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.2
Design Variance Request Procedure

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

California High-Speed Rail Program

TECHNICAL MEMORANDUM

Design Variance Guidelines
TM 1.1.18

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

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Note: Signatures apply for the latest technical memorandum revision as noted above.

Prepared by PB

for the California High-Speed Rail Authority

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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, reviewing 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 third parties shall be followed according to the procedures established by the appropriate third party. Evidence of approval of the design exceptions shall be provided to the Authority.

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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 decisions leading to the approval or rejection of the variance.

The process for obtaining design variances from third parties shall be followed according to the procedures established by the appropriate third party. Evidence of approval of the design exceptions shall be provided to the Authority.

1.2 GENERAL

Applicability: Technical Memoranda and design criteria generally include minimum or maximum (limiting) values. Design variances are required for design elements that do not achieve the defined minimum/maximum limits.

Justification: Typical justification for design variances includes substantial environmental or economic impacts that would severely affect project cost and implementation.

Mitigation: Where a design does not achieve the minimum/maximum criteria, proposed alternate designs shall be clearly identified and analysed along with mitigations that may be required to achieve an acceptable level of safety and security, and support system goals for operational reliability, availability, and maintainability. The Authority's goal of providing safe and reliable high-speed train operations shall be considered when requesting variances from established criteria.

1.2.1 Definition of Terms

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

Authority's representative	Qualified personnel acting at the Authority's direction, including the Program Management Team (PMT).
Designer	The term "designer" as used herein shall be understood to mean the entity responsible for preliminary design or final design. Generally, the "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	Represents limiting criteria. 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

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Authority	California High-Speed Rail Authority
CHSRP	California High-Speed Rail Program
DVR	Design Variance Request
PMIS	Program Management Information System
PMT	Program Management Team
RFC	Ready For Construction
TM	Technical Memorandum
VE	Value Engineering
V&V	Verification and Validation

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2.0 DEFINITION OF TECHNICAL TOPIC

2.1 GENERAL

Where applicable, preliminary design shall follow the guidelines described in the applicable technical memoranda, and final design under design-build contracts shall follow the CHSRP design criteria and other contract requirements. These design standards were developed specifically for the design, 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.

2.2 LAWS AND CODES

Criteria for preliminary 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.

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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 that may be required
- 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
- Document control and feedback loop to design standards development

See the Design Variance Process Diagram in Section 3.1.6.

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 and third party codes and standards. 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 criteria 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 include the identification of variances against third party and building, planning and zoning codes and standards for impacted municipal facilities. Facilities include but are not limited to roadways, overcrossings, and utilities.

Early identification and discussion with the Authority's representative regarding the potential 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 a substantive cost, an order of magnitude estimate shall be included with the design variance request. Design variance requests that involve cost reductions may initiate Value Engineering (VE) provisions.

3.1.3 Variance Request Preparation and Documentation

The designer is responsible for preparing the necessary documentation that allows for a thorough review of the variance request. The designer shall expand on prior investigations and prepare appropriate qualitative and/or quantitative analysis of the impact of the variance. The assessment may include a recommended course of action.

The designer shall 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.

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

Design Variances requested during the preliminary engineering phase require approval prior to submittal of the Preliminary Engineering for Procurement record plan set. Design Variances requested during final design require approval prior to the Ready for Construction (RFC) submittal.

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 associated with a variance request, processed as described in the previous sections, and that resolve comments shall proceed to the stage of a formal request for Authority approval. The Authority representative's review is to be completed in a timely basis.

If a similar design exception occurs in multiple locations and the justification and mitigations are identical, one Design Variance Request may be submitted for multiple locations with each of 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 shall 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.

Design variances requested from third party and building, planning and zoning codes and standards for impacted municipal facilities shall be obtained by the designer. Evidence of approval of the design exceptions shall be provided to the Authority no later than the RFC submittal.

3.1.5 Approval or Rejection of Variance

The following flow chart demonstrates the process by which an appropriate design variance is prepared, reviewed and approved.

During review, the design variance request will be assessed by the appropriate technical reviewers 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. Reviewer comments explaining reason for disapproval are recorded.

