DIRECTRIZ DE DISEÑO 308
Instrucciones Técnicas para Estructuras

Las instrucciones técnicas para estructuras que se exponen en esta directriz tienen la intención de aclarar ciertos aspectos técnicos que podrían estar excluidas en las guías o códigos utilizados por la Autoridad. Estas instrucciones técnicas servirán para reforzar la atención de una situación particular debido a experiencias, hallazgos o incidencias ocurridas.

A continuación se presentan las instrucciones por tipo de estructura:

a. Puentes:

1. Todo elemento de puente nuevo o existente no deberá ser sobrecargado debido a equipos de construcción ni acopio de materiales durante las operaciones de construcción (Ver copia del "Technical Advisory 5140.28 – Construction Loads on Bridges" de la Administración Federal de Carreteras del 8 de agosto de 2007 en el Anejo A – Documentos Técnicos). Se incluirá la siguiente nota general en los planos de construcción: "IN ANY CONSTRUCTION OPERATION ON NEW OR EXISTING BRIDGE, THE CONTRACTOR SHALL ENSURE THAT ANY CONSTRUCTION LOADING AND STOCKPILED RAW MATERIALS ON A STRUCTURE DOES NOT OVERLOAD ITS MEMBERS."

2. Se prohibe el uso de adhesivo epóxico de curado rápido ("Fast Set epoxy") en aplicaciones para la adherencia de anclajes que trabajarán en tensión sostenida o para la fijación de elementos superiores en proyectos con ayuda federal (Ver copia del "Technical Advisory 5140.26 – Use and Inspection of Adhesive Anchors in Federal-Aid Projects" de la Administración Federal de Carreteras del 17 de octubre de 2007 en el Anejo A – Documentos Técnicos).

3. En las losas de aproximación se considerará que el borde inicial de la losa de entrada y el borde final de la losa de salida serán transversales a la alineación del rodaje existente o nuevo. Esto permitirá una transición efectiva entre el puente y la carretera.

b. Atarjeas:

1. Las atarjeas tipo cajón ("box culverts") que tengan una longitud (medida desde la cara interior de las paredes exteriores) igual o mayor de 20 pies serán consideradas como estructuras de puente.

c. Muros de Retención:
Instrucción omitida intencionalmente.

d. Muros o Barreras contra Sonido:
Instrucción omitida intencionalmente.

Esta directriz tiene vigencia inmediatamente.

José E. Hernández Borges
Director Ejecutivo Auxiliar
para Infraestructura

22 Sept. 08
Fecha

Anejo A

Documentos Técnicos

U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: Technical Advisory 5140.28 - Construction Loads on Bridges Date: August 8, 2007

From: Frederick G. Wright (Bud)
Executive Director (HOA-3)

To: Division Administrators
Directors of Field Services
Federal Land Highway Division
Engineers

PURPOSE

In the ongoing investigation of the collapse of the I-35W Bridge in Minneapolis, the National Transportation Safety Board has identified construction equipment and materials loading on the bridge as part of their review. While no conclusions have been reached, in an abundance of caution, we strongly advise the State Transportation Agencies and other bridge owners who are engaged in or contemplating any construction operation on their bridges to ensure that any construction loading and stockpiled raw materials placed on a structure do not overload its members.

For more discussion on this issue, please refer to the AASHTO Standard Specifications for Highway Bridges, 17th Edition, Division II, Section 8.15 or the AASHTO Load Resistance and Factor Design Bridge Design Specifications, 4th Edition, Section 3.

Please refer any questions to Benjamin Tang at 202-366-4592 or benjamin.tang@dot.gov.

MOVING THE AMERICAN ECONOMY

Technical Advisory

U.S. DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

Subject

Use and Inspection of Adhesive Anchors in Federal-Aid Projects

Classification Code	Date	OPI
T 5140.26	October 17, 2007	HIBT-10

Par.

1. What is the purpose of this Technical Advisory?
2. Does this Technical Advisory supersede another Technical Advisory?
3. What is the definition of "Fast Set epoxy"?
4. What is this background of this Technical Advisory?
5. What are the recommendations for new Federal-aid projects and existing projects?

