

10 GENIUS INVENTIONS

WE WANT TO SEE

# Popular Mechanics

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POPULARMECHANICS.COM MAY 2008

SPECIAL REPORT

# REBUILDING AMERICA

SMART NEW PLANS FOR

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- Blackout-Proof Power
- Tougher Dams & Levees

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This 5-ft.-tall Crosby block and hook weighs 3800 pounds.

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JAY LENO'S 600-HP E85 VETTE



● REBUILDING AMERICA

# THE WORK STARTS HERE

● American infrastructure is in trouble, from collapsed bridges to leaking dams. In a yearlong investigation, **POPULAR MECHANICS** uncovered the fresh ideas, smart engineering and new technology we need to fix it. Here's the plan.

The St. Anthony Falls Bridge rapidly takes shape on the banks of the Mississippi River in Minneapolis. It will replace the I-35W bridge, which collapsed on Aug. 1, 2007, killing 13. (Photographed Feb. 4, 2008.)

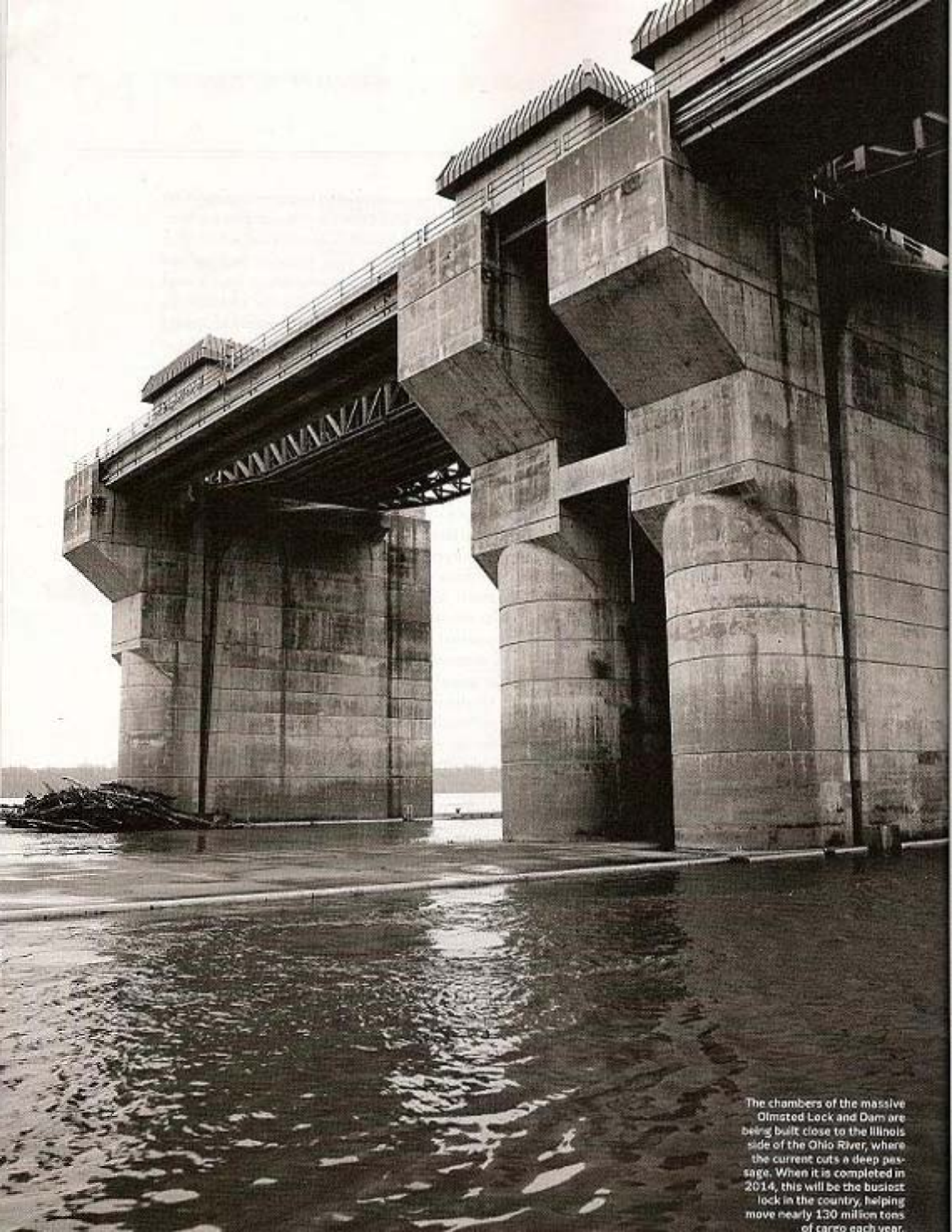
**ON THE WEB >**

For more photos, plus insights from an infrastructure conference being hosted by PM and the National Science Foundation in April, visit [popularmechanics.com/rebuilding](http://popularmechanics.com/rebuilding).

● *BY ERIK SOFGE*

*& THE EDITORS OF POPULAR MECHANICS*

*PHOTOGRAPHS BY CHRISTOPHER GRIFFITH*



The chambers of the massive Olmsted Lock and Dam are being built close to the Illinois side of the Ohio River, where the current cuts a deep passage. When it is completed in 2014, this will be the busiest lock in the country, helping move nearly 130 million tons of cargo each year.

GOAL

## Fix the Locks

### ACTION PLAN

Navigable waterways are America's stealth transportation system. "We're aware of trains when we're sitting at the crossing and of trucks when they're flying by on the highway," says Mark Hammond, an economist with the Army Corps of Engineers. "But we tend not to take notice of the river, which carries an awful lot of stuff." The country's more than 12,000 miles of inland waterways transport 625 million tons of freight each year, including coal and grain. About half of all U.S. lock-and-dam systems need to be replaced or modernized.