Return for Revision. The variance reviewer does not concur with the proposed variance as transmitted or there is insufficient information 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 significant impact to cost, schedule, safety, or functionality. This

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involves another review cycle after revision of the design variance by all reviewers with the “return for revision” disposition.

Design variance requests may be returned to the initiator with instruction to revise the submittal. Revisions shall be made to address all comments and the variance request shall be resubmitted with a new revision number.

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 review, variances will be submitted to the Authority Chief Program Manager with a recommendation to approve or reject. The Authority Chief Program Manager then provides their disposition. The Authority’s representative will facilitate working meetings and discussions, as needed.

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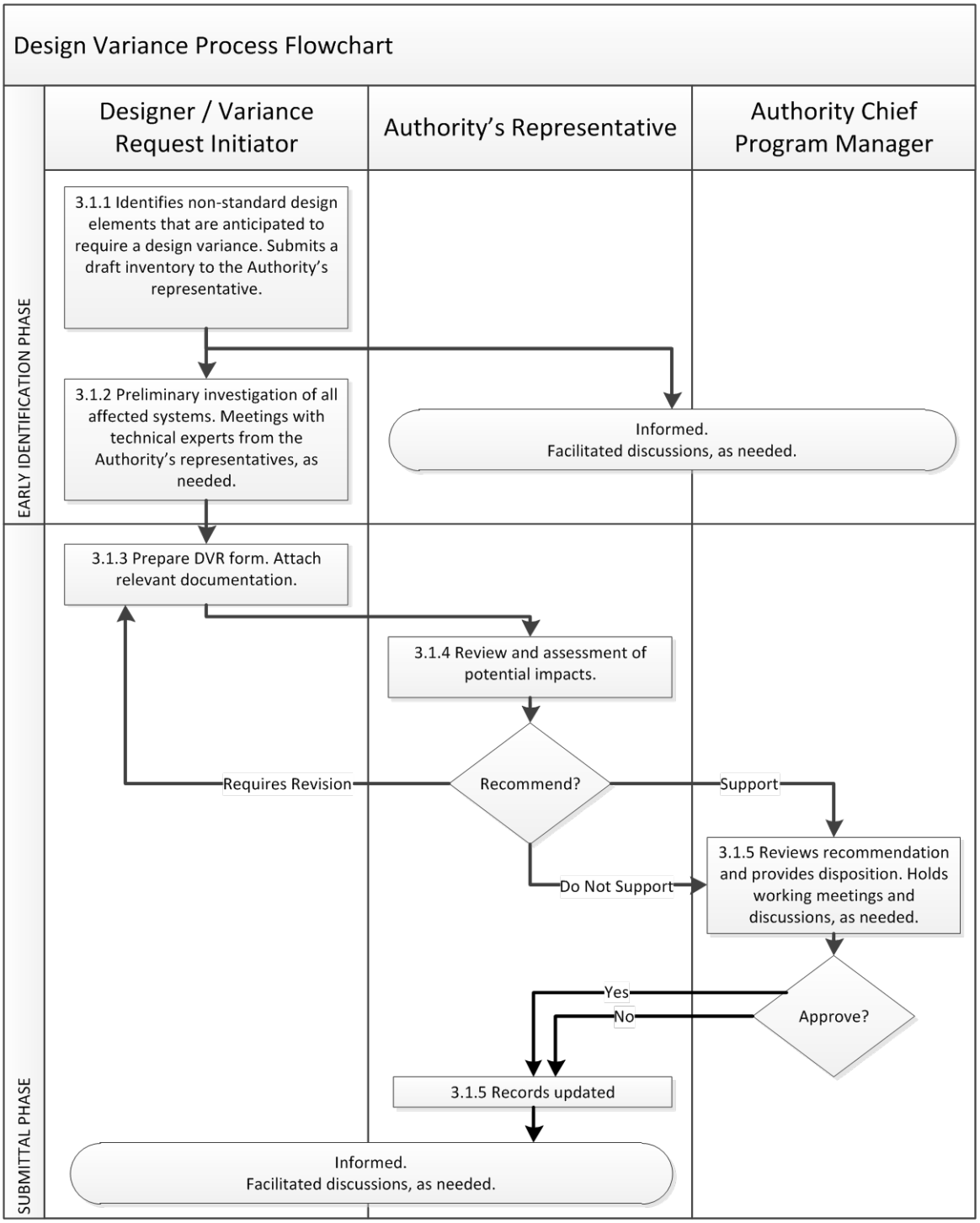
3.1.6 Design Variance Process Flowchart



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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. See the Program-level Configuration Management Plan.

