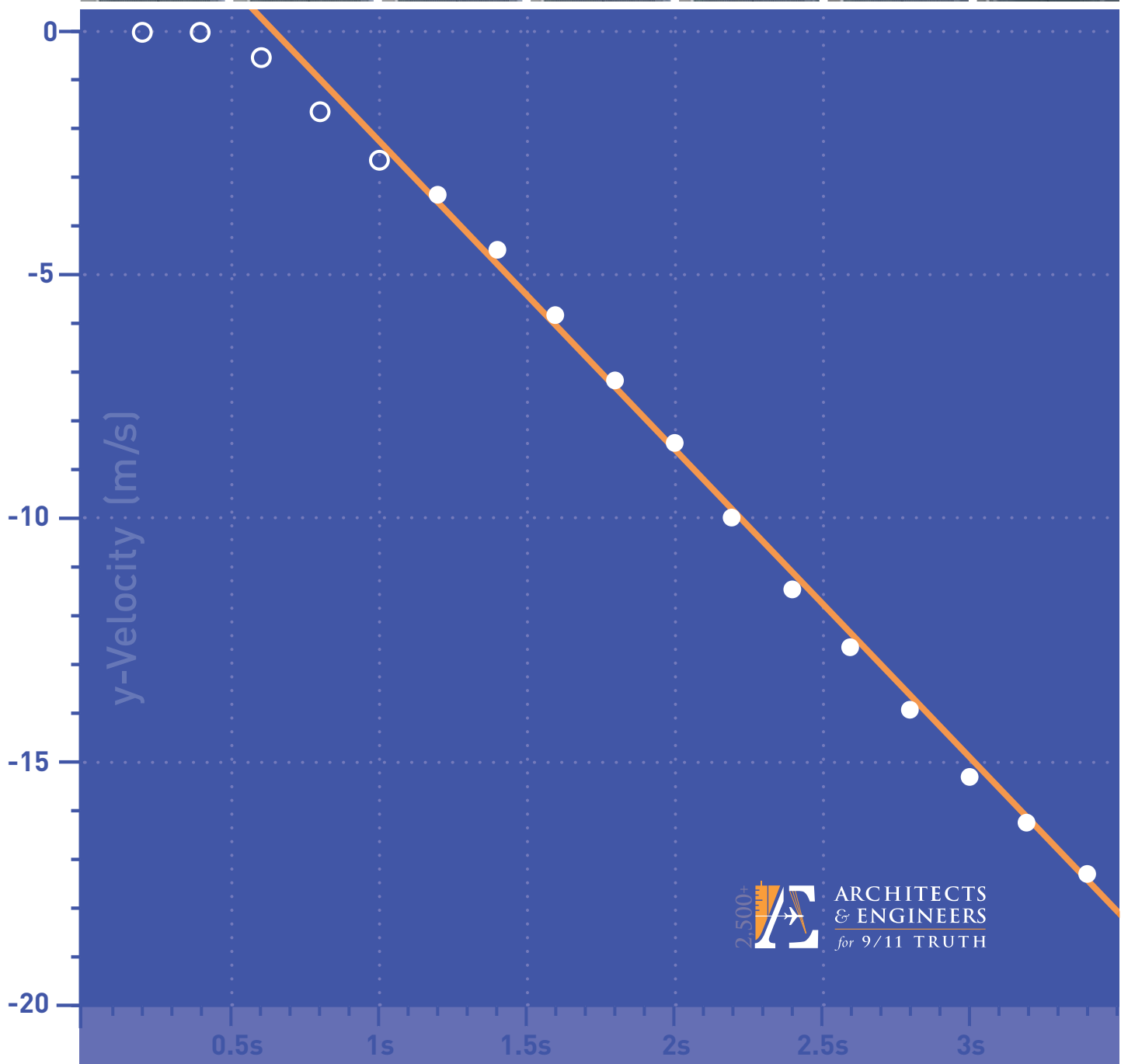


# WORLD TRADE CENTER PHYSICS

Why Constant Acceleration Disproves Progressive Collapse



# To Our Fellow Engineers, Building Professionals, and Citizens around the World

It is now 15 years since the attacks of September 11, 2001. The tragic and horrific events of that day claimed the lives of 2,977 innocent victims, including the 2,146 building occupants and 421 emergency responders who perished in the destruction of the World Trade Center Twin Towers.

With the aim of preventing a similar catastrophe in the future, the engineering community has endeavored to understand why and how these two buildings, along with the 47-story World Trade Center Building 7, could collapse completely to the ground when no other steel-framed high-rise in history has done so.

Now, 15 years later, many of us have reached the professional conclusion that the Twin Towers could not and did not collapse from the combined effects of the airplane impact damage and the fires that ensued, nor did Building 7 collapse because of the unextraordinary office fires it experienced.

In the pages that follow, you will find a discussion of the most central and decisive question concerning the collapse of the Twin Towers — a question that was not addressed in the investigation by the National Institute of Standards and Technology: Why was the upper section of each building able to fall through the lower section all the way to the ground without its fall ever being arrested or even — in the case of the North Tower, which can be measured accurately — decelerating at any time?

**Today, the argument that such behavior was possible without the aid of explosives — i.e., that the buildings underwent a natural progressive collapse — relies solely and entirely on a series of technical articles, examined herein, that have been comprehensively and indisputably refuted.**

If you share our concern, we urge you to join us in calling for a new investigation by going to [AE911Truth.org](http://AE911Truth.org) and signing the petition of Architects & Engineers for 9/11 Truth — which has now grown to more than 2,500 architects and engineers.

We, the engineering professionals who watched those towers come down, owe it to the people who lost their lives on September 11, 2001, and to future generations, to correct the record on this fateful event while it is still within our power to do so.

Yours respectfully,

**The Undersigned (listed at the back)**



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# THE QUESTION OF WHY A TOTAL COLLAPSE OCCURRED

The National Construction Safety Team Act (NCST Act), signed into law on October 1, 2002, mandated the National Institute of Standards and Technology (NIST) to establish the likely technical cause or causes of the three building failures that occurred on September 11, 2001.

After three years of investigation, NIST issued its final report on the collapse of the World Trade Center Twin Towers in September 2005. (It would issue its final report on

World Trade Center Building 7 in November 2008.)

