

California High-Speed Rail Authority



RFP No.: HSR 13-57

**Request for Proposal for Design-Build
Services for Construction Package 2-3**

**Book IV, Part E.2 – Verification Validation
and Self-Certification Procedures**

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1 Introduction

This Construction Package is a civil/structural package, but part of the High-Speed Rail System, which incorporates trackwork, stations, storage and maintenance facilities, train sets and railroad systems. The Verification and Validation process is a critical aspect of this design workflow to provide for an integrate-able 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 procedure.

This section includes:

- Verification and Validation (V&V) requirements for Contractor to demonstrate compliance with Technical Contract Requirements set forth in this Contract by provision of objective evidence.
- Requirements for Contractor Self-Certification to certify that the Technical Contract Submittals conform to Technical Contract Requirements as detailed in the Contract and as reasonably inferred therefrom.

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 design¹, 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 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. Non-Technical Contract Submittals (NTCS) are defined as Contract submittals that address Non-

¹ For a definition of final design refer to section Final Design 2.3.1.1.



Technical Contract Requirements, including Project Management Plans, Schedules, Invoices, etc.

If the Contractor includes Technical Contract Requirements in Non-Technical 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. Please refer to the General Provisions for NTCS submittal 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.

1.1 Reference Standards

- International Electrotechnical Commission (IEC)
 - IEC 10007 – Quality management system – Guidelines for configuration management (latest version)
 - IEC 15288 – Life Cycle Management–System Life Cycle Processes
- Institute of Electrical and Electronics Engineers (IEEE)
 - IEEE 1220/IEC 26702 – Systems engineering–Application and management of the systems engineering process
- International Council on Systems Engineering (INCOSE)
 - INCOSE Systems Engineering Handbook

1.2 Scheduling

- Include V&V submittals listed in Section 3.5 in Contract schedule.
- Add V&V activities as defined in Verification and Validation Plan to Contract schedule.



1.3 V&V Submittal Overview

Each Technical Contract Submittal shall be accompanied by a V&V submittal as defined in Section 2.6 and shown in Figure 1, identifying the Technical Contract requirements it satisfies and explaining how each Technical Contract requirement is met, inspected, or tested by the Contractor’s final design and construction. A V&V submittal includes the Requirements Verification Traceability Matrix (RVTM), Certifiable Items List (CIL), and a V&V report explaining how the Technical Contract Submittal meets the Technical Contract Requirements.

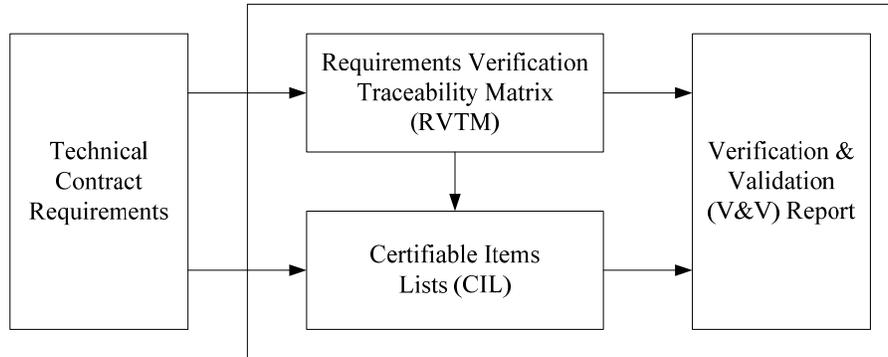


Figure 1: Contractor V&V Submittal

Non-Technical Contract Submittals do not require a V&V submittal.

1.4 Self-Certification Process Overview

Follow the Self-Certification Process as defined in Section 3.1.

1.5 Terms and Acronyms

Term	Definition
Authority	California High-Speed Rail Authority
Authority’s Representative	PCM, PMT or Authority
Certifiable Item	Contract Requirement that requires independent verification.
CI	Critical Item
CIL	Certifiable Items List
Contract Requirement	Any part of the Contract that requires an action or deliverable to be performed by the Contractor.
Contract Submittals	Submittals other than V&V submittals as required in this Contract
EIR/S	Environmental Impact Report/Statement
Fitness for Purpose	A product is suitable for the intended purpose
HSR	High Speed Rail
IBS	Interface Breakdown Structure
IM	Interface Management
NPCR	Non-Technical Contract Requirement
NTCS	Non-Technical Contract Submittal



PCM	Project Management / Construction Management
QA/QC	Quality Assurance / Quality Control
PHA	Preliminary Hazard Analysis
PMT	Program Management Team
RM	Requirements Management
RVTM	Requirements Verification Traceability Matrix
ROD	Record of Decision
SONO	Statement of No Objection
Subject to SONO	Submittal subject to a review by the Authority's Representative
Technical Contract Requirement	Contract Requirements specifying the characteristics of the final infrastructure deliverable including related final design, construction, inspection, testing, and acceptance requirements.
Technical Contract Submittal	Contract submittals that address the Technical Contract Requirements
TCR	Technical Contract Requirement
TCS	Technical Contract Submittal
TCSL	Technical Contract Submittal List
TVA	Threat and Vulnerability Assessment
V&V	Verification and Validation
Validation	Confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use have been fulfilled
Verification	Confirmation by examination and provision of objective evidence that the specified requirements have been fulfilled
VVP	Verification and Validation Plan

2 Products

2.1 Verification and Validation Plan

Develop and implement a Contractor Verification and Validation Plan (VVP) for the project that addresses the sub-processes in the following sections.

The Contractor may choose to submit the V&V plan in individual management plans. Each management plan shall address for each process:

- Contract life cycle phases (notice to proceed, final design, construction, and testing/acceptance)
- Inputs used for each phase
- Outputs (deliverables) for each phase
- Associated activities and processes for each deliverable
- Responsibility assignment matrix for deliverables and activities
- Tools and methods used
- RVTM and CIL forms



- Stakeholder coordination
- Metrics used to measure and report progress on a monthly basis

Each life-cycle phase shall be described separately. Activities for each life-cycle phase shall be described as individual processes including inputs, steps performed, outputs, applicable roles and responsibilities as well as supporting tools and methods as depicted in Figure 2. Describe the processes for the V&V activities segregated in the following subsections: Verification and Validation Process, Requirements Management, Design Management, Interface Management, Inspection and Testing Program Management, and Change Management.

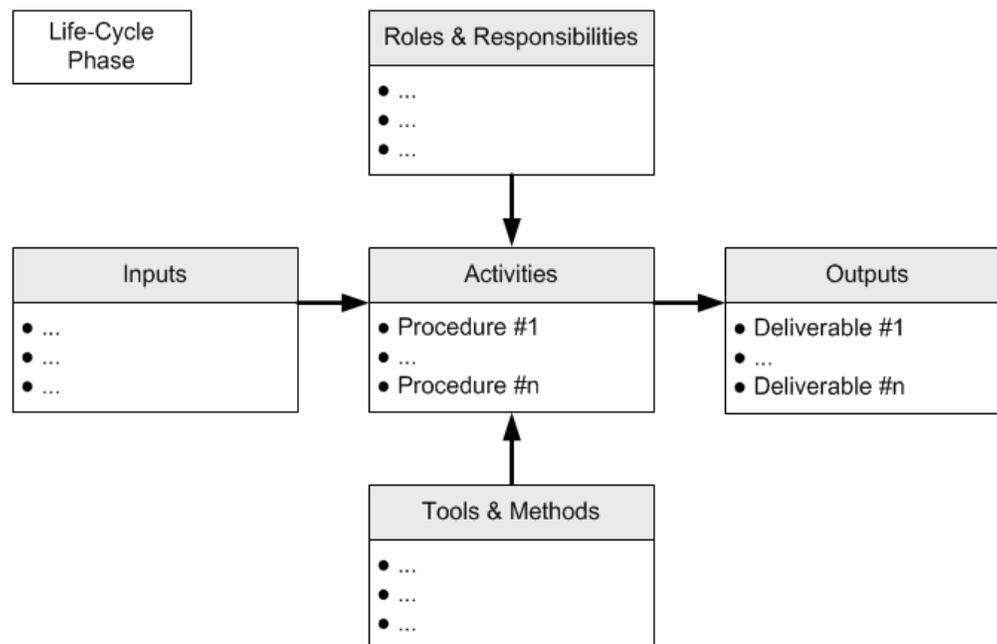


Figure 2: Contractor Verification and Validation Plan Requirements

Submit the VVP as specified in Section 3.5.

2.1.1 Verification and Validation (V&V) Process

Develop and implement a comprehensive V&V process to demonstrate how each Technical Contract Requirement is met during final design, construction, and testing.

The V&V process shall be based on the general provisions of INCOSE Systems Engineering Handbook Rev. 3.2.2 or later and shall follow the general provisions of IEC 15288 "Life Cycle Management–System Life Cycle Processes."

Tailor the V&V process for the purpose of a civil/structural project.

Coordinate the V&V process with the Quality Assurance / Quality Control (QA/QC) process (Section 2.1.2).



The V&V lead person shall meet the requirements for Contractor Key Personnel as specified in Section 3.3.1.

2.1.2 Quality Assurance (QA) and Quality Control (QC)

Develop and implement a comprehensive QA/QC process as described in the General Provisions.

The quality management plan shall include quality procedures that interface and integrate with the V&V process.

Quality Planning: Any design, material, inspection, testing or other checklists used shall include appropriate section references to the Contract as required for RVTMs (Section 2.3). Provide sample forms in the Contractor Quality Management Plan for use in implementing this V&V process.

Technical Contract Requirements referenced in quality checklists shall be based upon the apportioned Technical Contract Requirements (Section 2.2.6). Do not develop inconsistent quality checklists and RVTMs.

Manage QA/QC checklists in the Requirements Management tool (Section 2.2). Allow the QA/QC checklists to be filtered and exported in Microsoft Word, Excel and Adobe PDF formats.

Quality Assurance: Develop detailed and auditable QA processes that serve to measure the effectiveness of the V&V process and include them in the Contractor's Quality Management Plan.

Quality Control: Coordinate the QA/QC checklists with RVTMs as figuratively depicted in Figure 3 below:

Contract		QC Check	V&V References
Contract Reference #1	Technical Contract Requirement #1	√	...
...
Contract Reference #n	Technical Contract Requirement #n	√	...

Figure 3: Coordination of QA/QC Checklists with RVTMs

2.1.3 Requirements Management

Develop and implement a comprehensive requirements management (RM) process, defining how the Technical Contract Requirements are parsed, captured, documented, derived, apportioned, traced, managed, verified, and validated.



Manage the Technical Contract Requirements Types, including the following:

- Interface requirements
- Environmental requirements
- Safety requirements
- Security requirements
- Reliability, availability, maintainability requirements
- Operational requirements
- Functional requirements
- Performance requirements
- Physical requirements
- Expandability requirements
- Logistics, support, other requirements

The RM lead person shall meet the requirements for Contractor Key Personnel as specified in Section 3.3.1.

Manage Technical Contract Requirements in the RM tool as specified in Section 2.2.

Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.1.4 Design Management

Develop and implement a comprehensive design management process, defining how the Technical Contract Requirements are developed into the final design.

Apply the design management process to infrastructure engineering disciplines and associated design elements, including the following:

- General design criteria and requirements
- Survey and mapping
- Clearances
- Track geometry
- Intrusion protection
- Civil site design
- Drainage



- Utilities
- Geotechnical design
- Seismic design
- Structural design
- Tunnels
- Stations
- Support facilities
- Mechanical, electrical and plumbing
- Grounding and bonding
- Corrosion control

Develop a design breakdown structure, including the following:

- Engineering disciplines within Contract
- Design elements for each engineering discipline

Use the RM process to apportion requirements to the design breakdown structure. Demonstrate in final design documents compliance with apportioned requirements.

The design management lead person shall meet the requirements for Contractor Key Personnel as specified in Section 3.3.1.

Manage the final design documents in the RM tool.

Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.1.5 Interface Management

This contract is part of the overall California High-Speed Train Project (the Project). Many external interfaces and dependencies exist between this contract and other Project contracts and stakeholders.

Develop and implement a comprehensive interface management (IM) process, defining how interfaces are identified, documented, specified, verified, and validated.

Create an interface register with the contents in an interface breakdown structure (IBS), including the following:

- Level 1: Future Project contracts interfacing with this Contract



- Level 2: Sub-systems of future Project contracts
- Level 3: Interface categories (e.g. loads, forces, clearances, spatial needs, etc.)
- Level 4: Actual interfaces

Use the interoperability items list provided in Appendix A as the basis for the interface register. Follow the general outline of that list, and add additional interfaces as needed to address:

- General / system-wide
 - Environmental, including noise & vibration, reliability, availability, maintainability, etc.
- Operations & maintenance
 - Operations, maintenance, safety, security
- Rolling stock
 - HST trainsets
- Systems
 - Traction power, overhead contact system, automatic train control system, etc.
- Guideway (infrastructure), excluding trackwork
 - Engineering disciplines as defined in Section 2.1.4
- Trackwork
- Stations
- Storage and maintenance facilities (yards)
- External / third parties
 - Shared rail corridor, shared-use track, high/roadways, utilities, etc.

Manage the interfaces top-down, e.g. HST trainset axle loads shall be treated as a rolling stock interface being imposed on this Contract. Place the interface in the IBS in the future rolling stock category, see interface ID 1073 in Appendix A for more detail.

The IM lead person shall meet the requirements for Contractor Key Personnel as specified in Section 3.3.1.

Manage the interfaces and the interface register in the RM tool.

Demonstrate compliance to Technical Contract Requirements and identified interfaces using the RVTM as specified in Section 2.3.

Certify compliance to critical interfaces using the CIL as specified in Section 2.4.



2.1.6 Inspection and Testing Program Management

Develop and implement a comprehensive inspection and testing program, defining how the Technical Contract Requirements are validated.

Develop individual inspection and test management plans, including the following:

- Prototype Testing
 - Use only products that have been proven in comparable high-speed-rail projects.
 - If products not used on comparable high-speed rail projects are proposed, prototypes of or incorporating those products shall be built and type-tested prior to First Article Production.
 - Retain the services of an independent test lab to demonstrate and certify product compliance to the Technical System Requirements and Final Design.
- First Article Compliance Inspection
- Production Run Testing (i.e., at supplier facility during manufacturing)
- Factory Acceptance
- Inspections
- Site Installation
- Site Acceptance
- Integration Testing²
- Interoperability Test²
- Start-Up Testing²
- Pre-Revenue Testing²
- Reliability, Availability, Maintainability Testing
- Safety Certification
- Security Certification

For each inspection and test, address the following:

- Inspection and test preparation
- Inspection and test coverage
- Inspection and test execution
- Inspection and test reports

² As applicable to this Contract.



- Inspection and test failure reporting, analysis and corrective action system
- Regression inspection and testing

The lead person for the inspection and test program management shall meet the requirements for Contractor Key Personnel as specified in Section 3.3.1.

Manage the inspections, testing, and acceptance in the RM tool.

Demonstrate compliance to Technical Contract Requirements and final design using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements and interfaces using the CIL as specified in Section 2.4.

2.1.7 Change Management

Refer to the General Provisions of the Contract for overall Contract Change Management.

Develop and implement a comprehensive change management process, defining how changes to the Technical Contract Requirements Baseline are managed.

Follow the general provisions of the latest version ISO/IEC 10007 “Quality management systems–Guidelines for configuration management” and as stipulated by the standards listed in this section.

Address the following:

- Configuration identification, including Technical Contract Requirements, final design, construction, and testing/acceptance baselines
- Configuration control, including impact analysis and approval procedures including Configuration Control Boards
- Configuration status accounting
- Configuration audits

Apply the change management process to ensure Contract integrity and conformance with the HSR program.

The change management lead person shall meet the requirements for Contractor Key Personnel as specified in Section 3.3.1.

Manage the changes in the RM tool.

Demonstrate compliance to the Technical Contract Requirements using the RVTM as specified in Section 2.3.

Certify compliance to critical requirements using the CIL as specified in Section 2.4.



2.2 Requirements Management (RM) Tool

Parse, capture, document, analyze, derive, apportion, trace, manage, verify, and validate Technical Contract Requirements using an RM tool.

Manage the final design, inspection, testing and acceptance documents in the RM tool to allow the automatic export of:

- Requirements Verification Traceability Matrices as specified in Section 2.3.
- Certifiable Items Lists as specified in Section 2.4.

