MEMORANDUM

Date: July 29, 2015

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Pima County Bridge Infrastructure Program**

Attached is a July 27, 2015 memorandum from the Department of Transportation Director regarding the adequacy and inspection of bridges maintained by Pima County in the unincorporated area. We provide a comprehensive inspection and monitoring program for the safety of these bridges.

The recent Interstate 10 bridge collapse in California appears to have been caused by severe bridge abutment erosion.

The July 27, 2015 memorandum describes deficiencies as functionally obsolete, which means narrow bridges or structurally deficient. Of greatest concern is the structurally deficient bridges, only seven percent of our bridges fall into this category. These bridges undergo detailed inspections and many have weight restrictions.

In addition, our bridge abutments are protected with soil cement, and new bridges have foundations of deep-drilled shafts, meaning that during reoccurring flooding conditions, our bridges will be stable and undamaged. This is evident from the bridge repair, replacement and flood damage bond investments made by the County after the October 1983 flood, where floods of similar and higher magnitude occurred on the Rillito and Santa Cruz Rivers. Little, if any, damage has occurred to our more modern, invested and flood proofed infrastructure.

CHH/anc

Attachment

c: John Bernal, Deputy County Administrator for Public Works
Priscilla Cornelio, Director, Department of Transportation
Dave Zaleski, Civil Engineer Manager, Department of Transportation

PIMA COUNTY
TRANSPORTATION

MEMORANDUM

DATE: July 27, 2015

TO: C.H. Huckelberry, County Administrator

FROM: Priscilla S. Cornelio, P.E., Director

SUBJECT: **Pima County Bridge Infrastructure Program**

The recent collapse of the I-10 bridge over the Tex Wash in California raises the question about the conditions of bridges in Pima County, and whether or not Pima County's bridges are at risk. There are 65 bridges and 145 culverts maintained by Pima County Department of Transportation (DOT). This memorandum describes the comprehensive inspection and monitoring program DOT conducts to ensure the safety of these bridges to the traveling public.

Qualifications and Inspection Requirements

DOT is responsible for administering a bridge management and inspection program and works closely with Arizona Department of Transportation (ADOT) and Federal Highway Administration (FHWA) to ensure that it conforms to all federal and state requirements. The guidance for this program comes from the National Bridge Inspection Standards (NBIS) with our bridges being included within the National Bridge Inventory (NBI). Bridges in this inventory must be on public roads and must have a length of at least 20 feet from end to end. Bridges or culverts are included in this list as long as they conform to the requirements of the NBIS. DOT maintains a team of trained inspectors and is certified as a "self-inspecting local agency" and is one of only two in the state, with ADOT being responsible for conducting the inspections for all other local agencies in Arizona.

In addition to the training and certification, DOT's inspection program and files are audited on an annual basis and has been commended for the quality of our program. As of 2014, new bridge inspection software and inspection techniques have been put in place by FHWA, and DOT has included these techniques in current inspections and development of a Bridge Management System (BMS).

Under federal requirements, bridge inspections must be conducted at least every 24 months and culverts are allowed a maximum inspection frequency of 48 months. Additionally, DOT conducts in-depth inspections of our steel bridges, as well as fracture critical steel bridges every 4 years. Steel bridges have significant issues as a result of fatigue so additional inspections are warranted and are utilized in order to avoid collapses such as the I-35W bridge that occurred in Minnesota several years ago. DOT also inspects all weight restricted bridges every 12 months, and lastly, DOT also performs post flood inspections of all waterway bridges to assess them for scour impacts and debris buildup.

For your information, Attachment 1 contains a photograph of the Marsh Station Road Bridge at Cienega Creek which is Pima County's oldest bridge (built 1920-21). There is also a photo of the recent inspection of that structure that was conducted in 2014. Lastly, there is a photograph of the La Cholla Boulevard bridges at the Cañada Del Oro wash, which are Pima County's newest bridges.

