

California High-Speed Rail Authority



RFP No.: HSR 13-57

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

**Book IV, Part E.3
Design Variance Request Procedure**

04/02/2014 - RFP NO. : HSR 13-57

California High-Speed Rail Program



TECHNICAL MEMORANDUM

Design Variance Guidelines TM 1.1.18

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ABSTRACT

This Technical Memorandum (TM) establishes a procedure for identifying, preparing, requesting, and documenting a design variance from mandatory requirements established for the California High Speed Rail Program (CHSRP). It is intended to provide clear guidance for preparing a clear and concise record of the relevant design standard or other mandatory requirement, proposed variance and rationale, assessment, review and key decisions leading to the approval of the variance. This process is to be used through the design and delivery of the project.

This TM also defines the roles and responsibilities associated with the requirements in requesting, approving and documenting the project's design variances. Forms for use in preparing, submitting and documenting design variance requests are included as appendices.

The process for obtaining design variances from the third parties shall be followed according to the established procedures defined by those third party entities. Evidence of third party approval of these design exceptions shall be provided to the Authority upon approval by the third party but no later than the Ready for Construction (RFC) submittal.



1.0 INTRODUCTION

1.1 PURPOSE

This memorandum provides background information, defines the requirements and establishes the procedure by which designers may request and obtain approval to deviate from mandatory requirements established for the preliminary engineering of CHSRP and established in the contract documents for later design phases. It is intended to provide guidance for preparing a clear and concise record of the relevant design standard or other mandatory requirement, proposed variance and rationale, assessment, review and key decisions leading to the approval or rejection of the variance.

The process for obtaining design variances from the third parties shall be followed according to the established procedures defined by those third party entities. Evidence of third party approval of these design exceptions shall be provided to the Authority upon approval by the third party but no later than the RFC submittal.

1.2 GENERAL

Applicability: CHSRP TM and design manual typically include minimum/maximum limits. Design variances are required for design elements that do not fall within the defined minimum/maximum limits.

Justification: Typical justification for design variances includes avoidance of existing physical impediments or substantial environmental or economic impacts that would severely affect project cost and implementation. Such considerations may include existing residential, commercial or industrial establishments; costly right of way acquisition; issues with safety, security, and liability; operational performance/reliability, noise and vibration impacts; adverse terrain, and environmental impacts.

Mitigation: Where design does not fall within minimum/maximum limits, proposed alternate designs must be clearly identified with mitigations that achieve an acceptable level of safety and security, and support system goals for operational reliability, availability, and maintainability. The Authority goal of providing safe and reliable high-speed intercity train operations shall be considered when reviewing design variances from the established design criteria.

1.2.1 Definition of Terms

The following technical terms and acronyms used in this document are defined with regard to the program.

<u>Authority's Representative</u>	An entity within the Authority's team responsible for program management. This includes the Authority, Program Management Team (PMT), Project and Construction Management (PCM) consultant.
<u>Designer</u>	The term "designer" as used herein shall be understood to mean the entity responsible for design as part of a preliminary engineering team or the design-build Contractor. Generally, "designer" is the entity requesting a design variance.
Recommended	Standard to be equaled or exceeded where there are no major physical, cost or schedule constraints. Designers should use 'recommended' values to the extent practical.



Minimum/Maximum Represent limits. Designers shall make every effort to avoid the use of minimum/maximum values. These values are acceptable where constraints make the use of 'recommended' values impracticable

Non-Standard Design feature that does not meet minimum criteria.

Variance Deviation, or exception, from a CHSRP minimum design criteria or minimum design standard.

Acronyms

AREMA	American Railway Engineering and Maintenance of Way Association
Authority	California High-Speed Rail Authority
CFR	Code of Federal Regulations
CHSRP	California High-Speed Rail Program
CPUC	California Public Utilities Commission
DVR	Design Variance Request
FRA	Federal Railroad Administration
GP	General Provisions
PCM	Project and Construction Management consultant
PMIS	Program Management Information System
PMT	Program Management Team
RFC	Ready For Construction
TM	Technical Memoranda
VE	Value Engineering
V&V	Verification and Validation

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2.0 DEFINITION OF TECHNICAL TOPIC

2.1 GENERAL

Where applicable, preliminary engineering design shall follow the guidelines described in the applicable TM and design under design-build contracts shall follow the CHSRP design criteria and other contract requirements. These design standards were developed specifically for the construction and operation of high-speed railways and are based on international best practices. Additionally, local building, planning and zoning codes and standards must be met.