The RM tool requirements:

- The RM tool shall be the latest IBM Rational DOORS 9.X version. Do not use IBM Rational DOORS Next Generation.
- Procure three (3) IBM Rational DOORS Floating User Licenses (Part Number D09LELL at time of writing the Contract) along with software subscription and support by IBM for the duration of the contract within the timeframe defined in the Submittals Section 3.5. Other types of licenses such as Authorized User Licenses or Web Access Editor Licenses are not acceptable. This requirement is independent from the web access requirement stated below. The disposition of the licenses will be determined at the end of the Contract.
- Follow the procedures of the Verification and Validation Process as defined in this section.
- Train Authority, PCM and Contractor RM tool users in the operation and configuration of the features of the RM tool required enabling them to perform the requirements of this section.
- Enable web access to the RM tool and provide the Authority's Representative with full real-time readability access to the Contractor's RM tool database. One (1) Authority's Representative shall be able to access the RM tool at any given time using web access.
- Create Requirements Verification Traceability Matrices (RVTM) and Certifiable Items Lists (CIL) directly from the RM tool.
- Submit the RM tool database as defined in Section 3.5. The RM tool database shall be provided as a project archive (.dpa) file.

2.2.1 Parse the Contract for Technical Contract Requirements

Parse the following list of Contract documents for Technical Contract Requirements:

- General provisions, special provisions and scope of work and appendices
- Design Criteria Manual
- Directive Drawings
- Mandatory standard specifications



- Standard specifications and standard drawings
- Special specifications
- Preliminary engineering documents
- Other Contract documents containing Technical Contract Requirements, including manuals, reports, drawings, procedures, policies, permits, agreements
- Approved Change orders and design variances

2.2.2 Capture Technical Contract Requirements

Capture Technical Contract Requirements from the following Contract documents:

- General provisions, special provisions and scope of work and appendices
 - Capture applicable Technical Contract Requirements
- Design Criteria Manual
 - Capture the design criteria
 - Assess applicability and identify each criterion that is determined to not be applicable to the Contract using RM tool attributes
- Directive Drawings
 - Capture the directive drawings, use RM tool attributes to identify applicable Technical Contract Requirements
 - If directive drawings support design criteria, trace the design criteria to the directive drawings
- Mandatory standard specifications
 - Capture applicable Technical Contract Requirements.
- Standard specifications and drawings
 - Assess each standard specification and standard drawing and determine applicability to Contractor's final design and construction methods
 - If applicable, capture applicable Technical Contract Requirements and follow requirements for Directive Drawings and Mandatory Standard Specifications as described above
- Special specifications
 - Assess each special specification and determine applicability to Contractor's final design and construction methods
 - If applicable, capture applicable Technical Contract Requirements and follow requirements for Mandatory Standard Specifications as described above



- Other Contract documents containing Technical Contract Requirements (e.g. Aesthetic Guidelines for Non-Station Structures)
 - Capture applicable Technical Contract Requirements.
- Approved change orders and design variances
- For each Technical Contract Requirement:
 - Capture the Contract document reference
 - Capture the Contract document section reference
 - Capture the Technical Contract Requirement language
 - Do not capture more than 1 Technical Contract Requirement in any 1 RM tool requirement
 - Assign unique requirements identifier

2.2.3 Document Technical Contract Requirements

- Store and manage the Technical Contract Requirements in the RM tool.

2.2.4 Analyze Technical Contract Requirements

- Analyze each Technical Contract Requirement and assign one or more requirement type attributes. Requirements types are defined in Section 2.1.2.
- Flag all Technical Contract Requirements identified per Section 2.2.2 using RM tool attributes.

2.2.5 Derive Technical Contract Requirements

- Advance Technical Contract Requirements to the final design level in the RM tool, including:
 - General/typical requirements
 - Site specific requirements
- Develop specific, measurable, achievable, and realistic derived requirements for this Contract that can be verified and validated. Document and capture implied requirements, transform performance level requirements and create sub-requirements as required.
- Advance Technical Contract Requirements through tracing to supporting documentation, including, but not limited to:
 - Requests for information
 - Studies
 - Analyses, including:
 - Design and code analyses



- Site-specific hazard analyses
- Calculations
- Reports, including, but not limited to:
 - Design baseline reports
 - Aesthetic design and review reports
 - Value engineering reports
 - Hydrology and hydraulics reports
 - Geotechnical and foundation reports
 - Structure reports
 - Seismic design reports
 - Phase II hazardous materials
- Design workshop
- Agreements
- Letters
- Directions
- Meetings minutes
- Site inspections
- Approved change orders and design variances
- Parse supporting documentation and capture, document and analyze derived applicable requirements as Technical Contract Requirements.

2.2.6 Apportion Technical Contract Requirements

- Allocate the Technical Contract Requirements to the applicable engineering disciplines and design elements using the RM tool. Engineering disciplines are defined in Section 2.1.4.
- If Technical Contract Requirements are apportioned to 2 or more engineering disciplines or design elements, identify and manage the interfaces using the Interface Management process.

2.2.7 Trace Technical Contract Requirements

- Provide full traceability from the Technical Contract Requirements to the following documents using the RM tool:
 - Derived requirements including supporting documentation
 - Apportioned requirements



- Design baseline reports
- Final design documents
- Ready for construction documents
- As-built drawings and specifications
- Interfaces
- Pending and approved changes including supporting documentation
- Tracing direction shall be top-down, starting with the Technical Contract Requirements (RVTM) and Critical Items (CIL) connecting to the contractor submittals.

2.2.8 Manage Technical Contract Requirements

- Baseline the Technical Contract Requirements and associated final design and construction documents:
 - After they have been imported into the RM tool
 - After submittal of the Preliminary and Final Design Baseline Report
 - After final design submittals (60 percent, 90 percent)
 - After ready for construction submittal
- Follow the Change Management Process for changes to Technical Contract Requirements.
- Add and manage Technical Contract Requirements from the Contract and other sources during the life of the Contract as defined in this section, including:
 - Environmental requirements and mitigations as found in the environmental documents including EIR/S, Record of Decision (ROD), permits and approvals
 - Safety requirements including hazard mitigations
 - An initial set of Preliminary Hazard Analysis (PHA) mitigations is provided in Book 4
 - Security requirements including threat mitigations
 - An initial set of Threat and Vulnerability Assessment (TVA) mitigations is provided in Book 4
 - Interoperability items
 - An initial set of interoperability items are provided as part of Appendix A
 - Public and third-party outreach, including law enforcing agencies, fire departments, emergency medical services, utilities
 - Reviews, including peer reviews
 - Directions, letters, meetings, change orders, design variances, other



2.2.9 Verify Technical Contract Requirements

- Demonstrate compliance to the Technical Contract Requirements by provision of objective evidence that:
 - Derived requirements meet Technical Contract Requirements.
 - Apportioned requirements meet Technical Contract Requirements.
 - Final design documents including typical and site specific construction and shop drawings and specifications meet Technical Contract Requirements.
 - Ready for construction drawings and specifications meet final design drawings and specifications.
 - Construction meets ready for construction drawings and specifications.
 - As-built drawings and specifications meet Technical Contract Requirements.
 - Inspection plans and procedures meet Technical Contract Requirements.
 - Test and acceptance plans and procedures meet Technical Contract Requirements.
- Support variances by referencing the approved change(s) as per Section 2.2.7
- Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.
- Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.2.10 Validate Technical Contract Requirements

- Demonstrate compliance to Technical Contract Requirements by provision of objective evidence that:
 - Construction items meet Technical Contract Requirements as documented in inspection reports.
 - Construction items meet Technical Contract Requirements as documented in inspection test and acceptance reports.
- Support variances by referencing the approved change(s) as per Section 2.2.7
- Demonstrate compliance to Technical Contract Requirements using the RVTM as specified in Section 2.3.
- Certify compliance to critical requirements using the CIL as specified in Section 2.4.

2.2.11 Reporting

- Configure the RM tool to allow filtering and exporting for type of requirements, final design, construction, testing, and acceptance documents, including the following:
 - Technical Contract Requirements
 - Derived requirements including supporting documentation



- Apportioned requirements
- Final design drawings, specifications and reports
- Ready for construction drawings and specifications
- Change orders and design variances
- Inspection plans, procedures, and reports
- Test and acceptance plans, procedures, and reports
- As-built drawings and specifications
- Interfaces
- Pending and approved changes including backup documentation
- When filtered, configure the RM tool to identify incoming and outgoing traces and to export as an RVTM or a CIL as defined in sections 2.3 and 2.4.

Submit the RM tool database to the Authority’s Representative as defined in Section 3.5.

2.3 Requirements Verification and Traceability Matrix

Demonstrate compliance to Technical Contract Requirements using the RVTM.

Manage the RVTM in the RM tool. Allow the RVTM to be filtered and exported in Microsoft Word, Excel and Adobe PDF format.

Use the RVTM template as provided in Table 1. Tracing shall be continuous, starting with the Technical Contract Requirements, as shown in the RVTM template.

Provide an RVTM that identifies for each Technical Contract Requirement the appropriate section references to the final design, construction, and testing & acceptance documents. Appropriate section references to these documents shall explain how each Technical Contract Requirement is met, inspected, tested and accepted by the Contractor’s final design and construction, including the following:

- Technical Contract Requirement
 - Unique requirements identifier
 - Contract document reference
 - Contract document section reference
 - Technical Contract requirement language
- Final Design
 - Derived requirements
 - Apportioned requirements



- Allocation to engineering disciplines/design elements
- Final design document references
- Final design document section references
- Construction
 - Ready for construction document reference
 - Ready for construction document section reference
 - Inspection plan, procedure and report document references
 - Inspection plan, procedure and report document section references
 - As-built document reference
 - As-built document section reference
- Testing and acceptance
 - Test and acceptance plan, procedure and report document references
 - Test and acceptance plan, procedure and report document section references

When supplying the references, apply the lowest practical level of precision, for example:

- Unique drawing number
- Smallest practical numbered section in a document.

The exported RVTM hardcopy shall be readable by a human being without the need of the RM tool. Provide an uncluttered RVTM without any irrelevant information such as RM tool folder and path names, unrelated attributes, or similar.

Reflect in the RVTM any changes in final design, construction, inspection testing, and acceptance that have been approved by the Authority's Representative.

Regularly held Technical Exchange Meetings shall be used to apprise the Authority's Representative of the development of the RVTM.

2.3.1 Submittals

Provide an exported RVTM hardcopy and an electronic copy in Microsoft Excel format to the Authority's Representative with every V&V submittal.

2.3.1.1 Final Design

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. Any design submittal shall be considered a final design submittal.



- Preliminary and Final Design Baseline Report
 - Submit a RVTM with Technical Contract Requirements captured, analyzed, derived, and apportioned to engineering disciplines and design elements.
 - The RVTM shall include a complete list of Technical Contract Requirements fully traced to the design baseline report. Using RM tool attributes, clearly demonstrate the following:
 - Which Technical Contract Requirements are addressed in the baseline reports and therefore baselined
 - Which Technical Contract Requirements have not been addressed in the baseline reports and therefore not baselined
- 60 Percent Design
 - Submit RVTM with Technical Contract Requirements captured, analyzed, derived, and apportioned to engineering disciplines and final design elements.
 - Demonstrate that each Technical Contract Requirement has been sufficiently advanced (derived) and allocated (apportioned) and which final design document (CDRL) is used to demonstrate compliance.
- 90 Percent Design
 - Submit RVTM with Technical Contract Requirements fully traced to applicable final design documents including section references.
- Other Design Submittals
 - Submit RVTM with apportioned Technical Contract Requirements fully traced to applicable final design documents including section references applicable to the design element.

2.3.1.2 Construction

- Ready for Construction
 - Submit RVTM with Technical Contract Requirements fully traced to applicable ready for construction documents including section references.
- Inspection plans, procedures and reports
 - Submit RVTM with apportioned Technical Contract Requirements fully traced to applicable inspection plans, procedures and reports including section references applicable to the inspected construction element.
- Test/acceptance plans, procedures and reports
 - Submit RVTM with apportioned Technical Contract Requirements fully traced to applicable testing and acceptance documents including section references applicable to the test/accepted construction element.



2.3.1.3 As-Built

- Submit RVTM with Technical Contract Requirements fully traced to as-built documents including section references.

2.4 Certifiable Items List (CIL)

Critical requirements are a subset of the Technical Contract Requirements and are henceforth referred to as Critical Items (CI).

Demonstrate compliance to Critical Items using CILs. Critical Items include the following:

- Environmental requirements and mitigations as found in the environmental documents including EIR/S, Record of Decision (ROD), permits and approvals
- Safety requirements including hazard mitigations
- Security requirements including threat mitigations
- Interoperability items (interfaces) with other Project contracts

Manage the CIL in the RM tool. Allow the CIL to be filtered by type of Critical Item and exported in Microsoft Word, Excel and Adobe PDF format.

Use the CIL template as provided in Table 2. Tracing shall be continuous, starting with the Critical Items connecting to the contractor submittals, as shown in the CIL template.

An initial set of Critical Items is provided as part of the Contract. Refer to Section 2.2, Requirements Management Tool, for details. Coordinate with Authority's Representative and Managers of the Critical Items specified above to populate and manage the CIL.

Identify all Technical Contract Requirements that are Critical Items using RM tool attributes.

Maintain the list of Critical Items during the life of the Contract. Treat any item as a Technical Contract Requirement and follow directions in the RM tool as specified in Section 2.2, including capturing, documenting, analyzing, deriving, apportioning, tracing, managing, verifying, and validating of Critical Items. Tailor Certifiable Items Lists as needed for the specific certification process, such as for Safety and Security certification, including management of PHAs and TVAs. Include objective evidence with the CILs as required for the Safety and Security Certification Packages.

Develop the CIL based on the RVTM, with extra columns or fields to include the date and initials of the verifier, certifying that the Critical Item has been incorporated into the final design, construction, inspected, tested, and accepted as appropriate at each stage of development.



Wet signatures/initials are required for Ready for Construction submittals, Inspection, Test and Acceptance Reports. The Contractor may decide to include the Critical Items in the RVTM for other submittals as long as Critical Items are clearly labeled as shown in Table 1.

Reflect in the CIL any changes in final design, construction, inspection, testing, and acceptance that have been approved by the Authority's Representative.

Regularly held Technical Exchange Meetings shall be used to apprise the Authority's Representative of the development of the CIL.

Submit an exported CIL hardcopy and an electronic copy to the Authority's Representative as defined in Section 3.5.

2.5 Contractor Verification and Validation (V&V) Report

Provide a V&V report with every Technical Contract Submittal.

Use the V&V report to provide a submittal-specific executive summary and a Certificate of Compliance with Technical Contract Requirements. Provide additional explanation as necessary on how the Technical Contract Submittal meets the Technical Contract Requirements that is not readily available from the RVTM or CILs. Variances between Technical Contract Requirements and the Technical Contract Submittal shall be explicitly identified and discussed in the V&V report.

The certification of compliance within this V&V report shall include the confirmation by the Contractor's V&V Manager that the references to the objective evidence provided in the RVTM and CILs have been checked by the Contractor's QA/QC process, and have been confirmed as complete, correct and consistent.

The Contractor may choose to provide the content of the V&V report as part of the submittal letter.

2.6 Contractor Verification and Validation Submittal

Provide a V&V submittal with every Technical Contract Submittal.

The Contractor V&V submittal includes the following:

- RVTM as defined in Section 2.3
- CILs as defined in Section 2.4
- Contractor V&V report as defined in Section 2.5

The Contractor V&V submittal shall assist the Authority's Representative (Section 3.4) to perform a full compliance check against the Technical Contract Requirements.



