

Ten-years after of the I-35W bridge: Remembering lives lost, many affected, and with gratitude to our resilient and amazing first responders and the impressive community.

Upon reflection on witnessing the collapse of the I-35W bridge, I wrote some of my thoughts on ... The following are the chronological sequence of some of the messages I sent to our colleagues, alumni and students. Honoring all involved:

-----Original Message-----

From: Massoud Amin [mailto:amin@umn.edu]

Sent: Wednesday, August 01, 2007 7:17 PM

Subject: Tragic event-- collapse of I-35 bridge near Washington Ave and WBOB building

A few minutes ago my colleague, Prof. Bruce Wollenberg, and I witnessed the sudden tragic collapse of the entire I-35 bridge over the Mississippi River near Washington Avenue. I hope that you, all your loved ones, our friends and colleagues are OK and safe.

Bruce, Mr. Gary Smaby, and I were in my office at CDTL on the fifth floor of WBOB this afternoon. Shortly after Gary left, Bruce and I were discussing our smart grid research projects.

In our plain sight we witnessed this tragedy happen very shocking -- the people on the bridge and people in cars, trucks, and a school bus plunging down -- I immediately called the 911 and the University's emergency. The bridge sections buckled and several parts collapsed, almost in slow motion

Chris Nelson, the CDTL accountant, Bruce and I were the only ones left in the office at the time. I hope that you are safe. Our thoughts are with you and those unfortunately affected.

Best regards,
Massoud

Sent from my BlackBerryR handheld (sorry for any typos)

-----Original Message-----

From: Massoud Amin [mailto:amin@umn.edu]

Sent: Thursday, August 02, 2007 9:59 PM

Subject: FW: Tragic event-- collapse of I-35 bridge near Washington Ave (and WBOB)

Many thanks for many kind email messages and phone calls after the tragic collapse of the I-35W bridge in Minneapolis.

We have all spent the last day in disbelief running the tragic images in our minds and watching video images we thought only possible in other parts of the world or in movies. Yet this bridge collapse tragedy did take place in Minnesota, so close to our offices, reminding us of the fragility of life and how precious it is.

I was interviewed four times by BBC and by CBC and spoke on their radio and TV programs; they were all very gracious and grateful. In addition, an article on BBC news has briefly quoted me

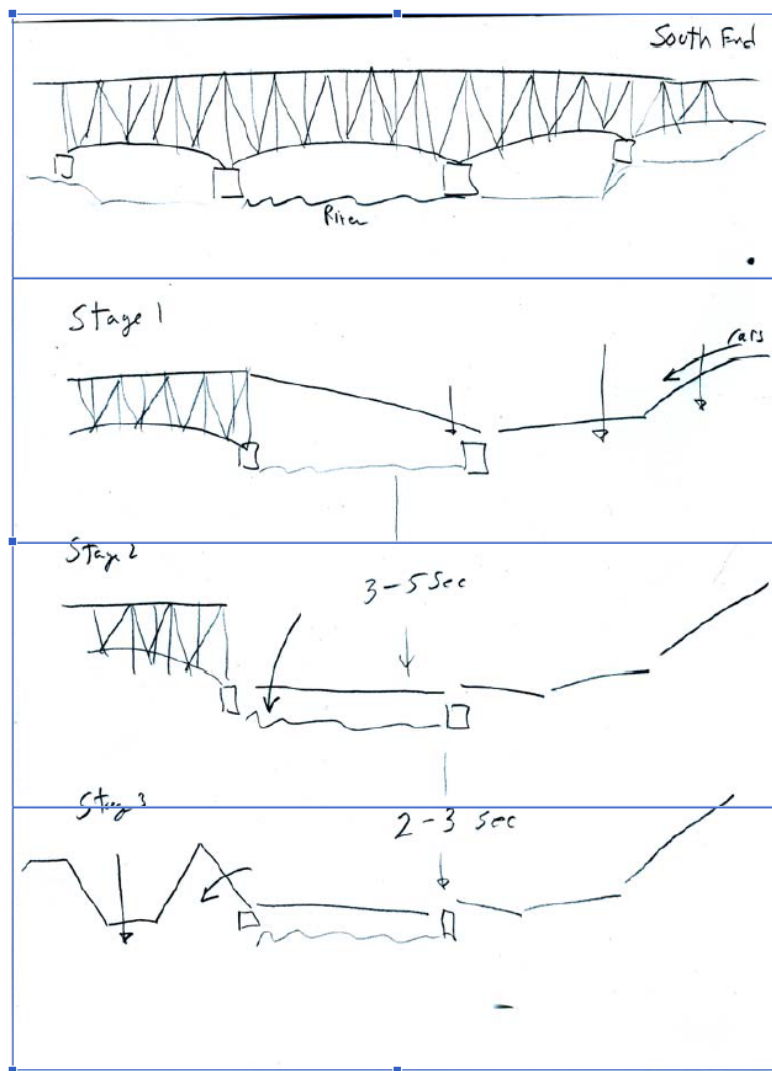
from my first interview last night recounting the events of the I-35W bridge's collapse
<http://news.bbc.co.uk/2/hi/americas/6927147.stm>

