Bridge Building 101

Construction for the Spanish Creek Bridge Project began June of 2010 and is scheduled for completion in October of 2013.

The project is financed primarily ($28.2 million) by President Obama’s American Recovery and Reinvestment Act of 2009, and is the 11,000th transportation project to be obligated stimulus funding nationwide.

The original steel truss bridge, completed in 1932, has exceeded its expected service life, shows signs of significant structural fatigue, and does not meet modern seismic and permit truckload standards.

The new 627-foot bridge, which has a 75 year design life, will stand approximately 3 feet west of the existing bridge, rising 160 feet above the creek. The 354 foot arch span will be one of the longest in the state.

The Spanish Creek bridge is also unique in that it will contain a time capsule with letters and items submitted by Plumas County school children, making it truly a bridge to the future.
The Spanish Creek Bridge Replacement Project has been in the works for over ten years, and countless groups and individuals have worked toward the success of this project. Along the steps of planning, design, financing, engineering, and construction, both private and public sector stakeholders have been involved. It has not only required coordination between state, county, and federal government agencies, but also contractors, sub contractors, manufacturers, and suppliers.

Four villagers from various groups are shown in the photo: from left to right, Ande Stevens, VC&A private consultant, Derek Willis, Caltrans Area Construction Engineer, Ron Collins, Caltrans Resident Engineer, and Cesar Perez, Federal Highway Administration Inspector.

Inset: The existing bridge was completed in 1932.
On July 7, 2010, Caltrans in cooperation with the U.S. Forest Service, contractor CC Myers Inc. and the people of Plumas County held a project groundbreaking/construction kickoff at the site of the new Spanish Creek bridge. Work then proceeded with ground preparation at the building site and staging areas. Staging areas are designated areas where vehicles, supplies, and construction equipment are positioned for access and use in a construction site.
Trestles

Three trestles were constructed: one for access to the site, one for the crane, and one for falsework. Falsework is the metal and wood frame that supports the weight of the steel as it is being placed and the concrete as it is being poured and cured. The crane and falsework trestles are shown above. The trestles will be dismantled once work is complete.
A soil nail wall was put into place to stabilize and reinforce existing soil and allow room for construction in this confined area. Soil nails are long hollow steel rods, generally ranging in length from 20 to 60 feet. They are inserted into pre-drilled holes at a slightly downward angle. Grout is then pumped through the center of each nail, filling the hole. Steel mesh and rebar are installed for reinforcement, then the surface is covered with shotcrete, a spray-on concrete. This particular wall is faced with sculpted shotcrete, giving it a natural rock-style appearance. The concrete will be stained to match the existing terrain.
Micropiles or minipiles, are high-capacity, small-diameter (approximately 8”) steel casings that are drilled into place, reinforced with an internal structural bar and casing, and grouted. They are an economical alternative to large diameter drilled shaft foundations, and are especially well suited for restricted access situations or difficult ground conditions such as those in Spanish Creek canyon. Each of the main pier foundations required 72 micropiles.
Piers 2 and 6 are considered to be on the “critical path,” as they will be supporting the entire load of the arch. Thus, it is vitally important that everything from the amount of air in the concrete to the temperature at which it is cured be monitored carefully. Above, Pier 6 thrust block is readied for pouring. Each thrust block requires 250 yards of concrete. The function of a thrust block is to transfer the load from the arch to the foundation.
Abutments 1 and 8 support the ends of the first and last spans and are supported by spread footings. The spread footings use a large concrete slab to absorb the load, and are used where bedrock is close to the surface and space is not an issue. They also help to transfer any seismic energy into the ground.

Pier seven is needed due to the length of the span between Pier 6 and Abutment 8, and is supported by Cast-in-drilled-hole pile footings. CIDH pile footings consist of a series of drilled holes with rebar cage reinforcement filled with concrete. They are used in confined areas or where bedrock is deep in the ground as is the case with Spanish Creek Bridge.
The arch in this bridge design consists of two side-by-side sections. In the photo, you can see where the separation will be between the two sides. Falsework for the arch is being constructed to support the weight of the rebar and concrete while it is being poured and cured. Each arch will be 8’ thick at the base and require special cooling tubes and blankets to cool the concrete as it cures. Arch Bridges are one of the oldest types of bridges, and have great natural strength. Instead of pushing straight down, the loading of an arch bridge is carried along the curve of the arch to the supports at each end.
Support columns are added to complete Piers 2 and 6. Spandrel Bents 3, 4 and 5 transfer load from the bridge deck to the arch. The spandrel is the area above the arch and below the bridge deck and bents are the piers in between. The side-by-side Pier 6 column cages (right) can be seen next to the arch falsework and cages in the photo above.
Finishing Up: Bridge Deck & Details

The bridge deck is the last major piece to be put into place. After concrete is poured, the bridge approaches will be installed and tied to the existing roadway. Next is railing, paving and striping. The barrier railing design, modified to be bicycle friendly, is see-through and will be beneficial for snow removal efforts.

The old bridge will be dismantled and the trestles removed.

After the bridge is completed, all that is left to do is a super Ribbon Cutting Ceremony hosted by our Caltrans District 2 Public Information Office team!