTANCE FOR TEST TRACK

Contract No.: [•] **Date of Contract:** _____

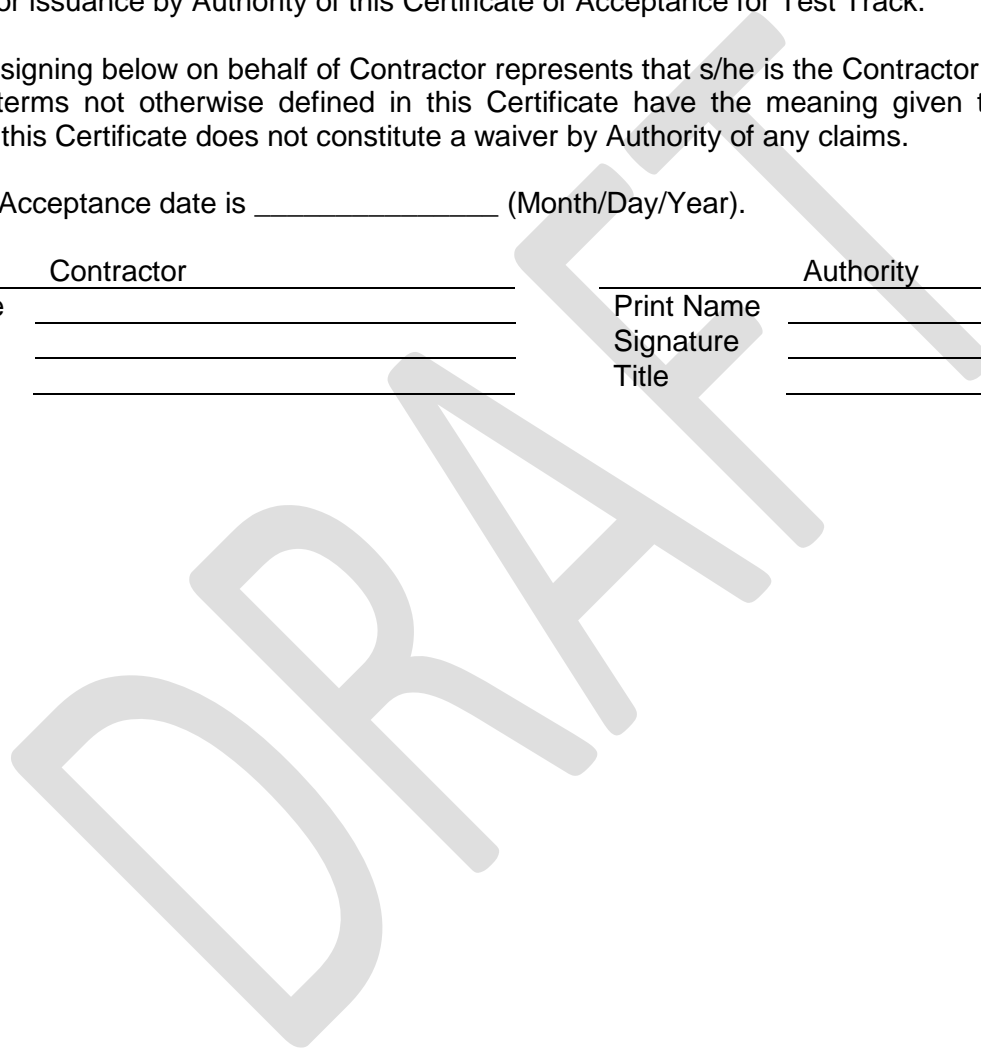
Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.4 of the General Provisions for issuance by Authority of this Certificate of Acceptance for Test Track.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Test Track Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____



SCHEDULE 5-5

**CERTIFICATE OF ACCEPTANCE FOR MAINTENANCE TRAINING PLAN AND
MAINTENANCE PLAN**

Contract No.: [•] **Date of Contract:** _____

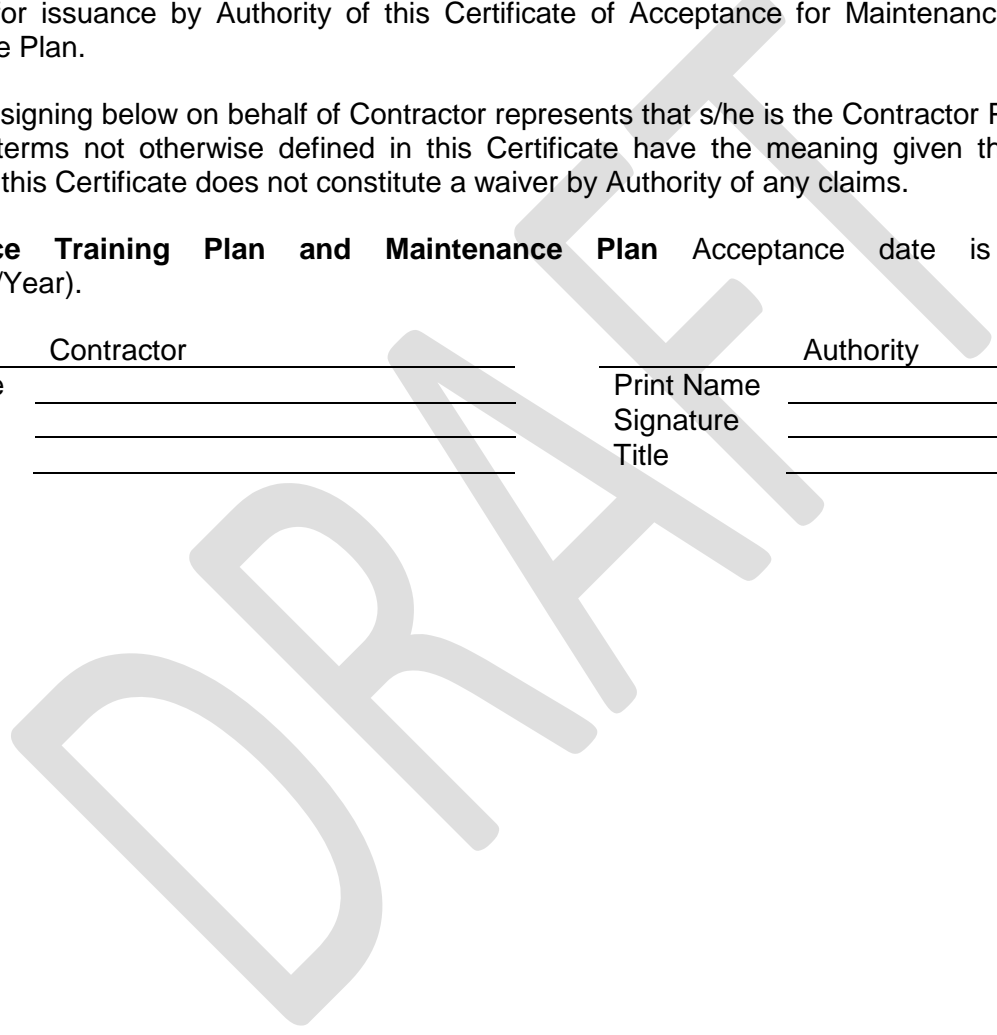
Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.5 of the General Provisions for issuance by Authority of this Certificate of Acceptance for Maintenance Training Plan and Maintenance Plan.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Maintenance Training Plan and Maintenance Plan Acceptance date is _____
(Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____



