



# PRELIMINARY COMPARISON BETWEEN RESPONSE SPECTRA EVALUATED AT CLOSE SOURCE FOR L'AQUILA EARTHQUAKE AND ELASTIC DEMAND SPECTRA ACCORDING TO THE NEW SEISMIC ITALIAN CODE

(V 1.00)

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A preliminary comparison between the response spectra evaluated at close source for L'Aquila earthquake (data 06/04/2009 – 1.32AM UTC – Magnitude 5.8) and the elastic demand spectra according to the new seismic Italian code (NTC2008) are herein presented for ordinary (*reference period*  $V_R=50$  yrs) and strategic constructions (*reference period*  $V_R=200$  yrs).

To this end, the following horizontal corrected components (1), recorded for epicentral distance lower than 10 km, have been considered:

- FA030 – *station AQG*, site Colle dei Grilli  
Soil profile type B, Topography factor ST=1,1
- GX066 – *station AQV*, site Aterno Valley  
Soil profile type B, Topography factor ST=1,0
- AM043 – *station AQK*, site Aquila Parking  
Soil profile type C, Topography factor ST=1,1
- CU104 – *station AQA*, site Aterno River  
Soil profile type B, Topography factor ST=1,0

Soil parameters have been preliminary estimated by data available from ITACA database (2) on accelerometric RAN network (3) and from geographic database available from Regione Abruzzo (4).

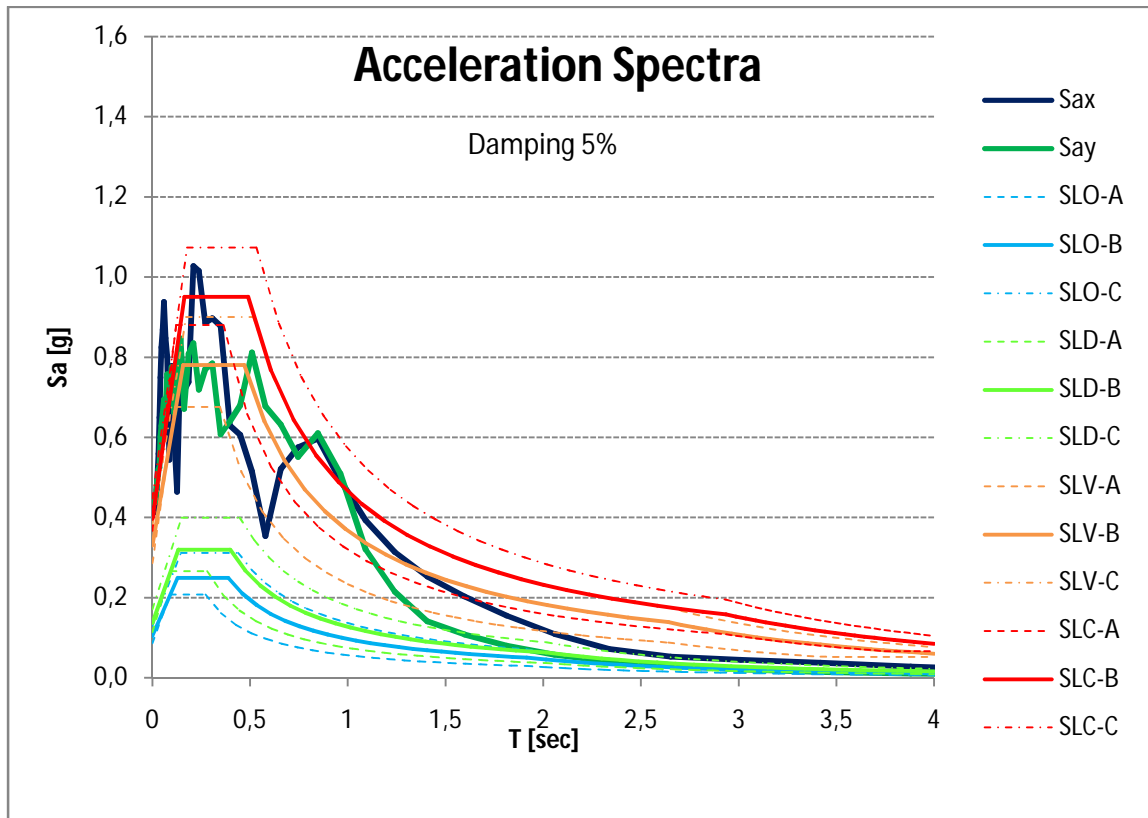
The earthquake response spectra, for both the horizontal direction  $S_{ax}$  and  $S_{ay}$ , have been carried out by considering 5% damping coefficient and logarithmic subdivision of the considered period range. The obtained spectra have been compared with the elastic demand spectra according to the new seismic Italian code (NTC2008), as follows:

| <b>Target Performance Levels</b>   | <b>Return Period <math>T_R</math> [yrs]</b>          |  |
|------------------------------------|--|--|
|                                    | <i>Ordinary<br/>Constructions</i><br>( $V_R=50$ yrs) | <i>Strategic<br/>Constructions</i><br>( $V_R=200$ yrs) |
| Immediate Operative ( <b>SLO</b> ) | 30   | 120  |
| Damage Control ( <b>SLD</b> )      | 50   | 201  |
| Life Safety ( <b>SLV</b> )         | 475  | 1898   |
| Collapse Prevention ( <b>SLC</b> ) | 975  | 2475   |

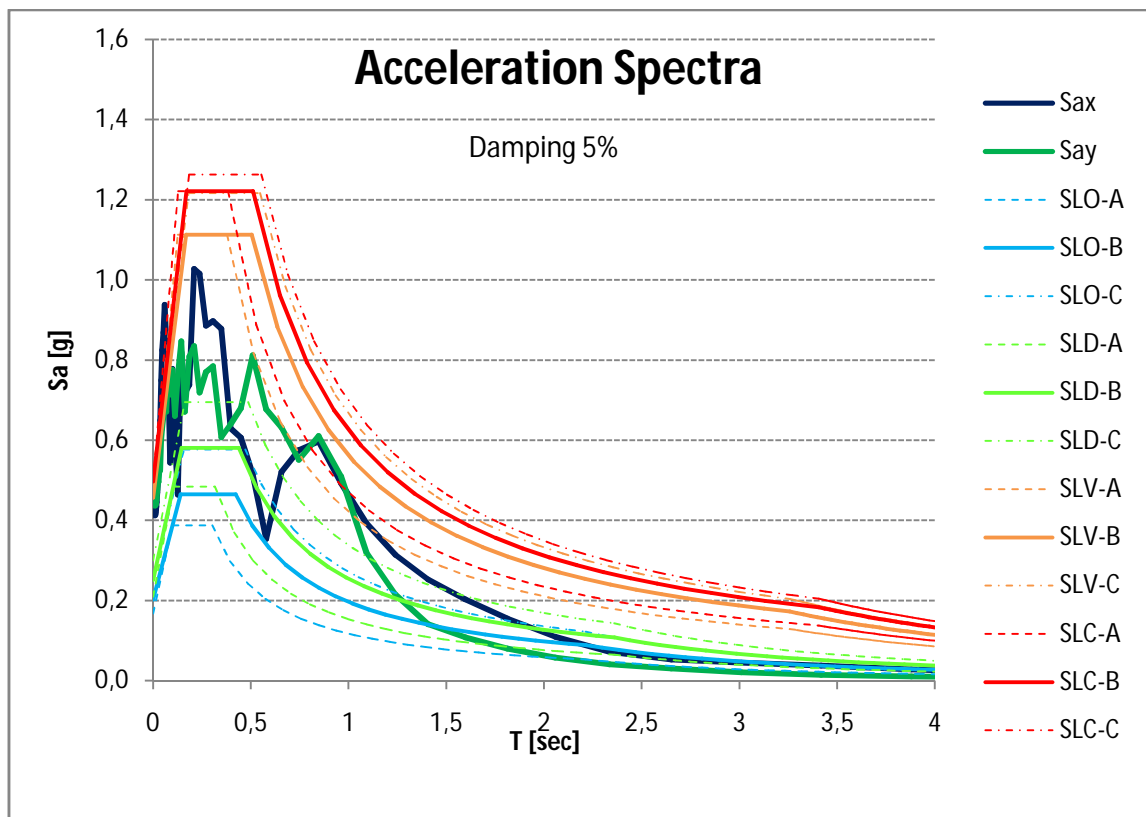
In particular, for each target performance level, the elastic demand spectra for soils type A, B and C have been considered.