Please take a look at this:

http://www.liveleak.com/view?i=1ab_1186054443&p=1

I also recall that the bridge fell first at the short span on the downtown side, then the main span went down first at the downtown end, and broke off the opposite side short span (quite clear in video) which stood for a few seconds before the support buckled and it went down.

I was in my office about 200 yards from the bridge (attached please find a picture with a red arrow to my corner office on the fifth floor of the six story building) with two walls of glass in my office facing Mississippi River and the I-35W bridge that collapsed.



The whole scene played over and over in my mind all night -- didn't get a good night sleep at all. I just got back from Rochester, Minnesota (about 95 miles away).

I hope that the other members of alumni/faculty/staff/students and family members are safe following this tragedy.

The rescue effort was amazing, especially the number of university students and other members of the community and first responders who were carrying wounded people and looking for injured. Although emergency crews and police prefer and instruct that civilians stay away.

Best wishes and warmest regards
Massoud

PS. Our colleagues in the news media were asking me if I took any pictures or videos or "as an engineer, what is my assessment..."...

Ironically I didn't take any pictures as I was busy calling 911, University Emergency, my wife, and then heading to the site to help if I could.

Regarding the areas of expertise, I told the BBC and Reuters' colleagues that for the design, inspection and condition of bridges it is important for them to speak with structural engineers; and referred them to the Board on Infrastructure and Constructed Environment (BICE) at the National Academy of Engineering (NAE), and professors in Civil Engineering who teach courses on bridges and also assess their condition.

For my expertise, I kept my comments as brief as it was relevant in the areas of the risk assessment, as well as reliability and robustness of critical infrastructure. As an example, I mentioned the ASCE's infrastructure score card that I provide to my students who are full-time working Mn/DOT civil engineers and city managers. They receive the complete handout of the scorecards and the summary reports/paper in one of my classes at the University of Minnesota (Infrastructure Systems Engineering-ISE 5302, Critical Infrastructure Security and Protection).

In addition, even locally the issue of interdependency among infrastructures has kicked in... not only the train that was under the collapsed north side of the bridge, but also the public communication systems got overloaded, and a transformer was crushed in the bridge collapse... and the West Bank Campus has been asked to minimize electricity use:

"The collapse of the 35W bridge has caused damage to the Xcel electrical system and is threatening the electrical service to most of the West Bank.

Xcel is in the process of developing a work around to this problem. When this solution is in place, the service to the West Bank will be stabilized.

In the meantime, there is some risk that electrical service could be interrupted, reduced or lost. The critical period is today and over the weekend"

I don't know whether I mentioned earlier that the rescue effort was outstanding, and my hat is off to the great work of so many amazing first responders and people involved in rescue and recovery efforts- although we only seem to notice the infrastructure when it fails or causes

delays and disruptions in our activities. We expect it to be in the background and not to interfere with our wishes and activities.

Considering the tragedies of recent years, as we plan ahead, I hope that we don't take our nation's critical infrastructure for granted; and I hope that as a nation we'd dedicate a risk-assessed and increased resources to the "pipelines" including the key factors that would mitigate risks and even prevent similar tragedies and other infrastructure and corresponding human capital.

Infrastructure is Patriotic as it fundamentally underpins our society, our economy, and quality of life.

Have a restful weekend and please take very good care. I look forward to seeing you soon in good health.