Classification and Additional Analysis

NBIS guidelines require identification of bridges as functionally obsolete or structurally deficient. A bridge which is labeled as functionally obsolete is one in which it may have insufficient operational capacity such as the number of travel lanes, clearances for the road below, or flow capacity for streams or rivers which pass under them. Structurally deficient bridges are ones where a primary load carrying member has sufficient deterioration or physical defects as to cause a concern about load capacity for the bridge. Often these bridges have a weight restriction in place in order to preserve safety and extend the useful service life of the bridge until rehabilitation or replacement can be completed. Pima County currently has ten functionally obsolete bridges (9% of total inventory) and 16 structurally deficient bridges (7%) in the NBI list.

FHWA and ADOT also require public agencies and bridge owners to conduct a load rating analysis for their bridges and culverts. DOT completed the bridge portion in 2014, and is currently underway with the culvert portion and expects to provide the results to ADOT and FHWA in spring 2016. As a direct result of the inspections of the structurally deficient bridges and load rating work, DOT currently has 14 weight restricted bridges and is evaluating several more for possible weight restrictions. In order to address the impacts that may be associated with any proposed weight restrictions, DOT has developed a protocol for assessing the usage (vehicle types and frequency) combined with a public outreach component in order to compare that information against the proposed weight restriction. This allows us to determine the most appropriate limits, while attempting to minimize impact to the traveling public and potential businesses. This approach has been most recently utilized on the Elephant Head Bridge over the Santa Cruz River in which DOT is currently developing the design for a repair effort that will be starting in late 2015/early 2016. The combination of a highly accelerated schedule and an

assessment of the primary users of the facility, allowed DOT to make the determination that the public can continue using the bridge in an un-restricted manner.

Floods and Scour

As part of its inventory, DOT maintains many bridges that cross waterways, and due to the nature of floods, scour is a naturally occurring event that may adversely affect the foundation of a bridge, and therefore, must be designed for appropriately. To account for this, all new DOT bridges are designed to withstand the effects of a 100-year flood event.

In accordance with FHWA requirements, DOT has analyzed our existing bridges and there are currently 20 bridges that are classified as "scour critical", which means that the foundations may potentially be at risk in extreme flood events. In recognizing the importance of scour, FHWA also requires that all public agencies prepare a Plan of Action (POA) to identify the basis of closure for all scour critical bridges, as well as post flood conditions which determine how and when to re-open a bridge following a flood event.

DOT works jointly with the Pima County Regional Flood Control District (RFCD) to implement these POA's for all scour critical bridges, which are available to the appropriate County staff during flood events. RFCD maintains a flood alert system to monitor rainfall and stream flows during these events. The close coordination between the two departments provides the ability to closely monitor flows in the waterways which may cause a failure or washout of any of those same bridges, thus ensuring that our bridges and the traveling public remain safe.

In addition to the monitoring plans, protection measures such as the use of soil cement can help provide additional benefit against the effects of flooding. Specifically, for those waterways such as the Rillito River, where soil cement has been added for a significant length of the channel, this measure results in additional protection for the bridge abutments.

Future Opportunities

Despite the fact that DOT bridges remain safe and do not pose a risk to the traveling public, additional funding is needed to address bridge infrastructure needs. DOT is assisting Pima Association of Governments and the Regional Transportation Authority (RTA) with a regional bridge infrastructure assessment and summary of funding needs. The goal of this work effort is to obtain an increase in funding for bridge infrastructure in the proposed extension of the RTA sales tax or other new funding source.

In summary, DOT's comprehensive program for inspecting and monitoring the bridges in our inventory is a crucial investment in order to ensure that they are safe for the public and to minimize the possible occurrence of a bridge failure similar to the one that recently occurred in California on I-10, or any of the others that have occurred over the last several years across the country.

Please let me know if you have any questions.

