



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois/62764

October 31, 1991

Seismic Design for Local Agency Bridges

COUNTY SUPERINTENDENTS OF HIGHWAYS
MUNICIPAL ENGINEERS
CONSULTING ENGINEERS

#91-17

Circular Letter #91-5, sent to you on March 15, 1991, provided a summary of information (entitled "General Applicability") concerning the seismic design of bridges for earthquake forces based on the 1983 AASHTO Guide Specifications for the Seismic Design of Highway Bridges. The letter included an attachment that delineated the seismic acceleration coefficients on a statewide grid. Since that mailing the Guide Specifications have been incorporated as a part of the AASHTO Standard Specifications for Highway Bridges with the 1991 Interim Specifications.

Attached are an updated map of the acceleration coefficients for Illinois and a revised summary of the "General Applicability". The revisions involve new map contours for the acceleration coefficients and minor changes to the descriptions of the limits of the four Seismic Performance Categories (SPC) in Table 1. With the new grid map, the SPC for a given location will either remain the same or be lower than the value on the superseded map.

Please replace the original attachments to Circular Letter #91-5 with the three attached sheets.

Very truly yours,

A handwritten signature in cursive script that reads "Bill Sunley".

William T. Sunley, P.E.
Engineer of Local Roads
and Streets

Attachments

cc-
District Engineers

GENERAL APPLICABILITY OF
AASHTO STANDARD SPECIFICATIONS FOR
SEISMIC DESIGN OF HIGHWAY BRIDGES

Each bridge is assigned to one of four Seismic Performance Categories (SPC), A through D, based on the Acceleration Coefficient (A) (expressed in Table 1 as a percentage of the force of gravity) determined from the attached map and the Importance Classification (IC). The two Importance Classifications are: "I" - for essential bridges and "II" - for other bridges. Additional discussion about these two Importance Classifications can be found in the commentary of the Standard Specifications. Minimum analysis and design requirements are governed by the SPC. Table 1 determines the SPC for a particular bridge.

TABLE 1
Seismic Performance Category (SPC)

Acceleration (Percentage of Gravity)	Importance Classification (IC)	
	I	II
≤ 9.0	A	A
> 9.0 and ≤ 19.0	B	B
> 19.0 and ≤ 29.0	C	C
> 29.0	D	C

In General, for any single span bridge classified as SPC A, B or C or for multispan bridges classified as SPC A, seismic requirements include:

- 1.) Design of connection between the superstructure and the substructure. (Sections 4.5 and 4.6)
- 2.) Design of minimum support lengths at the expansion end of all girders. (Section 4.9)

For multispan bridges classified as SPC B, seismic requirements include:

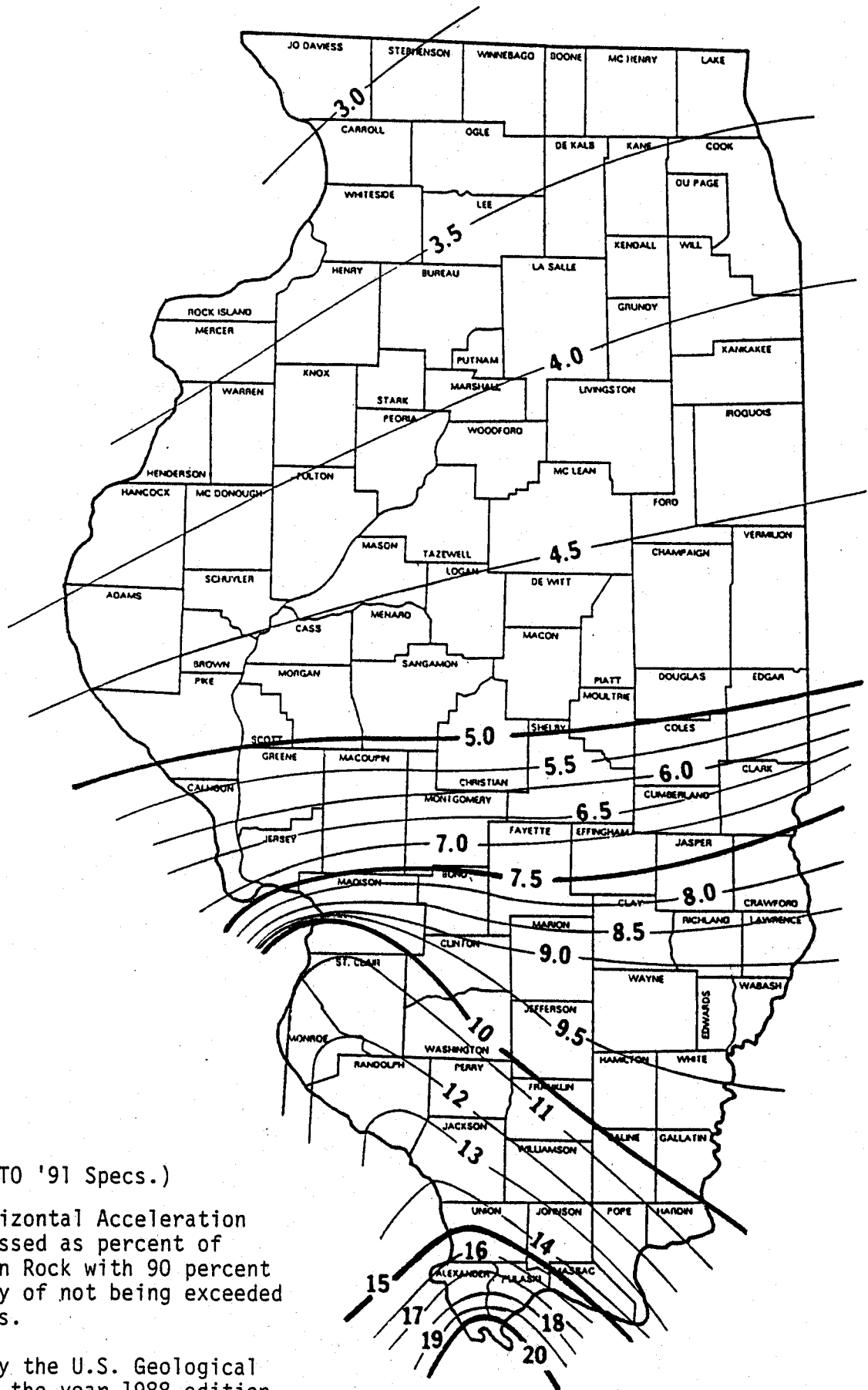
- 1.) Design of the superstructure to substructure connection. (Section 4.7)
- 2.) Design of minimum support lengths. (Section 4.9)
- 3.) Additional seismic analysis for the foundation and superstructure design as described in the current AASHTO Standard Specifications for Highway Bridges with Interim Specifications.

SPC C multispan bridges require a more detailed seismic analysis for the foundation and superstructure design than required for SPC B bridges. Additional seismic design requirements to be analyzed include:

- 1.) Design of positive horizontal linkage between adjacent sections of the superstructure at supports and expansion joints within the span. This positive linkage should be provided by ties, cables or other equivalent mechanisms. (Section 4.8)
- 2.) Design of hold-down devices at all supports or hinges in continuous structures when certain seismic forces are exceeded. (Section 4.8)

Since the seismic acceleration in Illinois does not reach or exceed 29.0 % of gravity, there are no SPC D bridges in the State.

Preliminary earthquake analyses show that single span bridges included in Standard Plans, Volume I: Precast Prestressed Concrete Deck Beams, Illinois Department of Transportation, January 1, 1981 meet the minimum requirements of the Standard Specifications statewide. Multiple span precast prestressed concrete deck beam bridges (PPCDB) utilizing "Standard Plan" design may be used without additional analysis only in the parts of the state that fall in the SPC A . For multiple span PPCDB located in SPC B and C, adequacy for seismic design should be evaluated on a project-by-project basis.



From:

(AASHTO '91 Specs.)

Map of Horizontal Acceleration (A) [expressed as percent of gravity] in Rock with 90 percent probability of not being exceeded in 50 years.

Prepared by the U.S. Geological Survey for the year 1988 edition of NEHRP Recommended provisions for the Development of Seismic Regulations for New Buildings