3 Execution

3.1 Self-Certification Process Overview

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 has to demonstrate compliance resulting in reduced review efforts on the Authority side. This is achieved by a two-step process, a (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) as defined in section **Error! Reference source not found.**

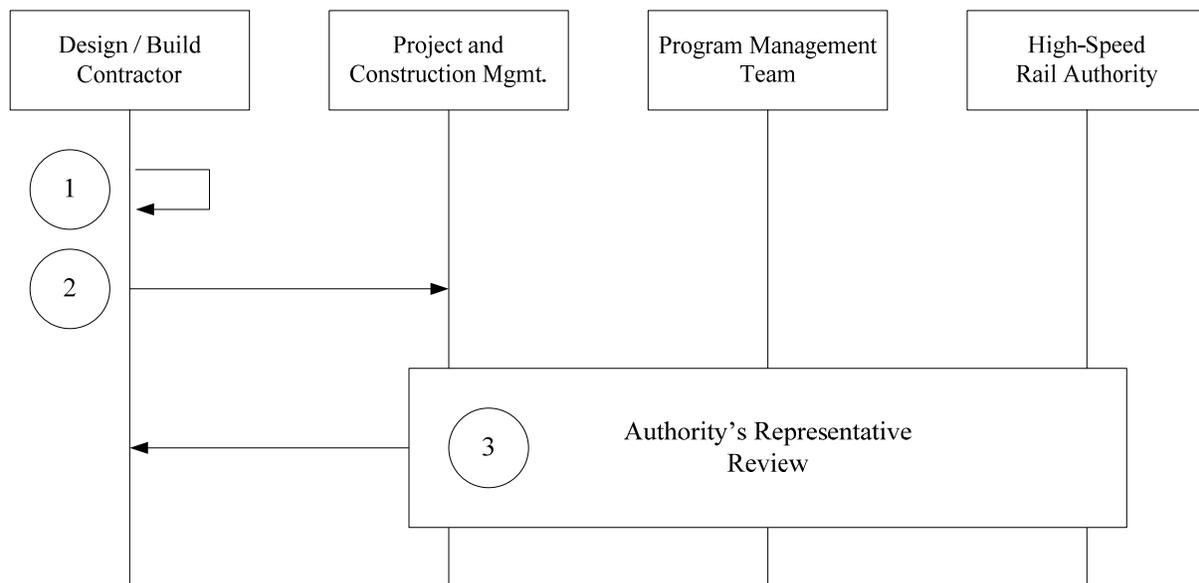


Figure 4: Self-Certification Process

Follow the self-certification process as presented in Figure 4.

1. The Contractor shall prepare Technical Contract Submittal as specified in the Contract and shall perform quality procedures as stipulated by the Contract. Contractor shall self-certify



compliance with Technical Contract Requirements and fitness for purpose prior to issuing the submittal to the Authority's Representative for their review. The self-certification statement shall be provided as a Certificate of Compliance to be included in the V&V submittal.

2. Contractor shall submit Technical Contract Submittal, including the V&V submittal, for Technical Contract Submittals to the Authority's Representative for review.
3. The Authority's Representative will review the submittal as deemed necessary and issue a disposition in accordance with the General Provisions. The Authority's Representative may also perform audits of the Contractor's V&V process adherence as they deem appropriate.

Unless otherwise noted, the following steps apply to each type of Technical Contract submittal.

Technical Contract Submittal	Step 1	Step 2	Step 3
Prepared, no submittal to Authority	Yes	No	No
Submitted for Information	Yes	Yes	No
Submitted for SONO	Yes	Yes	Yes
Submitted for Approval	Yes	Yes	Yes

3.2 Self-Certification Process involving Third Party Entities

Third party entities include jurisdictional authorities (Caltrans, cities, and counties), railroads, utilities as defined in detail in the CHSTP Scope of Work and the General Provisions.

Contractor shall apply V&V and self-certification as follows:

- CHSTP Work³ affecting CHSTP Technical Contract Requirements (TCR):
 - Contractor shall follow full V&V and self-certification requirements
- CHSTP Work affecting third party entities and NOT affecting CHSTP TCRs:
 - Contractor shall ensure that the CHSTP Work is planned, executed, monitored, controlled and is in compliance with the CHSTP Work
 - Contractor shall demonstrate compliance to the applicable CHSTP Work using full V&V and self-certification requirements
 - Contractor and/or third party entity shall follow the third party entity requirements, policies, codes, standards, processes, delivery methods as required by the Contract
- Third party entity Work affecting CHSTP TCRs:

³ As defined in the General Provisions



- Contractor shall ensure that the third party entity Work is planned, executed, monitored, controlled and is in compliance with the CHSTP TCRs
- Contractor shall demonstrate compliance to the affected CHSTP TCRs using full V&V and self-certification requirements
- Contractor and/or third party entity shall follow the third party entity requirements, policies, codes, standards, processes, delivery methods as applicable
- Third party entity Work affecting other third party entities:
 - This Work is considered outside the CHSTP Work and CHSTP TCRs, CHSTP V&V and self-certification requirements do not apply
 - Contractor and/or third party entity shall follow the third party entity requirements, policies, codes, standards, processes, delivery methods as required by the Contract

3.3 Contractor Verification and Validation Requirements

3.3.1 Contractor V&V Key Personnel

Employ only professionals with at least 10 years of experience in the stated field of expertise for key positions with a proven track record in the following functions as supported by their resumes:

- Federal projects with Federal Transit Administration or Federal Rail Administration oversight
- Design/Build contracts
- Systems Engineering
- 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

The skill sets listed below shall be required for individuals to be considered for V&V key personnel positions:

- Verification and validation management
- Quality Assurance and Quality Control
- Requirements management
- Design management
- Interface management
- Inspection and testing management



- Change management

The Authority's Representative may elect to designate other positions as V&V key positions or reduce the number of such positions required at any time during the Contract.

Key positions shall not be shared with more than 1 person. One person, however, can hold more than one key position.

Submit resumes of key employees to the Authority's Representative for review and approval if appropriate.

3.3.2 Verification and Validation Plan (VVP)

Prepare and submit a Contractor VVP in compliance with the requirements defined in Section 2.1.

Follow the V&V procedures, as defined in Section 2.1 and as documented in the Contractor VVP, including the following:

- Verification and validation management
- Quality Assurance and Quality Control
- Requirements management
- Design management
- Interface management
- Inspection and testing management
- Change management

3.3.3 Requirements Management Tool

Procure an RM tool and follow directions in compliance with the requirements defined in Section 2.2.

3.3.4 Requirements Verification Traceability Matrix

Prepare and submit RVTMs in compliance with the requirements defined in Section 2.3.

3.3.5 Certifiable Items Lists

Prepare and submit CILs in compliance with the requirements defined in Section 2.4.

3.3.6 Verification and Validation Reports

Prepare and submit V&V reports in compliance with the requirements defined in Section 2.5.



3.4 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.

3.5 Submittals

V&V Deliverables listed below are subject to SONO except when identified for Approval, Information, or not required to be submitted to Authority in the Contract.

The Contractor VVP is subject to Approval.

Section	Deliverable	Timeframe
V&V Process Management		
2.1	VVP – Draft	60 days after NTP
	VVP – Final	120 days after NTP
	VVP – Update	Other design submittals
2.2	RM Tool – Floating User Licenses	30 days after NTP
	RM Tool – Database	Monthly
3.2	Key Personnel Resumes	Mobilization phase and prior to hiring
Design Baseline Report Submittals		
2.3	RVTM – Technical Contract Requirements	Design baseline report submittal
2.4	CIL – Critical Items	Design baseline report submittal
2.5	V&V Report	Design baseline report submittal
3.1	Contractor Self Certification	Design baseline report submittal
Final Design Milestone Submittals		
2.3	RVTM – Technical Contract Requirements	Milestone design submittals
2.4	CIL – Critical Items	Milestone design submittals
2.5	V&V Report	Milestone design submittals
3.1	Contractor Self Certification	Milestone design submittals
Other Submittals		
2.3	RVTM – Apportioned Requirements	Other design submittals



2.4	CIL – Apportioned Critical Items	Other design submittals
2.5	V&V Report	Other design submittals
3.1	Contractor Self Certification	Other design submittals
Construction Submittals: Plans, Procedures, and Reports		
2.3	RVTM – Apportioned Requirements	Construction submittals
2.4	CIL – Apportioned Critical Items	Construction submittals
2.5	V&V Report	Construction submittals
3.1	Contractor Self Certification	Construction submittals
As-Built Submittal: Plans, Procedures, and Reports		
2.3	RVTM – Apportioned Requirements	As-built submittals
2.4	CIL – Apportioned Critical Items	As-built submittals
2.5	V&V Report	As-built submittals
3.1	Contractor Self Certification	As-built submittals



Table 1: RVTM Template

Technical Contract Requirement				Final Design							Construction		Testing/Acceptance			
				Requirements				Design								
Req. ID	Doc. ID	Document Section	Requirements Text	TCR	CI	Derived Requirements	Apportioned Requirements	Allocation	Doc. ID/Name	Section	Doc. ID/Name	Section	Doc. ID/Name	Section		
1	Design Criteria	4.4.5.3 Unbalanced Superelevation	The maximum unbalanced superelevation (Eu) shall be limited to 3 inches	Yes	Yes	N/A	N/A	Track Geometry	Drawing Set (e.g., Plan & Profile)	Drawing #	...	...	...	...
2	Design Criteria	5.8.2 Subballast or Asphalt Underlayment	The thickness shall be determined by analysis of the support required.	Yes	No	The thickness shall be xxx inches.	N/A	Track	Report ...	Section #	...	...	...	...
									Cross Section (Typical)	Drawing #	N/A	N/A	...	...
									Cross Section (Site Specific)	Drawing #	Drawing Set (Released for Construction)	Drawing #	...	...
											Inspection (Plan, Procedure, Report)	Section #	...	...
											Drawing Set (As Constructed)	Drawing #	...	...
											Test/Acceptance (Plan, Procedure, Report)	Section #	...	
3	Design Criteria	1.9 Climatic Conditions	Climatic conditions necessary for design, including those that are site-specific, shall be researched and considered by the designer	Yes	Yes	The design wind speed shall ...	Wind loads on structures shall consider the design wind speed (velocity) as defined ...	Structures	Report ...	Section #	...	...	...	...
4	PHA	1.1.1.4 Derailment due to Washout	Perform hydraulics analysis and incorporate results into sub-grade design, slope protection, and setting of profile.	Yes	Yes	Hydraulics analysis shall ...	N/A	Geotech	...	...	...	...	...
							Sub-grade shall ...	Track	...	...	...	...
							Slope protection shall ...	Civil	...	...	...	...
							Setting of profile shall ...	Track Geometry	...	...	...	...
							Install appropriate drainage.	Yes	Yes	Drainage system shall	Drainage
							Inspection and maintenance of drainage systems.	Yes	Yes	O&M
							Identification and monitoring by O&M of potential hazardous locations.	Yes	Yes	O&M
Notes: RVTM template to be used by Contractor Content for illustration purposes only For detailed RVTM requirements refer to Contract Follow document control procedures for header and footer								Legend: Req. Requirement Doc. Document ID Identifier								

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Table 2: CIL Template

Technical Contract Requirement				Final Design						Construction		Testing/Acceptance		
Req. ID	Doc. ID	Document Section	Requirements Text	CI	Requirements		Design			Certification	Content as per RVTM	Certification	Content as per RVTM	Certification
					Derived Requirements	Apportioned Requirements	Allocation	Doc. ID/Name	Section	Certified By & Date		Certified By & Date		Certified By & Date
1	PHA	1.1.1.4 Derailment due to Washout	Perform hydraulics analysis and incorporate results into sub-grade design, slope protection, and setting of profile.	Yes	Hydraulics analysis shall ...	N/A	Geotech	...	...	...	...	...	...	...
						Sub-grade shall ...	Track	...	...	...	...	...	...
						Slope protection shall ...	Civil	...	...	...	...	...	...
						Setting of profile shall ...	Track Geometry	...	...	...	...	...	...
		Install appropriate drainage.	Yes	Drainage system shall ...	...	Drainage	...	...	...	...	...	...	...	...
		Inspection and maintenance of drainage systems.	Yes	...	...	O&M	...	...	...	...	...	...	...	...
		Identification and monitoring by O&M of potential hazardous locations.	Yes	...	...	O&M	...	...	...	...	...	...	...	...
Notes: CIL template to be used by Contractor Content for illustration purposes only For detailed CIL requirements refer to Contract Follow document control procedures for header and footer							Legend: Req. Requirement Doc. Document ID Identifier							

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4 Appendix A – Interoperability Items

This appendix contains an initial list of Interoperability Items. It is preceded by a table of contents of the list, and followed by a legend of abbreviations.

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Interoperability Items Abbreviation Legend

Abbreviation	Definition	Abbreviation	Definition
ATC	Automatic Train Control	Mol	Maintenance of Infrastructure
BoD	Basis of Design	MTC	Maintenance
COM	Communications	O&M	Operations & Maintenance
ConOps	Concept of Operations	OCS	Overhead Contact System
DCM	Design Criteria Manual	PHA	Preliminary Hazard Analysis
EXT	External	RST	Rolling Stock
G&B	Grounding & Bonding	SAF	Safety
GEN	General	SYS	Systems
GWY	Guideway	TCC	Train Control & Communications
HST	High Speed Train	TP	Traction Power
INF	Infrastructure		



ID	Interface	Document Reference(s)
	1 General	
	1.1 Reliability, Availability, Maintainability & Safety	
	1.1.1 Interfaces with Guideway (excl. Trackwork)	
	1.1.1.1 Reliability & Availability	
IF 1233	A. Interface between GEN Reliability & Availability Targets and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the applicable GEN RAMS targets have been addressed by the INF team, including but not limited to:</p> <ul style="list-style-type: none"> • Reliability • Availability • ... 	<p>DCM [GEN] 1.4.6 Design Life DCM [GEN] 1.5 Durability 30 SoW CP01 2012-12-19 5.10.1 Reliability of the Drainage Subsystem DCM [GEO] 10.8.6 Soil Materials Used for Embankments DCM [STR] 12.4.1 Structural Design Parameters DCM [STR] 12.8.6.9 Expansion Joints DCM [STR] 12.8.6.11 Bearings DCM [STR] 12.11.3.5 Water tightness DCM [TUN] 13.6.3 Durability DCM [DRN] 8.1 Scope DCM [DRN] 8.5.3.1 Design Elements DCM [UTL] 9.5.3 Encroachment Justifications</p>
	2 Operations & Maintenance	
	2.1 Operations	
	2.1.1 Interfaces with Guideway (excl. Trackwork)	
	2.1.1.1 Service/Operating Plan	
IF 6330	A. Interface between O&M Universal Crossover Spacing Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M universal crossover spacing requirements have been addressed by the INF team.</p>	<p>30 ConOps Rev 2 2011-12-30 6.3.1.1 Turnouts and Crossovers DCM [ALG] 4.10 High-Speed Crossovers 20 Conceptual Ops Plan Ver3R1 2012-06-25 3.2 Infrastructure 30 ConOps Rev 2 2011-12-30 6.3.1.1 Turnouts and Crossovers DCM [ALG] 4.10 High-Speed Crossovers</p>
IF 6331	B. Interface between O&M Station Crossover Spacing	



ID	Interface	Document Reference(s)
	Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M station crossover spacing requirements have been addressed by the INF team.</p>	<p>20 Conceptual Ops Plan Ver3R1 2012-06-25 3.2 Infrastructure 30 ConOps Rev 2 2011-12-30 6.3.1.1 Turnouts and Crossovers DCM [ALG] 4.10 High-Speed Crossovers</p>
	2.1.1.2 Design & Operating Speeds	
IF 355	A. Interface between O&M Maximum Design Speed (HST Tracks) and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M maximum design speed (HST tracks) has been applied by the INF team.</p>	<p>30 ConOps Rev 2 2011-12-30 4.3.1 The High-Speed Strategy from San Francisco to San Jose: The Shared Use Corridor for CHST and Caltrain 30 ConOps Rev 2 2011-12-30 4.3.2 The High-Speed Strategy from Los Angeles to Anaheim: The Shared Use LOSSAN Corridor for CHST, Metrolink, and Amtrak 30 ConOps Rev 2 2011-12-30 4.3.3 The High Speed Strategy from San Jose to Los Angeles: The Exclusive Use 220 MPH Central Valley Alignment 30 ConOps Rev 2 2011-12-30 4.3.4 The High Speed Strategy Extended to Sacramento and San Diego DCM [GEN] 1.2.5 Design and Operating Speeds DCM [ALG] 4.4.1 Selection of Design Speed DCM [ALG] 4.4.2 Minimum Lengths of Alignment Segments DCM [ALG] 4.4.3 Minimum Radii DCM [ALG] 4.4.5.2 Actual Superelevation DCM [ALG] 4.4.5.3 Unbalanced Superelevation DCM [ALG] 4.4.6.3 Spiral Lengths DCM [ALG] 4.5.2.2 Minimum Vertical Curve Lengths (LVC) DCM [TUN] 13.3.2 Train Operating Speed DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.5 Track Center Spacing</p>
IF 4355	B. Interface between O&M Maximum Design Speed (Special Trackwork) and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M maximum design speed (special trackwork) has been applied by the INF team.</p>	<p>20 Conceptual Ops Plan Ver3R1 2012-06-25 3.2 Infrastructure 30 ConOps Rev 2 2011-12-30 6.3.1.1 Turnouts and Crossovers DCM [ALG] 4.10 High-Speed Crossovers DCM [ALG] 4.14 Access Tracks to Yards and Maintenance Facilities DCM [ALG] 4.7 High-Speed Turnouts (60 mph and faster)</p>
	2.1.1.3 Operation Simulation / Computer-Based Modeling	



