

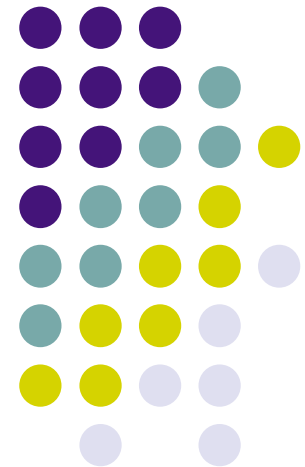
Building Bridges in the US and China

Presented as part of
*The Wisconsin Department of Transportation's Careers in Motion:
Science, Engineering, and Transportation*
Wednesday, February 25, 2009

By:

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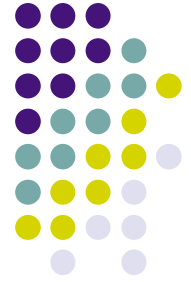


Why Build Bridges?

- *“To get to the other side, of course!”*
 - River
 - Road
 - Ravine
 - Other?



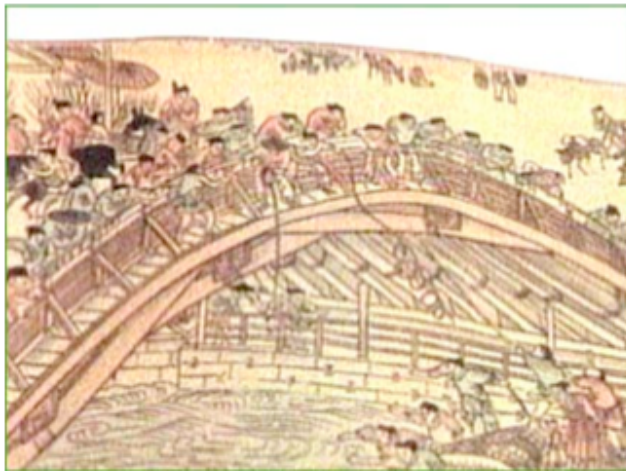
Great US Bridges





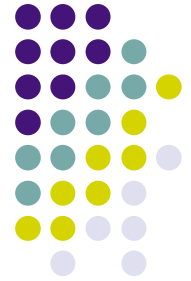
Chinese Bridges

- Some of the oldest in the world
- Built using simple designs and materials



韓江飛雁圖 Flying birds over Syantse Bridge, Teochew, Flickr,
<http://www.flickr.com/photos/83381149@N00/3022283294>

Oldest Extant (“still in existence”) Bridge in China



Zhaozhou (Anji) Bridge,
Circa 600 AD
This bridge is over
1400 years old!

DID YOU KNOW: China has been building bridges over waterways since at least the ancient Zhou Dynasty (1600–1046 BC)? That’s more than 3400 years ago!

Did you know: Chinese Workers Helped Build the US Transcontinental Railroad (1863-1869)



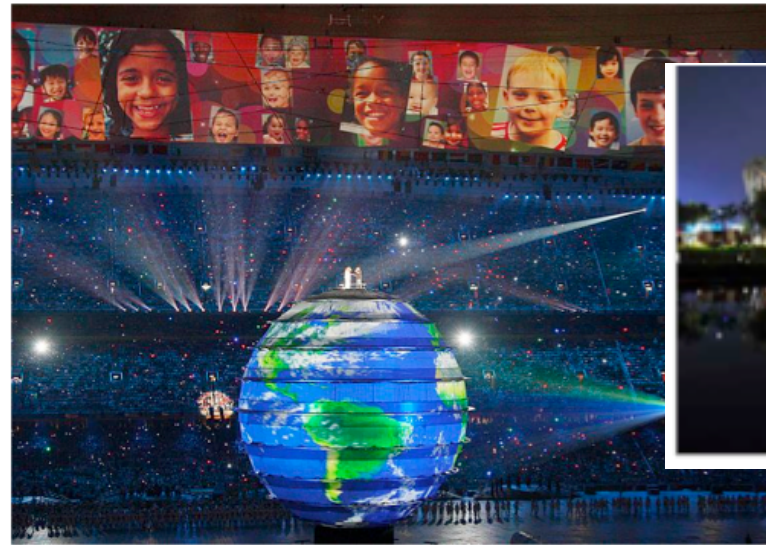
Photo credit: The US National Park Service



Photo credit: The Andrew J. Russell Collection, the Oakland Museum of California

“With an average height of 4'10" and weight of 120 lbs., many doubted these men could handle 80 lb. ties and 560 lb. rail sections. But handle them they did, as well as most other construction jobs. So well, in fact, that by the time they joined the rails at Promontory Summit, Utah on May 10, 1869, **more than 9 out of 10 workers, over 11,000 in all were Chinese.**” --Robert Chugg, The Brown Quarterly, Volume 1, No. 3 (Spring 1997) <http://brownvboard.org/brwnqurt/01-3/01-3f.htm>