Design variance requests that affect contract scope, price, or schedule may result in a contract change order. See the Design-Build Contract Change Order Procedure.

3.1.8 Retention of Approved and Rejected Variances

Approved and rejected design variance requests will be stored on a SharePoint database, an element of PMIS, for official record.

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 representative to allow feedback that may result in updates to the program's contract documents. These documents include but are not limited to:

Design Requirement Documents

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

Drawings and Specifications

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

Program Management Documents

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

Timely notification of approved design variances will allow for coordination within the Authority's team and with external stakeholders.

3.1.10 Verification and Validation

Documented design variances will support the implementation of the Verification and Validation (V&V) process. When verifying the design-build contractor's conformance to the project's established criteria, the Authority's representative responsible for V&V will utilize archived variances as part of the V&V process.

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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., Authority, PMT)

- 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 revisions to design criteria, as appropriate
- Coordination with impacted program functions (i.e., risk management, project controls)
- Archival of appropriate documentation

Authority Chief Program Manager

- Inform appropriate Authority staff, as needed
- Approval / rejection of proposed design variances

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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 issued by the Authority's representative to be utilized across the project geographic segments. The DVR tracks the date of the final version of the request, the number of the request (generated in a sequential manner), name of the originator requesting, Authority contract number, the specific variance requested and why, a clear reference or link to the design criteria being impacted, the major design areas (i.e., operations, maintenance, infrastructure, railroad systems, safety, security, etc.) that may be impacted by the request, 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. Appropriate supporting 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

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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, 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 standard cannot be achieved and what measures, if any, could be taken to mitigate adverse impacts that may result from a design that does not achieve the standard.

- Limitations in project scope are generally not appropriate reasons for exception from a design standard.
- The cost of providing a 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 acquisition 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. 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 variance request in PMIS. Include his/her title, the design exception he/she reviewed and the date of review or disposition.

Form

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

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5.0 SOURCE INFORMATION AND REFERENCES

1. Design-Build Contract Change Order Procedure
2. Program-Level Configuration Management Plan and Procedure

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6.0 DESIGN CRITERIA

Not applicable

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7.0 APPENDICES

7.1 DESIGN VARIANCE REQUEST FORM

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CALIFORNIA HIGH-SPEED RAIL PROGRAM
DESIGN VARIANCE REQUEST

DVR No: _____ **DVR Title:** _____

Prepared by: _____ Firm: _____

Review

Supported by: _____ Firm: _____

PMT System-Level Review

Infrastructure	☐Support DVR ☐Do Not Support	Railroad Systems	☐Support DVR ☐Do Not Support
Operations & Maintenance	☐Support DVR ☐Do Not Support	Rolling Stock	☐Support DVR ☐Do Not Support
Systems Integration	☐Support DVR ☐Do Not Support	Safety & Security	☐Support DVR ☐Do Not Support
Engineering Manager	☐Support DVR ☐Do Not Support	Criteria Classification:	Choose an item.

PMT Engineering Manager Recommendation	
PCM DB Oversight Manager Recommendation	
CHSRA Design & Construction Mgr. Recommendation	
CHSRA Engineering Mgr. Recommendation	
DVR Committee Recommendation*	

Approval

Authority Action: ☐Approve ☐Reject

Name: _____ Title: _____

Signature: _____ Date: _____

* (Ad hoc group to meet as necessary)

Approval Cover

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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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Cost Impact	☐ Yes, amount unknown	☐ None
	☐ $100k or less	☐ $100k to $500k
	☐ $500k to $1M	☐ $1M to $5M
	☐ $5M to $10M	☐ More than $10M
Explanation of cost impact		
Schedule Impact		
Other		

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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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