SCHEDULE 5-6
CERTIFICATE OF PROVISIONAL ACCEPTANCE

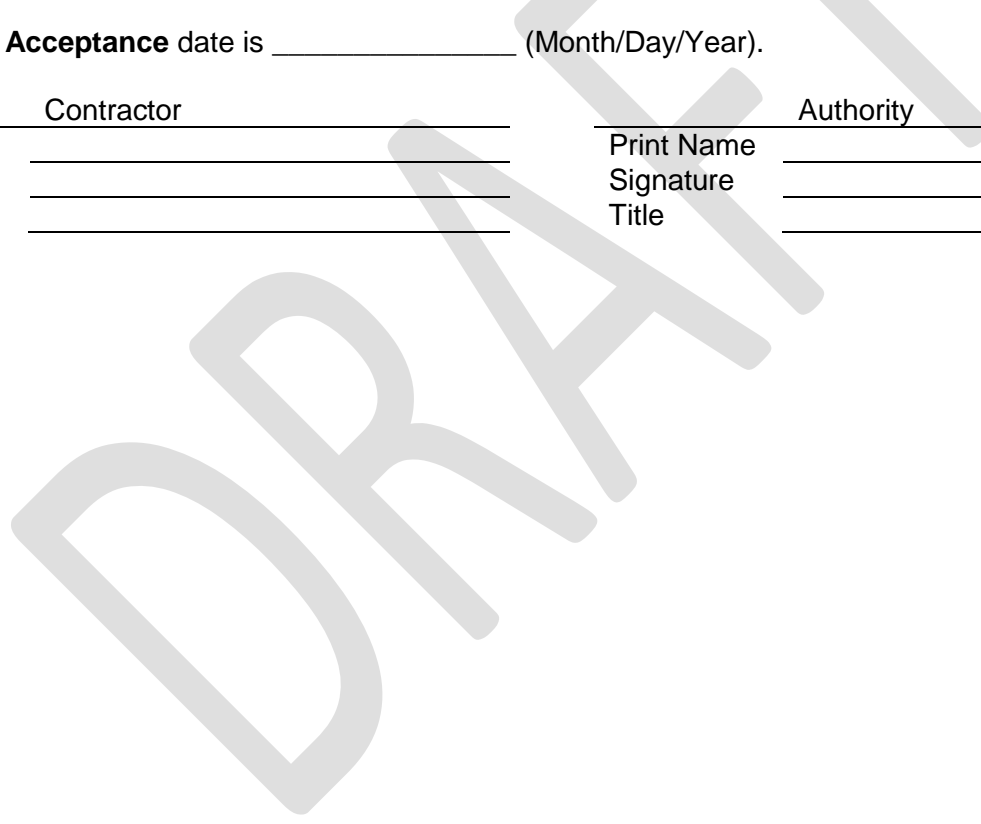
Contract No.: [●] **Date of Contract:** _____
Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.6 of the General Provisions for issuance by Authority of this Certificate of Provisional Acceptance except for those items approved by Authority in its sole discretion and set out in attached Schedule 5-12 - Non-Conformances.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Provisional Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority	
Print Name	_____		Print Name	_____
Signature	_____		Signature	_____
Title	_____		Title	_____



SCHEDULE 5-X

CERTIFICATE OF ACCEPTANC OF PLAIN LINE SEGMENT

Contract No.: [●] **Date of Contract:** _____

Contractor Name: _____

Contractor certifies that Contractor has satisfied all of the conditions set forth in Article 10.6 of the General Provisions for issuance by Authority of this Certificate of Acceptance except for those items approved by Authority in its sole discretion and set out in attached Schedule 5-12 - Non-Conformances.

Contractor has provided a Rail Infrastructure System (CP1-4 geographic limits) to operate one diesel train-per-hour, per-direction with an Operating Speed of 79mph in accordance with milestones in schedule 3.

Contractor has Designed, Procured, Built, Tested, Commissioned in accordance with all other contract requirements:

1. All plain line track work (final design and positioning);
2. All relevant Positive Train Control requirements as described in CFR 236 and compliant with the Rail Safety Improvement Act of 2008;
3. An FRA compliant broken rail detection system; and
4. An adequate fixed/radio communications system;

The system has been designed and constructed in such a way that it can be upgraded to form the final, fully electrified, 12 trains-per-hour, per-direction, 250mph Design Speed, Rail Infrastructure System with minimal disruption.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Provisional Acceptance date is _____ (Month/Day/Year).

Contractor

 Print Name

 Signature

 Title

Authority

 Print Name

 Signature

 Title

SCHEDULE 5-7

CERTIFICATE OF CONDITIONAL ACCEPTANCE

Contract No.: [●] **Date of Contract:** _____

Contractor Name: _____

Contractor certifies that, except for those items approved by Authority in its sole discretion and set out in attached Schedule 5-12 – Non-Conformances:

- (i) Contractor has satisfied all of the conditions set forth in Article 10.7 of the General Provisions for issuance by Authority of this Certificate of Conditional Acceptance; and
- (ii) Contractor has resolved the non-conformances, if any, set forth in Schedule 5-12 – Non-Conformances attached to the Certificate of Provisional Acceptance.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Conditional Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____

SCHEDULE 5-8

CERTIFICATE OF ACCEPTANCE FOR TEST PERIOD PERFORMANCE

Contract No.: [•] **Date of Contract:** _____

Contractor Name: _____

Contractor certifies that:

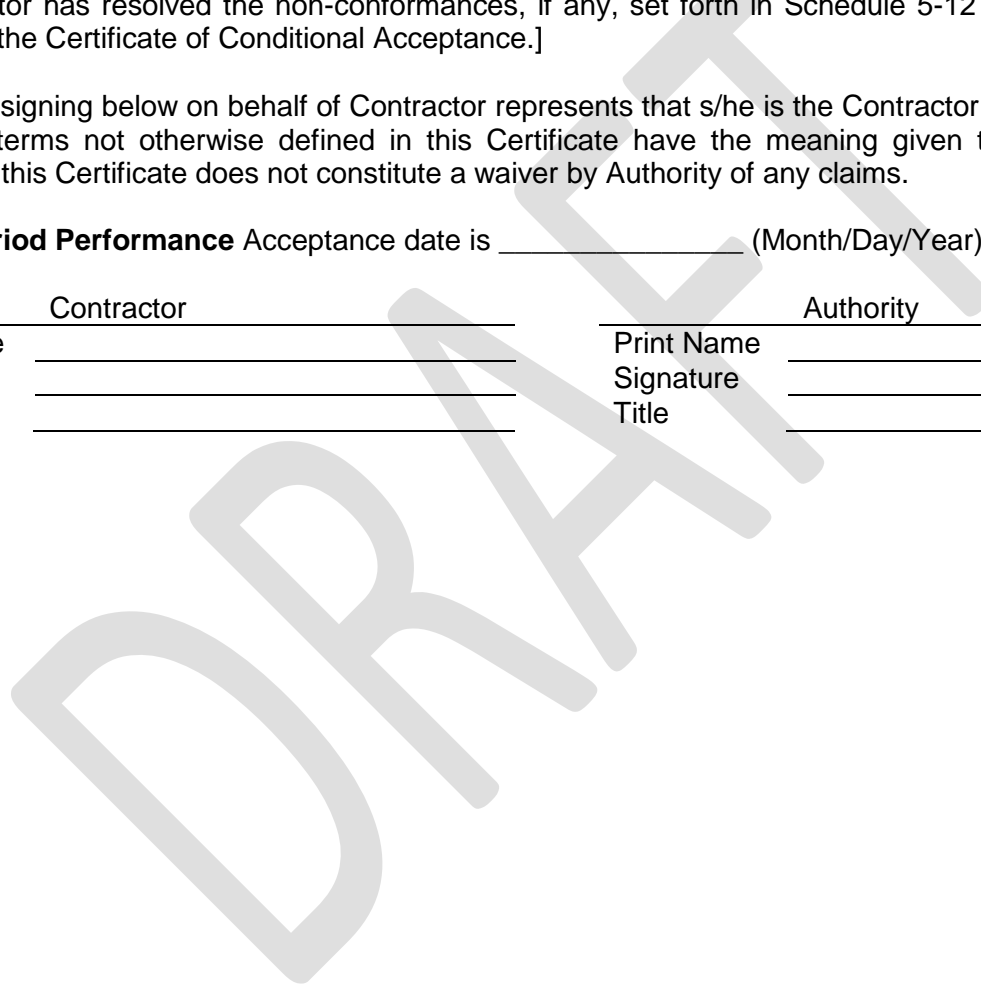
(i) Contractor has satisfied all of the conditions set forth in Article 10.8 of the General Provisions for issuance by Authority of this Certificate of Acceptance for Test Period Performance; and

[(ii) Contractor has resolved the non-conformances, if any, set forth in Schedule 5-12 – Non-Conformances attached to the Certificate of Conditional Acceptance.]

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Testing Period Performance Acceptance date is _____ (Month/Day/Year).

	Contractor		Authority
Print Name	_____	Print Name	_____
Signature	_____	Signature	_____
Title	_____	Title	_____



SCHEDULE 5-9
CERTIFICATE OF FINAL ACCEPTANCE

Contract No.: [●] **Date of Contract:** _____

Contractor Name: _____

Contractor certifies that:

- (i) Contractor has satisfied all of the conditions set forth in Article 10.9 of the General Provisions for issuance by Authority of this Certificate of Final Acceptance; and
- (ii) Contractor has resolved the non-conformances, if any, set forth in Schedule 5-12 – Non-Conformances attached to the Certificate of Conditional Acceptance.

The person signing below on behalf of Contractor represents that s/he is the Contractor Program Director. All capitalized terms not otherwise defined in this Certificate have the meaning given them in the Contract. Issuance of this Certificate does not constitute a waiver by Authority of any claims.

Final Acceptance date is _____ (Month/Day/Year).