China's Recent Construction Accomplishments (<8 years)



China's New Bridges





Bridges in Today's China

- Some of the world's
 - LONGEST
 - WIDEST
 - DEEPEST
 - TALLEST
- Designed and built using some of the world's
 - NEWEST TECHNOLOGIES
 - STRONGEST MATERIALS



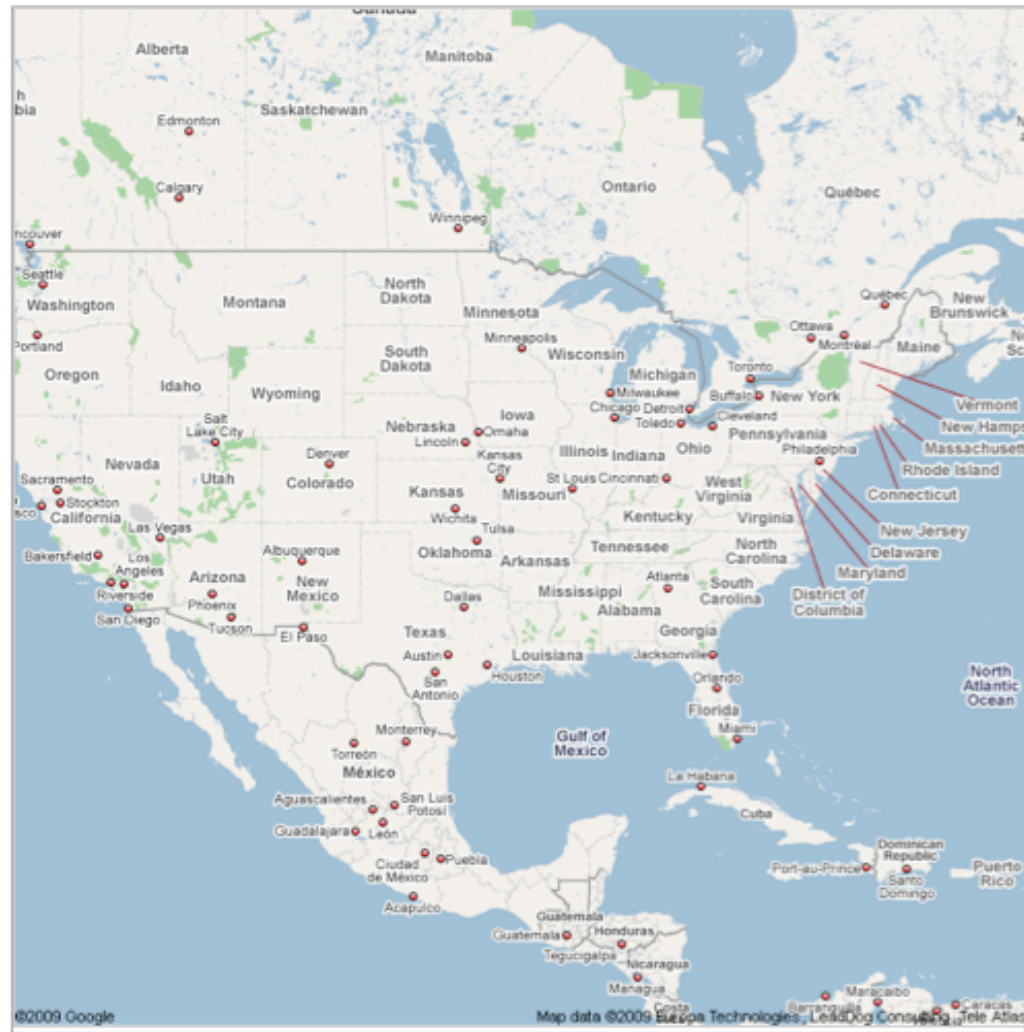
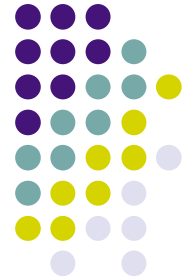
Name	Length metres (feet)	Span metres (feet)	Completed 	Country
Wei River Bridge of Zhengzhou–Xi'an Passenger Dedicated Railway	79,732 m (261,588 ft) ^[1]	? (?)	2009	People's Republic of China
Bang Na Expressway	54,000 (178,000)	44 (144)	2000	Thailand
Lake Pontchartrain Causeway	38,422 (126,024)	45.7 (149.9)	1956	United States
Manchac Swamp bridge	36,710 (120,400)	? (?)	1970s	United States
Yangcun Bridge of Beijing-Tianjin Intercity Rail	35,812 m (117,493 ft) ^[2]	?	2007	People's Republic of China
Hangzhou Bay Bridge	35,673 m (117,037 ft)	448 (1,470)	2007	People's Republic of China
Runyang Bridge	35,660 (116,994) ^[3]	1,490 m (4,888 ft)	2005	People's Republic of China
Donghai Bridge	32,500 (106,627)	400 (1,312)	2005	People's Republic of China
Shanghai Maglev Train Line	30,500 (100,066)	?	2004	People's Republic of China
Atchafalaya Basin Bridge	29,290 (96,095)	? (?)	1973	United States
Yanshi Bridge of Zhengzhou–Xi'an Passenger Dedicated Railway	28,543 m (93,645 ft) ^[4]	? (?)	2009	People's Republic of China
The No. 1 bridge (光华路 – 八堡村) of Tianjin Binhai Mass Transit	25,800 (84,645)	? (?)	2003	People's Republic of China
Chesapeake Bay Bridge-Tunnel	24,140 (79,200)	? (?)	1964	United States
Liangshui River Bridge of Beijing-Tianjin Intercity Rail	21,563 m (70,745 ft) ^[2]	?	2007	People's Republic of China
Yongding New River Bridge of Beijing-Tianjin Intercity Rail	21,133 m (69,334 ft) ^[5]	?	2007	People's Republic of China