### **References**

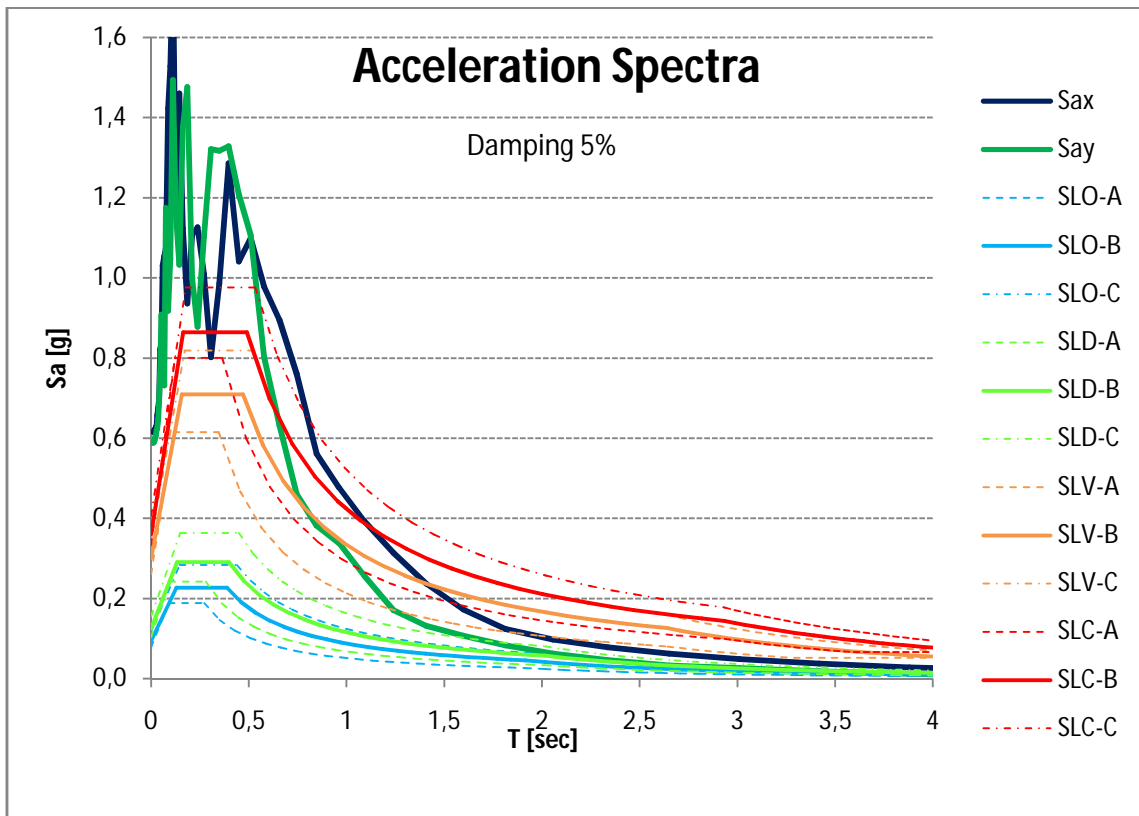
- (1) E. Cosenza, E. Chioccarelli, I. Iervolino (2009), *Preliminary study of displacement and accelerations at close source distances for L'Aquila earthquake* V1.00 (<http://www.reluis.it>)
- (2) ITACA, Italian Accelerometric Archive (<http://itaca.mi.ingv.it/ItacaNet>)
- (3) RAN – National Accelerometric Network – DPC Dipartimento di Protezione Civile (<http://www.protezionecivile.it>)
- (4) Ufficio sistema informativo geografico – Regione Abruzzo (<http://www.regione.abruzzo.it/cartografianew/> )
- (5) NTC2008, *Norme tecniche per le costruzioni*, D.M. 14 Gennaio 2008