<p style="text-align: center;">Contractor</p> <hr/> Print Name _____ Signature _____ Title _____	<p style="text-align: center;">Authority</p> <hr/> Print Name _____ Signature _____ Title _____
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SCHEDULE 5-10

[RESERVED]

DRAFT



SCHEDULE 5-11

[RESERVED]

DRAFT

SCHEDULE 6
PERFORMANCE STANDARDS

1. GENERAL

There are three Performance Standards for the assessment of Performance-Based Payment Reductions. These Performance Standards measure:

- (a) Missed Stops, which relates to the Stops contained in the Timetable;
- (b) Late Stops, which relates to the timeliness of the Timetabled service; and
- (c) Mission Quality Failures, which relates to the proper functioning of equipment necessary for the comfort and convenience of passengers.

A "Trip" is a Timetable scheduled passenger-carrying revenue service on a Trainset from one terminus to another terminus.

A "Stop" is a Timetable scheduled stop at station on a Trip.

The Contractor shall assume that the Timetable will include a 5% [pad] for scheduled arrivals and departure for dedicated high-speed rail track and 10% [pad] for blended tracks.

Performance Standards for Missed Stops, Late Stops and Mission Quality Failures shall be measured over [four] measurement periods: a [10]-day measurement period, a [30]-day measurement period, a [90]-day measurement period and a [180]-day measurement period. All days in each measurement period shall be consecutive. The [four] measurement periods shall run concurrently.

Performance Standards shall be measured for the [10]-day measurement periods, the [30]-day measurement periods, the [90]-day measurement periods and [180]-day measurement periods described above, commencing in each case on the first day of [Timetabled service] and ending on the last day of the last [10]-day measurement period, [30]-day measurement period, [90]-day measurement period and [180]-day measurement period respectively.

If the number of Missed Stops, Late Stops, or Mission Quality Failures exceeds the allowable number of Missed Stops, Late Stops, or Mission Quality Failures, as applicable, over the relevant measurement periods, Authority shall assess Performance-Based Payment Reductions. The assessment of Performance-Based Payment Reductions under the various measurement periods is cumulative, such that a single Missed Stop, Late Stop, or Mission Quality Failure can result in the assessment of Performance-Based Payment Reductions under more than one measurement period.

The Contractor may not purposefully miss a Stop unless due to a Failure.

2. MISSED STOPS

A "Missed Stop" is a Stop which, due to a Failure, is not made according to the Timetable schedule. A Trip may have multiple Missed Stops if the Failure causes the Trainset to not make multiple Stops during a single revenue service Trip.

The number of Missed Stops shall be provided by the ADS and automatically recorded in the



O.C.C.

2.1. Allowable Percentage of Missed Stops

The percentage of Missed Stops shall be calculated for each measurement period as the total number of Missed Stops divided by the total number of Stops in such measurement period, expressed as a percentage.

To allow for a break-in period, the Allowable Percentage of Missed Stops in any measurement period during the first [360] days, starting on the day of the first Timetabled Trip, shall be as set forth below in Appendix 1 to this Schedule.

Starting the day after the first [360] days of Timetabled service, the Allowable Percentage of Missed Stops shall be set thereafter at [0.22% of Trips] during each [10]-day measurement Period, [0.15% of Trips] during each [30]-day measurement period, [0.10%] during each [90]-day measurement period and [0.05%] during each [180]-day measurement period.

For each measurement period, the allowable number of Missed Stops is the product of the total number of Stops for the measurement period multiplied by the Allowable Percentage of Missed Stops for that measurement period. For the avoidance of doubt, where the product of the total number of Stops multiplied by the Allowable Percentage of Missed Stops is not an integer, the allowable number of Missed Stops shall be the product rounded to the nearest integer, that is decimal fractions less than 0.5 shall be rounded down to the next lowest integer and decimal fractions equal to or greater than 0.5 shall be rounded up to the next highest integer.

3. LATE STOPS

A Late Stop shall be deemed to have occurred whenever, due to a Failure, any Trainset arrives later than its allowable lateness at its scheduled arrival for a Stop according to the Timetable. Any early arrival is counted as an on-time arrival.

Time shall be as recorded on the ADS, rounded down to the previous 15 seconds increment. In the first 120 days of Timetabled service the allowable lateness shall be 300 seconds. For the subsequent 180 days of Timetabled service the allowable lateness shall be 150 seconds. For all subsequent days of Timetabled service the allowable lateness shall be 120 seconds.

3.1. Allowable Percentage of Late Stops

The percentage of Late Stops shall be calculated for each measurement period as the total number of Late Stops divided by the total number of arrivals according to the Timetable (but irrespective of the scheduled time for arrival specified by the Timetable) in such measurement period, expressed as a percentage.

In the first [360] days of Timetabled service, the Allowable Percentage of Late Stops in each [10]-day measurement period, [30]-day measurement period, [90]-day measurement period, and [180]-day measurement period is equal to [1.28]% of Trips during the applicable measurement period.

In the subsequent [180] days of Timetabled service, from the [361st] day to the [540th] day, the allowable percentage of Late Stops in each [10]-day measurement period, [30]-day measurement period, [90]-day measurement period, and [180]-day measurement period



shall be equal to [0.64]% of Trips during the applicable measurement period.

In the periods after the first [540] days of Timetabled service, the allowable percentage of Late Stops in each [10]-day measurement period, [30]-day measurement period, [90]-day measurement period and [180]-day measurement period is equal to [0.384]% of Trips during the applicable measurement period.

For each measurement period, the allowable number of Late Stops is the product of the total number of arrivals according to the Timetable (but irrespective of the scheduled time for arrival specified by the Timetable) in the measurement period multiplied by the Allowable Percentage of Late Stops for that measurement period. For the avoidance of doubt, where the product of the total number of arrivals multiplied by the Allowable Percentage of Late Stops is not an integer, the allowable number of Late Stops shall be the product rounded to the nearest integer, that is decimal fractions less than 0.5 shall be rounded down to the next lowest integer and decimal fractions equal to or greater than 0.5 shall be rounded up to the next highest integer.

4. MISSION QUALITY

Mission Quality measures the proper operation of those systems that []. Failure of the systems or components shall be recorded on the MMS.

A Mission Quality Failure shall be deemed to have occurred whenever, due to a Failure, any Trainset arrives at a Stop or Station (platform equipment) in a condition not suitable for service.

The list of Failures to be used by the Parties to measure Mission Quality shall be developed by Contractor for Authority's approval prior to the commencement of the Service Period. The list shall include, but not be limited to:

- Station escalator and lift functioning
- Customer information availability on the platforms
- Car access (ADA access, Doors Opening, etc...)
- Car seats and equipment (power plug, individual lights, Tablet etc..) condition
- Car lightening
- Car air conditioning
- On board customer information availability
- On board catering availability
- Perturbed traffic information availability

A Mission Quality Failure is a condition described in the list developed by Contractor and approved by Authority, as described above, where such condition cannot be rectified successfully by re-setting the equipment or system.

4.1. Allowable Number of Mission Quality Failures

The percentage of Mission Quality Failure shall be calculated for each measurement period as the total number of Stops impacted by a Mission Quality Failure divided by the total number of Stops in such measurement period, expressed as a percentage.

In the first [360] days of Timetabled service, the Allowable Percentage of Mission Quality Failures in each [10]-day measurement period, [30]-day measurement period, [90]-day measurement period, and [180]-day measurement period is equal to [0.01]% of Trips during the



applicable measurement period.

In the subsequent [180] days of Timetabled service, from the [361st] day to the [540th] day, the allowable percentage of Mission Quality Failures in each [10]-day measurement period, [30]-day measurement period, [90]-day measurement period, and [180]-day measurement period shall be equal to [0.005]% of Trips during the applicable measurement period.

In the periods after the first [540] days of Timetabled service, the allowable percentage of Mission Quality Failures in each [10]-day measurement period, [30]-day measurement period, [90]-day measurement period and [180]-day measurement period is equal to [0.003]% of Trips during the applicable measurement period.

5. Performance-Based Payment Reductions

(a) Missed Stops

The allowable number of Missed Stops is specified in Section 2 below.

For each Missed Stop in excess of the allowable number of Missed Stops over a [10]-day, [30]-day, [60]-day, and [90]-day measurement period, the sums provided in Table [1] and based on the Category of Station, will be deducted from any Service Payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Missed Stops.

Table 1.

Category	Stations	[10]-day	[30]-day	[90]-day	[180]-day
1	Terminal Stations	[\$24,500]	[\$29,000]	[\$38,000]	[\$48,000]
2	Intermediate	[\$22,500]	[\$27,000]	[\$36,000]	[\$46,000]

(b) Late Stops

The allowable number of Late Stops is specified in Section 3 below.

For each Late Stop in excess of the allowable number of Late Stops over a [10]-day measurement period, the sum of [*under development*] shall be deducted from any Service Period payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Late Stops.