Warmest regards
Massoud

-----Original Message-----

From: Massoud Amin [mailto:amin@umn.edu]

Sent: Friday, August 17, 2007 3:40 PM

Subject: RE: Tragic event-- collapse of I-35 bridge near Washington Ave and WBOB building

Dear Colleagues,

Since I witnessed the tragic collapse of the I-35W bridge from my office at CDTL, several colleagues have asked me to assemble the messages I sent to our staff, faculty, students and alumni at CDTL and to provide a summary perspective.

As an individual, it was shocking and very painful to witness it right in from our offices here in Minneapolis.

After the first shockwave of their need for eyewitnesses was over, the news media and interested colleagues have increasingly been asking me about infrastructure security etc. related to my work while serving on the Board on Infrastructure and Constructed Environment (BICE) at the NAE, infrastructure interdependencies and protection, the course I developed and teach (ISE 5302, Critical Infrastructure Security and Protection). I intentionally downplay this since it is too early to know what went on and that I am a "math guy and an electrical engineer" with very limited knowledge of bridges and metallurgy...

Beyond being an eyewitness, when I was asked for my "assessment" and expertise, I have kept my comments as brief as it has been relevant in the areas of the risk assessment, as well as reliability and robustness of critical infrastructure. As an example, I mentioned the ASCE's infrastructure score card that I provide to my students who are full-time working Mn/DOT civil engineers and city managers, who receive the complete handout of the scorecards in one of my classes (Infrastructure Systems Engineering-ISE 5302, Critical Infrastructure Security and Protection).

Regarding the areas of expertise, I told the BBC and Reuters' colleagues that for the design, inspection and condition of bridges it is important for them to speak with structural engineers; and referred them to the Board on Infrastructure and Constructed Environment (BICE) at the National Academy of Engineering (NAE), and to Professors Roberto Ballarini, Ted Galambos, Vaughan Voller, and John Gulliver, in the Civil Engineering department who teach courses on bridges, infrastructure systems, and also assess their condition. They are especially qualified to comment on bridge design, inspection and conditions from an engineering perspective. After the initial shock, we begin to think how we can do positive things in humane, innovative, cost-effective, and forward-looking ways.

I also spoke with Prof. Vaughan Voller, the director of graduate studies for our joint Master of Science in Infrastructure Systems Engineering (ISE) about the tragedy and what we can do in a positive way to help. Professor Voller emphasized that one of the key objectives of the ISE program "is to train civil engineers to become effective managers capable of the complex tasks involved in operating and sustaining the civil infrastructure." However, the means to manage and sustain the infrastructure is a joint effort in which we are all stakeholders:

From a system's perspective, designers, builders, operators and maintenance personnel are obviously "inside" these infrastructure networks and can have direct and sometimes real-time effects on them. But users of a transportation, electric power, telecommunication or pipeline system also affect the behavior of those systems, often without conscious intent. The amounts, and often nature, of demands put on the network can be the immediate cause of conflict, diminished performance and even collapse. Reflected harmonics from one user's machinery degrade power quality for all.

Long transmissions from a few users create Internet congestion. Simultaneous lawn watering drops everyone's water pressure. No one is "outside" the infrastructure.

In Minnesota we will rise above the pain and come together considering all public policy/societal, engineering, design, aesthetics, economic and systemic aspects to build a very long lasting, efficient and elegant marvel of engineering and humanity.

This will help build a bridge to a much better place and will honor those affected so tragically.

-----Original Message-----

From: Massoud Amin [mailto:amin@umn.edu]

Sent: Friday, August 18, 2007 9:59 PM

Subject: FW: MPR forum broadcast at noon today on "What Does Safety Cost?"

Good morning,

MPR will have a program at noon today (that was recorded last night) on "What Does Safety Cost?"

Just in case if you have the time to tune in at noon, attached please find a related email and here is a brief summary of the topics discussed:

--

Catastrophes such as the 35W bridge collapse and 9/11 raise the question of how much the government should invest in the safety and security of its population. While it may be possible to ensure that every bridge in the United States is sturdy and every airport secure, it may come at a cost that is too great for the government to bear.

Minnesota Public Radio will host a discussion in The UBS Forum that will address several key questions:

1. How much should the state and federal government spend to improve our infrastructure?
2. When and how should that money be spent?
3. Where should the funding come from?
4. What level of safety do we require? Are we willing to accept the trade-off between cost and safety?