According to NIST, the collapse of each tower resulted from the combined effects of the airplane impact damage, widespread fireproofing dislodgment, and the fires that ensued. The sequence of failures that NIST concluded initiated the collapse of both towers involved the heat-induced sagging of floor trusses pulling some of the exterior columns on one side of each tower inward until they buckled, after which instability rapidly spread and the upper sections then fell onto the floors below.

fall,” its explanation for *why* the lower structure provided virtually no resistance was limited to a half-page section of its report entitled “Events Following Collapse Initiation.”

NIST’s rationale for not analyzing the structural behavior after the point of collapse initiation is astonishing for its lack of scientific merit. John Gross, one of two authors of the “Structural Fire Response and Probable Collapse Sequence” chapter of NIST’s report (NCSTAR 1-6), gave the following justification in a 2006 presentation:



“The focus of the [NIST] investigation was on the sequence of events from the instant of aircraft impact to the initiation of collapse for each tower.... [T]his sequence is referred to as the ‘probable collapse sequence,’ although it includes little analysis of the structural behavior of the tower after the conditions for collapse initiation were reached and collapse became inevitable.”

— NIST, NCSTAR 1, p. xxxvii

## “Little Analysis” after Collapse Initiation

NIST’s report on the collapse of the Twin Towers was voluminous, yet NIST did not analyze what is arguably the most important aspect of the collapses for establishing their likely technical cause: the structural behavior of the towers *during* the collapse.

Instead, NIST carried its analysis only to the point of what it called “collapse initiation.” After that, it asserted, collapse became inevitable. Despite NIST’s acknowledgment that the upper section of each tower came down “essentially in free

“We were charged with finding out the cause of the collapse. And we found what happened — I think we scientifically demonstrated what was required to initiate the collapse. Once the collapse initiated, the video evidence is rather clear: It was not stopped by the floors below. So there was no calculation that we did to demonstrate what is clear from the videos.”

In 2007, a group of scientists, an architect, and two family members of 9/11 victims filed a Request for Correction to NIST’s report, arguing that, among other things, NIST failed to fulfill its duty under the NCST Act because it did not explain why a total collapse occurred:



The South Tower (left) collapsed at 9:59 AM. The North Tower (right) collapsed at 10:28 AM.

“ In the section entitled ‘Events Following Collapse Initiation’ . . . NIST has not offered any explanation as to **why** (i.e., the technical cause of) the story below the collapse zone was not able to arrest the downward movement of the upper floors. The statement ‘as evidenced by videos from several vantage points’ is only an explanation of **what** occurred, but gives the reader absolutely no idea **why** it occurred.... The families of the firefighters and WTC employees that were trapped in the stairwells when the WTC Towers collapsed on top of them would surely appreciate an adequate explanation of **why** the lower structure failed to arrest or even resist the collapse of the upper floors.... A true scientific study examining the failure of the entire building would offer calculations to support this bald assertion.”

In its reply to the group, NIST maintained that it fulfilled its duty under the NCST Act because it had established how the failures were initiated, but it openly admitted that it was “unable to provide a full explanation of the total collapse.”

## NIST Turns to Dr. Bažant

NIST did, however, offer the work of researchers who *had* attempted to provide an explanation of the total collapse. On page 323 of NCSTAR 1-6, NIST cited an article published in the *Journal of Engineering Mechanics* in January 2002 that was written by a professor of Civil Engineering at Northwestern University, Zdeněk Bažant, and his graduate student, Yong Zhou.

As if explaining the total collapse were a secondary matter naturally outside the scope of its own investigation, NIST wrote that Bažant and Zhou’s article “was a simplified approximate analysis of the overall collapse of the WTC towers which addressed the question of why a total collapse occurred.”

Bažant, having fully assumed the mantle of explaining the total collapse of the Twin Towers, has since published three more articles elaborating on why the upper section of each building was able to fall through the lower section all

the way to the ground without its fall ever being arrested or even — in the case of the North Tower, which can be measured accurately — decelerating at any time.

Today, the argument that such behavior was possible without the aid of explosives — i.e., that the buildings underwent a natural progressive collapse — relies solely and entirely on his articles, which will be discussed in the pages that follow. ■



Zdeněk Bažant

“ NIST carried its analysis to the point where the buildings reached global instability. At this point, because of the magnitude of deflections and the number of failures occurring, the computer models are not able to converge on a solution.... [W]e are unable to provide a full explanation of the total collapse.”

— NIST, Response to Request for Correction, September 27, 2007

# THE MISSING JOLT: WHY DID THE NORTH TOWER NEVER DECELERATE?

In the days after 9/11, engineers began putting forward explanations for why the Twin Towers had collapsed.

Some, such as Ronald Hamburger, who later became a contractor on the NIST investigation, and Van Romero, an explosives expert at New Mexico Tech, suspected that explosive devices were used. "It appeared to me that charges had been placed in the building," Mr. Hamburger told the *Wall Street Journal*. "Upon learning that no bombs had been detonated, I was very surprised." Mr. Romero (who would later change his position) told the *Albuquerque Journal*, "The collapse of the buildings appeared 'too methodical' to be the chance result of airplanes colliding with the structures....

"My opinion is . . . there were some explosive devices inside the buildings that caused the towers to collapse."

Dr. Bažant, on the other hand, quickly hypothesized that heating from the fires was sufficient to cause the collapses. On September 13, 2001, he and Yong Zhou submitted an article to the *Journal of Engineering Mechanics* entitled **Why Did the World Trade Center Collapse?—Simple Analysis**. This was the article NIST would later cite in its final report.

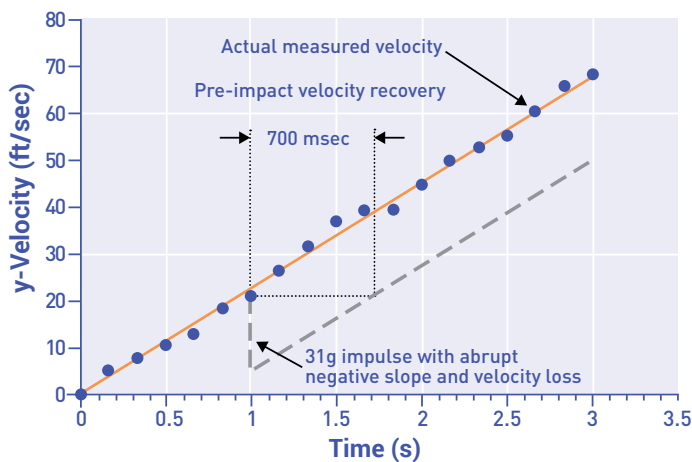
The crux of Bažant and Zhou's argument is that the impact of the falling upper section applied "enormous vertical dynamic load on the underlying structure, far exceeding its

load capacity," thus causing the failure of several floors below. "The part of the building lying beneath," they claimed, "[was] then impacted again by an even larger mass falling with a greater velocity, and the series of impacts and failures then proceed[ed] all the way down." Bažant and Zhou estimated that the gravitational energy of the falling upper section was approximately 8.4 times greater than the energy dissipation capacity of the columns.