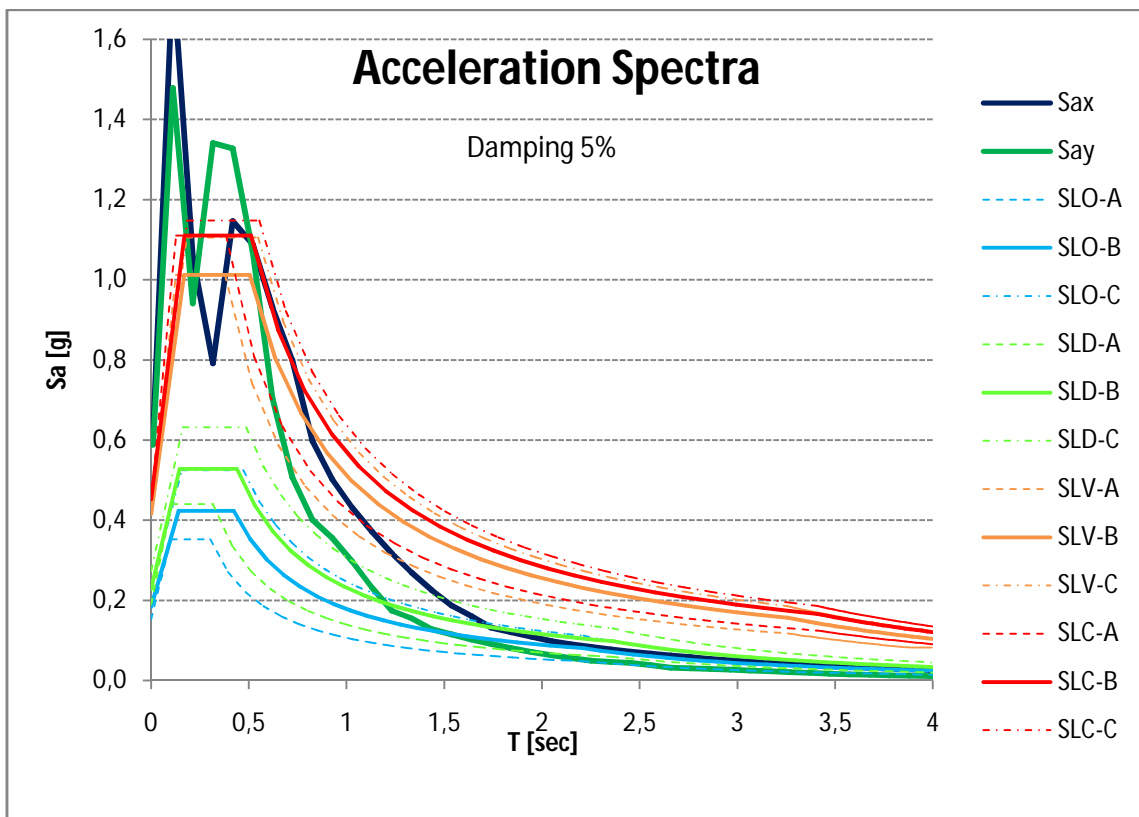
**Record FA030 – Earthquake Spectra Response vs. NTC208 Elastic Spectra for Civil Buildings**