For each Late Stop in excess of the allowable number of Late Stops over a 30-day measurement period, the sum of [*under development*] shall be deducted from any Service Period payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Late Stops.

For each Late Stop in excess of the allowable number of Late Stops over a 90-day measurement period, the sum of [*under development*] shall be deducted from any Service Period payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Late Stops.

For each Late Stop in excess of the allowable number of Late Stops over a 180-day measurement period, the sum of [under development] shall be deducted from any Service Period payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Late Stops.

(c) Mission Quality Failures

The allowable number of Mission Quality Failures is specified in Section 4 below.

For each Mission Quality Failure in excess of the allowable number of Mission Quality Failures over a [90]-day measurement period, the sum of [\$12,200] shall be deducted from any Service Period payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Mission Quality Failures.

For each Mission Quality Failure in excess of the allowable number of Mission Quality Failures over a 180-day measurement period, the sum of [\$____] [To be provided]. shall be deducted from any Service Period payments due, or to become due, to Contractor as a Performance-Based Payment Reduction for Mission Quality Failures.

(d) Performance-Based Payment Reduction Limitation

The cumulative Performance-Based Payment Reduction amount for Missed Stops, Late Stops, and Mission Quality Failures under Section 1.1(a), 1.1(b), and 1.1(c) for any month shall not exceed the Service Payment amount for the month.

5.1 Excused Late Stops, Missed Stops and Mission Quality Failures

Notwithstanding Section 1.1, a Late Stop, Missed Stop or Mission Quality Failure shall not count towards the assessment of Performance-Based Payment Reductions if Contractor can establish that (a) Authority, the Trainset operator, Rolling Stock Contractor, a third party, or a Force Majeure Event is wholly responsible for a sufficient number of the Late Stops, Missed Stops or Mission Quality Failures to bring the performance of the Rail Infrastructure System within the allowable number of Late Stops, Missed Stops or Mission Quality Failures set forth in this Schedule 6, and (b) the excused Late Stops, Missed Stops or Mission Quality Failures under (a) were out of Contractor's control and Contractor could not have avoided or prevented them by due diligence and use of reasonable efforts.

5.2 Performance-Based Payment Reduction Relief

In order to provide Contractor an incentive to correct performance failures, Contractor shall be entitled to claim relief pursuant to this Section 1.3 from [50]% of any Performance-Based Payment Reductions imposed under this Schedule 6 for (a) Missed Stops in excess of the allowable number of Missed Stops over a [10]-day measurement period and/or (b) Late Stops in excess of the allowable number of Late Stops over a [10]-day measurement period if:

- i. During the [180]-day measurement period (described in Section 1) in which Authority assessed the Performance-Based Payment Reduction at issue, Contractor does not exceed the allowable number of Missed Stops and/or Late Stops with respect to any other [10]-day measurement period for Missed Stops or Late Stops; and



- ii. During the subsequent [180]-day measurement period, Contractor does not exceed the allowable number of Missed Stops or Late Stops for any [10]-day measurement period.

Such relief, if any, shall take the form of a rebate paid to Contractor with the monthly payments due Contractor during the Service Period. Contractor shall invoice Authority for the rebate in accordance with Article 11.5 of the General Provisions. In no event shall Contractor be entitled to any relief under this Section 1.3 for Performance-Based Payment Reductions assessed as a result of Missed Stops or Late Stops in excess of the allowable number of Missed Stops or Late Stops over any [30]-day, [90]-day or [180]-day measurement periods or assessed for Mission Quality Failures.

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APPENDIX 1 TO SCHEDULE 6

Allowable Percentages of Missed Stops for first [360] days of Revenue Service

(See Following Page)

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Allowable Percentage of Missed Stops for [10]-Day Measurement Periods from the start of revenue service to the end of the first [360] days Service Period

[10]-Day Measurement Period	[Allowable Percentage of Missed Stops
1st	0.145
2nd	0.141
3rd	0.137
4th	0.133
5th	0.129
6th	0.125
7th	0.121
8th	0.117
9th	0.113
10th	0.109
11th	0.105
12th	0.101
13th	0.097
14th	0.093
15th	0.089
16th	0.085
17th	0.081
18th	0.077
19th	0.073
20th	0.069
21st	0.065
22nd	0.061
23rd	0.057
24th	0.053
25th	0.049
26th	0.045
27th	0.041
28th	0.037
29th	0.033
30th	0.029
31st	0.025
32nd	0.021
33rd	0.017
34th	0.013
35th	0.009
36th	0.005]

Allowable Percentage of Missed Stops for [30]-Day Measurement Periods from the start of revenue service to the end of the first [360] days Service Period

[30]-day measurement period	[Allowable percentage of Missed Stops
1st	0.144
2nd	0.132
3rd	0.120
4th	0.108
5th	0.096
6th	0.084
7th	0.072
8th	0.060
9th	0.048
10th	0.036
11th	0.024
12th]0.012

Allowable Percentage of Missed Stops for [90]-Day Measurement Periods during the start of revenue service to the end of the first [360] days Service Period

[90]-day measurement period	[Allowable percentage of Missed Stops
1st	0.135
2nd	0.099
3rd	0.063
4th	0.027]

Allowable Percentage of Missed Stops for [180]-Day Measurement Periods during the start of revenue service to the end of the first [360] days Service Period

[180]-day measurement period	[Allowable percentage of Missed Stops
1st	0.05
2nd	0.015]

SCHEDULE 7

DESIGN DEVELOPMENT AND REVIEW

DESIGN SUBMISSION AND REVIEW

1.1 General

The Contractor shall provide Technical Documentation including design and manufacturing drawings to a level of detail suitable for assembly, installation, maintenance, repair, overhaul and operation. The Technical Documentation will be used by the Authority to conduct Design Reviews of the Contractor's design. Technical Documentation shall record the As-Built, installed, tested and commissioned systems and shall provide sufficient information for the continued safe operation and maintenance of the HSR. The Technical Documentation shall conform to a standard and format that shall be Good Industry Practice using an electronic document management system. Drawings shall conform to the requirements of [Appendix xx]. Design Drawings shall identify the codes and standards with which the design is compliant. For all Software the Supplier shall provide sufficient information to allow a complete understanding of the function and interface requirements. The level of detail shall be sufficient to permit complete verification of all operational, RAM and safety criteria.

1.2 Configuration Management

The Contractor shall maintain accurate, thorough and current records throughout the performance of the Contract. A single Configuration Management system shall apply to all material furnished irrespective of its origin. Each Document, component, sub-system and system shall carry a configuration identity. All Technical Documentation shall be identified by title, number, issue, revision and date. The Configuration Management system shall include:

- Identification of and documentation of the physical and functional characteristics of components, sub-systems and systems as defined by technical information including functional schematics, physical schematics, applicable standards, software flow diagrams, software architecture, software source code, drawings, layouts, plans, specifications, specification control drawings, and both maintenance and operating manuals
- A means to search out associated documents, including next higher and lower levels, assembly level, specifications, software (including version), and documents
- Drawing trees for all major systems and sub-systems, with drawing identities reserved by groups
- Specification and process trees for all major systems and sub-systems, with engineering unit description identities reserved by groups



- Change control procedures, wherein the approval status of any document can be determined
- Completed incorporated changes can be identified
- Pending changes will be posted against any document
- Effect on manufacturing or installation will be identified with any changed document
- Changes will not be initiated without an impact analysis report and all affected party review
- A change board will be established
- A materials review board will be established
- Materials review actions will be tracked
- At the time of submittal of As-Built drawings, incorporation of changes can be verified by inspection or demonstration
- Records of change assessment will be kept. History logs, including photographic progress records, shall be kept for all major sub-elements of other Principal Design Units, including signaling circuits and interlockings, communications systems, traction power looms, and software. The history logs are to identify all the parts, the associated part, drawing, or identity, with change level applicable. History logs are to accompany items shipped for installation and be updated after installation and as As-Built drawings. The Contractor is required to close the history log with a set of As-Built or as-installed documentation including all internal interfaces and those external interfaces affecting the Work.

1.3 Configuration Management Plan

The Supplier shall produce a Configuration Management plan within [120] days after NTP, for the Authority's review. The Configuration Management plan shall identify the methods and procedures that shall be used to achieve the requirements of the Configuration Management System. The plan shall identify the associated procedures, systems and techniques employed.

1.4 Configuration Control

The Contractor shall establish a configuration control system consistent with the requirements for controlling the hierarchy and arrangement of the Technical Documentation and changes thereto. The system shall record, as a minimum:

- Changed items
- Reason for change
- Authority for change
- Date of change



- Approval status
- Any other significant data.