PSC:RE:DZ:dg

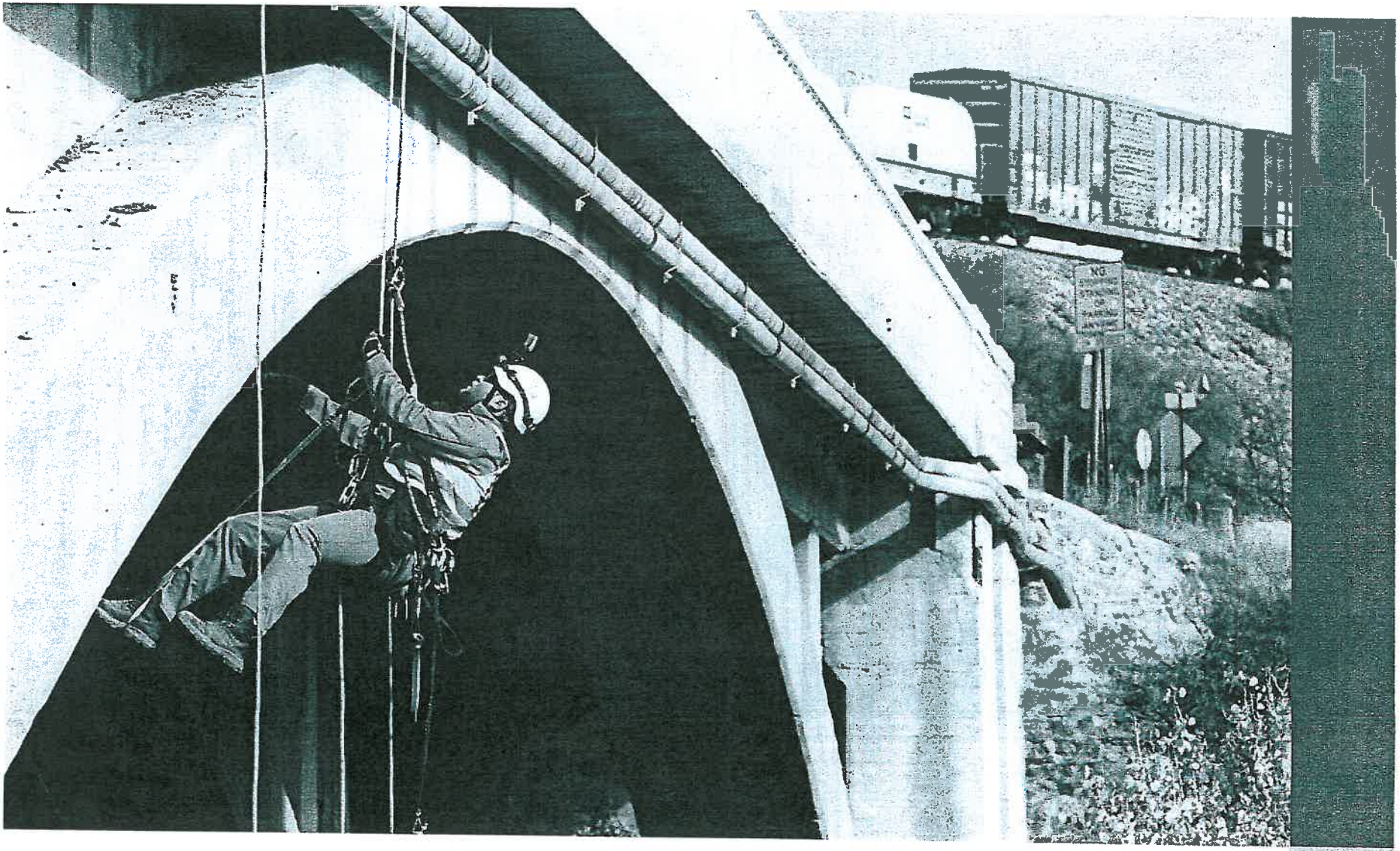
Attachment 1

c: John M. Bernal, Deputy County Administrator
Suzanne Shields, Director, RFCD
Ana Olivares, Deputy Director
Rick Ellis, Engineering Manager
Jim Cunningham, Division Manager
David Cummings, Operations Manager
Dave Zaleski, Civil Engineering Manager