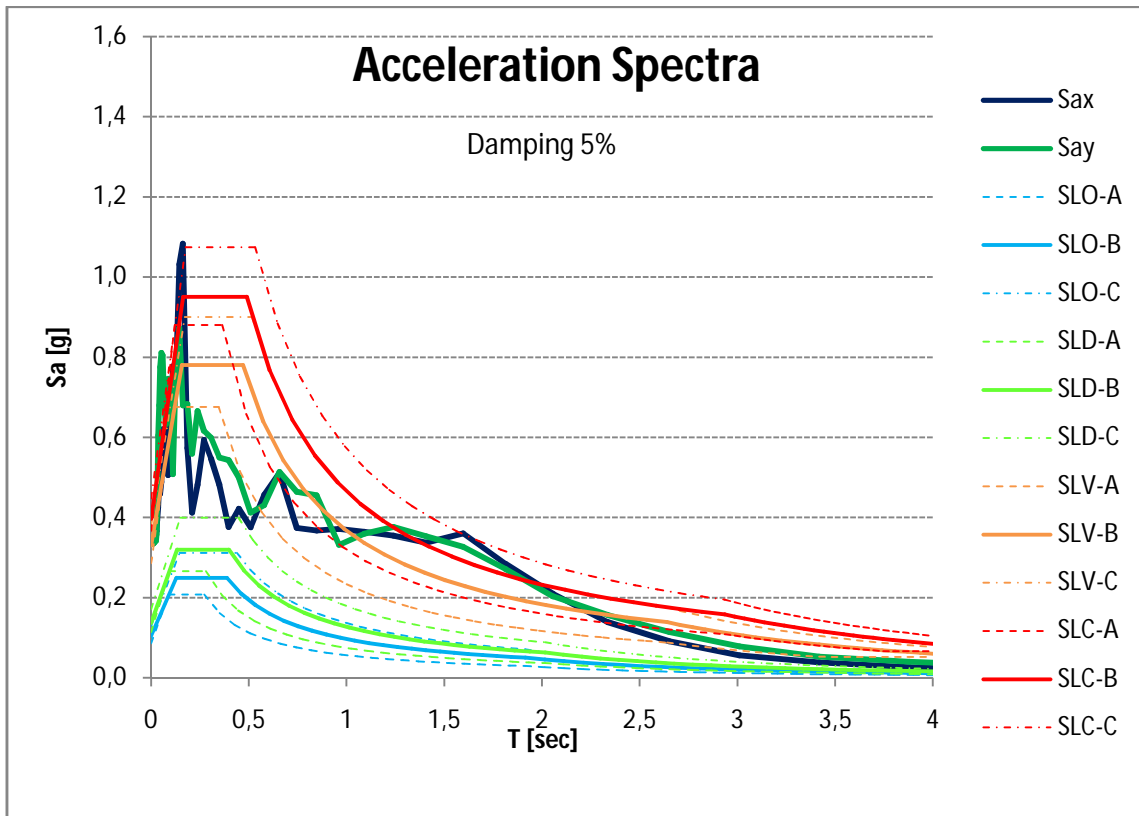
**Record FA030 – Earthquake Spectra Response vs. NTC208 Elastic Spectra for Strategic Constructions**



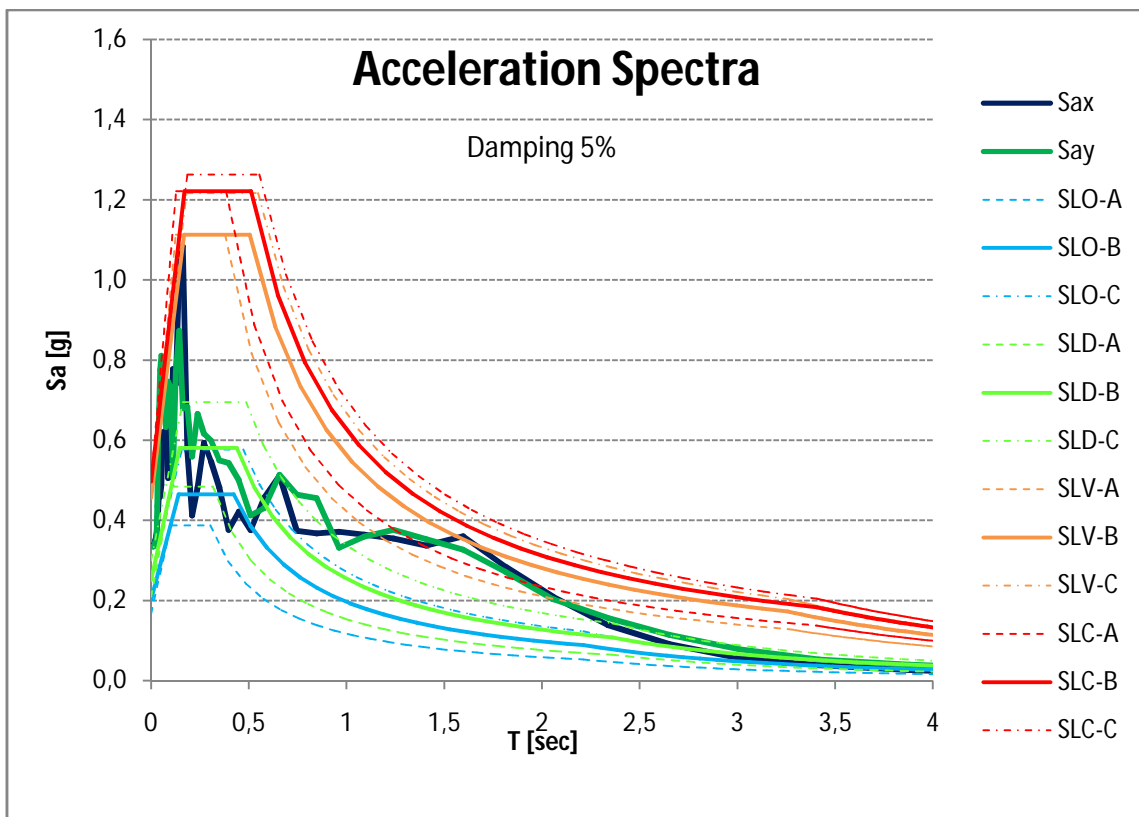
**Record GX066 – Earthquake Spectra Response vs. NTC2008 Elastic Spectra for Civil Buildings**



