From: Kim, Michael L@DOT
To: Nader Tamannaie
Subject: FW: Timber Bridge Question Marin County
Date: Friday, March 20, 2015 10:22:43 AM

FYI

From: Newton, Linda A@DOT
Sent: Friday, March 20, 2015 8:32 AM
To: Wu, Chien@DOT; Carpenter, Rachel@DOT
Cc: Crawford, Eileen@DOT; Fereshtehnejad, Reza@DOT; Kim, Michael L@DOT; Greg.Kolle@dot.gov
Subject: FW: Timber Bridge Question Marin County

Good morning Chien and Rachel,

The below email is from FHWA regarding timber bridges. The Town of Fairfax requested that we consult with FHWA regarding their use for the Meadow Way bridge (Br. No. 27C0008).

I agree with everything in the below email, except that the last sentence of the fourth paragraph states "that fasteners will need to be tightened periodically as a preventive maintenance activity." Tighten fasteners is not preventive maintenance, it is routine maintenance that the Town of Fairfax should do on a regular basis. This activity is not eligible under BPMP work.

Please covey this information to the Town of Fairfax.

If you have any questions, let me know.

Linda
916-651-0022

From: Greg.Kolle@dot.gov [mailto:Greg.Kolle@dot.gov]
Sent: Thursday, March 19, 2015 11:50 AM
To: Newton, Linda A@DOT
Subject: Timber Bridge Question Marin County

Linda,

Per our conversation last week.

I believe a timber bridge is an option that can be designed, built, and maintained that would serve Marin County traffic for many years. I have inspected several timber bridges on western U.S. Forest Service (USFS) roads and many have been built to carry heavy truck traffic associated with the logging industry.

These bridges are glue-laminated beam spans that have short cantilevers at each end of a main span. The cantilever end spans do not bear on the abutment end walls and have an open joint to allow drainage and roadway debris to fall through rather than collect in the bearing area which causes decay of the timber members. The beams are supported on concrete piers with various bearing types. It is best to use steel diaphragms with slotted holes for the attaching through bolts and shear plates to the glue-laminated beams. Details are everything on timber and hire a

consultant that has a history of designing timber bridges.

The deck types also very from cast-in-place concrete to glue-laminated deck panels with live load dowels connecting the panels together. The concrete deck is heavy where the timber deck is lighter and can result in a glue-laminated beam with less depth. The glue-laminated deck panels will need to have a wearing surface application and a good moisture barrier such as Petromat®. The USFS has found that placing a one inch asphaltic concrete lift directly to the glue-laminated panel deck, an application of Petromat®, and a final lift of 1-½ to 2 inches of an asphaltic concrete wearing surface has worked very well to avoid reflective cracks at panel joints (Do not build a glue-laminated panel deck without live load shear transfer dowels!). It is very important to maintain water tightness of the deck system to keep water out of the deck and superstructure beams.

The glue-laminated decks must be fastened to the glue-laminated beams. When designing the fastening system one needs to understand that wood expands and contracts as moisture content changes. Also, fasteners that are tensioned during the hot dry construction period will loosen up after the moisture has left the wood after each wet season. The fasteners will need to be tightened periodically as a preventative maintenance activity.

There are many ways to make a crash tested rail system. If typical steel rails are supported by timber posts that are fastened to the timber deck and maybe girder sides, the designer needs to make allowances for deck expansion/contraction during wet/dry seasons on longer spans so the rail posts (or other timber members) do not split or fail.

Timber is a good alternative to concrete and steel however, after you read this, you will realize it is not a system that you can walk away from. They must be maintained. I hope this helps you answer Marin County's question. Contact me if needed.

Take care,

Greg A. Kolle, PE
Senior Structures Engineer
California Division, FHWA
916-616-0760