The configuration control system shall differentiate between major and minor changes to the Technical Documentation. Examples of major changes include factors that affect any of the following factors:

- Safety
- Schedule or deliveries
- Performance outside the requirements
- Delivered equipment, so as to require retrofit
- Adjustments or schedules affecting operating limits or performance
- Reliability or maintainability outside agreed tolerances
- Physical or functional interchangeability
- Maintenance practices
- Maintenance manuals
- Training
- Spares
- Sources of equipment
- EMI/EMC characteristics
- Interface characteristics
- Environment
- Compatibility with training program.

Minor changes are those changes that do not require Authority's action. These include changes that deal only with manufacturing processes or sources in a way such that the physical and functional interchangeability, maintenance practices, maintenance manuals, and spares provisioning are unaffected.

Changes recording the incorporation of corrections are classified as minor if the correction did not involve a change classified as major.

1.5 Design Submissions and Review



Design Reviews will be conducted throughout the design lifecycle and shall generally comprise a formal design submission process supported by design presentations. The Design Review process shall include:

- Preliminary Design Reviews giving outline information in a formal submission
- Final Design Reviews giving detailed design information in a formal submission
- Design Progress Meetings presenting the design package
- A System Design Review shall be started as soon as all Principal Design Units have completed their Preliminary Design Reviews. Each design submission shall be for a distinct part of the Work and shall contain all the details necessary to enable the Authority to be able to understand and review the design, and to satisfy itself that the design submitted appears to be fully coordinated, to conform to the Contract Requirements and the performance requirements contained therein.



SCHEDULE 8

Verification Validation and Self Certification

1 – INTRODUCTION

The Verification and Validation (V&V) process is a critical aspect of this design workflow to provide for a completely integrated system in the future. The contractor shall provide time and resources necessary to conduct a thorough Verification and Validation, in accordance with the process specified in this Schedule and in the performance requirements.

This section includes:

1. Requirements for Contractor Self-Certification (SC) to certify that the Technical Contract Submittals¹ conform to Technical Contract Requirements as detailed in the Contract and as reasonably inferred therefrom. The Self-Certification Process is embedded in the CHSTS V&V process.
2. Verification and Validation requirements for Contractor supporting the Self-Certification by provision of documented objective evidence to demonstrate compliance with the Technical Contract Requirements set forth in this Contract.

The Contract differentiates between Technical and Non-Technical Contract Requirements and Technical and Non-Technical Contract Submittals.

Technical Contract Requirements (TCR) are defined as Contract Requirements specifying the characteristics of the final infrastructure deliverable including related final design², construction, inspection, testing, and acceptance requirements. Technical Contract Submittals (TCS) are defined as the Contract submittals that address the Technical Contract Requirements, including, but not limited to:

- Final design drawings, specifications and reports
- Ready for construction (RFC) drawings and specifications
- Inspection plans, procedures, and reports
- Test and acceptance plans, procedures, and reports
- As-built drawings and specifications

Non-Technical Contract Requirements (NTCR) are the remainder of the Contract Requirements such as Project Management, Commercial, Legal or other Contract Requirements.

¹ Refer to the Scope of Work for the Technical Contract Submittal List.

² Final design shall be defined as per 23 CFR 636.103 and means any design activities following preliminary engineering and expressly includes the preparation of final construction plans and detailed specifications for the performance of construction work.



Non-Technical Contract Submittals (NTCS) are defined as Contract submittals that address Non-Technical Contract Requirements, including Project Management Plans, Schedules, Invoices, etc.

Objective evidence is defined as Technical Contract Submittals provided by the Contractor that, when independently reviewed, clearly demonstrate that the TCRs have been met.

If the Contractor includes Technical Contract Requirements in Non-Technical Contract Submittals, the submittal shall be treated as a Technical Contract Submittal.

This section does not include:

- Submittal and review requirements for non-technical submittals, including management related and administrative submittals. Refer to the General Provisions for NTCS requirements.
- List of individually required Contract Submittals
- Quality control/assurance requirements
- Specific inspection and testing requirements

Refer to the applicable Contract provisions for the requirements not included in this section. Unless otherwise noted, all requirements in this document shall be performed by the Contractor.

In the event that a requirement of this section conflicts with another Contract requirement, the most stringent requirement or interpretation shall apply.

2 - PRODUCTS

2.1 Contractor Verification and Validation Management Plan

Verification & Validation Management in the California High-Speed Train Project is defined as a systematic engineering process based on generally accepted project management and systems engineering practices (INCOSE Systems Engineering Handbook, 4th Edition (2015)).

The contractor shall develop and implement a Verification and Validation Management plan (CVVP) for the project as defined in the performance specification.

The Plan shall address the following processes:

- Verification and Validation process
- Requirements Management process
- Self-certification process

The plan shall also demonstrate how it integrates the following processes which are developed in separate deliverables:

- Design Management process
- Interface Management process
- Inspection and Testing Program Management process
- Quality Program and Quality Management System



- Change Control and Configuration Management process

2.1.1 Verification and Validation (V&V) Process

The V&V process is the core process depending on the other processes described above, e.g. Verification and Validation can only be successfully performed against Technical Contract Requirements (TCRs). The TCRs shall be addressed by Technical Contract Submittals, while changes to TCRs shall be managed.

The Contractor shall develop and implement a comprehensive V&V process as defined in the Performances specifications to demonstrate how each Technical Contract Requirement is met during design, construction, inspection, testing, and certification.

The V&V lead person shall meet the requirements for Contractor Key Personnel as specified in this schedule 8 in section 3.1.

2.1.2 Requirements Management Process

The contractor shall Develop and implement a comprehensive requirements management (RM) process as defined in the Performances specifications, defining how the Technical Contract Requirements are captured, traced, managed, verified, and validated.

The Contractor shall manage Technical Contract Requirements in the RM tool as specified in Section 2.2.

The contractor shall also Demonstrate compliance to Technical Contract Requirements using the RVTM and compliance to Critical Items using the CIL as specified in the performance specification.

Certify compliance to Critical Items using the Certificate of Conformance Package as specified in the performance specification.

2.1.3 Self-Certification Process

The self-certification process is different from the traditional submittal and review process where the Contractor prepares a submittal for the full Authority review, typically resulting in either approval or rejection of the submittal.

The purpose of the self-certification process is to shift submittal review responsibility from the Authority to the Contractor, whereby the Contractor shall demonstrate compliance resulting in reduced review efforts on the Authority side. This is achieved by Contractor self-certification of compliance, supported by objective evidence (the V&V submittal) demonstrating compliance between the contract and the submittal.

The Self-Certification process applies to Technical Contract Submittals (TCS).

He Self-certification process is defined in the Performance specifications



2.2 Requirements Management (RM) Tool

The contractor shall Capture, trace, manage, verify, and validate Technical Contract Requirements using an RM tool as defined in the Performance specifications. The RM tool is foundational to maintaining programmatic visibility over implementation of project (this Contract) specific TCRs. It is critical that the information contained within the RM tool is complete, correct and consistent since it provides evidence of programmatic compliance.

The RM tool shall be the latest IBM Rational DOORS 9.X version. The Contractor shall not use IBM Rational DOORS Next Generation.

Detailed requirements concerning the RM Tools, capture of TCRs, traceability of the Requirements, organization and management of the DOORS data base and Performance metrics are described in the Performance Specifications

2.2 Contractor Verification and Validation Submittal

The Contractor shall

Provide a V&V submittal with every Technical Contract Submittal. The V&V submittal includes the following:

- The Requirements Verification and Traceability Matrix (RVTM)
- The Certifiable Items List (CILs)
- Certificate of Conformance Packages (CCP)
- Contractor V&V report

These submittals are defined in the Performances specifications

3 - EXECUTION

3.1 Contractor V&V Key Personnel

The Contractor shall employ only professionals with at least 10 years of experience in the V&V field of expertise for the V&V manager position. The candidates shall have a proven track record in the following functions as supported by their resumes:

- Rail Road projects with preferably Federal Transit Administration or Federal Railroad Administration oversight
- Design/Build contracts
- Systems Engineering with application to transportation and/or infrastructure industry
- Verification and Validation
- Certified Systems Engineering Professionals (CSEP) and/or membership in the International Council on Systems Engineering (INCOSE) is preferred
- Proven continuity through project delivery and commitment for the length of this contract is required
- Full time Presence at the local project office



3.2 Authority's Representative Review

Upon submittal of Technical Contract Submittals, the Authority's Representative will perform a review of the Contractor's submittal. An additional audit of the Contractor's adherence to the verification, validation and self-certification process may be performed as deemed necessary.

The Authority's Representative may require consultations with the Contractor's engineers for the various disciplines involved in the part of the work under review. The Contractor shall ensure that the relevant staff is available to participate in such consultations.