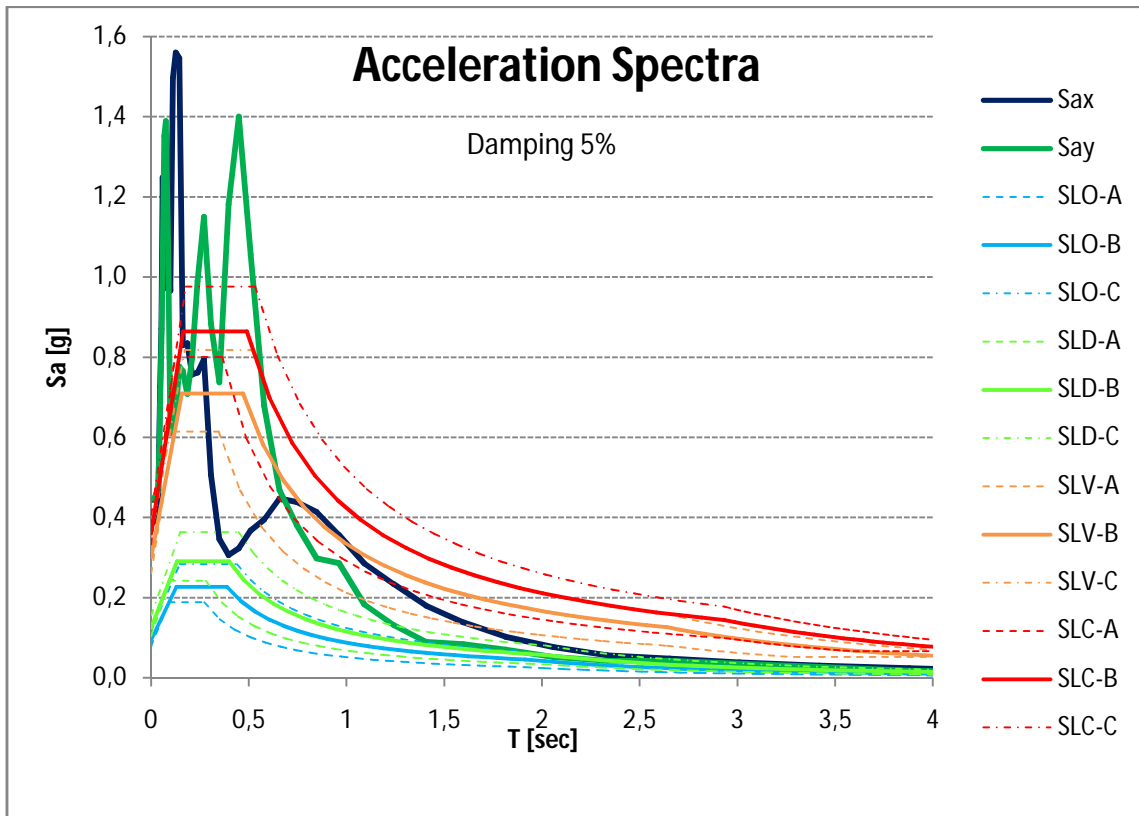
**Record GX066 – Earthquake Spectra Response vs. NTC2008 Elastic Spectra for Strategic Constructions**