Addressing these questions will require policymakers of every political stripe to find common ground. Many political groups advocate for policies that are fundamentally contradictory; are these differences irreconcilable?

This discussion will feature several of the state's most prominent public policy leaders including:

- * R.T. Rybak, Minneapolis Mayor (D)
- * David Hann, Minnesota State Senator (R)
- * Art Rolnick, director of research at the Federal Bank of Minneapolis
- * Sean Kershaw, president of the Citizens League
- * David Strom, president of the Minnesota Free Market Institute
- * Larry Jacobs, director, Center for the Study of Politics and Governance
- * Dane Smith, president of Growth and Justice
- * Peter Hutchinson, former Independence Party gubernatorial candidate

It will also include knowledgeable members of MPR's Public Insight Network.

This event will be streamed live online and recorded for broadcast at noon on Friday August 17th.

There was a high-level of audience participation. My wife Elizabeth and I were among the invited audience members; and I made a few comments that were also very well received by all. The recorded program will be on their website at

<http://minnesota.publicradio.org/display/web/2007/08/17/midday2/>

I was very careful not to mention that Bruce and I witnessed the whole thing (as it was not relevant) nor pushed for our Infrastructure Systems Engineering program ("ambulance chasing" is unacceptable and wrong). The interactions and comments were very well received and all went very well.

I wish you a restful weekend, and look forward to seeing you soon in good health.

Warmest regards,
Massoud

-----Original Message-----

From: Massoud Amin [mailto:amin@umn.edu]

Sent: Monday, August 20, 2007 6:26 PM

Subject: RE: Heard You on MPR!

Many thanks for your email messages, and it is great to hear from you.

I crossed the bridge a day earlier on my way to Mn/DOT training facility and it felt a bit odd (somewhat wobbly, and I told my wife Elizabeth that evening before the collapse that the bridge felt like an older wooden roller coaster I used to ride in New Jersey, and wondered whether it was by design built to be flexible-- like those in the West Coast or in earth-quake zones-- or due to the resurfacing and renovation).

There was a very good Op Ed piece in the Saturday issue of the New York Times (also available on NYT website) about bridge design by Professor David Billington from Princeton U, whom I met in February 2003 en route to Minnesota a month later.

Regarding the MPR forum "What Does Safety Cost?" at noon on Friday, I was unable to listen due to a meeting.

I really appreciate what MPR does for Minnesota and the broader community, and found the recorded program on their website at

<http://minnesota.publicradio.org/display/web/2007/08/17/midday2/>

As an audience member, I was very careful not to mention that Bruce and I witnessed the whole thing (as it was not relevant), nor pushed for our Infrastructure Systems Engineering program ("ambulance chasing" is unacceptable and wrong). The interactions and comments were very well received. More details are attached below.

Although I try to use reserve and focus but there is, from my point of view, still a strong sense that we have not yet figured a way to access the energy and wisdom and angst of our general community. Another nuanced question I also hear from concerned friends around the world is whether this bridge collapse is a telltale symbol of our Nation's deterioration when such a place that they had admired as Minnesota can no longer take care of its own.

The families of those affected by the collapse and our broader community have been coping for the last three weeks. Although coping is essential after loss of loved ones, major tragedies, and is useful for both limiting panics and for having some backups, to focus mainly on coping is unwisely defeatist.

As an infrastructure/energy professional and an electrical engineer, I cannot imagine how anyone could believe that in the United States we should learn to "cope" with bridge collapses and blackouts—and that we don't have the technical know-how, the political will, or the money to bring our infrastructure up to 21st century standards. I do not believe the American people would—or should—settle for a substandard critical infrastructure.

We can strengthen our infrastructure and reduce grid congestion and meet societal and customers' reliability expectations. And it is not just a matter of "can." We *must*—if the United States is to continue to be an economic power. However, it will not be easy or cheap. It will require an extensive, prolonged commitment by the federal government and the industry to provide funding and to reduce red tape. It will take a renewed commitment on the part of industry to modernize and invest in new technology. And it will take continuing collaboration among economists, scientists, engineers and policy makers to slowly but surely transform the critical infrastructure including the bridges and the power grid into what we know it can be—and what it must become.

I am in my office, as I type this overlooking the bridge, and am grateful for so many things that we often take for granted-- from people to infrastructure.

Please take good care and visit me next time you are in Minneapolis.

Best regards,
Massoud