The Authority's Representative may request additional reviews as considered necessary to ensure a continued and uniform consistency in the quality and effective incorporation of revisions to submittals and/or the Contractor may request additional reviews to facilitate release of designs for construction.

3.3 Submittals

The requested submittals list schedule is provided in the Performance Specifications.



SCHEDULE 9**Schedule of Values [Under development]****Concept**

The Contract Amount will be determined using Schedule of Value based on the following concepts:

During the Performance Period

Development Based Costs

- 1.) Preliminary Submittals, design developments, etc. will be based on % of Contract Amount

Physical Asset Based Costs

- 1.) The linear elements of the Track & Systems (e.g., trackwork, communications, Overhead Contact System, signaling, signage, access points, etc.), will be priced on a per mile basis:
 - a. At-grade and on embankment
 - b. In trench
 - c. In tunnel
 - d. On structure
- 2.) The non-linear elements will be priced on a per unit basis (e.g.);
 - a. Traction Power Facilities
 - i. Traction Power Substation
 - ii. Switching Stations
 - iii. Paralleling Stations
 - b. Special Trackwork (interlockings, turnouts, passenger station tracks, refuge tracks, etc.) as shown on the Track Schematic
 - c. Passenger Stations (platforms, canopies, vertical circulation)

Time Based Costs

1. The period between the issuance of the Certificate of Conditional Acceptance for a Segment Integrated Dynamic Test and the start of Revenue Service (Trial Running Period) will be priced on a monthly basis.

The Physical Asset Based elements of the Schedule of Values will be subject to escalation as per GP5, Schedule 4 to GP)



SCHEDULE 10
ASSET MANAGEMENT

1. Overview

1.1. The California High Speed Rail system will be comprised of assets, systems and subsystems that must function together to deliver safe reliable service and achieve the performance standards set forth by the contract. The assets must be managed effectively to achieve the required operational performance, condition and remaining useful life at the point of asset handback. The following principles apply to the ownership and management of Authority assets through the duration of the contract:

- 1.1.1. The Authority owns the physical assets that comprise the railroad system as well as the asset information and asset data that comprises the digital assets.
- 1.1.2. The Contractor is the Steward of the Authority's physical assets, asset information, and digital assets for the duration of the contract.
- 1.1.3. The digital asset data represents the information necessary for the contractor to effectively manage physical assets throughout the asset lifecycle and demonstrate to the Authority the effective management of the physical assets per the contract.
- 1.1.4. The Authority Enterprise Asset Management (EAM) System is the official system of record for all digital asset data.
- 1.1.5. Asset Management is the core capability by which the authority and the contractor will measure and manage asset information completeness, asset performance and asset condition.
- 1.1.6. All required reporting pertaining to asset information shall be derived from the digital asset data stored in the Authority EAM and managed by the Contractor.
- 1.1.7. The Contractor shall, on behalf of the Authority, comply with all Federal, State, Local and California High Speed Rail Policies and regulatory requirements for asset management.

2. Business Management System for Asset Management

- 2.1. As part of their Strategic Asset Management Plan, the Contractor shall submit, for Authority's review and approval, documentation describing how they will achieve one integrated management system for Asset Management. The proposed management system should incorporate industry best practices (e.g. Institute of Asset Management's "An Anatomy of Asset Management") and comply to the ISO 55000 and ISO 31000 standards.
- 2.2. The documentation provided must describe the management system at minimum to a level of detail depicting organizational framework, key decision processes, and the approach to managing asset information and implementing continuous improvement.



3. Asset Technology & Data Management

3.1. Architecture and Integration

3.1.1. System Architecture - The Contractor shall submit Enterprise System Architecture design documentation that describes all Contractor systems that store and manage asset information (EAM, CADD, GIS, BIM, DOORS, CM, DMS, RIIMS, MMIS, IoT, SCADA, etc) and how they will interface with Authority asset management systems of record (EAM, GIS, EDMS, DOORS) and adhere to the Authority asset management requirements.

3.1.1.1. A “single source of truth” asset information system shall be implemented and maintained; and is used to support all levels of decision making. Contractor shall provide all the necessary integration and support to the Authority EAM system, which is the authoritative source of asset data.

3.1.1.2. The Authority has operationalized IBM Maximo as the EAM system of record and has integrated ESRI’s Enterprise Geographic Information System (GIS). The Authority EAM system is supporting program delivery in several fronts including maintaining the Asset Registry for constructed assets, interfacing with other enterprise technologies, managing regulatory compliance processes with respect to Federal, State and Authority Policy requirements, Permanent Encroachment Management, and tracking the progress of the Civil construction packages (CP1, CP2-3, CP4).

3.1.2. Authority EAM System-of-Record - The Contractor shall ensure that data in the Authority EAM system is kept up-to-date in real-time. The Contractor shall submit a proposed plan to maintain asset data in the Authority EAM system through one or more of the following methods, or alternative methods.

3.1.2.1. The preferred method of maintaining asset data is for the Contractor to use the Authority EAM system directly.

3.1.2.2. Contractor to maintain their own EAM system(s) and establish a direct integration to Authority

3.1.2.3. Contractor to maintain their own EAM system(s) with interface to Authority EAM via third party system.

3.1.2.4. *Note: The Authority remains open to other possible avenues of integration besides the ones discussed above. The Authority leaves it up to the discretion of Contractor to propose one or a combination of alternatives.*

4. Asset Data Governance and Data Management



- 4.1.1. The Contractor shall submit asset management data governance framework documentation and data management plan documentation for review and approval by the Authority. The data governance framework and data management plan shall be documented, implemented and maintained within the context of the Contractor's management system for asset management and the proposed Enterprise technology solution.

5. Asset identification and referencing

- 5.1.1. As part of the Asset Information Management Plan, the Contractor shall propose standards, conventions, nomenclatures, management approaches, and business workflow schemas for uniquely identifying and referencing each asset class:
 - 5.1.1.1. Uniquely identify, designate/name and record the assets, components and their parent-child relationships to the LMU (Lowest Maintainable Unit) level;
 - 5.1.1.2. Achieve traceability and congruence across various information domains including CADD, GIS, RAMS, RIIMS, CMMS, SCADA, IoT, configuration management, and construction management at appropriate levels (i.e. not necessarily at the LMU level in all cases), and
 - 5.1.1.3. Compatibility with prevalent industry standards and best practices.
- 5.1.2. Congruence, Traceability, Line of Sight
 - 5.1.2.1. The contractor shall utilize the unique asset identifier as a common linkage for communicating across various contracts, documentation, practice boundaries and information systems (systems of record).
 - 5.1.2.2. Every interface involving an asset shall be captured and maintained as part of the asset lifecycle management.
 - 5.1.2.3. Contractor shall ensure that the data representing all activities an asset participates in or is subject to are traceable along a clear line of sight based on the asset's unique identifier.

Note: Authority will make available an Asset Information Requirements Guide (AIRG) which is intended to provide guidance on asset identification and referencing and the nature and tentative scope of the asset attribute information.

6. Deliverables

- 6.1. The first table below summarizes key deliverables to be submitted under Asset Management.



Deliverable	Description	Timeframe for initial delivery (after NTP)
Asset Information Management Plan	Describes Contractor's approach to acquiring, managing, and transmitting asset information into Authority EAM. Includes adopted standards and conventions.	[3 months]
Asset Management Policy (memo)	Part of Strategic Asset Management Plan but requires to be first approved separately by Authority	[3 months]
Management System for Asset Management (memo)	Part of Strategic Asset Management Plan but requires to be first approved separately by Authority	[3 months]
Strategic Asset Management Plan	A plan which establishes strategic goals, identifies necessary organizational capabilities, and formulates strategies to achieve the goals. Contains the approved Asset Management Policy.	[3 months]
Asset Class Strategies	Describes the lifecycle management of assets for each asset class. This document establishes the Asset Class-specific approach to achieving Performance Standards per contract.	[6 months]
Asset Management Plan (asset class plans)	Detailed management plans for every asset class and applicable sub-classes or systems.	[24 months]
Enterprise System Architecture design documentation	<u>Describes</u> all Contractor systems that store and manage asset information and how they will interface with Authority asset management technologies	[6 months]
Asset Data Governance Framework	Describes the framework for how asset data governance is effectively established, communicated and implemented.	[6 months]
Asset Data Management Plan	The plan for ongoing management of asset data within the management system, enterprise technology solution, and data governance framework.	[6 months]
Asset Management	Updates to the Authority EAM System-of-Record. Ensure to keep the Authority EAM	Regularly