ID	Interface	Document Reference(s)
IF 187	A. Interface between O&M Computer-Based Modeling and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the correct GWY track alignment configuration, track alignment features and performance criteria have been applied by the O&M team in the computer-based modeling (static simulation).</p>	
	2.1.1.4 Visibility of Wayside/Trackside Equipment	
IF 597	A. Interface between O&M Visibility of Wayside/Trackside Equipment Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M visibility of wayside/trackside equipment requirements have been applied by the INF team.</p>	<p>30 ConOps Rev 2 2011-12-30 6.3.1 Track DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DCM [CLR] 3.7.7 Appendix 3.G All Passenger Equipment, Structure Gauge and Fixed Equipment Envelope, Open Sections DCM [CLR] 3.7.8 Appendix 3.H All Passenger Equipment, Structure Gauge and Fixed Equipment Envelope, In Tunnels</p>
	2.2 Maintenance	
	2.2.1 Interfaces with Guideway (excl. Trackwork)	
	2.2.1.1 MoI Roadway Access	
IF 911	A. Interface between O&M MoI Infrastructure Access Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M MoI infrastructure access requirements have been addressed by the INF team.</p>	<p>10 MoI CnR Rev 2012-02-11 2 CHST Infrastructure System And Maintainability 10 MoI CnR Rev 2012-02-11 2.5 Structures 10 MoI CnR Rev 2012-02-11 9.3.1 Tunnels 10 MoI CnR Rev 2012-02-11 9.3.2 Bridges and Aerial Structures 10 MoI CnR Rev 2012-02-11 9.3.3 Depressed Structures 10 MoI CnR Rev 2012-02-11 9.4 Right of Way Access DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.7.1.1 Access Roads DD-CV-901 FENCE AND GATES LOCATIONS</p>



ID	Interface	Document Reference(s)
		DD-CV-900 FENCE AND GATE DETAILS DCM [STR] 12.4.1 Structural Design Parameters DCM [STR] 12.8 Design Considerations for Bridges and Aerial Structures DCM [TUN] 13.15.6 Fencing DCM [TUN] 13.16.4.2 Fixed Facility Power DCM [TUN] 13.16.5 Access Road DCM [TUN] 13.16.21 Parking for Tunnel Maintenance and Traction Power Facility DD-TN-400 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, PLAN DD-TN-401 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, ELEVATION DD-TN-406 TYPICAL TUNNEL PORTAL FACILITIES-BELOW GRADE, PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES, FOR SINGLE TRACK TWIN BORED TUNNEL, PLAN DD-TN-407 TYPICAL TUNNEL PORTAL FACILITIES-BELOW GRADE, PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES, FOR SINGLE TRACK TWIN BORED TUNNEL, FRONT ELEVATION DD-TN-403 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, PLAN DD-TN-404 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, FRONT ELEVATION
	2.2.1.2 Mol Walkway & Stairs	
IF 843	A. Interface between O&M Mol Walkway Spatial Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol walkway spatial requirements have been addressed by the INF team.</p>	10 Mol CnR Rev 2012-02-11 1.2.6 CHST and PUC Standards 10 Mol CnR Rev 2012-02-11 7.6.1 California Public Utilities Commission (CPUC) DCM [CIV] 7.7.7 Walkways and Cable Trough DCM [STR] 12.8.6.17 Walkways, Parapets, and Sound Walls DCM [STR] 12.14.1 Cable Trough DCM [TUN] 13.3.6 Walkways DCM [TUN] 13.15.5 Design Requirements for Cable Troughs DCM [CLR] 3.2 Regulations, Codes, Standards, and Guidelines DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.4.4 Effects of Superelevation



ID	Interface	Document Reference(s)
		DCM [CLR] 3.5 Track Center Spacing DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT DD-CV-102 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL DD-CV-103 TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT DD-CV-104 TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT DD-ST-901 TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT DD-ST-100 TYPICAL CROSS SECTION, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK DD-ST-101 TYPICAL CROSS SECTION, AERIAL STRUCTURE, TWO TRACK BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK DD-ST-900 TYPICAL CABLE TROUGH DETAILS , AERIAL STRUCTURE DD-ST-903 TYPICAL CABLE TROUGH DETAIL, AERIAL STRUCTURE, AT OCS POLE DD-ST-108 TYPICAL CROSS SECTION, AERIAL STRUCTURE, FOUR TRACK NON-BALLASTED, CROSS SECTIONS FOR BOX GIRDER DD-ST-120 TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY DD-ST-902 CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL DD-ST-904 CABLE TROUGH LAYOUT TRANSITION AREAS. AERIAL STRUCTURE / AT-GRADE / CUT & COVER TUNNEL DD-ST-121 TYPICAL CROSS SECTION, TWO TRACK TRENCH, INSIDE WALKWAY DD-ST-122 TYPICAL CROSS SECTION, ONE TRACK TRENCH DD-TN-103 TYPICAL CROSS SECTION, TWIN TRACK SINGLE BORED (TBM/ CIRCULAR), TUNNEL WITH SEPARATION WALL DD-TN-105 TYPICAL CROSS SECTION, TWIN TRACK SINGLE BORED (TBM/ CIRCULAR), TUNNEL WITHOUT SEPARATION WALL DD-TN-200 BASIC TUNNEL CONFIGURATION, SINGLE TRACK TWIN TBM



ID	Interface	Document Reference(s)
		BORED TUNNEL, DOUBLE TRAIN (1312 FT) DD-TN-201 BASIC TUNNEL CONFIGURATION SINGLE TRACK TWIN TBM BORED TUNNEL SINGLE TRAIN (660 FT) DD-TN-206 BASIC TUNNEL CONFIGURATION, DOUBLE TRACK SINGLE BORED TUNNEL, WITHOUT SEPARATION WALL 1312' TRAIN DD-TN-207 BASIC TUNNEL CONFIGURATION, DOUBLE TRACK SINGLE BORED TUNNEL, WITHOUT SEPARATION WALL 660' TRAIN DD-TN-102 TYPICAL CROSS SECTION, DOUBLE TRACK MINED TUNNEL, WITH SEPARATION WALL DD-TN-104 TYPICAL CROSS SECTION , TWIN TRACK SINGLE MINED TUNNEL, WITHOUT SEPARATION WALL DD-TN-111 TYPICAL TUNNEL NICHE DETAIL - ATC EQUIPMENT DD-TN-112 TYPICAL TUNNEL NICHE DETAIL - FIXED MOTORIZED DISCONNECT DD-TN-113 TYPICAL TUNNEL NICHE DETAIL - ATC SIGNALING AND COMMUNICATION SYSTEMS DD-TN-203 BASIC TUNNEL CONFIGURATION DOUBLE TRACK SINGLE MINED TUNNEL WITH SEPARATION WALL SINGLE TRAIN (660 FT) DD-TN-204 BASIC TUNNEL CONFIGURATION, DOUBLE TRACK SINGLE MINED TUNNEL, WITHOUT SEPARATION WALL, 1312' TRAIN DD-TN-205 BASIC TUNNEL CONFIGURATION, DOUBLE TRACK SINGLE MINED TUNNEL, WITHOUT SEPARATION WALL 660' TRAIN
IF 912	B. Interface between O&M Mol Access Stairway Spatial Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol access stairway spatial requirements have been addressed by the INF team.</p>	30 ConOps Rev 2 2011-12-30 6.3.5.2 Aerial Right-of-Way 10 Mol CnR Rev 2012-02-11 9.3.2 Bridges and Aerial Structures 10 Mol CnR Rev 2012-02-11 9.3.3 Depressed Structures 10 Mol CnR Rev 2012-02-11 9.4 Right of Way Access DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.2.6 Trackway on Aerial Structure DCM [CIV] 7.8.2.7 Trackway on Retained Fill DCM [CIV] 7.7.11 Emergency Stairs DD-CV-901 FENCE AND GATES LOCATIONS DCM [STR] 12.10.8 Trench Emergency Exits DCM [STR] 12.14.7 Access Stairs DCM [STR] 12.8.8 Emergency Access



ID	Interface	Document Reference(s)
		DD-ST-913 AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 1 DD-ST-914 AERIAL STRUCTURE, EMERGENCY EXIT STAIRWAY DETAILS 2
	2.2.1.3 Mol Live Loads	
IF 3481	A. Interface between O&M Mol Walkway Floor Live Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol walkway live load requirements have been addressed by the INF team.	10 Mol CnR Rev 2012-02-11 5 Maintenance Of Infrastructure Equipment And Vehicles DCM [CIV] 7.7.7 Walkways and Cable Trough DCM [STR] 12.5.2.1 Live Loads (LLP, LLV, LLRR, LLH, LLS) DCM [STR] 12.7.1.4 Floor Load DCM [STR] 12.8.6.17 Walkways, Parapets, and Sound Walls DCM [STR] 12.11.2.9.1 Cut-and-Cover Walkway Cover Live Loads DCM [STR] 12.11.2.9 Miscellaneous Loads
IF 3839	B. Interface between O&M Mol Access Stairway Live Load Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol access stairway live load requirements have been addressed by the INF team.	10 Mol CnR Rev 2012-02-11 5 Maintenance Of Infrastructure Equipment And Vehicles DCM [STR] 12.5.2.1 Live Loads (LLP, LLV, LLRR, LLH, LLS) DCM [STR] 12.7.1.4 Floor Load
	2.2.1.4 Mol Equipment	
IF 512	A. Interface between O&M Mol Equipment Dynamic Envelope Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol equipment dynamic envelope requirements have been addressed by the INF team.	10 Mol CnR Rev 2012-02-11 1.2.6 CHST and PUC Standards 10 Mol CnR Rev 2012-02-11 5 Maintenance Of Infrastructure Equipment And Vehicles 10 Mol CnR Rev 2012-02-11 5.1 Typical MOI Equipment DCM [CLR] 3.1 Scope DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.1 Appendix 3.A High-Speed Equipment Only, Static Envelope and Dynamic Envelope, Tangent Track DCM [CLR] 3.7.2 Appendix 3.B High-Speed Equipment Only, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation
IF 3691	B. Interface between O&M Mol Equipment Axle Loads	



ID	Interface	Document Reference(s)
	Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol equipment axle loads have been addressed by the INF team.</p>	<p>10 Mol CnR Rev 2012-02-11 5 Maintenance Of Infrastructure Equipment And Vehicles 10 Mol CnR Rev 2012-02-11 5.1 Typical MOI Equipment DCM [STR] 12.5.2.1 Live Loads (LLP, LLV, LLRR, LLH, LLS) DCM [TUN] 13.9.5 Fatigue Analysis DCM [UTL] 9.5.4.5 Placement</p>
IF 3678	C. Interface between O&M Mol Equipment Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol equipment dynamic train-structure interaction has been addressed by the INF team.</p>	<p>10 Mol CnR Rev 2012-02-11 5.1 Typical MOI Equipment DCM [STR] 12.5.2.2 Vertical Impact Effect (I) DCM [STR] 12.6 Track-Structure Interaction DCM [TUN] 13.9.3 Dynamic Analysis</p>
	2.2.1.5 Mol Maintainability & Ease of Maintenance	
IF 2586	A. Interface between O&M Mol CIV Maintainability & Ease of Maintenance Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the applicable O&M Mol CIV maintainability & ease of maintenance requirements have been addressed by the INF team.</p>	<p>DCM [GEN] 1.4 General Design Parameters DCM [GEN] 1.5 Durability DCM [CIV] 7.3 Grading, Side Slopes, and Retaining Walls for Roadway and Site Embankments DCM [CIV] 7.5 Slope/Surface Protection Systems Best Management Practices DCM [CIV] 7.7.4 Signage DCM [CLR] 3.5 Track Center Spacing</p>
IF 5892	B. Interface between O&M Mol STR Maintainability & Ease of Maintenance Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the applicable O&M Mol STR maintainability & ease of maintenance requirements have been addressed by the INF team.</p>	<p>10 Mol CnR Rev 2012-02-11 2.5 Structures 10 Mol CnR Rev 2012-02-11 9.3 Structures 10 Mol CnR Rev 2012-02-11 9.3.2 Bridges and Aerial Structures 10 Mol CnR Rev 2012-02-11 9.3.3 Depressed Structures 10 Mol CnR Rev 2012-02-11 10.3.9 Replacement of Bridge Structure/Components DCM [GEN] 1.4 General Design Parameters DCM [GEN] 1.5 Durability DCM [STR] 12.4.1 Structural Design Parameters</p>



ID	Interface	Document Reference(s)
		DCM [STR] 12.6.4 Track Serviceability Analysis DCM [STR] 12.6.4.2 Vertical Deflection Limits: Group 1a DCM [STR] 12.6.4.5 Transverse Deflection Limits DCM [STR] 12.9.3 Requirements for Highway Bridges DCM [STR] 12.8 Design Considerations for Bridges and Aerial Structures DCM [STR] 12.8.4.6 Inspection and Maintenance DCM [STR] 12.8.5.4 Maintenance and Inspection of Concrete Structures DCM [STR] 12.8.6.9 Expansion Joints DCM [STR] 12.11.3.5 Water tightness DCM [STR] 12.8.10 Maintenance of HST Aerial Structures, Bridges, and Grade Separations DCM [STR] 12.6.4.3 Vertical Deflection Limits: Group 1b DCM [CLR] 3.5 Track Center Spacing
IF 1203	C. Interface between O&M MoI DRN Maintainability & Ease of Maintenance Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M MoI DRN maintainability & ease of maintenance requirements have been addressed by the INF team.</p>	10 MoI CnR Rev 2012-02-11 2.5 Structures 10 MoI CnR Rev 2012-02-11 9.2.2 Drainage 10 MoI CnR Rev 2012-02-11 9.3.1 Tunnels 10 MoI CnR Rev 2012-02-11 9.3.2 Bridges and Aerial Structures 10 MoI CnR Rev 2012-02-11 9.3.3 Depressed Structures DCM [DRN] 8.5.2.1 Open Channel Hydraulics DCM [DRN] 8.5.2.1.6 Channel Lining DCM [DRN] 8.6.1 Track Drainage Systems DCM [DRN] 8.6.3.4 Deck Drainage System DCM [DRN] 8.6.3.4.3 Pipes and Downspouts DCM [DRN] 8.6.9.2 Storm Drain Design DCM [DRN] 8.6.9.3 Inlets and Maintenance Access DCM [DRN] 8.6.9.4 Pipe Characteristics DCM [DRN] 8.5.2.3 Underdrain System DCM [DRN] 8.5.2.3.4 Access Holes/Cleanouts and Risers DCM [DRN] 8.5.2.5 Siphons DCM [DRN] 8.5.2.5.4 Collars and Blowoff Structures DCM [DRN] 8.5.2.6 Pump Stations SD-CD-001 TRACK DRAINAGE SYSTEM / UNDERDRAIN SYSTEM, CLEANOUT AND RISER DETAILS SD-CD-003 STORM DRAIN MANHOLES



ID	Interface	Document Reference(s)
	2.3 Security	
	2.3.1 Interfaces with Guideway (excl. Trackwork)	
	2.3.1.1 TVA Mitigations	
IF 1237	A. Interface between O&M SEC Fencing Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the applicable O&M security fencing requirements have been addressed by the INF team.</p>	<p>DCM [GEN] 1.2.1 Infrastructure DCM [GEN] 1.2.8 Safety and Reliability DCM [CIV] 7.8.1 Access Control Devices DCM [CIV] 7.8.1.1.2 Access Detering Fencing DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.1.5.2 Walking Gates DCM [CIV] 7.8.1.5.3 Driving Gates DCM [CIV] 7.8.2 Access Control by Type of HST Trackway DCM [CIV] 7.8.2.4 At-Grade Trackway through High-Risk Trespassing Areas DCM [CIV] 7.8.2.7 Trackway on Retained Fill DCM [CIV] 7.8.2.8 Trackway on Retained Cut (Open) DCM [CIV] 7.8.2.9 Trackway Underground (Bored, Mined, and Cut-and-Cover Tunnels) DCM [CIV] 7.8.4.2 Roadway Overpasses Crossing HST Trackway DCM [CIV] 7.8.4.5 Emergency Exits and Equipment Rooms in Tunnels DCM [CIV] 7.8.4.6 Drainage Structures DCM [CIV] 7.9 Wildlife Crossing DD-CV-901 FENCE AND GATES LOCATIONS DD-CV-902 FENCING ON GRADE SEPARATED STRUCTURES DD-CV-903 FENCE AT CULVERT CROSSINGS DD-CV-900 FENCE AND GATE DETAILS DCM [DRN] 8.5.1.3 Access Control DCM [CIV] 7.8.1.1 Fences DCM [CIV] 7.8.1.1.1 Access Restriction Fencing DCM [CIV] 7.8.1.4 Fencing and Traffic Barriers in combination DCM [CIV] 7.8.2.1 At-Grade Trackway DCM [CIV] 7.8.2.2 At-Grade Trackway within Highway Corridor DCM [CIV] 7.8.2.5 Trackway in Cut or Fill (Embankment) Section DCM [CIV] 7.8.2.6 Trackway on Aerial Structure DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED,</p>