In the case of differing values, conflicts in the various design requirements, or discrepancies in the application of design guidelines, the standard followed shall be that which results in the highest level of satisfaction for all requirements. Refer to the CHSRP design criteria for more detailed description of resolution of conflicts among requirements.

In the unlikely possibility that the design in question does not fall under the jurisdiction of any referenced standard, the most appropriate requirement or standard will be established by the Authority. All standards shall be followed as required to ensure public safety and to secure regulatory approvals.

2.2 LAWS AND CODES

The following applies to preliminary engineering: Criteria for design elements not specific to high-speed train operation will be governed by existing applicable standards, laws and codes. Applicable local building, planning and zoning codes and laws are to be reviewed for the stations, particularly those located within multiple municipal jurisdictions, state rights-of-way, and/or unincorporated jurisdictions.

In the case of differing values, the standard followed shall be that which results in the satisfaction of all applicable requirements. In the case of conflicts, documentation for the conflicting standard is to be prepared and approval is to be secured as required by the affected agency for which an exception is required, whether it be an exception to the CHSRP standards or another agency standards.

In regard to design-build contracts, laws and codes shall be those established in the contract documents.



3.0 ASSESSMENT / ANALYSIS

3.1 DESIGN VARIANCE REQUEST PROCESS

The design variance request process is comprised of the following steps:

- Early identification of potential variances
- Preliminary assessment of variances to confirm feasibility and identify potential mitigations
- Variance request preparation and documentation
- Variance review and analysis of potential impacts
- Approval or rejection of variance
- Distribution or publication of the approved or rejected variance to all stakeholders
- Document control and feedback loop to design standards development

See the Design Variance Process Diagram further in this section.

3.1.1 Early Identification

The designer shall identify non-standard design elements that require variances early in the design process and submit an inventory of non-standard design elements for review. Additionally, this inventory shall include design elements that do not meet municipality or local third party codes and standards. If the Authority's representative agrees that a potential variance warrants consideration, the designer shall investigate the feasibility of alternate design solutions and assess the implications associated with the potential design variance.

3.1.2 Preliminary Investigation

The initial investigation shall include the identification of all impacted systems, safety, operations and maintenance factors, in terms of affected scope, cost, and schedule by introducing a design that does not fall within the minimum/maximum limits. Affected systems include but are not limited to engineering, train operations, maintenance, right of way, cost considerations, financial impacts to businesses and industry (including railroads), traffic impacts, and other physical impediments such as natural terrain and issues related to environmental concerns. The specific location(s) where a potential design variance would be introduced shall be clearly identified as part of the initial investigation.

The initial investigation shall also include the identification of variances against third party and local building, planning and zoning codes and standards for impacted municipal facilities. Impacts facilities include but are not limited to roadways, overcrossings, and utilities.

Early identification and discussion with the Authority's representative regarding the design variance is recommended; especially in cases where the design concept and/or project cost is dependent on the design variance. When a design variance has substantive impact to the project cost, a range order of magnitude estimate must be included with the design variance proposal. In some instances under design-build contracts, design variance requests which involve cost savings may trigger Value Engineering (VE) provisions of the General Provisions (GP).

3.1.3 Variance Request Preparation and Documentation

The designer is responsible for preparing the necessary documentation that allows for a suitable review of the variance request. The designer expands on any prior investigation from Section



3.1.2, prepares appropriate qualitative and/or quantitative analysis of the impact of the variance. The assessment may include a recommendation as to the course of action.

The designer is required to complete a Design Variance Request Form that summarizes essential information regarding the design variance. The submittal of the Design Variance Request Form shall include all relevant supporting documentation.

