

REQUIREMENTS FOR SEISMIC DESIGN SUMMARY REPORTS

March 2019

Except SDC A and single span bridges which do not require detailed seismic analysis, seismic summary reports shall be submitted along with bridge plans as stated here in. The structure engineer shall sign and seal the final seismic summary reports. The seismic summary reports are required for both in-house engineers and consultants.

The Design engineer shall include with the preliminary bridge plans submittal a preliminary seismic design summary report for the bridge documenting the strategy that will be used to achieve the required seismic performance criteria for the bridge. The report shall describe the seismic design approach for the bridge and shall include, at a minimum, the following information:

- a description of the project including bridge location(Longitude and Latitude),the geological and hydrological feature of the site, bridge preliminary configuration including layout, superstructure, substructure, bearing types, span lengths, end bent and interior bent type, skew angle, shear keys, expansion joints, wing walls, backwalls, shear walls etc,
- The seismic design specifications,
- The SEE,FEE Design Earthquakes, The ADRS data, the Operational classification, the Seismic Design Category (SDC),
- The analysis strategy to capture the structure seismic performance, including seismic models to be analyzed, how structure elements are going to be modeled,
- the expected performance of the bridge in regard to elastic and inelastic behavior (locations where plastic hinging is expected), the expected service performance and damage levels,
- ductility criteria, according to the SCDOT Seismic Design Specifications for Highway Bridges,
- the name(s) of computer software that will be used for modeling,
- any unique structural and geotechnical issues affecting the seismic design,
- The design response spectrum.

The Designer shall submit a final seismic design summary report for the bridge with the final bridge plans submittal and shall include, at a minimum, the following information:

- a project description, including any changes since preliminary design submittal,
- the Seismic Design Specifications,
- seismic design criteria and objectives, including Operational Classification, design earthquake(s), ADRS, and SDC,
- Objectives of service performance and damage levels,
- seismic design approach and strategy to achieve the required seismic performance; including seismic load path, potential plastic hinge locations, any unique aspects of the project, and seismic modeling performed,
- Soil shear strength loss(SSL) assessment and any other geotechnical hazard
- seismic analysis/design software used in the project (include discussions regarding the structural and geotechnical modeling aspects for the bridge),
- mass participation achieved, longitudinal and transverse fundamental periods,
- tabulated and graphed results from the design earthquake(s), tension and compression models, pushover models as applicable for variations of SSL and scour if applicable including:
 - displacement demand vs. displacement capacity
 - yield displacement
 - ductility demand check
 - ductility capacity check
- seismic detailing, including design of cap support length, hinge region detailing, shear keys, anchor bolts, bearings, wing walls, backwalls, shear walls, etc.
- discussion of approved design variances and justifications (with design variance approval attached)
- Seismic hazard mitigation if applicable

To make these reports more consistent, a cover page and the outlines for the reports are provided as follows:

RPG or Consultant

Cover page

(Preliminary or Final) Seismic Summary Report

Project info

Prepared for

SCDOT

955 Park Street

Columbia SC 29201

Consultant ABC or RPG

Consultant ABC Address if by Consultant

Date of report

SCDOT logo if in-house

Outline of the Preliminary Seismic Summary Report

1. Project Description

2. Seismic Design Criteria and Objectives

2.1 Seismic Design Specifications

2.2 Operational Classification

2.3 Design Earthquakes

2.4 Seismic Site Class or Site Stiffness

2.5 Seismic Design Category

2.6 Expected Seismic Performance and Damage Levels

2.7 Displacement and Ductility Criteria to be satisfied

2.8 Unique Structure and Geotechnical Issues if Applicable

2.9 Seismic Design Software

3. Seismic Design Approach and Analysis Strategy

Outline of the Final Seismic Summary Report

1. Project Description

2. Seismic Design Criteria and Objectives

2.1 Seismic Design Specifications

2.2 Operational Classification

2.3 Design Earthquakes

2.4 Seismic Site Class or Site Stiffness

2.5 Seismic Design Category

2.6 Expected Seismic Performance and Damage Levels

2.7 Displacement and Ductility Criteria

2.8 Unique Structure and Geotechnical Issues if Any

2.9 Seismic Design Software

3. Seismic Design Approach and Analysis Performed

3.1 Seismic Design Approach

3.1 Demand Analysis

3.2 Capacity Analysis

4. Seismic Modeling Results Analysis

4.1 Mass participation Ratio and Fundamental Periods

4.2 Displacement and Ductility Demand

4.3 Ductility Capacity

5. Design Variances if Applicable (Attach approval behind)

6. Seismic Detailing

7. Seismic Hazard Mitigation if Applicable