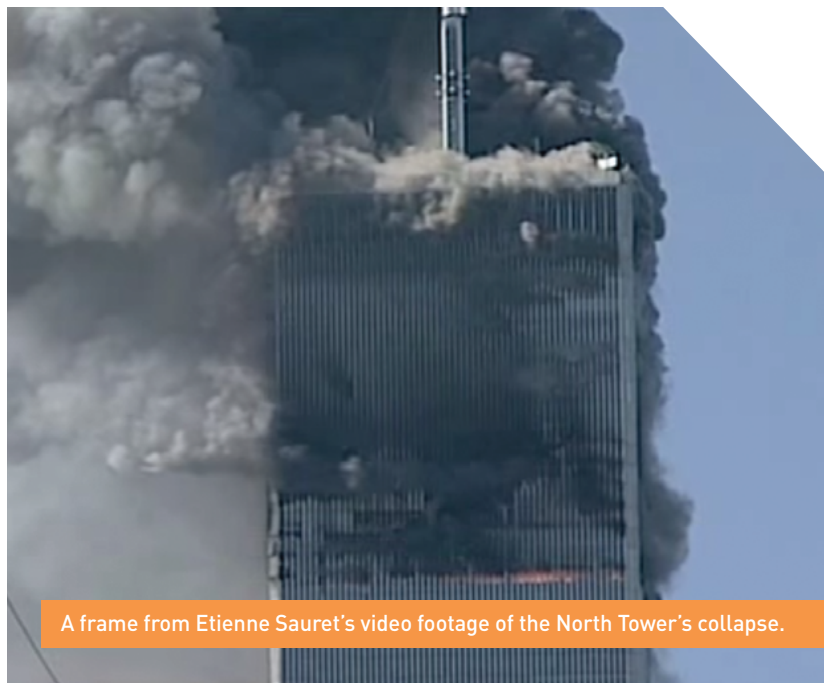
## The Missing Jolt

Newton's Third Law of Motion states that for every action there is an equal and opposite reaction. Therefore, we know the upper section of each tower *must* have

### Roof Velocity Curve with a Hypothetical 31g Deceleration



The above graph from *The Missing Jolt* compares the actual measured velocity of the North Tower's upper section with the estimated velocity curve that would result from the 31g impulse claimed by Bažant and Zhou.



A frame from Etienne Sauret's video footage of the North Tower's collapse.

experienced a deceleration at the moment of its supposed impact with the lower section.

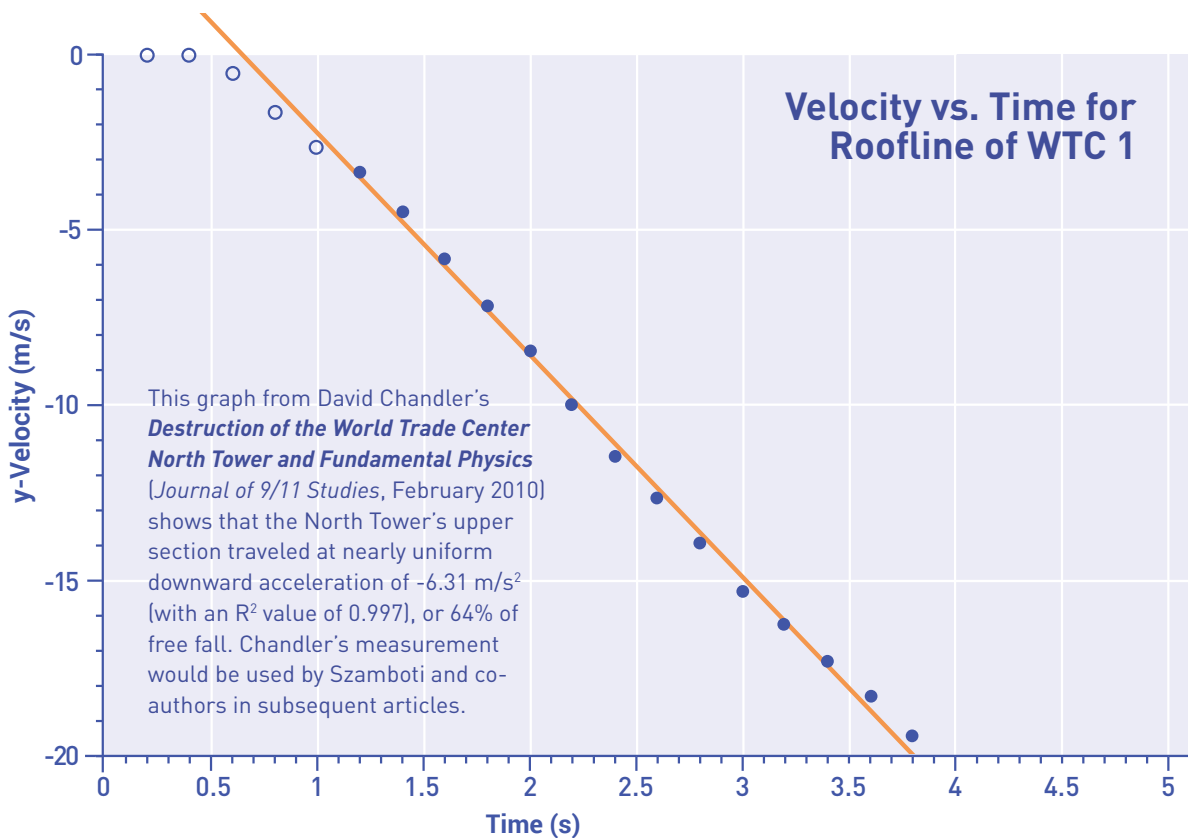
In 2009, Anthony Szamboti, a mechanical engineer, and Graeme MacQueen, a retired professor of Religious Studies and Peace Studies, published an article in the *Journal of 9/11 Studies* entitled ***The Missing Jolt: A Simple Refutation of the NIST-Bažant Collapse Hypothesis***. In it, they measured the velocity of the North Tower's upper section during its fall, using video footage recorded by Etienne Sauret. The measurements, they found, did not show any abrupt negative change in velocity. Thus, they concluded:

“No major interruption or significant abrupt deceleration, and therefore no amplified load, could have occurred during the fall of the upper block.... In the absence of an amplified load there is no mechanism to explain the collapse of the lower portion of the building....”

