APPENDIX A

Survey Questionnaire

In order to design the survey to be mailed to Out-Of-State bridge engineers, the results of the literature search was combined with the following bridge parameters: material properties, relative dimensions of girders and slabs, bridge geometry, skew angle, girder spacing, span length, number of spans, type of loading, location and stiffness of diaphragms and location of supports. The design of the survey was based on modern methodologies of surveying and sensing (Spunt 1999, Peterson, 1999).

In the process of formulating the questionnaire, we implemented recommendations for modern surveys and questionnaires (Spunt 1999, Peterson, 1999). We emphasized the following points:

- Questionnaire Objectives
- Questionnaire Layout
- Questionnaire Content
- Questionnaire Flow
- Question Structure
- Question Wording
- Questionnaire Reliability and Validity

The proposed questionnaire was designed such as it would give us basic information that would guide us in narrowing the parameters of analysis to those that are of practical implication. The questionnaire assumes familiarity of the surveyed people with bridge terminology. As such, lengthy descriptions were omitted.

Continuity Diaphragm For Skewed Continuous Span Precast Prestressed Concrete Girder Bridges

STATE Project No. 736-99-0914

QUESTIONNAIRE SURVEY

November 13, 2001

PROJECT TEAM

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Purpose and Definition

This survey concerns the use of continuity diaphragms for skewed continuous span precast prestressed girder bridges on skewed bents. These diaphragms are posing some difficulties in detailing and construction for skew angles larger than 30 degrees, especially when the girder spacing decreases, the connection and the construction become more difficult. Even the effectiveness of the diaphragms is questionable at these high skews.

The design guidelines for bridges in AASHTO indicate that diaphragms should be installed for T-girder spans and may be omitted where structural analysis show adequate strength. Furthermore, the effects of diaphragms are not accounted for in the proportioning of the girders.

The Louisiana Transportation Research Center has contracted with the Louisiana Tech University to study the effectiveness of such diaphragms and when needed to provide practical construction details.

The objectives of this research are to (1) determine the need of continuity diaphragms, (2) study the load transfer mechanism through diaphragms, (3) determine when a full depth diaphragms is required, and (4) to determine the minimum skew angle at which a diaphragm becomes ineffective.

The purpose of this survey is to gather the information needed to complete the study on the basis of practical information that will be integrated with theoretical analysis. Please take a few minutes to complete the survey. Where numerical data is requested, reasonable estimates and/or ranges are acceptable. Please return the survey, by Friday, December 14, 2001, via fax or E-mail to:

Dr. Aziz Saber
Louisiana Tech University
Fax: 318.257.2306
E-mail address: saber@coes.latech.edu

Thanking you in advance.

Aziz Saber, Leslie Guice, Abdelkader Tayebi

General Information

Organization's name:

Respondent's name:

Position/Title:

Address:

1. Do/Did you own, design or construct skew continuous precast concrete bridges?

   __ Yes ____ No (If no, please stop here)

2. Please estimate the number of skewed continuous precast prestressed concrete bridges with or without continuity diaphragms in each of the following categories: (Please answer those which apply to your organization)

	Last 5 Years		**Total**	
	With Diaph.	Without	With Diaph.	Without
Do you own or have in service?	_____	_____	_____	_____
Have you designed in your office?	_____	_____	_____	_____

3. Typical material properties specified for skewed bridges and diaphragms (Normal & High Performance/Strength Concrete mix):

Release strength (f'_{ci})	_____	_____
Final strength ($f'c$)	_____	_____
Strand size, grade, type	_____	_____
Strength of deck concrete (Lightweight)	_____	_____
Shear connectors type/strength	_____	_____
Concrete strength of slab	_____	_____
Concrete strength of intermediate/end diaphragm	_____	_____
Concrete strength of continuous diaphragm	_____	_____

4. What type of girders do you use in skew continuous precast prestressed concrete bridges?

Type of Girder	Span Length	Span Width	Slab Thickness	Girder Spacing	Girder Height	Bridge skew angle	Diaphragm skew angle	Diaphragm Dimensions
AASHTO Type I								
AASHTO Type II								
AASHTO Type III								
AASHTO Type IV								
AASHTO Type V								
AASHTO Type VI								
Box Type Girders								
Other								

5. What construction sequence do you follow? (check all which apply)

___ Continuity diaphragm cast first then deck.
___ Continuity diaphragm and deck cast at the same time.
____ Other

Please specify _____

_____

_____

6. What are some of the issues/problems with regards to skewed continuity diaphragms you use or have used in the past? (check all which apply)

Type of Problem	Bridge Skew Angle Range at which problems occur	Diaphragm skew angle range at which problems occur
none		
none		

7. Would you consider or have you used post-tensioning to prevent cracking at the continuity connection?

   ____ Yes ____ No

8. Have you experienced specific problems with the negative moment diaphragm connections?

   ____ Yes ____ No

   Please specify_____

   _____

9. When you design a continuity diaphragm what method of analysis do you use? (Check all which apply)

   ____ Code Methods
   ____ Simple beam theory
   ____ Finite Element Method (what type of elements)
   ____ Finite Strip Method
   ____ Other-please specify

10. Please indicate the type of continuity diaphragm connection used in skew bridges you dealt with: (Check all that apply)

___ None
____ Mild reinforcement extending from bottom flange of girder
  ____ Straight
  ____ 90^0 bent up into diaphragm
  ____ 180^0 (Hairpin) with both legs embedded in girder
____ Some form of mechanical bar connector
____ Welded bar connection
____ Strand extension bent up into diaphragm
____ Some form of mechanical strand connector
____ Other

Please specify _____

11. Are their any additional bars extending into the continuity diaphragm such as bars passing through holes in web?

Please specify:

_____

_____

_____

12. How much of the girder is embedded into the diaphragm? (check all which apply)

Check what applies	Embedded length	Bridge Skew Angle	Diaphragm Skew Angle	Special Conditions?
	0” to < 2”			
	2” to < 4”			
	4” to < 6”			
	6” to < 8”			
	8” to < 10”			
	10” to < 12”			
	12” and up			

If more than one box is checked, please comment on factors causing the use of different embedment distances.

_____

_____

_____

13. Can you share with us the diaphragm connection details that you used for your continuous concrete skew bridges? If yes, please provide a photocopy of the details.

_____

_____

_____

_____

14. Do you have any short-term or long-term field data (deflection, strain measurements) of skewed continuous precast prestressed concrete bridges with continuity diaphragms that can be made available to our Project Team? If yes can you give a brief description / data.

_____

_____

_____

_____

15. Please share with us any general comments on difficulties faced with skewed continuity diaphragms and solutions adopted

_____

_____

_____

We would appreciate the name of a contact person in your organization to discuss some of these issues in more detail.

Name:

Position:

Telephone:

Fax:

Email:

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SURVEY