

Consultant Seismic Information Request

PROJECT INFORMATION			
File No.		Project No. (PIN):	
County:	RPG ¹ :	Route:	
Description:			
Latitude (4 decimals):		Longitude (4 decimals):	
SEISMIC REQUEST			
<p>The SCDOT <u>Geotechnical Design Manual</u> and <u>Seismic Design Specifications for Highway Bridges</u>, latest editions, provide detailed seismic design requirements for transportation structures. The RPG Geotechnical Design Section (GDS) will be generating seismic design information from, <i>SCENARIO_PC</i>, the seismic analysis software. The consultant is encouraged to review the software documentation, <i>Information on Analysis Software</i>, for assistance in completing this form. The RPG GDS will be providing the pseudo-spectral acceleration (PSA) oscillator response for frequencies 0.5, 1.0, 2.0, 3.3, 5.0, 6.7 and 13 Hz, for 5% critical damping and peak horizontal ground acceleration (PGA) at either the B-C Boundary (Geologically Realistic) or Hard Rock Outcrop for specific project locations within South Carolina. The Geologically Realistic option is for sites in the Coastal Plain with sediment thickness greater than 100 feet to firm sediment ($V_s=2,500$ feet per second (ft/s) or NEHRP B-C Boundary). Geologically Realistic conditions can also be encountered outside of the Coastal Plain where the sediment thickness is 100 feet or less above the basement rock and the $V_s = 8,000$ ft/s. The Hard Rock Outcrop option is for an outcrop of hard rock ($V_s \geq 11,500$ ft/s). The Preconstruction Support – Geotechnical Design Section (PCS/GDS) has developed a map to assist in determining the site condition. South Carolina has been divided in two zones, Zone I – Physiographic Units Outside of the Coastal Plain and Zone II – Physiographic Units of the Coastal Plain. This information can be provided for the Safety Evaluation Earthquake (SEE) 3% probability of exceedance for 75-year exposure periods or for the Functional Evaluation Earthquake (FEE) 15% probability of exceedance for 75-year exposure periods. The consultant is reminded that all embankment structures are required to be designed for both the SEE and FEE. The consultant will use this information in developing the Acceleration Design Response Spectrum (ADRS) in accordance with the SCDOT <u>Geotechnical Design Manual</u> and <u>Seismic Design Specifications for Highway Bridges</u>. The RPG GDS can also provide the Time Series for use in performing a Site-Specific Response Analysis.</p>			
STRUCTURE SEISMIC INFORMATION			
Bridge Category / Seismic OC:			
Seismic Performance Category (SPC):			
Seismic Site Class:			
Bridge Seismic Level of Design:			
Select Design Earthquake			
SEE – 3% Probability of Exceedance in 75 years		<input type="checkbox"/>	
FEE – 15% Probability of Exceedance in 75 years		<input type="checkbox"/>	
Geologically Realistic <input type="checkbox"/>		Hard Rock Basement Outcrop <input type="checkbox"/>	
Requestor Information			
Requestor Name:			
Company Name:			
Phone Number:		() -	
Email Address			
Request Date:			

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TIME SERIES GENERATION REQUEST				
Time Series information is required if a Site-Specific Response Analysis is to be conducted. The SCDOT Geotechnical Design Manual requires a Site-Specific Response Analysis for Seismic Site Class "F". Unscaled and Scaled time series will be generated for the B-C Boundary in Shake91 data format. The Scaled time series are based on the earthquake magnitude (M_w) and Epicentral distance provided.				
Request Time Series: Yes <input type="checkbox"/> No <input type="checkbox"/>				
Sediment Thickness				
The sediment thickness is used by <i>SCENARIO_PC</i> , to generate the time series simulation. The time series can be generated with the default sediment thickness as indicated in 2.2.2.1 <i>Site Response Modeling</i> of the <i>Seismicity Study Report</i> (http://www.scdot.org/doing/pdfs/Reporttxt.pdf) or can adjusted specifically for the geology and analysis requirements at the specific project location. This option only applies to those site were the Geologically Realistic Model is used.				
Change Sediment Thickness: Yes <input type="checkbox"/> meters No <input type="checkbox"/>				
Match Entire Uniform Spectrum				
In cases where the uniform hazard spectrum is dominated by a single scenario (a well defined modal event in the Deaggregation plots), the spectrum of the modal event may closely match that of the uniform hazard spectrum, even without much scaling. This will be the case for sites in the Coastal Plain near Charleston, for the 3% in 75 year hazard level. However, at sites where there are two or maybe 3 modes in the deaggregation, matching the entire spectrum with a single modal event will require much scaling. This scaling can be done automatically over the entire spectrum. Matching the entire spectrum involves a phase-invariant spectral scaling of the scenario time series. It is often preferable to use two or more modal events, each matching a specific frequency of the uniform hazard spectrum. This results in a simple constant (frequency independent) scaling of the scenario time series. If the consultant selects to not match the entire spectrum, the spectrum may be scaled using either an oscillator frequency/PSA or a PGA that will be matched when simulating the ground motion.				
Match Entire Spectrum:	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
If Not matching Entire Spectrum, Select PSA or PGA Scaling	PSA Scaling <input type="checkbox"/>	Scaling Parameter	M_{w1}	M_{w2}
	PGA Scaling <input type="checkbox"/>	Oscillator Frequency	Hertz	Hertz
		PSA	g	g
		PGA	g	g
Scenario Earthquake Magnitude and Distance				
Determine earthquake magnitude, M_w , and epicentral distance from the deaggregation plots provided by the U.S. Geological Survey (http://eqint.cr.usgs.gov/deaggint/2002/index.php). The 3% and 15% in 75-year events are equivalent to the 2% and 10% in 50-year events, respectively.				
M_{w1} =	Epicentral Distance =		Kilometers	
M_{w2} =	Epicentral Distance =		Kilometers	

¹RPG – Region Production Group

Lowcountry - Beaufort, Berkeley, Charleston, Colleton, Dorchester, Hampton, Jasper

Pee Dee – Chesterfield, Clarendon, Darlington, Dillon, Florence, Georgetown, Horry, Kershaw, Lee, Marion, Marlboro, Sumter, Williamsburg

Midlands – Aiken, Allendale, Bamberg, Barnwell, Calhoun, Chester, Fairfield, Lancaster, Lexington, Newberry, Orangeburg, Richland, Union, York

Upstate – Abbeville, Anderson, Cherokee, Edgefield, Greenville, Greenwood, Laurens, McCormick, Oconee, Pickens, Saluda, Spartanburg