The designer is required to address all outstanding comments from the Authority's representative. Should comments result in revisions to the variance request, those revisions must be reflected throughout the standard submittal forms and clearly marked as a new revision. Revisions shall be submitted formally with a new revision number.

3.1.4 Review and Assessment of Potential Impacts

The Authority's representative will review variance request documentation and return comments for resolution. Only those non-standard design elements that were previously identified and associated with a variance request and that resolve all comments shall proceed to the stage of a formal request for Authority approval. The Authority representative's review process is to be completed on a timely basis to keep the program on schedule.

Note: If the same design exception occurs in multiple locations and the justification and mitigations are identical, one Design Variance Request may be submitted for multiple locations with the recurring locations identified.

Each variance will have unique identifiers and will reference the same design criteria sections. If more than one criterion is exceeded, all criteria must be identified as separate variance requests.

Non-standard features identified after the approval of a design variance shall require preparation of an amendment to the original Design Variance Request or submittal of a new Design Variance Request for approval.

Relevant design variances from third party and local building, planning and zoning codes and standards for impacted municipal facilities must be obtained and referenced by the designer.

3.1.4.1 Obtaining Required Regulatory Approvals

All design variance requests shall meet applicable Code of Federal Regulation (CFR) and California Public Utilities Commission (CPUC) General Orders. The Federal Railroad Administration (FRA) will be informed of design variances that impact the program's regulatory requirements.

Relevant design variances from third party and local building, planning and zoning codes and standards for impacted municipal facilities must be obtained and referenced by the designer.

3.1.5 Approval or Rejection of Variance

The following flow chart demonstrates the process by which an appropriate design variance becomes approved.



Some design variance requests will be returned to the initiator with instruction to revise the submittal. These changes must be made to address all review comments and then resubmitted with a new revision number.

During technical review, the design variance request will be assessed by the appropriate technical experts and their dispositions recorded as one of the following options:

- Support
- Do Not Support
- Return for Revision

Support. Confirms the reviewer's support with no exceptions taken. The variance advances according to procedure.

Do Not Support. Confirms the reviewer's disapproval of the proposed design variance. The Variance is returned to its initiator with comments explaining reason for disapproval.