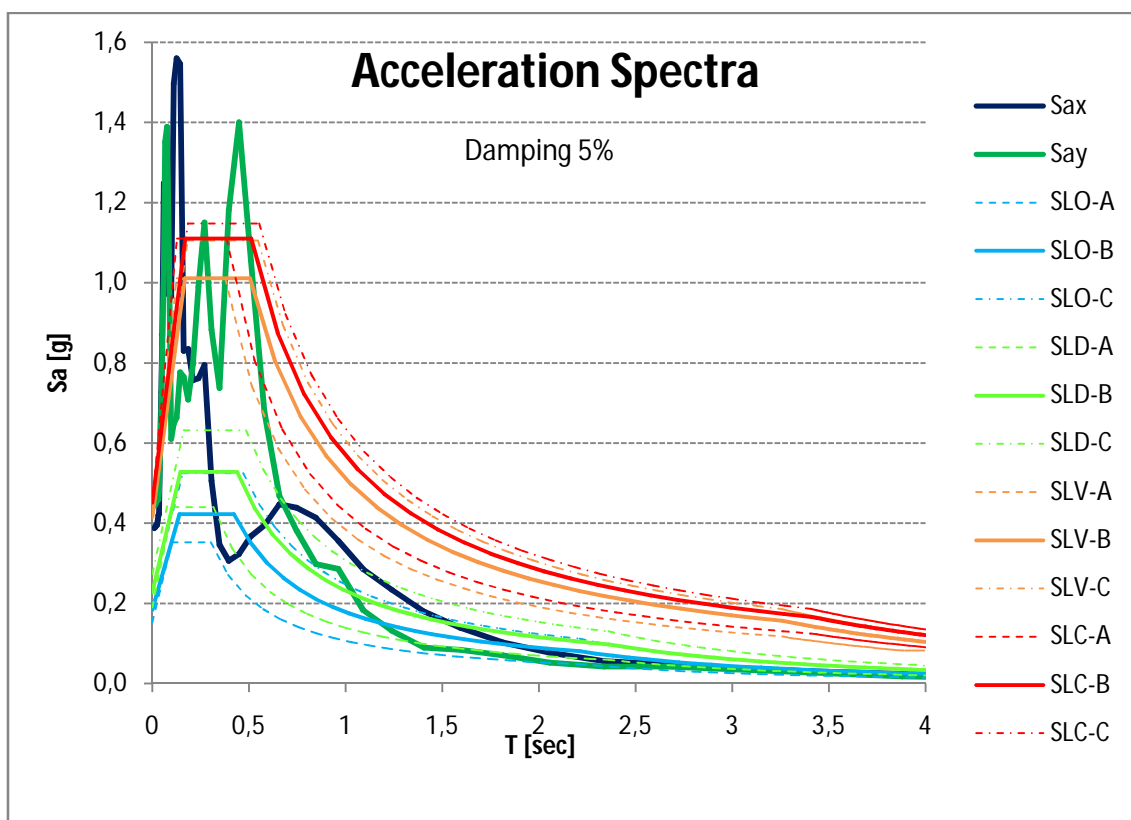
**Record AM043 – Earthquake Spectra Response vs. NTC2008 Elastic Spectra for Civil Buildings**



**Record AM043 – Earthquake Spectra Response vs. NTC2008 Elastic Spectra for Strategic Constructions**



**Record CU104 – Earthquake Spectra Response vs. NTC2008 Elastic Spectra for Civil Buildings**



**Record CU104 – Earthquake Spectra Response vs. NTC2008 Elastic Spectra for Strategic Constructions**