ID	Interface	Document Reference(s)
		EMBANKMENT DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT DD-CV-102 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL DD-CV-103 TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT DD-CV-104 TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT DD-IP-100 BARRIERS IN SHARED CORRIDOR DD-IP-102 IN SHARED AND ADJACENT CORRIDOR, AT-GRADE DD-IP-103 AT-GRADE BERM OR DITCH ON HST GUIDEWAY, RAILROAD ADJACENT TO HST DD-IP-106 ADJACENT TO HIGHWAY/ROADWAY DD-ST-120 TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY DD-ST-121 TYPICAL CROSS SECTION, TWO TRACK TRENCH, INSIDE WALKWAY DD-ST-122 TYPICAL CROSS SECTION, ONE TRACK TRENCH DD-IP-105 HST TRENCH AND RETAINING WALL PROTECTION DD-TN-400 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, PLAN DD-TN-406 TYPICAL TUNNEL PORTAL FACILITIES-BELOW GRADE, PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES, FOR SINGLE TRACK TWIN BORED TUNNEL, PLAN DD-TN-403 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, PLAN
IF 6265	B. Interface between O&M SEC Signage Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the applicable O&M security signage requirements have been addressed by the INF team.	DCM [CIV] 7.7.4 Signage DCM [CIV] 7.8.1.6 Fence Signage
IF 6278	C. Interface between O&M SEC Security Patrol Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the applicable O&M security patrol requirements have	



ID	Interface	Document Reference(s)
	been addressed by the INF team.	
	3 Systems	
	3.1 Traction Power	
	3.1.1 Interfaces with Operations & Maintenance	
	3.1.1.1 Maintenance	
IF 878	A. Interface between O&M MoI TP Facility Site Access Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M MoI TP facility site access requirements have been addressed by the INF team.</p>	<p>DD-SY-010 TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS, AT SYSTEM SITES, STATIONS, TUNNEL PORTAL FACILITIES AND O&M FACILITIES DD-TP-D101 CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH TWO HIGH-VOLTAGE TRANSFORMERS DD-TP-D102 CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH THREE HIGH-VOLTAGE TRANSFORMERS DD-TP-D201 CONCEPTUAL LAYOUT SWITCHING STATION DD-TP-D301 CONCEPTUAL LAYOUT PARALLELING STATION DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.3.2 Train Control, Communications and Traction Power Facilities DCM [CIV] 7.7.1.1 Access Roads DD-CV-901 FENCE AND GATES LOCATIONS DD-CV-900 FENCE AND GATE DETAILS</p>
	3.1.2 Interfaces with Guideway (excl. Trackwork)	
	3.1.2.1 Track Alignment	
IF 80	A. Interface between SYS TP Maximum Grade @ Phase Break Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP system maximum grade @ phase break requirements have been addressed by the INF team.</p>	<p>DCM [ALG] 4.5.1 Maximum Grades</p>
	3.1.2.2 Traction Power Facilities & Wayside Power Cubicles (Sites)	
IF 5597	A. Interface between SYS TP Facility & WPC Site Location Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP facility & WPC site location (where to install, not size) requirements have been addressed by the INF team.</p>	<p>DCM [TP] 20.7.2 Spacing of Traction Power Facilities DCM [TP] 20.7.3 Additional Location Requirements DCM [TP] 20.12.1 Wayside Power Control Cubicles DD-TP-D401 CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES DD-TC-004 STATION INTERLOCKING LAYOUT, TYPICAL TROUGHS AND CONDUITS, AND UNDERTRACK CROSSINGS DD-TC-005 UNIVERSAL INTERLOCKING LAYOUT, TYPICAL DUCTBANK AND CONDUIT DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT DCM [TUN] 13.3.10 Equipment Requirements and Tunnel Niches DCM [TUN] 13.16.4.1 Traction Power DCM [TUN] 13.16.14 Overhead Contact System Motorized Disconnect Switch</p>
IF 4271	<p>B. Interface between SYS TP Facility & WPC Site Spatial Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP facility & WPC site spatial (site, not location) requirements have been addressed by the INF team.</p>	<p>DCM [TP] 20.9.1 General Site Requirements DCM [TP] 20.9.23 Real Estate Requirements: Approximate Footprints for the TPF DCM [TP] 20.12.1 Wayside Power Control Cubicles DD-TP-D101 CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH TWO HIGH-VOLTAGE TRANSFORMERS DD-TP-D102 CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH THREE HIGH-VOLTAGE TRANSFORMERS DD-TP-D201 CONCEPTUAL LAYOUT SWITCHING STATION DD-TP-D301 CONCEPTUAL LAYOUT PARALLELING STATION DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.3.2 Train Control, Communications and Traction Power Facilities DCM [CIV] 7.7.1.1 Access Roads DD-CV-900 FENCE AND GATE DETAILS DCM [TUN] 13.3.10 Equipment Requirements and Tunnel Niches DCM [TUN] 13.16.14 Overhead Contact System Motorized Disconnect</p>



ID	Interface	Document Reference(s)
		Switch DCM [TUN] 13.16.21 Parking for Tunnel Maintenance and Traction Power Facility DCM [DRN] 8.6.7 Critical HST Structures/Facilities DCM [IPR] 6.3 Protection of HST Operating Infrastructure from Vehicle Intrusion DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
IF 871	C. Interface between SYS TP Facility & WPC Site Foundation Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS TPF & WPC site foundation requirements have been addressed by the INF team.</p>	DCM [TP] 20.9.3 Foundations DCM [TP] 20.12.1 Wayside Power Control Cubicles DD-TP-D121 TRACTION POWER SUBSTATION HIGH VOLTAGE EQUIPMENT DD-TP-D501 TYPICAL TRANSFORMER OIL CONTAINMENT SYSTEM DD-TP-E112 TYPICAL EQUIPMENT ARRANGEMENT PREFABRICATED ENCLOSURES TRACTION POWER SUBSTATION-CABLE VAULT DD-TP-E202 TYPICAL EQUIPMENT ARRANGEMENTS PREFABRICATED ENCLOSURES WAYSIDE POWER CONTROL CUBICLE-ELEVATION DD-TC-004 STATION INTERLOCKING LAYOUT, TYPICAL TROUGHS AND CONDUITS, AND UNDERTRACK CROSSINGS DD-TC-005 UNIVERSAL INTERLOCKING LAYOUT, TYPICAL DUCTBANK AND CONDUIT DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT DCM [STR] 12.5.3.2 Loads for Design of Traction Power Facility Gantry Pole Foundation DCM [STR] 12.7.2 Foundations for Equipment Enclosures DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports DCM [DRN] 8.6.7 Critical HST Structures/Facilities DCM [DRN] 8.3 Policies
	3.1.2.3 Wayside/Field Equipment	
IF 1143	A. Interface between SYS TP Wayside/Field Equipment Spatial	



ID	Interface	Document Reference(s)
Requirements and GWY Infrastructure		
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP wayside/field equipment spatial requirements have been addressed by the INF team.</p>	<p>DCM [TP] 20.7.3 Additional Location Requirements DD-TP-D111 TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D112 TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-D211 SWITCHING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D212 SWITCHING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-D311 PARALLELING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D312 PARALLELING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DCM [STR] 12.14.6 Trackside Equipment DCM [TUN] 13.3.5 Clearances DCM [TUN] 13.3.10 Equipment Requirements and Tunnel Niches DD-CD-003 AT-GRADE TRACK, DRAINAGE SYSTEM DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-TP-F101 TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT DD-TP-F102 TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT DD-TP-D401 CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES DD-TP-F201 TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE DD-TP-F301 TYPICAL CATENARY FEEDING ARRANGEMENT IN OPEN TRENCH LOCATIONS DD-TN-112 TYPICAL TUNNEL NICHE DETAIL - FIXED MOTORIZED DISCONNECT</p>
IF 5671	B. Interface between SYS TP Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP wayside/field equipment foundation requirements have been addressed by the INF team.</p>	<p>DCM [TP] 20.9.3 Foundations DD-TP-D111 TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D112 TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-D211 SWITCHING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D212 SWITCHING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-D311 PARALLELING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D312 PARALLELING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DCM [STR] 12.5.3.2 Loads for Design of Traction Power Facility Gantry Pole Foundation DCM [STR] 12.14.6 Trackside Equipment DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-TP-F101 TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT DD-TP-F102 TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT DD-TP-D401 CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES DD-TP-F201 TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE DD-TP-F301 TYPICAL CATENARY FEEDING ARRANGEMENT IN OPEN TRENCH LOCATIONS</p>
	<p>3.1.2.4 Conduits & Cables</p>	
IF 885	<p>A. Interface between SYS TP Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS TP conduit, duct bank, cable trough & manhole requirements have been addressed by the INF team, including but not</p>	<p>DCM [TP] 20.10.3 Raceway DCM [TP] 20.10.5 Electrical Manholes and Pullboxes DCM [TP] 20.10.6 Cable Trenches for Power Cables</p>



ID	Interface	Document Reference(s)
	limited to: <ul style="list-style-type: none"> • Overhead or duct bank from TPF to Main Gantry • Overhead from Main Gantry to Strain Gantry • Return System to Gantries • Feeder cables • Return cables • Surface conduits (multiple, large diameter) • Embedded conduits • ... 	DCM [TP] 20.10.7 Conductors DCM [TP] 20.10.7.1 General DCM [TP] 20.10.7.2 Segregation DCM [TP] 20.10.7.3 Sizes of Low Voltage Power and Control Cables DD-TP-D111 TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D112 TRACTION POWER SUBSTATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-D211 SWITCHING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D212 SWITCHING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-D311 PARALLELING STATION MAIN GANTRY ELEVATION SUBSTATION SIDE VIEW DD-TP-D312 PARALLELING STATION MAIN GANTRY ELEVATION TRACK SIDE VIEW DD-TP-E202 TYPICAL EQUIPMENT ARRANGEMENTS PREFABRICATED ENCLOSURES WAYSIDE POWER CONTROL CUBICLE-ELEVATION DD-TP-G101 TYPICAL SUBSTATION NEUTRAL RETURN SYSTEM DIAGRAM DD-TP-G111 TYPICAL SWITCHING STATION NEUTRAL RETURN SYSTEM DIAGRAM DD-TP-N101 TYPICAL 25KV DUCT BANK DETAIL DD-TP-N111 TYPICAL 25KV MANHOLE DETAILS DCM [STR] 12.14.4 Conduit Risers DCM [STR] 12.14.5 Embedded Conduits DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports DCM [TUN] 13.3.5 Clearances DCM [TUN] 13.15.3 Embedded Conduit and Cable Trough DCM [UTL] 9.4.1 Electrical DCM [UTL] 9.4.1.1 Duct Banks DCM [UTL] 9.4.1.2 Manholes and Handholes DCM [UTL] 9.5.4.5 Placement DCM [UTL] 9.5.4.6 Carrier Pipes DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure



ID	Interface	Document Reference(s)
		Gauge and Fixed Equipment Envelope, In Tunnels DD-TP-F101 TYPICAL SINGLE CATENARY FEEDING GANTRY ARRANGEMENT DD-TP-F102 TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT DD-TP-D401 CONCEPTUAL LOCATIONS, TRACTION POWER FACILITIES DD-TP-F201 TYPICAL DOUBLE CATENARY FEEDING GANTRY ARRANGEMENT ON AERIAL STRUCTURE DD-TP-F301 TYPICAL CATENARY FEEDING ARRANGEMENT IN OPEN TRENCH LOCATIONS
	3.1.2.5 Dead & Live Loads	
IF 3019	A. Interface between SYS TP System Dead Load Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the SYS TP system dead load requirements have been addressed by the INF team.	DCM [TP] 20.9.3 Foundations DCM [STR] 12.5.3.1 Loads and Load Combinations for Design of the Surrounding Area of the Embedded Sleeves of Overhead Contact System Pole Foundation DCM [STR] 12.5.3.2 Loads for Design of Traction Power Facility Gantry Pole Foundation
	3.1.2.6 Utilities	
IF 2606	A. Interface between SYS TP Utility Spatial Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the SYS TP system utility spatial requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Traction power • Electrical utility (e.g. PG&E) • Gas/fuel • Water • Sewer • Communications 	DCM [TP] 20.4.6 High-Voltage Utility Connections DCM [TP] 20.9.23 Real Estate Requirements: Approximate Footprints for the TPF DD-TP-C511 CONCEPTUAL LOCATIONS UTILITY HIGH VOLTAGE SWITCHING STATION AND TRACTION POWER SUBSTATION DCM [UTL] 9.4.1 Electrical DCM [UTL] 9.4.1.3 Service Connections DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
	3.2 Overhead Contact System	



ID	Interface	Document Reference(s)
	3.2.1 Interfaces with Guideway (excl. Trackwork)	
	3.2.1.1 Pantograph Clearances	
IF 656	A. Interface between SYS OCS Pantograph Clearance Envelope Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS OCS pantograph clearance envelope requirements have been addressed by the INF team (actual wayside equipment is addressed elsewhere).</p>	<p>DCM [OCS] 21.6.2 Geometry of the Pantographs DCM [OCS] 21.6.3 Compliance of the Overhead Contact Line System with the Infrastructure Gauge DCM [OCS] 21.14.8 Electrical Clearances to Rail Vehicles and Structures DCM [OCS] 21.14.9 Clearance Envelope at Fixed Structures DCM [OCS] 21.14.10 Applicable Pantograph and OCS Clearance Envelopes DD-OC-2071 PANTOGRAPH CLEARANCE ENVELOPE OPEN ROUTE-DEDICATED TRACK-220 MPH SEGMENT DD-OC-2072 PANTOGRAPH CLEARANCE ENVELOPE TUNNEL-DEDICATED TRACK-220 MPH SEGMENT DCM [TUN] 13.3.5 Clearances DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.1 Appendix 3.A High-Speed Equipment Only, Static Envelope and Dynamic Envelope, Tangent Track DCM [CLR] 3.7.2 Appendix 3.B High-Speed Equipment Only, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-CV-904 MINIMUM CLEARANCE, GRADE SEPARATED STRUCTURES</p>
	3.2.1.2 Wayside/Field Equipment	
IF 3299	A. Interface between SYS OCS Structure & Wire Spatial Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS OCS structure & wire spatial requirements have been addressed by the INF team.</p>	<p>DCM [OCS] 21.1 Scope DCM [OCS] 21.6.1 Geometry of the Overhead Contact Line DCM [OCS] 21.8.1 Contact Wire DCM [OCS] 21.8.2 Messenger Wire DCM [OCS] 21.8.3 Stitch Wire DCM [OCS] 21.8.4 Hanger Wire</p>