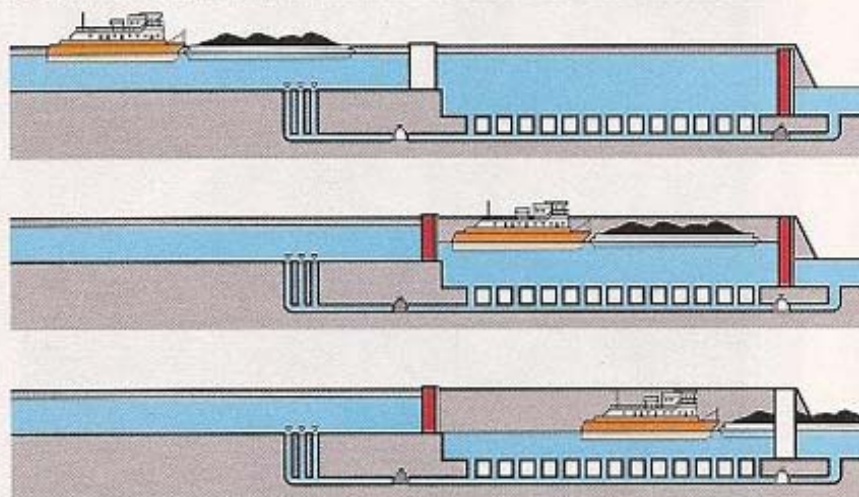
### PROGRESS REPORT

#### Olmsted Lock and Dam, Illinois

The Ohio River's Olmsted Lock and Dam (opposite), located on the border of Illinois and Kentucky, will replace rotting, 1920s-era structures. Along with other cargo, 12 million tons of coal travel through the current locks by barge each year, fueling power plants that supply electricity to millions of customers. (It would take 460,000 semi trucks to replace these barges.)

Olmsted's lock

chambers are being reinforced with layers of wrist-thick steel rebar to withstand possible earthquakes in the New Madrid Fault. Approach walls will float instead of being fixed to the river bottom, saving building and maintenance costs. Modern structures to control water levels will substitute for the current locks' timber wicket gates, which are operated by a dam tender in a boat.



The new Olmsted Lock and Dam has two 1200-ft.-long, 110-ft.-wide chambers. Once barges enter, operators will close the gates and adjust a set of valves to raise or lower the water level as needed. No pumps are required.

+

hangarlike structures where crews are constructing massive sections of the span. Heaters keep air temperatures at 40 degrees to help the concrete cure properly. When one section is finished, workers slide the house down the line, leaving a trail of monoliths in their wake. Everything seems to happen simultaneously, and that's been true since work began. When test shafts were drilled in November, engineers realized they'd need to adjust the placement of the footings by 5 ft. On another project, getting approval might have taken weeks; here, they made the appropriate change and kept moving.