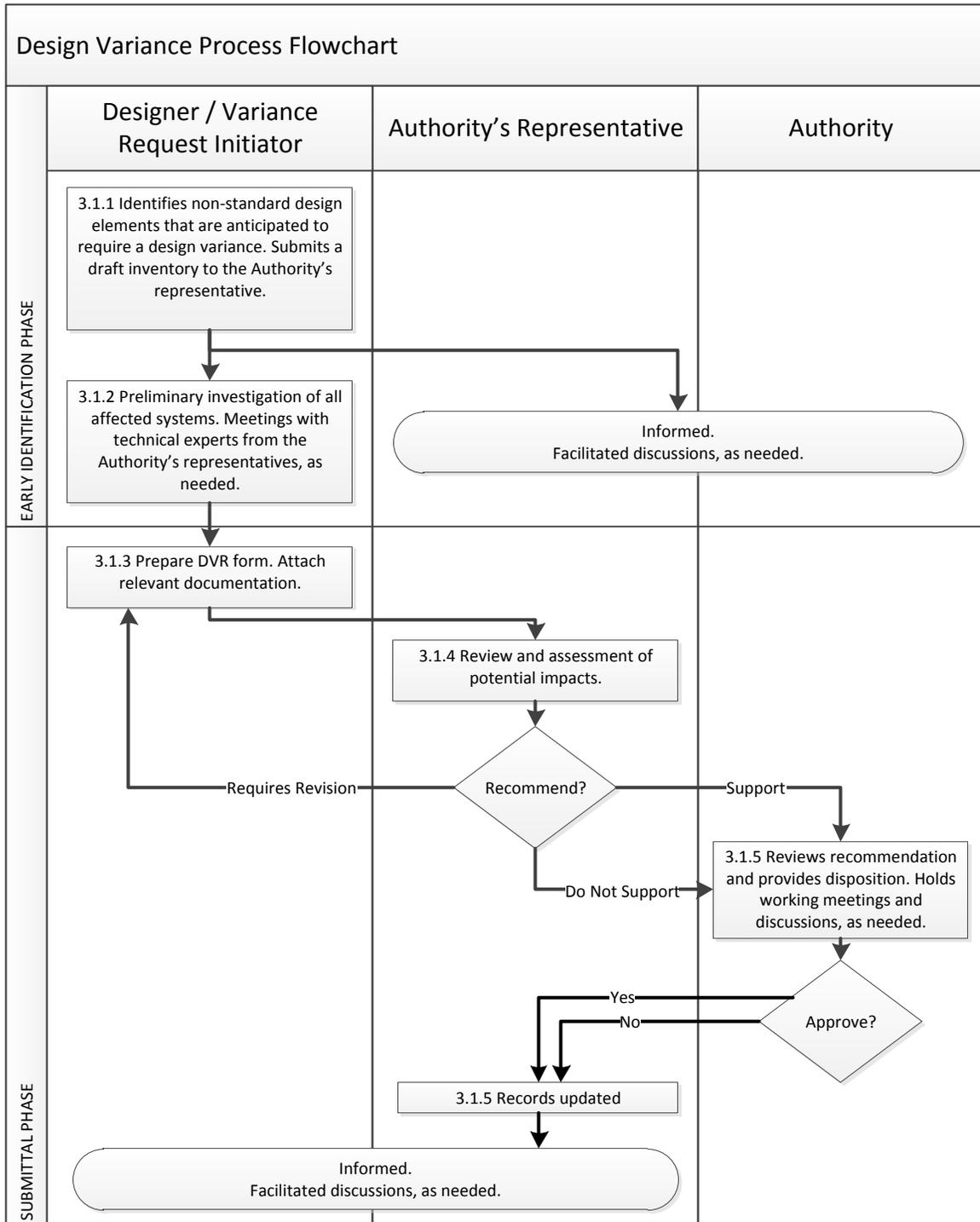
Return for Revision. The variance reviewer does not agree with the proposed variance as transmitted or there is not enough information provided to properly review the variance request. The reviewer will provide comments that identify one or many critical exceptions. A critical exception demonstrates that the proposed design variance does not consider that an approval of the variance, as is, would have one or several significant impacts to cost, schedule, safety, or functionality. The reviewer will also provide recommendations to resolve any exceptions taken. This option involves another review cycle after revision of the design variance by all reviewers with the "return for revision" disposition."

Dispositions that result from technical review will be recorded on the integrated Program Management Information System (PMIS) using a workflow tool that produces organized and auditable records of the comments and comment resolution.

At the conclusion of the technical review, variances will be submitted to the Authority with a recommendation to approve or reject. The Authority then provides its disposition. The Authority's representative will facilitate working meetings and discussions, as needed.



3.1.6 Design Variance Process Flowchart



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3.1.7 Change Management and Design Variances

Design variance requests with significant impact to the overall program scope, schedule, and/or budget are considered to be configuration changes and are evaluated against the established baseline. This review occurs concurrently with the technical evaluation of the design variance and may require additional approval by the Authority.¹

Design variance requests with impact to a related contract scope, price, or schedule may result in a change order.²

3.1.8 Distribution of Approved or Rejected Variances to Stakeholders

All approved or rejected design variance requests will be stored on a SharePoint database, an element of PMIS, for official record. Email notifications of formal approvals or rejections and links to the approved variances will be distributed to the all relevant agencies and authorities. The database will also have export or printing functions capable of reporting current status of one or several variances so that all relevant members of the Authority's team and stakeholders may remain updated and informed of the decisions made and the rationale behind each variance.

3.1.9 Document Control and Feedback to Design Standards Development

As design variances are approved, the approval notifications from PMIS will be distributed to the Authority's representatives to trigger feedback which may result in updates to the critical design documents for the program. These documents include but are not limited to:

Design Requirement Documents

- Contract General Provisions
- Contract Special Provisions
- Design Criteria
- Interface documents

Drawings and Specifications

- Affected Design Drawings
- Directive Drawings
- Standard Drawings
- Standard Specifications

Program Management Documents

- Program Cost Estimate
- Program Schedule
- System Safety Plan
- Risk Register
- Systems Interface Manual

¹ See Program-Level Configuration Management Plan

² See Design-Build Contract Change Order Procedure



Timely circulation of these design variances will allow for a high level of coordination within the Authority's team and with external stakeholders.