## An Answer to The Missing Jolt

In response to Szamboti and MacQueen's *The Missing Jolt*, Bažant and another graduate student, Jia-Liang Le, published a new article in the *Journal of Engineering Mechanics* in 2011 entitled ***Why the Observed Motion History of the World Trade Center Towers Is Smooth***.

Addressing what they called “a new objection, pertaining to the smoothness of the observed motion history . . . raised and disseminated on the internet,” Le and Bažant argued that the inevitable velocity drop of the North Tower's upper section was “three orders of magnitudes smaller than the error of an amateur video, and thus undetectable.” Based on their analysis, they concluded:



“[T]he velocity drop during the two-way crush phase is not discernible from the observed motion of the tower top. The reason is that the velocity drops by only 3% within only 0.03s, and increases again afterward, which is the start of one-way crush.”

## Correcting the Calculations

Szamboti and coauthors have since written two articles comprehensively and indisputably refuting Bažant's 2001 and 2011 analyses.

The first, a Discussion of Le and Bažant's 2011 article, showed that they used grossly incorrect input values in their calculations. Repeating those calculations with the correct values shows that the upper section would — in a natural progressive collapse — have decelerated by approximately 20%, which would have been clearly observable (this is before applying the *actual, measured, slower* rate of acceleration through the first story, as opposed to Le and

Bažant's assumption of free fall). Having been held in review by the *Journal of Engineering Mechanics* for more than two years and then rejected as “out of scope,” this unpublished Discussion is the subject of our next chapter.

The second article, entitled ***Some Misunderstandings Related to the WTC Collapse Analysis***, was published in the *International Journal of Protective Structures* in 2013. Applying the *actual, measured* acceleration of the upper section through the first story of its fall (which was 64% of free fall) and using correct input values, the authors concluded that the fall of the upper section would have been arrested within one or two stories in a natural progressive collapse. The authors found that Bažant and Zhou's 2001 analysis underestimated, by a factor of 11, the ability of the lower section to resist the fall of the upper section. In reality, the energy dissipation capacity of the columns significantly exceeded the gravitational energy of the falling upper section — thus invalidating the progressive collapse hypothesis as an explanation for the total collapse of the Twin Towers. ■

# DISCUSSION OF WHY THE OBSERVED MOTION HISTORY OF THE WORLD TRADE CENTER TOWERS IS SMOOTH

## Background

This chapter features a Discussion by Anthony Szamboti and Richard Johns of Le and Bažant's ***Why the Observed Motion History of the World Trade Center Towers Is Smooth***. It was originally submitted to the *Journal of Engineering Mechanics* on May 31, 2011, but was rejected by the editors 27 months later on the grounds that it was outside the scope of the *Journal* — despite having completed peer review and despite the *Journal* having published a separate Discussion of Le and Bažant's article by another author.

Consequently, the indisputable errors identified below in Le and Bažant's analysis remain uncorrected in the *Journal of Engineering Mechanics* to this day. Correcting those errors, as Szamboti and Johns have done, reverses the outcome of Le and Bažant's analysis — and thus invalidates the progressive collapse hypothesis as an explanation for the total collapse of the Twin Towers.

Discussion of the paper

### ***Why the Observed Motion History of World Trade Center Towers Is Smooth***

By Ja-Liang Le and Zdeněk Bažant

DOI: 10.1061/\_ASCE\_EM.1943-7889.0000198

*Journal of Engineering Mechanics*, Vol. 137, No. 1, January 1, 2011, pg. 82–84

Tony Szamboti

Richard Johns

## 1. Introduction

In their paper, Le and Bažant respond to the claim that the motion of the roofline of WTC 1, as captured in video footage, is inconsistent with the hypothesis of gravity-driven progressive collapse. Unfortunately they do not give any sources for this claim, but it is likely that they are responding to the work of Chandler (2010) and MacQueen and Szamboti (2009).

It is agreed on all sides that the collapse of WTC 1 initiated at the 98<sup>th</sup> floor leaving a 12-story upper part to fall onto a stationary 97-story lower part, as

stated by NIST NCSAR 1-6, p. 156. Le and Bažant calculate the total velocity reduction after impact to be about 3%. They also find that, after impact, the upper part continues to accelerate downwards at  $6.2 \text{ m/s}^2$ . It seems these calculations are based on assumptions, especially regarding the steel columns on story 97, which are without justification and contradicted by NIST.

## 2. Inertia Resistance

Le and Bažant first calculate the slowing of the upper portion due to the inertia of the first story



impacted. For reasons that are not specified, they consider only the mass of the concrete floor slab to be involved in this exchange of momentum. They calculate the effect of a descending mass of 54.18 Mkg striking a stationary mass of 0.627 Mkg. However, the concrete floor slab is only part of the overall floor mass, which also includes rebar, steel decking, truss work, and the live load. According to Bažant and Le (2008, p. 905), from which Le and Bažant obtain the data used,  $m_2$  = the mass of a single story is 3.87 Mkg for WTC 1. Using this value, we get a velocity ratio of  $54.18/(54.18 + 3.87) = 0.93$ . The velocity lost is therefore about 7% of the original, rather than the 1.1% claimed. (Note that this is already more than the 3% total loss, calculated by Le and Bažant.)

### 3. Column resistance

For simplicity, Le and Bažant's calculations assume that the 287 columns on the 97<sup>th</sup> story are identical. Unfortunately the full specifications of this representative column are not stated. We are told that the plastic moment  $M_p$  for this column is 0.32 MNm, and from Equation (3) we can infer that the yield stress  $\sigma_0 = 250$  MPa. The total cross-sectional area of the 287 columns is stated to be 6.05 m<sup>2</sup>. The shape of the column, its overall dimensions, and flange and web thicknesses are not given. We can find no specification consistent with this data.