ATTACHMENT 1

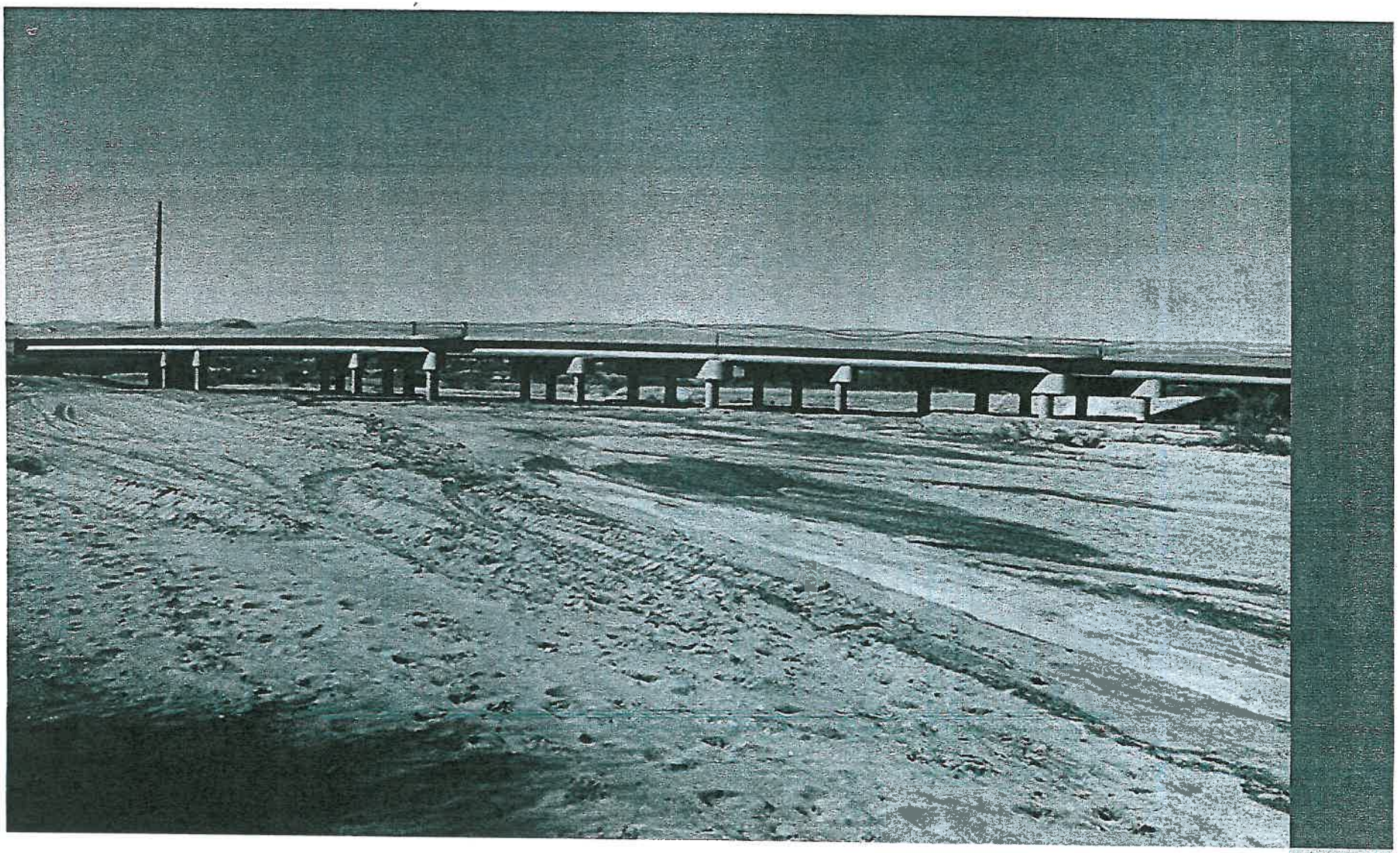
Marsh Station Road Bridge at Cienega Creek

Pima County's Oldest Bridge (built 1920-21)
(load restricted at 20 tons)



Marsh Station Road Bridge at Cienega Creek

Rope Access Inspection 2014 (Spencer Tucker, HDR)



La Cholla Boulevard Bridges at CDO Wash

Pima County's Newest Bridges