DID YOU KNOW:

Of the top 15 longest bridges in the world, 10 are located in China, and 4 are located in the US?

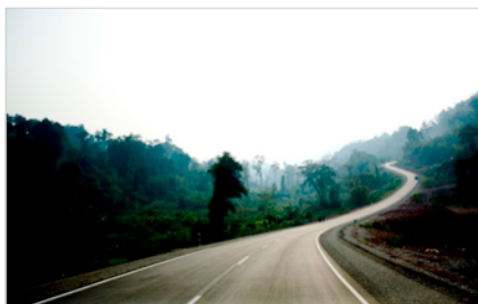
http://en.wikipedia.org/wiki/List_of_bridges_by_length

American Roads and Bridges





Chinese Roads and Bridges





While China is now building more new bridges than ever...

The New York Times - Breaking News, World News & Multimedia

SATURDAY, FEBRUARY 21, 2009
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TOOLS

Minneapolis Bridge Collapse

The I-35W bridge over the Mississippi in Minneapolis collapsed during rush hour on August 1, 2007, plunging dozens of cars and their occupants into the river. The calamity disrupted transportation, aimed a spotlight on public infrastructure, and evoked an outpouring of public response.

I-35W BRIDGE REOPENING

Read stories and see graphics, photos and video on the I-35W bridge reopening.

GETTING AROUND

Interactive map with live traffic information and resource links

YOUR VOICE

Our audience shares stories and photos

Were you affected by the collapse?

Send us your photos from the scene

LATEST NEWS

PCI seeks to add state, design firm to bridge case

A contractor that's being sued over the Interstate 35W bridge collapse says the state and an engineering firm should be defendants in the case as well. Progressive Contractors Inc. is seeking to make the others cover any damages it might



...our bridges
are beginning
to collapse!

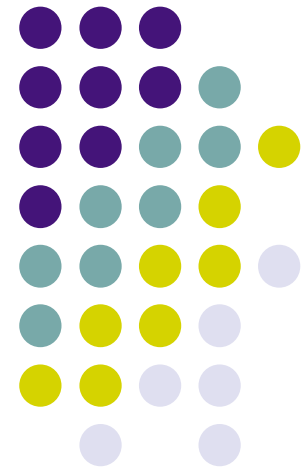


Want to be a bridge engineer? Well, we really need YOU!