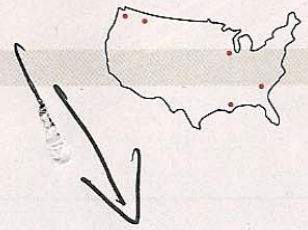
Outside the warming houses, a high-pitched buzz pierces the whine of generators and heavy equipment. Against the flat winter sky, a black dot grows bigger—an unmanned aerial vehicle is coming in for a landing in a nearby field. This toy-size radio-control plane has been on duty since construction started in the fall,

capturing aerial images that the contractor uses to help stay on schedule.

The work site is full of such innovations. There's an old engineering adage: You can have it good, fast or cheap—pick two. At a projected cost of more than \$230 million, the St. Anthony Falls Bridge will not be cheap, but more than money is at stake. Plans call for high-performance concrete, a structural monitoring system and a life span of 100 years. If it comes in on time, the bridge will prove what engineers and workers can do when they have the freedom to innovate and the resources to get the job done. On the riverbank where everything fell apart, a model for building the future may be coming together. America is watching. **PM**

REPORTING BY Davin Coburn, Alex Hutchinson, Emily Masamitsu, Erin McCarthy, Erin Scottberg and Erik Sofge.

DIAGRAM BY DOGO



## 10 Things to Fix Right Now

+ No one can predict what bridge, levee or water main will fail next. But some problems are widely known, and work is long overdue. We need to begin rebuilding the nation's infrastructure somewhere. Here are 10 great places to start.



### + Circle Interchange, CHICAGO

After years of being ranked two of the worst traffic bottlenecks in the country by groups like the American Highway Users Alliance, both the U.S. 101 at the I-405 Interchange in Los Angeles and the I-610 at I-10 Interchange in Houston are being revamped. But the third-worst spot for highway congestion, Chicago's Circle Interchange, is going nowhere. One parkway and three expressways meet here, and close to 300,000 vehicles a day are forced to reduce speed while navigating a network of tightly curved ramps. The result: an estimated 25 million hours in delays per year. A \$975 million expansion project might eventually relieve traffic on one of the expressways, but no plans have been announced to address the congested interchange itself.

### + Canal Lock, NEW ORLEANS

The Industrial Canal Lock in New Orleans carries up to 20 million tons of cargo a year between the Mississippi River and the city's Industrial Canal, which leads to the Gulf Intracoastal Waterway. Supporting this commerce is critical to the economy of New Orleans and the entire country, yet the city's infrastructure is barely up to the task. The 87-year-old lock is undersized, and vessels can wait 36 hours to navigate it. Congress first authorized new locks in 1956. The Army Corps of Engineers finally began the work in 2002 but was held up when a judge ruled it had failed to prepare the proper environmental impact study. Construction is expected to take 12 years and cost nearly \$800 million—but 50 years after work could have begun, no completion date has been set.

### + Alaskan Way Viaduct, SEATTLE

After an earthquake in 2001 damaged the Alaskan Way Viaduct, a traffic artery in Seattle, inspectors found that some supports had subsided 5 in., weakening the structure. Options included fixing the elevated roadway and replacing it with a tunnel or improved surface roads. There's still no decision. Meanwhile, as many as 110,000 vehicles travel on the compromised structure each day.

### + Dover Bridge, BONNER COUNTY, IDAHO

Idaho's Dover Bridge sees about 5000 vehicles per day, and we don't envy the drivers. The bridge scored an outrageously low "sufficiency rating" of 2 out of 100 in the National Bridge Inventory. Last year, a 30 x 30-in. piece of the deck was found hanging by its rebar. Replacing the bridge would cost \$25 million; the funds have not materialized.

### + Water System, ATLANTA

Water shortages aren't limited to the Southwest. When Georgians faced drought last fall, residents of Atlanta pitched in to reduce their consumption, yet as much as 18 percent of the city's water was hemorrhaging through leaking pipes. A similar situation is found throughout the country. Municipal lines running beneath the streets lose massive volumes of water, as do privately owned pipes that carry water to houses and other buildings.