Data	up-to-date with necessary data required to produce or substantiate the different reports prior to any such report being officially submitted.	
Asset Condition Report	Summarizes the condition of assets, including trend analysis, and prediction of forward risk and mitigations.	Quarterly after the start of Service Period
Infrastructure Status and Renewal Report	Provides a summary of the condition of assets from a long-term perspective addressing the trends, targets and strategies regarding state of good repair and remaining useful life, warranties and insurance, system resiliency, and capital needs over a 10-year horizon.	3 years after start of Service Period
Asset Management State of Practice Report	Diagnoses the state of asset management with respect to pre-planned maturity roadmap, global best practices and industry state of art; and identifies improvement actions to be incorporated into the subsequent SAMP update	4 years after start of Service Period

6.2. The table below lists key deliverables which are to be submitted under a heading other than Asset Management, however, their scope intersects with Asset Management. It is important that Contractor coordinates their internal disciplines to establish the coherence of these deliverables with respect to Asset Management practice and products. These deliverables will be subject to review by AMO for their final approval. All items in table below must be directly associated to a specific asset, asset classification, or asset classifications to ensure alignment with Authority management requirements

Deliverable	Timeframe
Configuration Management Plan	[3 months]
Quality Management Plan	[3 months]
RAM Program Management Plan	[3 months]
RAM Allocation Report	[6 months]
Maintenance Plan	[6 months]



Inspection and Test Plans	[18 months]
Maintenance Plans and Procedures	[18 months]
RAM Program Plan	[24 months]
Maintenance of Way Facilities and Sidings Plan	[24 months]
Guard Rail Risk Assessment	[24 months]
Infrastructure Performance Report	[Monthly]

6.3. The above lists of deliverables are not exhaustive. Upon review, the Contractor shall identify and communicate to the Authority any identified additional requirements or deliverables, and will influence the evaluation of their Proposal.

6.4. All asset management documentation shall be kept up to date to reflect the state of practice and shall adhere to Authority's document control standards.

7. Available References and Support

7.1. The Authority AMO has developed documentation on Authority's overall Digital Strategy for Asset Management, asset information management guidance (e.g. working documents concerning asset identification and referencing, asset information requirements, EAM system configuration schemas and lessons learned, data dictionaries, and business process and workflow maps).

7.2. The Authority AMO will provide the Contractor with access to the Authority EAM system and copies of the available documentation.



SCHEDULE 11**MAINTENANCE OF WAY FACILITY REQUIREMENTS****A. General Requirements**

Contractor shall comply with the following requirements:

1. Contractor shall construct sufficient Maintenance of Way Facilities on the Maintenance of Way Facility Property as needed to perform its maintenance obligations under the Contract.
2. [RESERVED]
3. The Maintenance Plan and Baseline Program shall identify all such facilities and/or contracts, including the timing for constructing each facility.
4. Maintenance of Way Facility buildings on Maintenance of Way Facility Property shall have a design life of no less than 50 years.
5. Maintenance of Way Facility buildings shall meet a minimum LEED "Silver" standard.
6. Contractor shall submit to Authority for approval the designs for Maintenance of Way Facilities to be provided on Maintenance of Way Facility Property. Contractor shall receive Authority's approval for such design documents as a condition to commencing construction. Authority's issuance of an approval for such design documents shall constitute approval of the design by Authority for purposes of Government Code Section 830.6, but shall not be deemed to relieve Contractor of liability for the design.
7. Maintenance of Way Facilities shall comply with standards and codes that are applicable. Prior to commencing construction of a Maintenance of Way Facility, Contractor shall submit to Authority a listing of the specific standards and codes that apply to the design and construction of such Maintenance of Way Facility.
8. [RESERVED]
9. Contractor shall only use the Maintenance of Way Facility Property to perform the Work. All other uses of the Maintenance of Way Facility Property are subject to Authority's prior written approval, in its sole discretion.
10. [RESERVED]
11. [RESERVED]
12. At the conclusion of the Service Period or termination of the Contract, Contractor shall, if requested by Authority, transfer the Maintenance of Way Facilities, including equipment but excluding hand tools and portable equipment, constructed on Maintenance of Way Facility Property to Authority. All such Maintenance of Way Facilities and equipment must be turned over to Authority in a state of good repair. Any maintenance contracts shall be assignable to Authority at Authority's option and at no additional cost to Authority.

SCHEDULE 12

COMMUNITY BENEFITS AGREEMENT

Pursuant to Article 31.2 of the General Provisions, the Community Benefits Agreement and Overhead Electrification System Agreement can be found on the Authority's website at http://www.hsr.ca.gov/Programs/Construction/community_benefits_agreement.html.

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SCHEDULE 13
GOVERNMENTAL APPROVALS

[Under Development]

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SCHEDULE 14

Integration and Interface Requirements

1.0 GENERAL

The Project is being implemented through a number of contracts including but not limited to civil infrastructure, station design, station construction, rail infrastructure, and rolling stock. As such, the careful coordination of all technical and programming matters between the relevant parties is a critical element in achieving fully coordinated design and construction. This Schedule 14 describes the Contractor's responsibilities with regard to integration and interface management and coordination with all internal to the contract and external to the contract Interfacing Parties, including Interfacing Parties identified in the future.

The Contractor shall have the lead responsibility for the management of Technical integration and interfaces through the entire program including but not limited to, Civil Infrastructure contracts, Rolling stock contract, station contracts, and Train Operation Contract.

2.0 RESPONSIBILITY OF THE CONTRACTOR

2.1 General

The Contractor shall

- a. Employ an interface and integration management approach to the scope of this Contract by identifying and coordinating the interfaces as well as performing design integration with adjacent contracts. Third Parties, and other entities in cooperation with the Authority;
- b. Demonstrate that the Work is being designed and executed such that facilities and subsystems identified in the design criteria, drawings, and by other means are being accommodated without functional or spatial constraints;
- c. Ensure delivery of the complete Project that integrates into the adjacent geographical territories and functions to support future systems and facilities components of the complete HSR system; and
- d. Resolve conflicts by partnering with all parties associated with the interface conflict to reach an agreeable solution so as not to place constraints on this or other/future contracts.



The Contractor shall at all times use reasonable efforts and due diligence to resolve all interfaces applicable to this Contract. Pursuant to this, the Contractor shall be proactive in seeking out integration and interface issues and their solutions, and shall identify the Interfacing Parties and their interface needs.

The Contractor shall communicate, coordinate and exchange information directly with the Interfacing Parties. Information necessary to fulfill the Contractor's integration and interface obligations shall be directly requested and obtained from the Interfacing Parties, and receipt acknowledged. Conversely, the Contractor shall provide directly to the Interfacing Parties information within the Contractor's scope that is required by them.

All requests for information, acknowledgement of receipt of information, and any official communication between the Contractor and the Interfacing Parties shall be made in writing. The Contractor shall provide a communication log to the Authority, and copies of official communications upon request of the Authority.

While complying with the Contract requirements, the contractor shall issue a baseline Program within [90 days] after NTP to allow for the delivery of information in accordance with the needs of the Interfacing Parties. If necessary, the contractor shall program early the design of a particular element to allow delivery of necessary interface information.

Many of the design activities for the different HSR contracts will be proceeding concurrently. The contractor shall issue a Master Interface Table no later than [90 days] after NTP. The contractor shall coordinate with interfacing parties to collect latest dates for transfer of selected information. These dates shall be incorporated into the Master Interface table including any particular interface action.

The level of information that the Contractor provides to and requests from others should be appropriate for the particular stage of the design. The Contractor shall ensure that allowances for delivery and receipt of increasing levels of information from Interfacing Parties are included in each design stage. The Contractor shall also recognize and allow for times when it may be necessary to modify the design process to accommodate the timing of information availability from the Interfacing Parties in order to achieve a coordinated design. Similarly at times it will be necessary for the Contractor to modify its design process to allow information needed by Interfacing Parties to be expedited for them to achieve timely completion of their coordinated design. The Contractor shall advise the Authority in writing of any problems encountered in obtaining necessary information, and/or any lack of cooperation from any Interfacing Party. In the event that the Authority considers that an interface is not proceeding satisfactorily, the Authority will review the matter and establish a coordinated plan directing the Contractor and the Interfacing Party or Parties as to the required action.