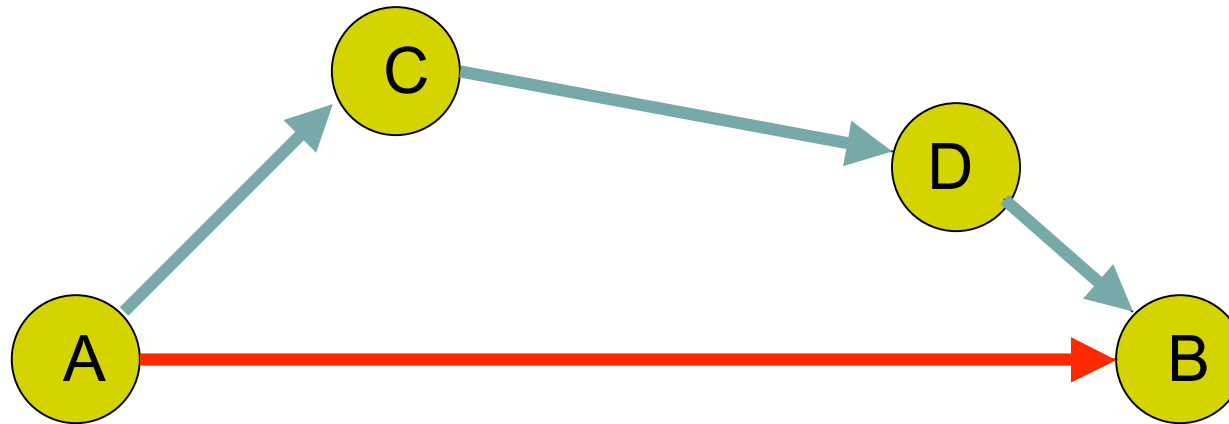
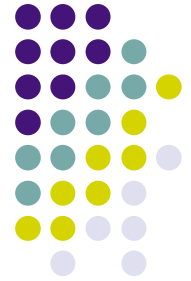


- Learn:
 - Math
 - Physics
 - Chemistry
 - Other?
- Also very important:
 - History
 - Politics
 - English
 - Communications
 - Urban Planning
 - Other?

Practice Exercise



Question: Which Path Is Best?



A-B or **A-C-D-B**?

Answer: *It Depends!*

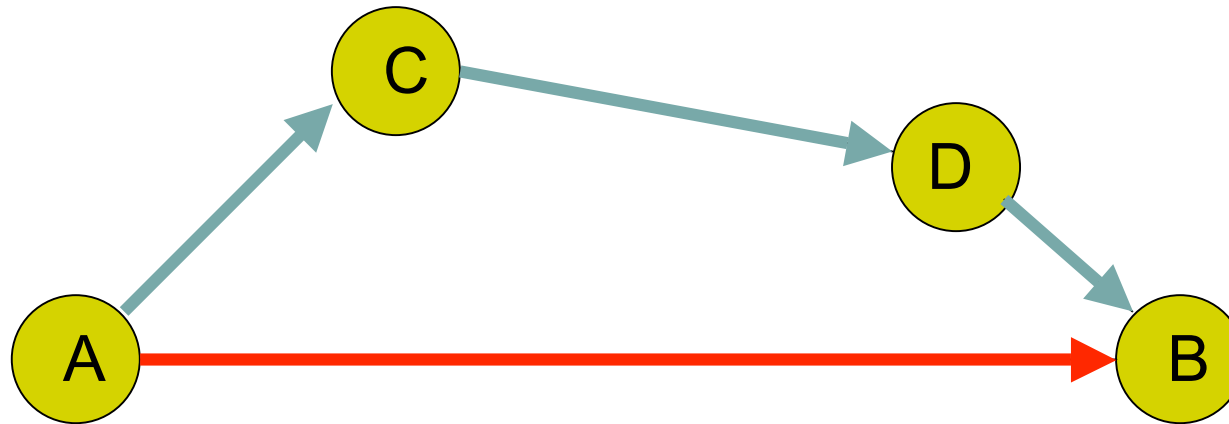


It Depends on...

- Costs
- Safety
- Design
- Environmental impacts
- How many travelers will use it
- How long it will last
- Other?

It Depends...

on the *values of the links*



If: **AB = 10** and
AC = 3, **CD = 4** and **DB = 1**,
Then: $A-B > A-C-D-B$
Therefore: A-C-D-B is best

If: **AB = 6** and
AC = 3, **CD = 4** and **DB = 1**,
Then: $A-B < A-C-D-B$
Therefore: A-B is best

If: **AB = 8** and
AC = 3, **CD = 4** and **DB = 1**,
Then: $A-B = A-C-D-B$
Therefore: A-B and A-C-D-B
are the same

Here's What You Can Do Right Now...



- Observe bridges all around you, wherever you go
 - Look at their design
 - Think about who wanted to build them and why
 - Can you figure out what it took to get them built?
 - Think about what would happen if bridges weren't there-- who would miss them?
- Study hard in school and talk about bridges with your friends and your family
 - Tell them what you notice about them
 - Ask them what they notice about them

Things to Notice About A Bridge



- Who uses it?
- How long is it?
- How tall is it?
- How many supports does it have?
- Do cars, trains or boats go underneath it?
- How is the roadway being held up?
- How many lanes of traffic does it carry?
- Are pedestrians allowed to walk across on it? How about bicycles?
- What would people do without it?

Thank you for thinking about building bridges!

Eva Lerner-Lam

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