3.1.10 Validation & Verification

Documented design variances will also support the implementation of the Validation and Verification (V&V) process. When verifying the design-build contractor's conformance to the project's established criteria, the Authority's representative team responsible for V&V will utilize all archived variances as backup documentation to address potential disconnects that arise from identified deviations as part of the V&V process.

3.2 ROLES AND RESPONSIBILITIES

Responsibilities defined in this section will be performed by a person in responsible charge.

Initiator of Design Variances

(I.e. regional consultants, third-party designers, design-build contractors)

- Application of appropriate design standards and other contract requirements
- Early identification of non-standard design features
- Communication of non-standard design elements to the Authority's representative
- Assessment of impacted interfaces
- Assessment of alternative design solutions or appropriate mitigations
- Assessment of related prior design variance approvals, if any.
- Coordination with stakeholder, permitting, operating, and other affected agencies
- Determination of sufficient justification to warrant a variance
- Preparation and transmittal of the variance request to the Authority's representative
- Response and resolution of comments from technical reviews
- Preparation and transmittal of required documentation
- Design variance implementation

Authority's Representative (i.e. PMT or PCM)

- Identification of non-standard design features
- Review of the design variance request
- Discussion of variance with Authority staff, as appropriate
- Provide review comments
- Support or non-support of design variance requests
- Distribution of design variance approvals or rejections
- Coordination of design variance impacts to design documents
- Coordination with impacted program functions (i.e. risk, project controls)
- Archival of appropriate documentation



3.3 DOCUMENTATION

The section describes the required documentation related to design variance requests.

3.3.1 Design Variance Request Form

The Design Variance Request (DVR) form is a standard form issued by the Authority's representative to be utilized across all project segments. The DVR tracks the dates of draft and final versions of the request, the number of the request (generated in a sequential manner), name of the originator requesting, name of Authority contract, Authority contract number, the specific variance requested and why, a clear reference or link to the design criteria being impacted, the major design elements (i.e., rail, structures, right of way, utility, environmental) that may be impacted and supporting documentation.

3.3.2 Required Data

Each DVR shall include the following information:

- Identification of variance with regard to the minimum/maximum limits.
- Description of the specific design element and the applicable criteria, i.e. design criteria.
- Rationale and justification for the request and the location(s and/or length) where the variance may be applied.
- Seal and signature of an engineer licensed in California.

DVRs that omit the above items will be returned to the initiator.

3.3.3 Supporting Documentation

The initiator shall provide appropriate and specific documentation that allows for review, assessment, concurrence and approval of the DVR. In addition to the DVR, additional information may consist of but is not limited to:

- Supporting drawings, and/or details
- Calculations, risk assessments, cost estimates and corresponding mitigations
- Assessment of impacts to environmental, constructability, etc.
- When applicable, recommendation on proper documentation of the variance in related or follow-on contract procurement documents



4.0 SUMMARY AND RECOMMENDATIONS

The following section lists the guidelines for preparing a DVR.

Features Requiring an Exception

A. Non-standard Features:

Describe the proposed non-standard feature(s) and reference plans, typical sections and/or sketches. If several non-standard features are proposed, reference a table summarizing the location and nature of the non-standard elements.

B. Standard for Which Variance Is Requested:

Reference the TM, design criteria section, mandatory standard specifications provision, and topic and tables that apply. It is not necessary to restate the entire design standard or other mandatory requirement; only state the portion that applies to the exception request

C. Reason for Requesting Variance:

Avoid open-ended statements. Clearly explain why the standards cannot be followed and what measures, if any, could be taken to mitigate impacts.

- Limitations in project scope are generally not appropriate reasons for exception from a design standard.
- The cost of providing a full standard design may be a supportive factor for approving a non-standard feature, particularly if this cost is generated by an impact such as right of way purchases or environmental mitigation.
- Project schedule should not typically be used as a reason to justify a non-standard feature but can be used as a supportive factor in terms of delay of benefits.