ID	Interface	Document Reference(s)
		DCM [OCS] 21.8.5 Alternate Conductors DCM [OCS] 21.9 Other Overhead Conductors and Cables DCM [OCS] 21.9.1 Parallel Negative Feeder DCM [OCS] 21.9.2 Static (Ground) Wire DCM [OCS] 21.9.3 Insulated 25 kV Cable DCM [OCS] 21.9.4 Insulated Return Cable DCM [OCS] 21.12 Sectionalizing and Switching DCM [OCS] 21.15.2 OCS Pole and Foundation Requirements DCM [OCS] 21.16 Traction Power Return System DD-OC-2041 TYPICAL JUMPER AND CONTACT WIRE CROSSING ARRANGEMENTS-220 MPH SEGMENT DD-OC-2042 TYPICAL 25KV HIGH SPEED SECTION INSULATOR ARRANGEMENT FOR CROSSOVER AND TURNOUT-220 MPH SEGMENT DD-OC-2050 TYPICAL OCS CROSSOVER ARRANGEMENT WITH AIR GAP-220 MPH SEGMENT DD-OC-2053 TYPICAL UNINSULATED CATENARY OVERLAP FIVE SPAN ARRANGEMENT-220 MPH SEGMENT DD-OC-2057 TYPICAL INSULATED CATENARY OVERLAP FIVE SPAN ARRANGEMENT-220 MPH SEGMENT DD-OC-2058 TYPICAL CANTILEVER ARRANGEMENT THREE SPAN INSULATED AND UNINSULATED OVERLAPS-220 MPH SEGMENT DCM [TUN] 13.3.5 Clearances DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.5 Track Center Spacing DCM [UTL] 9.5.5 Utility Clearances DCM [OCS] 21.6.2 Geometry of the Pantographs DCM [OCS] 21.6.3 Compliance of the Overhead Contact Line System with the Infrastructure Gauge DCM [OCS] 21.14.7 Clearances for Utility Lines Crossing over the Electrified Railroad DCM [OCS] 21.14.8 Electrical Clearances to Rail Vehicles and Structures DCM [OCS] 21.14.9 Clearance Envelope at Fixed Structures DCM [OCS] 21.15.1 General DCM [OCS] 21.15.3 OCS Poles DD-CV-904 MINIMUM CLEARANCE, GRADE SEPARATED STRUCTURES



ID	Interface	Document Reference(s)
		DD-OC-2011 TYPICAL OPEN ROUTE HIGH SPEED OCS CONFIGURATION - 220 MPH SEGMENT DD-OC-2012 TYPICAL OCS STRUCTURE FOR TANGENT TRACKS IN OPEN ROUTE - 220 MPH SEGMENT DD-OC-2013 TYPICAL OCS STRUCTURE FOR SUPERELEVATED TRACKS IN OPEN ROUTE - 220 MPH SEGMENT DD-OC-2018 TYPICAL OCS PORTAL STRUCTURE ON FOUR TANGENT TRACKS - 220 MPH SEGMENT DD-OC-2019 TYPICAL OCS SUPPORT STRUCTURE FOR FOUR TRACKS INTERMEDIATE STATION-220 MPH SEGMENT DD-OC-2014 TYPICAL OCS SUPPORT STRUCTURE ON VIADUCT-TANGENT TRACKS - 220 MPH SEGMENT DD-OC-2015 TYPICAL OCS SUPPORT STRUCTURE ON VIADUCT-SUPERELEVATED TRACKS - 220 MPH SEGMENT DD-OC-2022 TYPICAL OCS STRUCTURE FOR CUT AND COVER TUNNEL ON TANGENT TRACKS-220 MPH SEGMENT DD-OC-2023 TYPICAL OPEN TRENCH OCS STRUCTURE TANGENT TRACKS WITH CENTER WALKWAY-220 MPH SEGMENT DD-OC-2024 TYPICAL OPEN TRENCH OCS STRUCTURE SUPERELEVATED TRACKS WITH CENTER WALKWAY-220 MPH SEGMENT DD-OC-2025 TYPICAL OPEN TRENCH OCS STRUCTURE ON TANGENT TRACK WITH SIDE WALKWAY-220 MPH SEGMENT DD-OC-2026 TYPICAL OPEN TRENCH OCS STRUCTURE ON SUPERELEVATED TRACK WITH SIDE WALKWAY-220 MPH SEGMENT DD-OC-2027 TYPICAL SINGLE OPEN TRENCH OCS STRUCTURE OCS WALL MOUNTED ON TANGENT TRACKS-220 MPH SEGMENT DD-OC-2028 TYPICAL SINGLE OPEN TRENCH OCS STRUCTURE OCS WALL MOUNTED ON SUPERELEVATED TRACKS-220 MPH SEGMENT DD-OC-2029 TYPICAL OCS PORTAL STRUCTURE OPEN TRENCH/TUNNEL PORTAL ON TANGENT TRACKS-220 MPH SEGMENT DD-OC-2037 TYPICAL CUT & COVER TUNNEL OCS STRUCTURE WITHOUT CENTER WALL ON TANGENT TRACKS-220 MPH SEGMENT DD-OC-2020 TYPICAL OCS STRUCTURE FOR CIRCULAR TUNNEL ON TANGENT TRACKS-220 MPH SEGMENT DD-OC-2035 TYPICAL CIRCULAR TUNNEL OCS STRUCTURE WITHOUT CENTER WALL ON TANGENT TRACKS-220 MPH SEGMENT DD-OC-2021 TYPICAL OCS STRUCTURE FOR MINED TUNNEL ON TANGENT



ID	Interface	Document Reference(s)
		TRACKS-220 MPH SEGMENT DD-OC-2036 TYPICAL MINED TUNNEL OCS STRUCTURE WITHOUT CENTER WALL ON TANGENT TRACKS-220 MPH SEGMENT
IF 5752	B. Interface between SYS OCS Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS OCS wayside/field equipment spatial requirements have been addressed by the INF team.</p>	DCM [OCS] 21.1 Scope DCM [OCS] 21.4 Overhead Contact System Description and General Performance Requirements DCM [OCS] 21.6.1 Geometry of the Overhead Contact Line DCM [OCS] 21.12.2 Phase Breaks DCM [OCS] 21.12.3 OCS Sectionalizing in Tunnels DCM [OCS] 21.12.4 Disconnect Switches DD-OC-2030 TYPICAL TWIN BALANCE WEIGHT ARRANGEMENT TERMINATION IN OPEN ROUTE-220 MPH SEGMENT DD-OC-2031 TYPICAL OCS MIDPOINT ANCHOR ARRANGEMENT IN OPEN ROUTE-220 MPH SEGMENT DD-OC-2032 TYPICAL OCS FIXED TENSION TERMINATION ARRANGEMENT-OPEN ROUTE-220 MPH SEGMENT DD-OC-2034 TYPICAL OCS SUPPORT STRUCTURE WITH DISCONNECT SWITCH-220 MPH SEGMENT DCM [TUN] 13.3.5 Clearances DCM [TUN] 13.3.10 Equipment Requirements and Tunnel Niches DCM [TUN] 13.16.14 Overhead Contact System Motorized Disconnect Switch DCM [TUN] 13.17.1 A Shorter Tunnel up to One-Half Mile in Length DCM [TUN] 13.17.3 Shorter Tunnel with Constrained Access DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [OCS] 21.6.3 Compliance of the Overhead Contact Line System with the Infrastructure Gauge DCM [OCS] 21.14.8 Electrical Clearances to Rail Vehicles and Structures DCM [OCS] 21.14.9 Clearance Envelope at Fixed Structures DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels



ID	Interface	Document Reference(s)
		DD-OC-2033 TYPICAL OCS SUPPORT WITH AUXILIARY POWER FOR TWO TANGENT TRACKS IN OPEN ROUTE-220 MPH SEGMENT DD-OC-2038 TYPICAL BORED TUNNEL OCS STRUCTURE WITH DISCONNECT SWITCH ARRANGEMENT-220 MPH SEGMENT
IF 5766	C. Interface between SYS OCS Phase Break Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS wayside/field equipment spatial requirements have been addressed by the INF team.	DCM [TP] 20.7.3 Additional Location Requirements DCM [OCS] 21.4 Overhead Contact System Description and General Performance Requirements DCM [OCS] 21.12.2 Phase Breaks DD-OC-2043 TYPICAL OCS PHASE BREAK ARRANGEMENT WITH NEUTRAL SECTION-220 MPH SEGMENT DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
	3.2.1.3 Foundations & Support Structures	
IF 898	A. Interface between SYS OCS Foundation & Supporting Structure Location Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS foundation & supporting structure location requirements have been addressed by the INF team.	DCM [OCS] 21.6.1 Geometry of the Overhead Contact Line DCM [OCS] 21.15.1 General DCM [OCS] 21.15.2 OCS Pole and Foundation Requirements DCM [OCS] 21.15.3 OCS Poles DD-OC-2011 TYPICAL OPEN ROUTE HIGH SPEED OCS CONFIGURATION - 220 MPH SEGMENT DCM [STR] 12.5.3.1 Loads and Load Combinations for Design of the Surrounding Area of the Embedded Sleeves of Overhead Contact System Pole Foundation DCM [STR] 12.14.8 Overhead Concrete Anchors DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports DCM [TUN] 13.15.1 Catenary Support Provisions DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT

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ID	Interface	Document Reference(s)
		DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT DD-CV-102 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, RETAINED FILL DD-CV-103 TYPICAL CROSS SECTION, ONE TRACK NON-BALLASTED, EMBANKMENT AND OPEN CUT DD-CV-104 TYPICAL CROSS SECTION, FOUR TRACK NON-BALLASTED, EMBANKMENT
IF 5780	B. Interface between SYS OCS Foundation & Supporting Structure Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS foundation & supporting structure spatial requirements have been addressed by the INF team.	DCM [OCS] 21.15.1 General DCM [OCS] 21.15.2 OCS Pole and Foundation Requirements DCM [OCS] 21.15.4 OCS Foundations DCM [STR] 12.5.3.1 Loads and Load Combinations for Design of the Surrounding Area of the Embedded Sleeves of Overhead Contact System Pole Foundation DCM [STR] 12.14.8 Overhead Concrete Anchors DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports DD-ST-903 TYPICAL CABLE TROUGH DETAIL, AERIAL STRUCTURE, AT OCS POLE DCM [TUN] 13.15.1 Catenary Support Provisions
	3.2.1.4 Conduits & Cables	
IF 886	A. Interface between SYS OCS Conduit, Duct Bank & Manhole Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS conduit, duct bank & manhole requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Traction power return • Grounding • Cross bonding • Disconnect switches • Switch heater power supply • Switch heater power distribution • ... 	DCM [OCS] 21.17.1 Traction Power Supply System DCM [OCS] 21.17.3 Train Control System DCM [OCS] 21.17.4 Communications System DCM [OCS] 21.17.6 Trackwork DD-OC-2033 TYPICAL OCS SUPPORT WITH AUXILIARY POWER FOR TWO TANGENT TRACKS IN OPEN ROUTE-220 MPH SEGMENT DD-OC-2034 TYPICAL OCS SUPPORT STRUCTURE WITH DISCONNECT SWITCH-220 MPH SEGMENT DD-OC-2038 TYPICAL BORED TUNNEL OCS STRUCTURE WITH DISCONNECT SWITCH ARRANGEMENT-220 MPH SEGMENT DCM [STR] 12.14.4 Conduit Risers



ID	Interface	Document Reference(s)
		DCM [STR] 12.14.5 Embedded Conduits DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports DCM [TUN] 13.15.3 Embedded Conduit and Cable Trough DCM [UTL] 9.4.1 Electrical DCM [UTL] 9.4.1.1 Duct Banks DCM [UTL] 9.4.1.2 Manholes and Handholes DCM [UTL] 9.5.4.5 Placement DCM [UTL] 9.5.4.6 Carrier Pipes DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
	3.2.1.5 Dead & Live Loads	
IF 3018	A. Interface between SYS OCS Dead Load, Additional Load & Capacity Protection Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS dead load, additional load and capacity protection requirements have been addressed by the INF team.	DCM [OCS] 21.15.2 OCS Pole and Foundation Requirements DCM [OCS] 21.15.3 OCS Poles DCM [OCS] 21.15.4 OCS Foundations DCM [STR] 12.5.1.1 Dead Load (DC, DW) DCM [STR] 12.5.3.1 Loads and Load Combinations for Design of the Surrounding Area of the Embedded Sleeves of Overhead Contact System Pole Foundation DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports
	3.2.1.6 Protective Screens	
IF 5641	A. Interface between SYS OCS Protective Screening & Barrier Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS OCS protective screening & barrier requirements have been addressed by the INF team.	DCM [OCS] 21.14 OCS Clearances and Protection against Electric Shock DCM [OCS] 21.14.3 Protective Screening and Barriers for Standing Surfaces in Public Areas DCM [OCS] 21.14.4 Protective Screening and Barriers for Standing Surfaces in Restricted Areas DCM [CIV] 7.8.4.2 Roadway Overpasses Crossing HST Trackway DCM [OCS] 21.14.2 Protection by Clearances from Standing Surfaces DD-OC-2044 TYPICAL PROTECTION BARRIERS ARRANGEMENT, AT



ID	Interface	Document Reference(s)
		OVERHEAD BRIDGE, 220 MPH SEGMENT DD-CV-902 FENCING ON GRADE SEPARATED STRUCTURES
	3.3 Automatic Train Control	
	3.3.1 Interfaces with Operations & Maintenance	
	3.3.1.1 Maintenance	
IF 831	A. Interface between O&M Mol ATC Interlocking & TCC House Site Access Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the O&M Mol ATC Interlocking & TCC house site access requirements have been addressed by the INF team.</p>	DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.3.2 Train Control, Communications and Traction Power Facilities DCM [CIV] 7.7.1.1 Access Roads DD-CV-901 FENCE AND GATES LOCATIONS DD-CV-900 FENCE AND GATE DETAILS DD-SY-010 TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS, AT SYSTEM SITES, STATIONS, TUNNEL PORTAL FACILITIES AND O&M FACILITIES
	3.3.2 Interfaces with Guideway (excl. Trackwork)	
	3.3.2.1 Interlockings / TCC Houses (Sites)	
IF 5611	A. Interface between SYS ATC Interlocking & TCC House Site Location Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS ATC interlocking & TCC house site location (where to install, not size) requirements have been addressed by the INF team.</p>	DCM [ATC] 24.3.12 Hardware Requirements DCM [ATC] 24.8.8 Equipment Enclosures DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT
IF 794	B. Interface between SYS ATC Interlocking & TCC House Site Spatial Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS ATC interlocking & TCC house site spatial requirements (site, not location) have been addressed by the INF team.</p>	DCM [ATC] 24.8.8 Equipment Enclosures DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.3.2 Train Control, Communications and Traction Power Facilities DCM [CIV] 7.7.1.1 Access Roads



ID	Interface	Document Reference(s)
		DD-CV-900 FENCE AND GATE DETAILS DCM [DRN] 8.6.7 Critical HST Structures/Facilities DCM [IPR] 6.3 Protection of HST Operating Infrastructure from Vehicle Intrusion DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [ATC] 24.3.12 Hardware Requirements DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT
IF 1049	C. Interface between SYS ATC Interlocking & TCC House Site Foundation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC interlocking & TCC house site foundation requirements have been addressed by the INF team.	DCM [ATC] 24.3 General Design Requirements DCM [ATC] 24.3.12 Hardware Requirements DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT DCM [STR] 12.7.2 Foundations for Equipment Enclosures DCM [DRN] 8.6.7 Critical HST Structures/Facilities DCM [DRN] 8.3 Policies
	3.3.2.2 Wayside/Field Equipment	
IF 3304	A. Interface between SYS ATC Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC wayside/field equipment (not trackside) spatial requirements have been addressed by the INF team.	DCM [ATC] 24.3.12 Hardware Requirements DCM [ATC] 24.8 Wayside Equipment DCM [ATC] 24.8.1 Signals DCM [ATC] 24.8.2 Wayside Signs DCM [ATC] 24.8.3 Track Circuits DCM [ATC] 24.8.7 Switch Machines DCM [ATC] 24.8.8 Equipment Enclosures DD-TC-009 SIGNAL SYSTEMS, TYPICAL DWARF SIGNAL LAYOUT DD-TC-011 SWITCH LAYOUT-MAIN LINE-HIGH SPEED-TYPICAL DCM [STR] 12.14.6 Trackside Equipment



ID	Interface	Document Reference(s)
		DCM [TUN] 13.3.5 Clearances DCM [TUN] 13.3.10 Equipment Requirements and Tunnel Niches DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.6.4 Space Around Turnouts DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-ST-100 TYPICAL CROSS SECTION, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK DD-ST-120 TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY DD-TN-111 TYPICAL TUNNEL NICHE DETAIL - ATC EQUIPMENT DD-TN-113 TYPICAL TUNNEL NICHE DETAIL - ATC SIGNALING AND COMMUNICATION SYSTEMS
IF 5627	B. Interface between SYS ATC Wayside/Field Equipment Foundation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC wayside/field equipment foundation requirements have been addressed by the INF team.	DCM [ATC] 24.3 General Design Requirements DCM [ATC] 24.3.12 Hardware Requirements DCM [ATC] 24.8.1 Signals DCM [ATC] 24.8.2 Wayside Signs DCM [ATC] 24.8.3 Track Circuits DCM [ATC] 24.8.7 Switch Machines DCM [ATC] 24.8.8 Equipment Enclosures DD-TC-009 SIGNAL SYSTEMS, TYPICAL DWARF SIGNAL LAYOUT DD-TC-011 SWITCH LAYOUT-MAIN LINE-HIGH SPEED-TYPICAL DCM [STR] 12.14.6 Trackside Equipment DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports
	3.3.2.3 Conduits & Cables	
IF 876	A. Interface between SYS ATC Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS ATC conduit, duct bank, cable trough & manhole requirements have been addressed by the INF team, including but not limited to:	DCM [ATC] 24.3.12 Hardware Requirements DCM [ATC] 24.8.10 Cables, Cable Trough, and Conduit DCM [ATC] 24.8.13 Signal Power DCM [COM] 28.5.6 Systems Conduits at Track