Most of the columns (240 of the 287) were perimeter columns, the overall dimensions and shape of which are stated by NIST (NCSTAR 1-3D, p. 4) to be approximately 14" square box columns, i.e. having width and breadth equal to 0.3556 m. To calculate  $M_p$  we used a standard formula for the plastic section modulus of a hollow rectangular section (see Gaylord et al, 1979, 7-3), putting width equal to breadth  $b$ , web thickness equal to flange thickness  $t$ , and multiplying by the yield stress, gives:

$$M_p = \frac{b^3}{4} \left( 1 - \left( 1 - \frac{2t}{b} \right)^3 \right) \sigma_0. \quad (1)$$

Calculating backwards (from  $M_p=0.32$  MNm) gives  $t = 7.02$  mm. This is much less than the 10 mm thickness given in Bažant and Le (2008, p. 896) for the aircraft impact level, and even a little less than the 7.5 mm they state for the top story. It also entails a total cross-sectional area of  $287 \times 4 \times 0.3556 \times 0.00702 = 2.87$  m<sup>2</sup>, which is less than half of the 6.05

m<sup>2</sup> stated. The authors need to explain how their  $M_p$  value was obtained.

Our estimate of the average plastic moment of the columns on story 97 is 0.64 MNm, obtained as follows. For the perimeter columns, we conservatively assume web and flange thicknesses  $t = 7.5$  mm. The yield stress of the perimeter columns at story 97 is reported by NIST to be 55ksi – 100ksi (NCSTAR 1-6, p. 61, and NCSTAR 1-3B, Table 4-2, p. 52). We estimate the average yield stress to be 65ksi, i.e. 450 MPa, which is also conservative, since NIST reports the measured yield stresses to be above nominal. (NCSTAR 1-6, p. 61). This gives  $M_p = 0.61$  MNm for the perimeter columns.

The core columns vary in size and steel types. They are wide-flange columns, with flanges ranging from 16.695" x 3.033" down to 8" x 0.528", and either 36, 42, 45, or 50 ksi yield strength. (See the available NIST SAP2000 model data, reproduced by MacQueen and Szamboti (2009), pp. 22-3.) To calculate  $M_p$  for the weak axis the plastic section modulus  $Z_p = \frac{1}{2} t \cdot b^2$ , also obtained from Gaylord et al (1972, 7-3), was used, omitting the small contribution from the web. The  $M_p$  values for core columns were found to range from 2.01 MNm to 0.09 MNm, the average being 0.75 MNm. The weighted average, for core and perimeter columns, is then 0.64 MNm. We conclude that 0.32 MNm is much too low.

Using this corrected  $M_p$  value, together with the other column data stated above, we can repeat Le and Bažant's calculations for the velocity reduction of the upper part of WTC 1. First we calculate the total yield load for all columns. For the 240 perimeter columns:  $P = 240 \times 4bt\sigma_0 = 1150$  MN. For the core, using the NIST data, the total cross-sectional area of the core columns is found to be 1.69 m<sup>2</sup>, and maximum load is 460 MN. In total, we have  $P = 1,610$  MN.

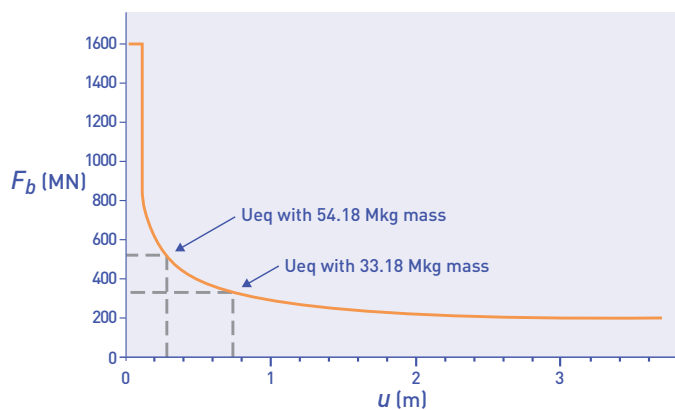
For calculating the load-displacement curve we also need the column length  $L$ , given by Le and Bažant as 3.7 m for all the columns. Bažant and Zhou (2002, p. 5) state the effective height of the perimeter columns to be 2.5 m, the distance between the 1.32 m deep spandrel plates, that were heavier gauge than the adjacent column webs. (See NIST NCSTAR 1-3A, pp. 7-9.) Since our aim is to calculate a conservative estimate of the velocity drop, however, we will ignore the spandrel plates and use  $L = 3.7$  m – which makes the perimeter columns more slender, substantially reducing their resistance

during buckling. The resistive force  $F_b$  is then given by the formula below (see Bažant and Zhou 2002, p. 6) where number of columns is  $n$ , and  $u$  the reduction in column length.

$$F_b = \frac{4nM_p}{L\sqrt{1 - \left[1 - \left(\frac{u}{L}\right)\right]^2}} \quad (2)$$

Using  $M_p = 0.64 \text{ MNm}$  we get the graph shown in Fig. 1.

**Fig. 1. Diagram of load vs. displacement during axial deformation and buckling**



The average resistance of the columns is 310 MN, using numerical integration. The displacement  $u_{eq}$  at which column resistance equals the 530 MN weight of the upper part (i.e. the 54.18 Mkg mass used by Le and Bažant) is 0.27 m, rather than the 0.065 m claimed.

Up to this point we have used Le and Bažant's mass value of 54.18 Mkg for the upper part of the tower, but this conflicts with the NIST report (NCSTAR 1-6D, p. 176, Table 4-7), which states the actual total load on the columns between floors 98 and 99 to be 73,143 kips, i.e. 325.4 MN or 33.18 Mkg. NIST's estimate is also much closer to typical mass per square meter values for other buildings sharing this type of construction, such as the Sears (now Willis) Tower and John Hancock building. For a detailed examination of the masses of WTC 1 and 2 see Ulrich (2007).

From here on, we will use NIST's 33 Mkg figure in our calculations. For example,  $u_{eq}$  then occurs at roughly 0.76 m, as shown in Fig. 1.