1. **What is the purpose of this Technical Advisory?** The purpose of this Technical Advisory is to provide guidance and recommendations regarding the use and in-service inspection of adhesive anchors, including those utilizing "Fast Set epoxy" (see definition in paragraph 3), in sustained tension applications on all Federal-aid highway projects.

2. **Does this Technical Advisory supersede another Technical Advisory?** No. This is a new Technical Advisory.

3. **What is the definition of "Fast Set epoxy"?** "Fast Set epoxy" refers to an epoxy produced by the Sika Corporation called Sikadur AnchorFix-3. This epoxy is also repackaged and distributed by the following names/companies:

   a. Power-Fast+ Epoxy Injection Gel Fast Set Formula by Powers Fasteners, Inc.

   b. NRC 1000 Gold Premier Epoxy Fast Set Formula by Newman Renner Colony, LLC.

   c. Foil-Fast Epoxy Injection Gel Fast Set Formula by the Rawlplug Company, Inc.

4. **What is this background of this Technical Advisory?**

a. On July 10, 2006, a portion of the suspended ceiling system of the I-90 connector tunnel in Boston, Massachusetts, collapsed onto a passing car killing the passenger and injuring the driver. The suspended ceiling in the collapsed section was comprised of concrete panels connected to steel hangers suspended from the tunnel concrete ceiling by an adhesive anchor system consisting of stainless steel anchor rods embedded in epoxy. Immediately after the accident, the Federal Highway Administration (FHWA) launched an independent study and testing plan to determine the probable cause of failure of the suspended ceiling system.

b. The testing plan consisted of short-term strength and long-term performance testing of the adhesive anchor system installed in the I-90 connector tunnel, as well as an experimental parametric study and a limited sustained load characterization study on the adhesive anchor system supplied for use in the I-90 connector tunnel conducted at the FHWA's Turner-Fairbank Highway Research Center (TFHRC). The testing program identified several installation factors that affect the short-term strength of adhesive anchors. However, while these factors may have contributed to the timing of the failure, the results clearly show that the primary cause of the collapse was the use of Fast Set epoxy which is incapable of resisting sustained tension loads without excessive creep.

c. In addition to the testing conducted on the adhesive used in the I-90 tunnel, data produced at TFHRC show that some anchor systems utilizing adhesives other than Fast Set epoxy that have passed the International Code Council (ICC) creep certification process are still vulnerable to creep under typical bridge and tunnel exposure conditions. The results indicate that the current American Society for Testing and Materials (ASTM) and the ICC creep prediction methodology do not appear to guarantee safe performance of adhesive anchors over the entire expected service life (75 to 100 years) of transportation structures. In addition, the ICC does not address issues related to overhead installation of anchors nor the effect that vibration could have on their long-term performance and integrity.

d. Therefore, as a result of the investigation of the collapsed suspended ceiling support system, and in concurrence with the National Transportation Safety Board's findings, the FHWA is now implementing these safety recommendations to ensure that similar incidents will not occur in the future. This Technical Advisory applies to new and existing Federal-aid highway projects.

5. **What are the recommendations for new Federal-aid projects and existing projects?**

a. **New Federal-aid projects**

(1) This Technical Advisory strongly discourages the use of Fast Set epoxy for adhesive anchor applications.

(2) This Technical Advisory also strongly discourages anchor systems utilizing adhesives other than Fast Set epoxy for permanent sustained tension applications or overhead applications until the FHWA is satisfied that an improved certification process has been developed to ensure long-term creep performance and that recognizes the effect of overhead installation.

b. **Existing projects**

(1) Where applications are those specific to the use of Fast Set epoxy adhesive in sustained tension, it is strongly recommended the anchors be retrofitted and/or replaced with a reliable and appropriate mechanical anchor system and that rigorous and regular inspections are performed in the interim.

(2) Where applications of anchor systems in sustained tension using adhesives other than Fast Set epoxy or from an unknown source have been identified, instituting a rigorous and regular inspection program that considers importance and redundancy is strongly recommended to maintain an appropriate level of confidence in their long-term performance. This may require developing a testing protocol and program to determine the site specific ultimate capacities and creep characteristics of the adhesive over the expected life of the structure.

King W. Gee
Associate Administrator
for Infrastructure