ID	Interface	Document Reference(s)
	<ul style="list-style-type: none"> • Track circuits & cases • Signals • Transponder & LEU • Cross bonding • Signal power supply • Signal power distribution • ... 	<p>DD-SY-010 TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS, AT SYSTEM SITES, STATIONS, TUNNEL PORTAL FACILITIES AND O&M FACILITIES</p> <p>DD-CO-G013 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, SYSTEMS LOW VOLTAGE MANHOLE AND UNDERGROUND, DUCTBANK PATHWAYS AERIAL</p> <p>DD-TC-004 STATION INTERLOCKING LAYOUT, TYPICAL TROUGHS AND CONDUITS, AND UNDERTRACK CROSSINGS</p> <p>DD-TC-005 UNIVERSAL INTERLOCKING LAYOUT, TYPICAL DUCTBANK AND CONDUIT</p> <p>DCM [CIV] 7.7.7 Walkways and Cable Trough</p> <p>DCM [STR] 12.14.1 Cable Trough</p> <p>DCM [STR] 12.14.4 Conduit Risers</p> <p>DCM [STR] 12.14.5 Embedded Conduits</p> <p>DCM [TUN] 13.15.3 Embedded Conduit and Cable Trough</p> <p>DCM [TUN] 13.15.5 Design Requirements for Cable Troughs</p> <p>DCM [UTL] 9.4.1 Electrical</p> <p>DCM [UTL] 9.4.1.1 Duct Banks</p> <p>DCM [UTL] 9.4.1.2 Manholes and Handholes</p> <p>DCM [UTL] 9.5.4.5 Placement</p> <p>DCM [UTL] 9.5.4.6 Carrier Pipes</p> <p>DCM [CLR] 3.4 Vehicle Clearance Envelopes</p> <p>DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section</p> <p>DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels</p> <p>DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT</p> <p>DD-ST-901 TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT</p> <p>DD-CO-G014 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, SYSTEMS LOW VOLTAGE MANHOLE AND UNDERGROUND, DUCTBANK PATHWAYS TRENCH</p> <p>DD-CO-G015 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, CABLE TROUGH, CIC, END DEVICE PATHWAYS AT-GRADE</p> <p>DD-ST-100 TYPICAL CROSS SECTION, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK</p> <p>DD-ST-900 TYPICAL CABLE TROUGH DETAILS , AERIAL STRUCTURE</p> <p>DD-ST-903 TYPICAL CABLE TROUGH DETAIL, AERIAL STRUCTURE, AT OCS</p>



ID	Interface	Document Reference(s)
		POLE DD-ST-120 TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY DD-ST-902 CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL DD-ST-904 CABLE TROUGH LAYOUT TRANSITION AREAS. AERIAL STRUCTURE / AT-FRADE / CUT & COVER TUNNEL DD-CO-G016 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, CABLE TROUGH, CIC, END DEVICE PATHWAYS AERIAL DD-TN-113 TYPICAL TUNNEL NICHE DETAIL - ATC SIGNALING AND COMMUNICATION SYSTEMS
	3.3.2.4 Dead & Live Loads	
IF 3017	A. Interface between SYS ATC System Dead Load Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the SYS ATC system dead load requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Wayside facilities 	DCM [ATC] 24.8 Wayside Equipment DCM [STR] 12.5.1.1 Dead Load (DC, DW) DCM [STR] 12.5.3.1 Loads and Load Combinations for Design of the Surrounding Area of the Embedded Sleeves of Overhead Contact System Pole Foundation
	3.3.2.5 Utilities	
IF 2611	A. Interface between SYS ATC System Utility Spatial Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the SYS ATC system utility spatial requirements have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • Electrical utility (e.g. PG&E) • Gas/fuel • Water • Sewer • Communications 	DCM [ATC] 24.3.12 Hardware Requirements DCM [ATC] 24.8.13 Signal Power DCM [ATC] 24.8.15 Wayside Interfaces DCM [UTL] 9.4.1 Electrical DCM [UTL] 9.4.1.3 Service Connections
	3.4 Communications	
	3.4.1 Interfaces with Operations & Maintenance	
	3.4.1.1 Maintenance	
IF 5871	A. Interface between O&M Mol COM Equipment Shelter & Radio Tower Site Access Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the O&M MoI COM equipment shelter & radio tower site access requirements have been addressed by the INF team.</p>	<p>DD-CO-F090 STANDALONE RADIO SITE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.3.2 Train Control, Communications and Traction Power Facilities DCM [CIV] 7.7.1.1 Access Roads DD-CV-901 FENCE AND GATES LOCATIONS DD-CV-900 FENCE AND GATE DETAILS DD-SY-010 TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS, AT SYSTEM SITES, STATIONS, TUNNEL PORTAL FACILITIES AND O&M FACILITIES</p>
	<p>3.4.2 Interfaces with Guideway (excl. Trackwork)</p>	
	<p>3.4.2.1 Equipment Shelter (Sites)</p>	
IF 5653	<p>A. Interface between SYS COM Equipment Shelter & Radio Tower Site Location Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM equipment shelter & radio tower site location (where to install, not size) requirements have been addressed by the INF team.</p>	<p>DCM [COM] 28.4.5.1 Operations Radio System DCM [COM] 28.4.5.3 Broadband Radio System DCM [COM] 28.5.4 Standalone Radio Sites DD-TP-D101 CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH TWO HIGH-VOLTAGE TRANSFORMERS DD-TP-D102 CONCEPTUAL LAYOUT TRACTION POWER SUBSTATION WITH THREE HIGH-VOLTAGE TRANSFORMERS DD-TP-D201 CONCEPTUAL LAYOUT SWITCHING STATION DD-TP-D301 CONCEPTUAL LAYOUT PARALLELING STATION DD-CO-C001 COMMUNICATIONS SYSTEMS SITES AND LOCATIONS OVERVIEW DD-CO-F090 STANDALONE RADIO SITE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F091 CO-LOCATED RADIO SITE COMMUNICATIONS SPACES, SITE LAYOUT DD-CO-H001 STANDALONE RADIO SITE, PLACEMENT RULES DD-TC-025 TYPICAL INTERLOCKING AT STATIONS DD-TC-026 TYPICAL UNIVERSAL INTERLOCKING LAYOUT</p>
IF 904	<p>B. Interface between SYS COM Equipment Shelter & Radio Tower Site Spatial Requirements and GWY Infrastructure</p>	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM equipment shelter & radio tower site spatial requirements have been addressed by the INF team.</p>	<p>DCM [COM] 28.4.1.4 General Communications Systems Physical, Enclosure and Power DCM [COM] 28.5.3 Communications Shelters DCM [COM] 28.5.4 Standalone Radio Sites DD-CO-F070 SIGNALING EQUIPMENT HOUSE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F080 TRACTION POWER FACILITY, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F110 TUNNEL CROSS PASSAGE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.8.3.2 Train Control, Communications and Traction Power Facilities DCM [CIV] 7.7.1.1 Access Roads DD-CV-900 FENCE AND GATE DETAILS DCM [DRN] 8.6.7 Critical HST Structures/Facilities DCM [IPR] 6.3 Protection of HST Operating Infrastructure from Vehicle Intrusion DCM [CLR] 3.3.2 Horizontal Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DD-CO-F090 STANDALONE RADIO SITE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F091 CO-LOCATED RADIO SITE COMMUNICATIONS SPACES, SITE LAYOUT</p>
IF 1048	<p>C. Interface between SYS COM Equipment Shelter & Radio Tower Site Foundation Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM equipment shelter & radio tower site foundation requirements have been addressed by the INF team.</p>	<p>DCM [COM] 28.5.5 Radio Towers DD-CO-F070 SIGNALING EQUIPMENT HOUSE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F080 TRACTION POWER FACILITY, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F090 STANDALONE RADIO SITE, COMMUNICATIONS SPACES, PHYSICAL SITE LAYOUT DD-CO-F091 CO-LOCATED RADIO SITE COMMUNICATIONS SPACES, SITE LAYOUT</p>



ID	Interface	Document Reference(s)
		DCM [STR] 12.7.2 Foundations for Equipment Enclosures DCM [DRN] 8.6.7 Critical HST Structures/Facilities DCM [DRN] 8.3 Policies
	3.4.2.2 Wayside/Field Equipment	
IF 600	A. Interface between SYS COM Wayside/Field Equipment Spatial Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM wayside/field equipment spatial requirements have been addressed by the INF team.</p>	DCM [COM] 28.4.1.4 General Communications Systems Physical, Enclosure and Power DCM [COM] 28.4.1.5 General Communications Systems End-Devices DCM [COM] 28.4.5.2 Operations Radio System at Trench and Tunnel Locations DCM [COM] 28.4.5.4 Broadband Radio System at Trench and Tunnel Locations DCM [COM] 28.4.5.5 Public Safety Trench and Tunnel Radio System DCM [COM] 28.4.5.6 Radio Interoperability with External Agencies and First Responders DCM [COM] 28.4.11.1 Telephone Subsystem DCM [COM] 28.5.2 Communications Interface Cabinets DD-CO-F100 WAYSIDE CIC DCM [STR] 12.14.6 Trackside Equipment DCM [TUN] 13.3.5 Clearances DCM [TUN] 13.3.10 Equipment Requirements and Tunnel Niches DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-ST-100 TYPICAL CROSS SECTION, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK DD-ST-120 TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY DD-TN-111 TYPICAL TUNNEL NICHE DETAIL - ATC EQUIPMENT DD-TN-113 TYPICAL TUNNEL NICHE DETAIL - ATC SIGNALING AND COMMUNICATION SYSTEMS
IF 5725	B. Interface between SYS COM Wayside/Field Equipment	

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ID	Interface	Document Reference(s)
Foundation Requirements and GWY Infrastructure		
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM wayside/field equipment foundation requirements have been addressed by the INF team.</p>	<p>DCM [COM] 28.4.1.4 General Communications Systems Physical, Enclosure and Power DCM [COM] 28.4.1.5 General Communications Systems End-Devices DCM [COM] 28.5.2 Communications Interface Cabinets DD-CO-F100 WAYSIDE CIC DCM [STR] 12.14.6 Trackside Equipment DCM [STR] 12.8.9 OCS Pole and Traction Power Facility Gantry Supports</p>
3.4.2.3 Conduits & Cables		
IF 877	<p>A. Interface between SYS COM Conduit, Duct Bank, Cable Trough & Manhole Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM conduit, duct bank, cable trough & manhole requirements have been addressed by the INF team.</p>	<p>DCM [COM] 28.4.6 Cable Infrastructure DCM [COM] 28.4.6.4 Cable Infrastructure Physical, Enclosure and Power DCM [COM] 28.4.6.5 Cable Infrastructure End-Devices DCM [COM] 28.5.6 Systems Conduits at Track DD-SY-010 TYPICAL CIVIL ACCOMMODATIONS FOR SYSTEMS, AT SYSTEM SITES, STATIONS, TUNNEL PORTAL FACILITIES AND O&M FACILITIES DD-CO-F002 PHYSICAL SITE LAYOUT, TYPICAL CONNECTIVITY, BETWEEN COMMUNICATIONS SPACES DD-CO-F003 PHYSICAL SITE LAYOUT, TYPICAL CONNECTIVITY AT WAYSIDE SITES DD-CO-G013 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, SYSTEMS LOW VOLTAGE MANHOLE AND UNDERGROUND, DUCTBANK PATHWAYS AERIAL DD-TC-004 STATION INTERLOCKING LAYOUT, TYPICAL TROUGHS AND CONDUITS, AND UNDERTRACK CROSSINGS DD-TC-005 UNIVERSAL INTERLOCKING LAYOUT, TYPICAL DUCTBANK AND CONDUIT DCM [CIV] 7.7.7 Walkways and Cable Trough DCM [STR] 12.14.1 Cable Trough DCM [STR] 12.14.4 Conduit Risers DCM [STR] 12.14.5 Embedded Conduits DCM [TUN] 13.15.3 Embedded Conduit and Cable Trough DCM [TUN] 13.15.5 Design Requirements for Cable Troughs DCM [UTL] 9.4.1 Electrical</p>

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ID	Interface	Document Reference(s)
		DCM [UTL] 9.4.1.1 Duct Banks DCM [UTL] 9.4.1.2 Manholes and Handholes DCM [UTL] 9.5.4.5 Placement DCM [UTL] 9.5.4.6 Carrier Pipes DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels DD-CV- 100 TYPICAL CROSS SECTION, TWO TRACK NON-BALLASTED, EMBANKMENT DD-ST-901 TYPICAL CABLE TROUGH DETAILS, EMBANKMENT/CUT DD-CO-G014 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, SYSTEMS LOW VOLTAGE MANHOLE AND UNDERGROUND, DUCTBANK PATHWAYS TRENCH DD-CO-G015 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, CABLE TROUGH, CIC, END DEVICE PATHWAYS AT-GRADE DD-ST-100 TYPICAL CROSS SECTION, AERIAL STRUCTURE, TWO TRACK NON-BALLASTED, TYPICAL CONFIGURATION ON TOP OF DECK DD-ST-900 TYPICAL CABLE TROUGH DETAILS , AERIAL STRUCTURE DD-ST-903 TYPICAL CABLE TROUGH DETAIL, AERIAL STRUCTURE, AT OCS POLE DD-ST-120 TYPICAL CROSS SECTION, TWO TRACK TRENCH, OUTSIDE WALKWAY DD-ST-902 CABLE TROUGH DETAILS, TRENCH / CUT AND COVER TUNNEL DD-ST-904 CABLE TROUGH LAYOUT TRANSITION AREAS. AERIAL STRUCTURE / AT-FRADE / CUT & COVER TUNNEL DD-CO-G016 COMMUNICATION TYPICAL DEVICE AND INSTALLATION, CABLE TROUGH, CIC, END DEVICE PATHWAYS AERIAL DD-TN-113 TYPICAL TUNNEL NICHE DETAIL - ATC SIGNALING AND COMMUNICATION SYSTEMS
	3.4.2.4 Air Gaps	
IF 657	A. Interface between SYS COM Air Gap Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS COM air gap requirements have been addressed	DCM [COM] 28.4.1.5 General Communications Systems End-Devices DCM [CLR] 3.4 Vehicle Clearance Envelopes



ID	Interface	Document Reference(s)
	by the INF team.	DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
	3.4.2.5 Dead & Live Loads	
IF 3016	A. Interface between SYS COM System Dead Load Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS COM system dead load requirements have been addressed by the INF team, including but not limited to:</p> <ul style="list-style-type: none"> • Wayside facilities 	DCM [COM] 28.4.1.4 General Communications Systems Physical, Enclosure and Power DCM [COM] 28.4.1.5 General Communications Systems End-Devices DCM [COM] 28.5.2 Communications Interface Cabinets DCM [COM] 28.5.6.2 Aerial Cable Conduits DCM [STR] 12.5.1.1 Dead Load (DC, DW) DCM [STR] 12.5.3.1 Loads and Load Combinations for Design of the Surrounding Area of the Embedded Sleeves of Overhead Contact System Pole Foundation
	3.5 Grounding & Bonding	
	3.5.1 Interfaces with Guideway (excl. Trackwork)	
	3.5.1.1 Systemwide	
IF 4252	A. Interface between SYS Conduit, Duct Bank, Cable Trough & Manhole Requirements G&B Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the SYS conduit, duct bank, cable trough & manhole grounding & bonding requirements have been addressed by the INF team.</p>	DCM [G&B] 22.3 General Grounding and Bonding Requirements DCM [G&B] 22.8.1 General Requirements DCM [G&B] 22.10 Grounding Requirements for Raceway, Cable Tray, Underground Ductbanks, and Structures DCM [G&B] 22.11.1 General DCM [G&B] 22.11.4 Facility Power System and Lighting System DCM [G&B] 22.11.5 Cable Trough and Outside Plant DCM [STR] 12.14.2 Grounding and Bonding
	3.5.1.2 At-Grade	
IF 1141	A. Interface between SYS At-Grade G&B Requirements and GWY Infrastructure	