## 4. Calculating the Velocity Curve

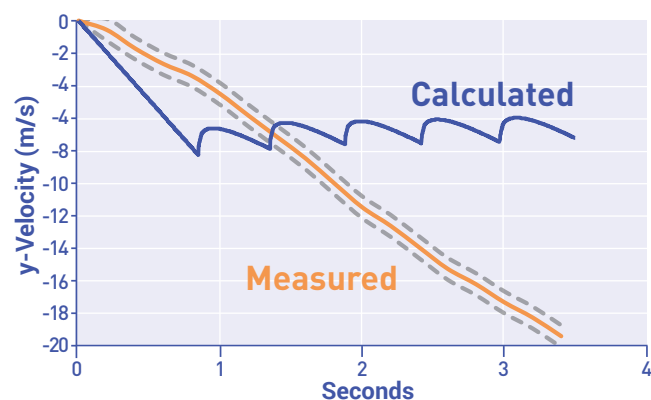
To verify the accuracy of the gravity-driven model, we can calculate the velocity curve for the roof line, and compare it with the behavior of WTC 1 itself. Fortunately, there is high-resolution footage of the collapse of WTC 1 shot by professional filmmaker Etienne Sauret, and used for the documentary film WTC - The First 24 Hours (2002). Each pixel of this footage represents 0.27 m of the tower, and frame rate is 30 per second, allowing for accurate measurements of the motion.

David Chandler has analyzed this motion using Tracker, an open source video analysis tool. His graph is shown below, together with a calculated velocity plot for a gravity-driven collapse.

The calculated velocity of the roofline was obtained numerically using the load-displacement curve shown above, and scaling up linearly for lower stories, according to the increasing design load. We also assumed  $Le$  and Bažant's freefall acceleration during the collapse of the first story. Floors are treated as rigid and incompressible, and assumed to stick together upon impact. The upper part of the building is modeled as a rigid block, which  $Le$  and Bažant regard as a reasonable approximation.

It is easy to derive an approximation of this curve, using hand calculations, given the average 97<sup>th</sup> story column resistance of 310 MN, which is approximately NIST's (325.4 MN) weight for the upper part of the building. Hence the average velocity is approximately constant after the first impact—decreasing slightly due to the inertia of the impacted stationary floors.

**Fig. 2. Measured and calculated velocity curves**



The calculated first velocity decrease is 1.65 m/s (approximately 20%), and would be visible (if it existed) in a velocity plot obtained from the Sauret video footage. Also, the predicted average acceleration after impact (roughly zero) is significantly different from what was observed.

## 5. Conclusion

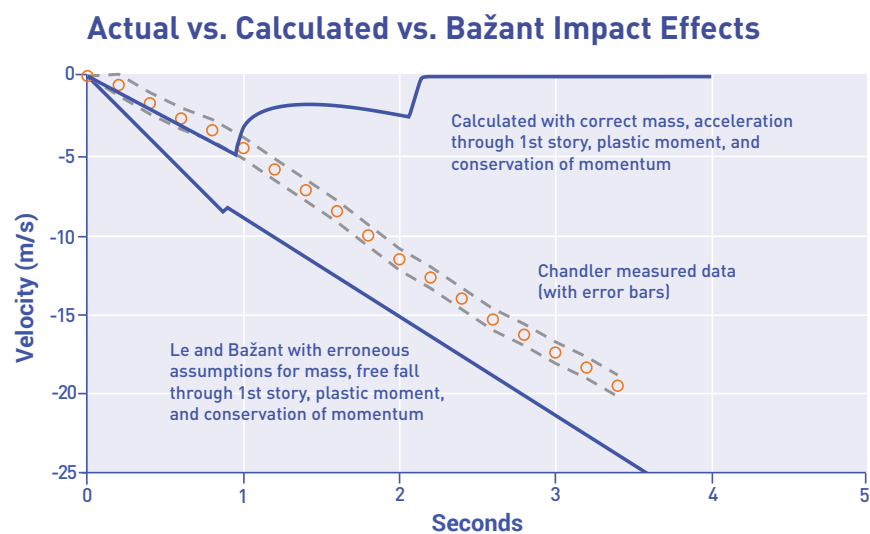
The analysis of Le and Bažant uses incorrect input values. These errors each have the effect of reducing the resistance of the lower part of the building. As a result, their calculated velocity drop on impact is too low, and their calculated acceleration following that drop is too high.

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## Applying the Actual Acceleration

Due to the word limit imposed on Discussions, Szamboti and Johns were unable to address Bažant's incorrect use of free fall for the acceleration of the upper section through the first story. Replacing free fall with the actual, measured acceleration of 64% of free fall results in the velocity curve shown in the graph at right. It indicates that the fall of the upper section would have been arrested at the second story in a natural progressive collapse. ■



# OTHER EVIDENCE INCOMPATIBLE WITH PROGRESSIVE COLLAPSE

## Eyewitness Accounts of Explosions

**156** witnesses, including 135 first responders, said that they saw, heard, and/or felt explosions prior to and/or during the collapses. Read them all at [AE911Truth.org/downloads/156eyewitnessaccounts.pdf](https://www.ae911truth.org/downloads/156eyewitnessaccounts.pdf).

“I thought it was exploding, actually.... Everybody I think at that point still thought these things were blown up.”

— John Coyle, FDNY



## Molten Metal in the Debris and Pouring out of the South Tower

**Dozens** of eyewitnesses observed molten metal in the debris of both Twin Towers. Molten metal was also observed pouring out of the South Tower continuously during the seven minutes leading up to its collapse.

“You’d get down below and you’d see molten steel — *molten steel* — running down the channel rails, like you’re in a foundry, like lava.”

— Philip Ruvolo, FDNY



# Pulverization, Dismemberment, and Explosive Ejection of Materials

**90,000** tons of concrete in each of the Twin Towers were pulverized in midair. Their steel structures were almost entirely dismembered and ejected up to 500 feet in all directions at speeds up to 70 mph.

“

Tower 2 appeared to explode.... As the building began to disintegrate before your very eyes, there came an earthshaking roar.”

— Pt. Middleton, PAPD



## Demolition Squibs

**High-velocity** bursts of debris clocked at 116 mph were ejected from point-like sources in both of the Twin Towers as many as 60 stories below the collapse front.

“

It seemed like on television they blow up these buildings. It seemed like it was going all the way around like a belt, all these explosions.”

