(One of the weekly columns I wrote for the Telegraph during the bridge construction. I also supplied photos.)

**City of Folsom**

American River Bridge at Lake Natoma Project

For immediate release
Weekly bridge progress report Aug. 14 1998
Contact: Linda Holderness at 355-1742.

**CUTLINE:**
The columns of the new bridge are the key to making it earthquake safe. They are ductile, meaning they move with the quake instead of snapping in two, and they are separated from the bridge by isolation bearings, which allow the bridge to move with the quake and then return to its original place.

**New Folsom bridge being built to withstand 'worst-ever' earthquake**

The recent earthquake in central California has raised the question of how Folsom's new bridge would fare if we had an earthquake here. The answer, as the city's transportation consultant, Will Kempton, put it recently, is that "in the event of an earthquake, the new bridge may be one of the safest places to be."

The bridge is being built to withstand earthquakes of two different magnitudes: a quake that would likely occur in Folsom only once every 250 years; and a quake that would predictably occur in Folsom only once in a geologic age – the worst ever possible.

In the first case, the bridge would sustain minor surface damage, but it would remain standing and you would be able to drive over it.

In the second case, which engineers call "maximum credible," the bridge would sustain major damage but would not collapse. This earthquake is not one we're ever likely to see here, says Michael Chlarson, Folsom bridge office engineer with FMcH. But if one did happen, the columns would lose all their surface concrete down to the reinforcing steel cages underneath.

"They would look terrible," Chlarson says, "but the bridge would remain standing. It might need to be repaired, but probably not replaced."

Two main design elements give this bridge, and all other bridges built according to current Caltrans standards, its resilience to earthquakes. One is the way the columns are constructed, and the second is the bearings placed between the columns and the bridge.

The columns, Chlarson says, remain standing in earthquakes for three main reasons: First, they are, in engineering terms, "ductile," meaning "compliant." A column that isn't ductile is brittle. A ductile column will bend in an earthquake like a willow in the wind. A brittle column is more like an oak tree: It could snap.

Second, the columns are securely anchored deep into the bedrock layer that lies up to 80 feet below the surface of the earth. And third, the reinforcing steel inside them is formed into a cage, and the hoops of the cage give the columns more strength and ductility.

If an earthquake hits and shifts the bedrock, the ductile column will move with it, but it won't fall.

The other main earthquake provision in this bridge is its seismic isolation bearings. The bearings are placed above every column – 36 of them in this bridge. These bearings are like a ball and cup, Chlarson says. The cup portion is at the top of the column; the ball is at the bottom of the bridge.

The ball of the bridge rests inside the cup on the column. When an earthquake hits, the ball will roll around the sloped sides of the cup, but gravity will always pull it back to the bottom. When the earthquake movement stops, the ball stops rolling. No matter how great the quake, the ball cannot roll out of its cup.

Because of these bearings, the bridge is not physically anchored to the columns. A huge giant (very huge) could simply lift up the bridge intact.

It's possible to design a bridge that would be earthquake-safe without isolation bearings and without ductile columns, Chlarson says, but it would require much-larger-diameter columns placed deeper into the bedrock and cost a lot more money. Ductile columns with isolation bearings withstand earthquakes better than larger columns connected to the bridge.

"Stronger," says Chlarson, "is not always better when you build in earthquake country."

**Bridge progress**

At the south side of the project, bridge workers this week are placing concrete for the soffit and stems (bottom and sides) on the west side of the two southern-most spans. If the weather is hot, they will start at 1 a.m.

Crews have now finished driving piles for the falsework at the south frame – the section of the bridge that spans the lake. They will continue building the falsework across the lake, working northward from the south abutment. The falsework materials that have been taken down from the north frame are being reused for the south frame.

The falsework for the south frame is arched for added strength because the distances between the piers are greater than the distances between piers in the north frame. The roadway will be at the correct level – only the depth from the roadway to the bottom of the bridge will vary.

As the falsework is being placed, crews also will place the forms for the bridge and lay the reinforcing steel.

Unlike the north frame, the south frame is being built half at a time – the west half first, then the east half for each span. This is because of the limited distances the cranes can reach. A span is the distance between the piers.

Concrete pours for the upper retaining wall for the southbound onramp from Leidesdorff Street are beginning this week.

At the north side of the project, the falsework is now stripped, and from some vantage points you can see the design details at the columns and the overlooks. Workers at the north side are organizing the falsework materials to reuse them for the south frame.

The Leidesdorff Lid is expected to open to cross traffic in late August. The road across the lid will be a detour, not the finished road. Once the lid detour is in place, River Way will be removed to make way for retaining walls.

The Leidesdorff Lid is an overcrossing that allows bridge traffic on Folsom Boulevard to pass under Leidesdorff Street. It's a unique feature of the new bridge that was designed to allow vehicles and pedestrians to travel throughout the historic area, add parking to downtown Folsom, and eventually carry light rail to the bridge.