ID	Interface	Document Reference(s)
	<p><u>Purpose/Scope:</u> Ensures that the SYS at-grade grounding & bonding requirements have been addressed by the INF team.</p>	<p>DCM [G&B] 22.5.12 Fence and Gate Grounding DCM [CIV] 7.8.1.1 Fences DCM [CIV] 7.8.1.5 Gates DD-CV-900 FENCE AND GATE DETAILS</p>
	<p>3.5.1.3 Aerial Structures</p>	
IF 4071	<p>A. Interface between SYS Aerial Structure G&B Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS aerial structure grounding & bonding requirements have been addressed by the INF team.</p>	<p>DCM [G&B] 22.5.3 Grounding and Bonding of Structures - General DCM [G&B] 22.5.4.1 Concrete Structures DCM [G&B] 22.5.4.2 Steel Structures DCM [G&B] 22.5.11 Screen/Noise/Wind/Safety Barriers DCM [STR] 12.14.2 Grounding and Bonding DD-OC-2047 TYPICAL GROUNDING AND BONDING ARRANGEMENT, AERIAL STRUCTURE, 220 MPH SEGMENT</p>
IF 4112	<p>B. Interface between SYS New Overpass Structure G&B Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS new overpass structure grounding & bonding requirements have been addressed by the INF team.</p>	<p>DCM [G&B] 22.5.8 New Overpasses DCM [G&B] 22.5.11 Screen/Noise/Wind/Safety Barriers DCM [G&B] 22.6.3 Overhead Contact System DCM [STR] 12.14.2 Grounding and Bonding DD-OC-2046 TYPICAL GROUNDING AND BONDING ARRANGEMENT, GRADE SEPARATED STRUCTURE, 220 MPH SEGMENT</p>
	<p>3.5.1.4 Trench Structures</p>	
IF 4122	<p>A. Interface between SYS Trench Structure G&B Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS trench structure grounding & bonding requirements have been addressed by the INF team.</p>	<p>DCM [G&B] 22.5.11 Screen/Noise/Wind/Safety Barriers DCM [STR] 12.14.2 Grounding and Bonding DD-OC-2049 GROUNDING AND BONDING ARRANGEMENT, OPEN TRENCH, 220 MPH SEGMENT</p>
IF 5796	<p>B. Interface between SYS Cut & Cover Tunnel Structure G&B Requirements and GWY Infrastructure</p>	
	<p><u>Purpose/Scope:</u> Ensures that the SYS cut & cover tunnel structure grounding & bonding requirements have been addressed by the INF team.</p>	<p>DCM [G&B] 22.5.10 Tunnels DCM [STR] 12.14.2 Grounding and Bonding DD-OC-2048 TYPICAL GROUNDING AND BONDING ARRANGEMENT, CUT</p>



ID	Interface	Document Reference(s)
		AND COVER TUNNEL, 220 MPH SEGMENT
	3.5.1.5 Utilities	
IF 3999	A. Interface between SYS Utility G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS utility grounding & bonding requirements have been addressed by the INF team.	DCM [G&B] 22.3.1 General Facility Grounding DCM [G&B] 22.5.13 Third-Party Grounding Interface DCM [G&B] 22.9 Grounding and Bonding Requirements for Facility Power Systems and Lighting Systems DCM [G&B] 22.12 Grounding and Bonding Requirements for Utilities DCM [UTL] 9.5.4.7 Casings DCM [UTL] 9.5.5.7 Overhead Utilities
	3.5.1.6 External	
IF 4107	A. Interface between SYS Existing Overpass Structure G&B Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the SYS existing overpass structure grounding & bonding requirements have been addressed by the INF team.	DCM [G&B] 22.5.7 Existing Overpasses DCM [G&B] 22.5.11 Screen/Noise/Wind/Safety Barriers DCM [G&B] 22.6.3 Overhead Contact System DCM [STR] 12.14.2 Grounding and Bonding DD-OC-2046 TYPICAL GROUNDING AND BONDING ARRANGEMENT, GRADE SEPARATED STRUCTURE, 220 MPH SEGMENT
	4 Rolling Stock	
	4.1 HST Trainset	
	4.1.1 Interfaces with Guideway (excl. Trackwork)	
	4.1.1.1 Track Alignment	
IF 392	A. Interface between RST HST Trainset Minimum Horizontal Radii Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset minimum horizontal radii requirements have been addressed by the INF team.	10 RST Specs 2.10 Major Dimensions/Attributes DCM [ALG] 4.4.3 Minimum Radii DCM [ALG] 4.14 Access Tracks to Yards and Maintenance Facilities DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.4.3 Effects Due to Curve Radius DCM [CLR] 3.5.1 Effect of Small Radii DCM [CLR] 3.7.2 Appendix 3.B High-Speed Equipment Only, Static Envelope



ID	Interface	Document Reference(s)
		and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
IF 6587	B. Interface between RST HST Trainset Minimum Vertical Radii Requirements and GWY Infrastructure	
IF 489	C. Interface between RST HST Trainset Actual Superelevation Requirements (incl. Tilting) and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset actual superelevation requirements have been addressed by the INF team.	10 RST Specs 2.3 Design of Trains (5-01.2) 10 RST Specs 22.1 Static Gauge and Dynamic Envelopes 10 RST Specs 22.3 Dynamic Envelope (SR5-03.1) DCM [ALG] 4.4.5.2 Actual Superelevation DCM [CLR] 3.3.1 Vertical Clearances DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.4.4 Effects of Superelevation DCM [CLR] 3.5.2 Effect of Superelevation on Track Centers DCM [CLR] 3.7.2 Appendix 3.B High-Speed Equipment Only, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
IF 395	D. Interface between RST HST Trainset Unbalanced Superelevation Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset unbalanced superelevation requirements have been addressed by the INF team.	10 RST Specs 7.10.1 General DCM [ALG] 4.4.5.3 Unbalanced Superelevation
IF 70	E. Interface between RST HST Trainset Maximum Grade Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset maximum grade requirements have been addressed by the INF team.	10 RST Specs 10.6 Maximum Gradients (SR 5-03.6) DCM [ALG] 4.5.1 Maximum Grades
	4.1.1.2 Vehicle Static Gauge & Dynamic Envelope	
IF 490	A. Interface between RST HST Trainset Static Gauge Requirements	



ID	Interface	Document Reference(s)
	and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the RST HST trainset static gauge requirements have been addressed by the INF team.</p>	<p>10 RST Specs 2.3 Design of Trains (5-01.2) 10 RST Specs 2.10 Major Dimensions/Attributes 10 RST Specs 22.1 Static Gauge and Dynamic Envelopes 10 RST Specs 22.2 Static Gauge (SR5-03.1) DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.1 Appendix 3.A High-Speed Equipment Only, Static Envelope and Dynamic Envelope, Tangent Track DCM [CLR] 3.7.2 Appendix 3.B High-Speed Equipment Only, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation</p>
IF 481	B. Interface between RST HST Trainset Dynamic Envelope Requirements and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the RST HST trainset dynamic envelope requirements have been addressed by the INF team.</p>	<p>10 RST Specs 2.3 Design of Trains (5-01.2) 10 RST Specs 22.1 Static Gauge and Dynamic Envelopes 10 RST Specs 22.3 Dynamic Envelope (SR5-03.1) DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.7.1 Appendix 3.A High-Speed Equipment Only, Static Envelope and Dynamic Envelope, Tangent Track DCM [CLR] 3.7.2 Appendix 3.B High-Speed Equipment Only, Static Envelope and Dynamic Envelope Swept Path of Vehicle Rotated for Superelevation</p>
	4.1.1.3 Aerodynamic Effects	
IF 604	A. Interface between RST HST Trainset Aerodynamic Effects and GWY Infrastructure	
	<p><u>Purpose/Scope:</u> Ensures that the RST HST trainset aerodynamic effects have been addressed by the INF team.</p>	<p>10 RST Specs 5.16 Carbody Aerodynamic Provisions 10 RST Specs 5.16.1 Aerodynamic Loads on Track Workers at the Line Side (5-06.3) 10 RST Specs 5.16.3 Pressure Loads in Open Air (5-06.5) 10 RST Specs 5.18 Tables DCM [CIV] 7.8.1.2 Walls DCM [STR] 12.5.2.7 Slipstream Effects (SS) DCM [STR] 12.7.1.7 Slipstream Effects from Passing Trains DCM [STR] 12.8.6.17 Walkways, Parapets, and Sound Walls DCM [STR] 12.8.8 Emergency Access DCM [TUN] 13.1 Scope DCM [TUN] 13.2 Regulations, Codes, Standards, and Guidelines</p>



ID	Interface	Document Reference(s)
		DCM [TUN] 13.3.11 Rolling Stock DCM [TUN] 13.3.12 Aerodynamic Considerations DCM [TUN] 13.4 Tunnel Portals DCM [TUN] 13.4.1 Sonic Booms at Tunnel Portals DCM [TUN] 13.8.6 Aerodynamic forces DCM [TUN] 13.16.2 Noise Mitigation Hood DCM [CLR] 3.4 Vehicle Clearance Envelopes DCM [CLR] 3.5 Track Center Spacing DCM [CLR] 3.7.3 Appendix 3.C High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, Open Section DCM [CLR] 3.7.4 Appendix 3.D High-Speed Equipment Only, Structure Gauge and Fixed Equipment Envelope, In Tunnels
	4.1.1.4 Loads & Forces	
IF 1073	A. Interface between RST HST Trainset Axle Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset axle loads have been addressed by the INF team.	10 RST Specs 2.5 Static Axle Load (5-03.2) DCM [STR] 12.5.2.1 Live Loads (LLP, LLV, LLRR, LLH, LLS) DCM [STR] 12.6.6.1 High Speed Train Loading (LLV) DCM [TUN] 13.9.5 Fatigue Analysis DCM [UTL] 9.5.4.5 Placement
IF 3457	B. Interface between RST HST Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset dynamic train-structure interaction has been addressed by the INF team.	TM 6.1 3.1.1 ANALYSIS DCM [STR] 12.6 Track-Structure Interaction DCM [STR] 12.6.6 Dynamic Structural Analysis DCM [STR] 12.6.6.1 High Speed Train Loading (LLV) DCM [STR] 12.6.7.1 Dynamic Vehicle-Train-Structure Interaction Analysis Requirements DCM [TUN] 13.9.3 Dynamic Analysis
IF 3180	C. Interface between RST HST Trainset Traction & Braking Forces and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset traction and braking forces have been addressed by the INF team.	10 RST Specs 10.4 Mean Acceleration (SR 5-08.1) 10 RST Specs 10.34 Tables 10 RST Specs 11.6 Minimum Braking Performance (5-04.1) 10 RST Specs 11.7 Service Braking Performance (5-04.4)



ID	Interface	Document Reference(s)
		10 RST Specs 11.29 Tables DCM [STR] 12.5.2.4 Traction and Braking Forces (LF) DCM [TUN] 13.9.3 Dynamic Analysis
IF 3185	D. Interface between RST HST Trainset Nosing & Hunting Effects and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset nosing and hunting effects have been addressed by the INF team.	10 RST Specs 7.10.10 Design for Vehicle Stability DCM [STR] 12.5.2.5 Nosing and Hunting Effects (NE)
IF 3227	E. Interface between RST HST Trainset Derailment/Collision Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the RST HST trainset derailment/collision loads have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • HST structures • Trench structures • Other than station & platform structures • Beyond end of track structures 	10 RST Specs 2.5 Static Axle Load (5-03.2) DCM [STR] 12.5.2.13 Derailment Loads (DR) DCM [STR] 12.5.2.14 Collision Loads (CL) DCM [TUN] 13.9 Structural Analysis
	5 Guideway (excl. Trackwork)	
	5.1 Drainage	
	5.1.1 Interfaces with Operations & Maintenance	
	5.1.1.1 Maintenance	
IF 1260	A. Interface between O&M Mol Pump Station Site Access Requirements and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the O&M Mol pump station site access requirements have been addressed by the INF team.	10 Mol CnR Rev 2012-02-11 2 CHST Infrastructure System And Maintainability 10 Mol CnR Rev 2012-02-11 2.5 Structures 10 Mol CnR Rev 2012-02-11 9.4 Right of Way Access DCM [CIV] 7.7.5.1 Parking Facilities for Wayside Facilities DCM [CIV] 7.8.1.5 Gates DCM [CIV] 7.7.1.1 Access Roads DD-CV-901 FENCE AND GATES LOCATIONS DD-CV-900 FENCE AND GATE DETAILS DCM [STR] 12.10.7 Trench Drainage DCM [TUN] 13.15.6 Fencing



ID	Interface	Document Reference(s)
		DCM [TUN] 13.16.4.2 Fixed Facility Power DCM [TUN] 13.16.5 Access Road DCM [TUN] 13.16.21 Parking for Tunnel Maintenance and Traction Power Facility DCM [DRN] 8.6.4 Tunnels DCM [DRN] 8.6.6 Trenches DD-TN-400 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, PLAN DD-TN-401 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE TWIN TUNNEL CONFIGURATION, ELEVATION DD-TN-406 TYPICAL TUNNEL PORTAL FACILITIES-BELOW GRADE, PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES, FOR SINGLE TRACK TWIN BORED TUNNEL, PLAN DD-TN-407 TYPICAL TUNNEL PORTAL FACILITIES-BELOW GRADE, PORTAL ARRANGEMENT SHOWING MAXIMUM FACILITIES, FOR SINGLE TRACK TWIN BORED TUNNEL, FRONT ELEVATION DD-TN-403 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, PLAN DD-TN-404 TYPICAL TUNNEL PORTAL FACILITIES, AT GRADE SINGLE TUNNEL CONFIGURATION, FRONT ELEVATION
	6 External	
	6.1 Amtrak	
	6.1.1 Interfaces with Guideway (excl. Trackwork)	
	6.1.1.1 Vehicle Static Gauge & Dynamic Envelope	
IF 3764	A. Interface between EXT Amtrak Trainset Dynamic Envelope Requirements and GWY Infrastructure	
	Purpose/Scope: Ensures that the EXT Amtrak trainset dynamic envelope requirements have been addressed by the INF team.	DCM [CLR] 3.1 Scope DCM [CLR] 3.4 Vehicle Clearance Envelopes
	6.1.1.2 Loads & Forces	
IF 3706	A. Interface between EXT Amtrak Trainset Axle Loads and GWY Infrastructure	
	Purpose/Scope: Ensures that the EXT Amtrak trainset axle loads have been addressed	DCM [STR] 12.5.2.1 Live Loads (LLP, LLV, LLRR, LLH, LLS) DCM [STR] 12.5.2.1.5 Amtrak Live Loads



ID	Interface	Document Reference(s)
	by the INF team.	DCM [UTL] 9.5.4.5 Placement
IF 3683	B. Interface between EXT Amtrak Trainset Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT Amtrak trainset dynamic train-structure interaction has been addressed by the INF team.	DCM [STR] 12.6 Track-Structure Interaction DCM [STR] 12.6.8 Modeling Requirements
IF 3537	C. Interface between EXT Amtrak Trainset Derailment/Collision Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT Amtrak trainset derailment/collision loads have been addressed by the INF team, including but not limited to: <ul style="list-style-type: none"> • HST structures • Trench structures 	DCM [STR] 12.5.2.13 Derailment Loads (DR) DCM [STR] 12.5.2.13.2 Track Side Containment DCM [STR] 12.5.2.14 Collision Loads (CL)
	6.2 Construction Equipment	
	6.2.1 Interfaces with Guideway (excl. Trackwork)	
	6.2.1.1 Loads & Forces	
IF 3701	A. Interface between EXT Construction Equipment Axle Loads and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT construction equipment axle loads have been addressed by the INF team.	DCM [STR] 12.4.1 Structural Design Parameters DCM [STR] 12.5.2.1 Live Loads (LLP, LLV, LLRR, LLH, LLS) DCM [STR] 12.5.2.1.4 Maintenance and Construction Train Live Loads: Cooper E-50 Loading (LLRR) DCM [STR] 12.5.3.3 Construction Loads and Temporary Structures DCM [STR] 12.8.5.3 Crack Control DCM [UTL] 9.5.4.5 Placement
IF 3673	B. Interface between EXT Construction Equipment Dynamic Train-Structure Interaction Analysis and GWY Infrastructure	
	<u>Purpose/Scope:</u> Ensures that the EXT construction equipment dynamic train-structure interaction has been addressed by the INF team.	DCM [STR] 12.6 Track-Structure Interaction DCM [STR] 12.6.8 Modeling Requirements