— Richard Banaciski, FDNY



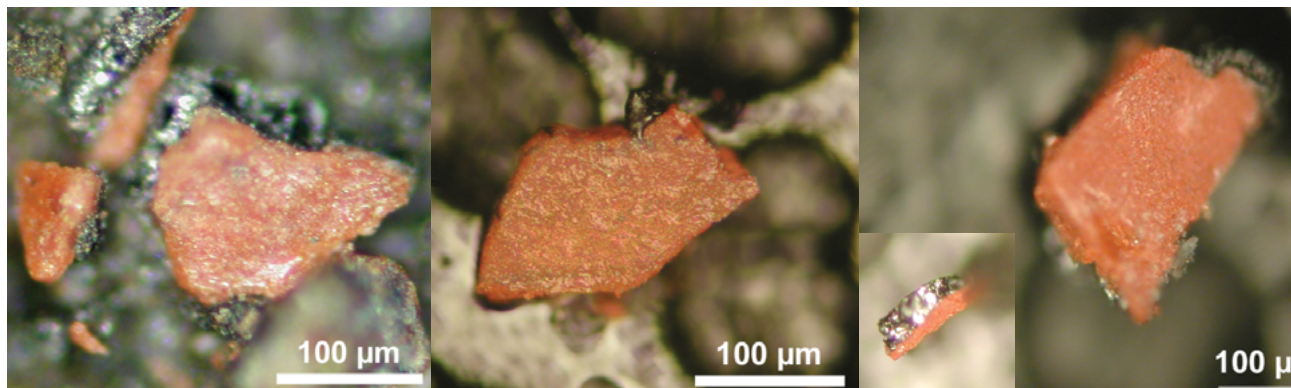
## Nano-thermite in the WTC Dust

**Unreacted** nano-thermitic material has been discovered in four independent World Trade Center dust samples. Nano-thermite is a form of thermite with explosive properties engineered at the nano-level.

“

[T]he red layer of the red/gray chips . . . is active, unreacted thermitic material, incorporating nanotechnology...”

— Harrit et al., *Open Chemical Physics Journal*, April 2009



# THE FREE-FALL COLLAPSE OF WORLD TRADE CENTER BUILDING 7

**A**t 5:20 PM on September 11, 2001, the 47-story World Trade Center Building 7 (WTC 7) collapsed completely and symmetrically into its own footprint. The collapse exhibited *all* the signature features of controlled demolition.

“ [W]e heard this sound that sounded like a clap of thunder. Turned around.... [I]t looked like there was a shockwave ripping through the building and the windows all busted out.... And then about a second later the bottom floor caved out and the building followed after that.”

— NYU Medical Student on 1010 Wins Radio

## All the Signature Features of Controlled Demolition

**Sudden onset:** The roofline of WTC 7 went from being stationary to being in free fall in approximately one-half second.

**Rapidity:** The roofline of WTC 7 fell to the ground in less than seven seconds.

**Free fall:** For 2.25 seconds of its descent, WTC 7 fell at the rate of gravity over a distance of eight stories, meaning that the lower structure of the building provided no resistance whatsoever.

**Totality:** The entire structure of WTC 7 collapsed to the ground, leaving no sections of the building standing.

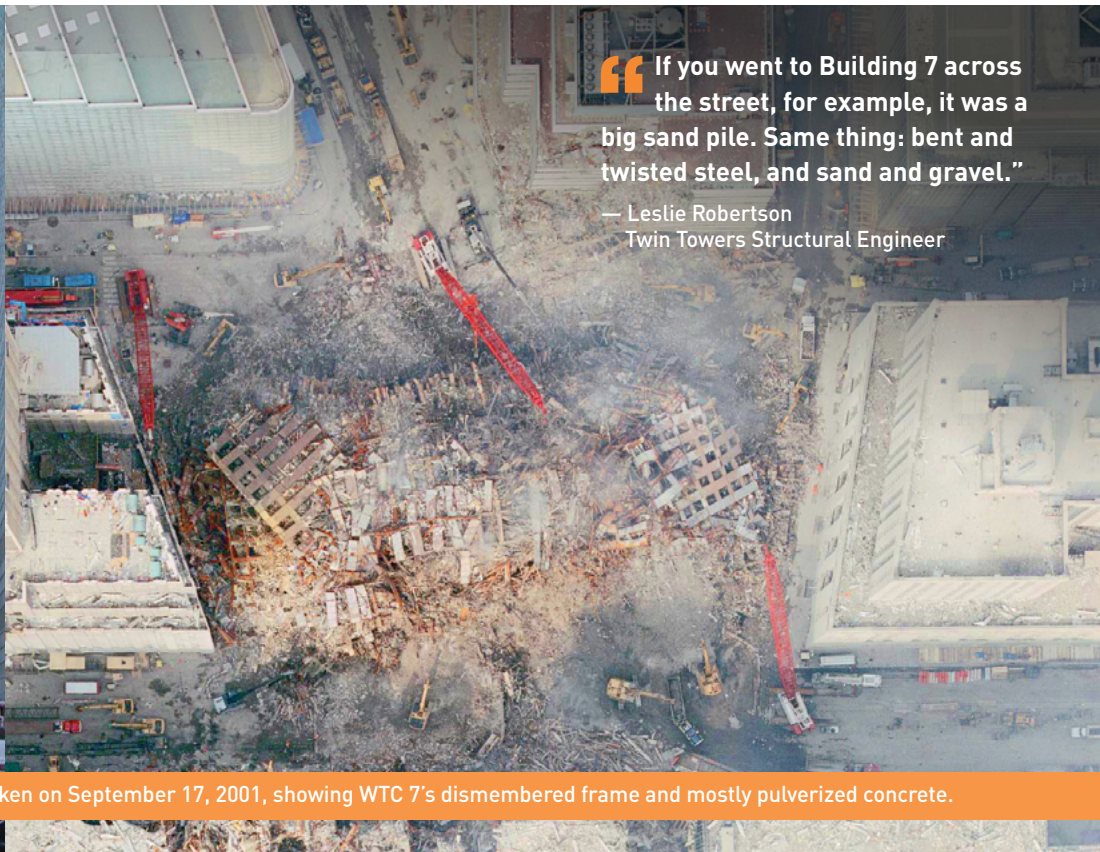
**Symmetry:** WTC 7 fell directly downward through what had been the path of greatest resistance, with the debris deposited mostly inside the building's footprint.