D. Potential Mitigations:

Identify potential and reasonable mitigations to achieve an acceptable level of safety and security, or to achieve operational reliability, availability, or maintainability goals. Commitments to implementing potential mitigations are generally not appropriate for inclusion. Mitigations may not be an operational rule, such as a speed restriction at the location of the non-standard feature. The DVR process is specifically established for "design" features and not exceptions to either operations or maintenance standards. If an operational or maintenance procedure is the resulting mitigation for the design variance, this operational restriction must be communicated to the Authority and included in relevant operations and maintenance procedures and contract documents. Reference to this procedure or restriction shall be made in the DVR.

E. Requirements/Estimated Cost to Make Standard:

Provide a reasonable cost estimate summary required to achieve design within the minimum/maximum limits and summary for the design proposed in the DVR for each element for which an exception is requested. Costs should be presented by major cost elements (i.e., rail, structures, right of way, utility, environmental).



Reviews

List the people/agencies that have reviewed and commented on the design exception. Include his/her title, the design exception he/she reviewed and the date of review or concurrence.

Form

DVR form is a stand-alone document and must contain exhibits and drawings that show proposed non-standard features.

5.0 SOURCE INFORMATION AND REFERENCES

1. Manual for Railway Engineering of the American Railway Engineering and Maintenance of Way Association (AREMA Manual)
2. Federal Railroad Administration Code of Federal Regulations (CFR)
3. California Department of Transportation, Manuals and Standards, in particular the following documents:
 - Highway Design Manual, Chapter 80: Application of Design Standards (September 1, 2006)
 - Project Development Procedures Manual, Chapter 21: Exceptions to Design Standards (July 1, 1999)
4. California Public Utilities Commission General Orders
5. Design-Build Contract Change Order Procedure
6. Program-Level Configuration Management Plan and Procedure



6.0 DESIGN CRITERIA

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7.0 APPENDICES

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7.1 DESIGN VARIANCE REQUEST FORM

CALIFORNIA HIGH-SPEED RAIL PROGRAM
DESIGN VARIANCE REQUEST FORM



DVR NO:

DVR TITLE:

Prepared by: Firm:

CONCURRENCE

Supported by: Firm:

System-Level Review

Railroad Systems	<input type="checkbox"/> Support <input type="checkbox"/> Do Not Support	Infrastructure	<input type="checkbox"/> Support <input type="checkbox"/> Do Not Support
Operations/ Maintenance/ Safety	<input type="checkbox"/> Support <input type="checkbox"/> Do Not Support	Rolling Stock	<input type="checkbox"/> Support <input type="checkbox"/> Do Not Support
Systems Integration	<input type="checkbox"/> Support <input type="checkbox"/> Do Not Support	Engineering Manager	<input type="checkbox"/> Support <input type="checkbox"/> Do Not Support

APPROVAL

Authority action: Approve Reject

Name: Title:

Signature: Date:

NOTES

Additional comments:

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PART 1 - DVR GENERAL INFORMATION

DVR No.: Rev.:

DVR Title:

Contract No.:

Design Drawing Reference(s):

Engineering Seal

(Engineering Seal)

Name: Firm:

Signature: Date:

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PART 2 - DVR REQUIREMENTS

CHSRP Design Requirement:

Design Criteria Requiring a Variance:

Reason for Requesting Variance:

Justification for Variance:

Proposed Alternative Design Requirement

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PART 3 - DVR IMPACT ANALYSIS

Operations

--

Maintenance

--

Infrastructure

--

Railroad Systems

--

Reliability/
Functionality

--

Third Party

--

Safety & Security

--

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Direct Cost

Other

PART 4 - MITIGATION MEASURES

Mitigations

PART 5 - LIST OF DVR SUPPORTING DOCUMENTATION

Detailed Analysis

Publications/
Standards Extract

Risk Assessment

Cost Estimate

Drawings

Calculations

Expert Testimonial

Correspondence

Other

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