The Contractor shall establish a documented Interface Management System which shall include development and maintenance of the Coordinated Interface Report and Coordinated Interface

Program (See Section 4 of this Schedule 14), and perform, without limitation, the following duties:

- Maintaining an Interface Management Team consisting of managers representing all of the disciplines within this Contract, under the direction of an Interface Manager with the authority to resolve interface matters to the satisfaction of the Authority under the direction of an Interface Manager with the Authority to resolve interface matters by giving evidence of the economically most efficient and effective solution for each interface measured by an economical Life-Cycle-Cost-Evaluation including – where relevant – the interests of Track & Systems, Rolling Stock, Stations, Future Operator, Authority.
- Responding to, confirming and making written agreements with regard to interfaces.
- Acting as the Chair of Interface Meetings and making decisions regarding interfaces. The Contractor shall arrange regular meetings to monitor the status of interfaces.
- The contractor shall conduct no less than monthly interface coordination workshops with the Authority, or at other times as required.
- Acting as Deputy Chair/Secretary/Recorder at Interface Meetings organized with the Authority. The Authority may arrange special meetings as may be necessary to resolve specific issues. The Contractor may request assistance from the Authority to arrange meetings on particular subjects.
- Providing the Authority information and/or details of interfaces, including copies of relevant correspondence and other documents.
- Providing the Authority access to information to conduct audits on interface compliance and confirming that interface coordination is proceeding consistently with the Project requirements.

The Contractor shall support the Interfacing Parties and the process of achieving a fully coordinated design for the Work and the Project, including undertaking the following duties:

- Providing timely interface information when requested.
- Anticipating the information needs of the Interfacing Parties and transmitting such information as soon as it is available.
- Keeping the Interfacing Parties informed of any development of the Work related to the interfaces.
- Advising the Interfacing Parties on potential problems related to the interfaces, together with proposed solutions likely to be acceptable to Interfacing Parties and which meet the needs of the Project.

- Arranging and/or attending meetings with the Interfacing Parties as necessary to resolve interface problems.
- Communicating and cooperating with the Interfacing Parties to identify and resolve potential interface problems.

2.2 Stages of Interface

The Contractor shall develop the Rail Infrastructure System Design in such a way as to ensure that interface conflicts are either removed or minimized. Design schemes that impose unnecessary or unreasonable construction challenges for Interfacing Parties will not be considered suitable for a Statement of No Objection.

3.0 INTERFACE MANAGEMENT PLAN

As specified in the General Provision Article 22, The Contractor shall develop an Interface Management Plan (IMP) that establishes and maintains a systematic, documented, comprehensive and verifiable management process applied throughout the duration of the Contract to coordinate the interfaces. The IMP shall include the following:

- a. In accordance with the V&V processes, detailed processes for systematic identification, management, tracking, and documentation of the physical, technical, functional, and other interfaces by means of the RM Tool;
- b. Documentation of interfaces between systems components as applicable to the Contract (e.g., track, traction power, overhead contact system, train control, communications, electrical, mechanical, and safety and security);
- c. Identification of interfaces between the Contract and other interfacing contracts or geographical adjacent contracts;
- d. Identification of third party interfaces (utilities, agencies, regulators, sub-projects, railroads and others);
- e. Identification of major coordination milestones (e.g., engineering, construction, testing, and commissioning) and the handling of interface requirements during these phases;
- f. Procedures for the identified interfaces to be included in the Interface Registry held in the RM Tool;
- g. Defined processes to confirm and demonstrate interface compatibility through testing or other verification methods throughout the Contract;

- h. Defined processes to assure that RAMS requirements are propagated through all interface components, elements, and systems to meet the criteria set out in the RAMS requirements;
- i. A schedule of expected meetings and workshops that shall include organizations external to the Contractor;
- j. Provision for the establishment of an Interface Coordination team (ICT) as the management group for the interface and design integration task as defined in the performance specifications; and
- k. An organization chart showing members of the ICT.

The Contractor shall submit to the Authority a draft IMP [60 days] after NTP and the final IMP [120 days] after NTP, which shall be subject to a SONO. The IMP will be updated as required to reflect the current interface management and design integration process as the Project progresses.

4.0 COORDINATED INTERFACE REPORT AND COORDINATED INTERFACE PROGRAM

The Contractor shall prepare the proposed Coordinated Interface Report and proposed Coordinated Interface Program, within [120 days] of Notice to Proceed. The Coordinated Interface Report and Coordinated Interface Program shall incorporate and expand upon the concepts contained in the Information Delivery Table and the Master Interface Table and shall completely define the Contractor's program for interface coordination. Subsequently the Contractor shall keep each document up to date and submit each document on a quarterly basis to the Authority for review and comment. The Contractor shall include in each Monthly Progress Report a summary of principal issues with Interface management progress metrics defined by the contractor in coordination with the Authority.

Until such time as the Coordinated Interface Report and Coordinated Interface Program have been the subject of a statement of no objection by the Authority, the Master Interface Table shall be used for the Contractor's Interface management. After such acceptance of the Coordinated Interface Report and Coordinated Interface Program, the Master Interface Table will be superseded.

The Coordinated Interface Report is that document which describes the Contractor's interface management system in terms of providing a clear description of each of the interfaces, both technically and sequentially, and represents an account of how the Contractor proposes to achieve coordinated design and coordinated construction. This document is also required to demonstrate that the coordinated design and construction details described therein fully comply with the requirements of Interfacing Parties, and acceptance of these details by the Interfacing Parties will be a pre-requisite to the Authority's statement of no objection. Each Interface shall be referenced in an individual Interface Control Document (ICD) and traced as define in this schedule 14 section 3 point a.



The Coordinated Interface Program is that program which describes the sequencing and timing of each of the Interfacing Parties' scopes of work, clearly describing the interdependencies between the Work and the work of the Interfacing Parties, and complementing the Coordinated Interface Report. This Coordinated Interface Program shall be prepared in accordance with the Baseline Program and shall show the sequences and timing agreed with the Interfacing Parties to the necessary degree of detail to clearly illustrate each of the interfaces to be undertaken.

The Coordinated Interface Report and Coordinated Interface Program shall:

- Be coordinated with and incorporate information from the Interfacing Parties to ensure compatibility of interface identification and definition.
- Be transmitted to the Interfacing Parties concurrently with submittals to the Authority's Representative.
- Support the Baseline Program.
- Address each design unit, stage of design and construction.
- List all relevant interfaces in detail, their status, and the corresponding source(s) of information.
- Include interface information transfer dates which have been agreed by the Interfacing Parties.
- Accommodate comments and input required by the Authority.
- Follow the outline structure, numbering system, and related procedures provided by the Authority.
- Include an account of how the interfaces are being managed.
- Identify the latest information regarding agreements with the Interfacing Parties and transfers of information.
- Identify any problems related to coordination with Interfacing Parties.
- Identify construction provision for interfacing parties in terms of specific requirements at hand over, and allocation of space for working room, adequate access and the provision of temporary facilities.

5.0 COORDINATION DRAWINGS (CSD / SEM / DRD / IDD)

For the purpose of achieving a design which is fully coordinated with respect to electrical, mechanical, architectural and Rail Infrastructure System Assets, and to ensure compatibility between different services, and adequate space requirements, the Interfacing Parties involved in civil and station work shall develop and maintain service coordination drawings that

specifically detail the requirements of others in relation to the design in terms of special arrangements, space allocation, cast in items, primary and secondary fixings, grouting of equipment/plinths, drill and fix brackets and cast-in and surface-mounted conduit. These drawings shall also include composite cross-sections and layouts which show the spatial requirements of the Contractor and all Interfacing Parties and identify items to be finalized, defined, or resolved

As the design progresses the service coordination drawings shall be supplemented by Combined Services Drawings (CSD) and Structural Electrical Mechanical (SEM) drawings, Delivery Route Drawings (DRD) and Interface Demarcation Diagrams (IDD) prepared by the relevant Interfacing Parties.

The CSDs will show the intended locations, routes and spatial relationships of the individual E&M services and Rail Infrastructure System installations fully coordinated with each other and the structural work. These CSDs shall also clearly indicate that effective cable coordination has been achieved in terms of cable location or cable trays and the trunking and cable routing.

The SEMs will show all of the structural requirements for the E&M services and the Rail Infrastructure System installations including but not limited to openings, penetrations, sleeves, plinths, lifting beams, and access panels.

The Delivery Route Drawings (DRD) will demonstrate how and in which access is provided for the purpose of successful and safe delivery and installation of equipment. These drawings shall illustrate all reasonable provisions needed including the provision of hard-stand and suitable access roads for heavy loads to the building location for the equipment. These drawings shall also show the route to be taken within the buildings, confirm the adequacy of doorway and corridor widths and indicate the provision of safe lifting hooks where needed.

The Interface Demarcation Diagrams (IDD), will show in diagrammatic format for each interface the demarcation of scope of responsibilities between the Contractor and each of the Interfacing Parties.

The Contractor shall provide to the Interfacing Parties responsible for the above-stated drawings, all of the information, related to the Works, that is required for the preparation of the drawings, provide reviews and written comments if applicable, and agree in writing that the drawings correctly represent provisions within the work of the Interfacing Parties required by the Contractor.

APPENDIX 1 TO SCHEDULE 12

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