**Explosions and window breakage:** Vertical sequences of explosions and window breakage could be seen running up the north face of WTC 7 as it began to collapse.

**Dismemberment:** The steel frame of WTC 7 was almost entirely dismembered.

**Pulverization:** Most of WTC 7's concrete was pulverized to a consistency of sand and gravel.





**“ If you went to Building 7 across the street, for example, it was a big sand pile. Same thing: bent and twisted steel, and sand and gravel.”**

— Leslie Robertson  
Twin Towers Structural Engineer

Left: Fires in WTC 7. Right: An aerial photograph taken on September 17, 2001, showing WTC 7's dismembered frame and mostly pulverized concrete.

## Foreknowledge of the Collapse

Although the fires in WTC 7 were unextraordinary and the building had only modest structural damage, the NYC Office of Emergency Management began warning sometime before 11:30 AM that WTC 7 “was in serious danger of collapse.” Then, in the early afternoon, the FDNY established a safety zone around the building, which it enforced until the collapse at 5:20 PM. Anticipation of the impending collapse was widely reported in the media, including by the BBC, which announced the collapse 23 minutes before it occurred.

**“ I’ve heard several reports from several different officers now that that is the building that is gonna go down next. In fact, one officer told me they’re just waiting for that to come down at this point.”**

— Ashleigh Banfield, MSNBC

**“ Building is about to blow up, move it back.... We are walking back, there’s a building**

**about to blow up. Flame and debris coming down.”**

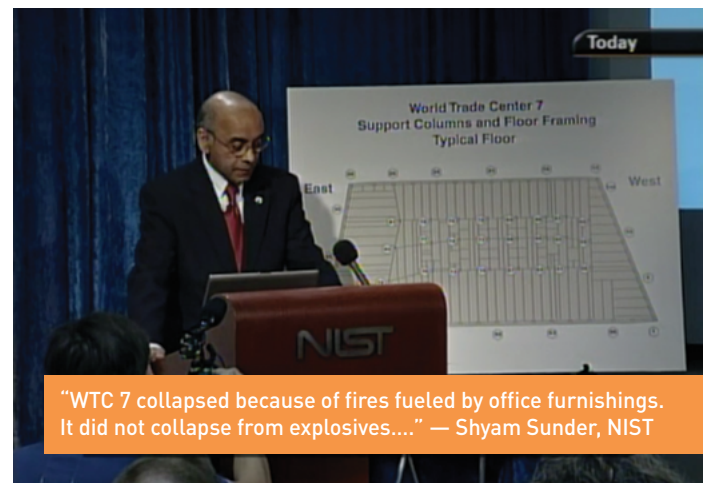
— Unidentified Emergency Responder on CNN Video

## Predetermined Conclusions

Despite the fact that fires had never caused the total collapse of a steel-framed high-rise and despite the fact that the collapse of WTC 7 exhibited *all* the signature features of controlled demolition, investigators for FEMA and NIST began with the predetermined conclusion that the collapse was caused by fires. NIST would release its final report with that very conclusion in 2008, after postponing it for more than three years.

**“ The specifics of the fires in WTC 7 and how they caused the building to collapse remain unknown at this time.... [T]he best hypothesis has only a low probability of occurrence.”**

— FEMA Building Performance Study, May 2002



**“WTC 7 collapsed because of fires fueled by office furnishings. It did not collapse from explosives....”** — Shyam Sunder, NIST

**“ The WTC Towers and WTC 7 are the only known cases of total structural collapse in high-rise buildings where fires played a significant role.”**

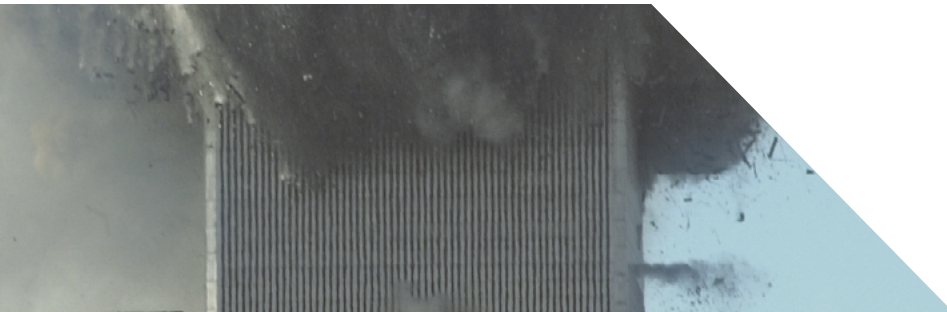
— NIST, Final Plan, August 2002

**“ [T]ruthfully, I don’t really know. We’ve had trouble getting a handle on building No. 7.”**

— Shyam Sunder, NIST Lead Investigator, March 2006

# WORLD TRADE CENTER PHYSICS

Why Constant Acceleration Disproves  
Progressive Collapse



Sign the Petition at [AE911Truth.org](http://AE911Truth.org)

“We owe it to the people who lost their lives on September 11, 2001, to correct the record on this fateful event while it is still within our power to do so.”

*Lynn Affleck, P.E.*

*Gene K. Baxter, Ph.D., P.E., LM.ASME, LM.IEEE*

*Steven Dusterwald, P.E., S.E.*

*Rick Fowlkes, MBA, P.E., S.E.*

*Scott C. Grainger, P.E., L.S., F.SFPE, LM.ASCE*

*Jill Hacker, MS, P.E.*

*Peter Jamtgaard, MAS, C.E., P.E., P.E.-S, S.E.*

*Edward Knesl, MSCE, P.E., S.E. (Ret.)*

*Robert Korol, Ph.D, P.Eng, FCSCE, FEIC*

*Nathan S. Lomba, P.E., S.E. (Ret.), LM.ASCE/SEI*

*Anthony Lusich, P.E., G.E., F.ASCE*

*Kamal Obeid, MSCE, P.E., S.E., M.ASCE*

*Marshall Casey Pfeiffer, P.E., S.E.*

*Oswald Rendon-Herrero, Ph.D., P.E., M.ASCE, M.NAFE*

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*Bill Sublette, Ph.D., P.E., M.ASCE*

*John Watt, CEng, MICE, MIStructE*