Greening vs. Chandler and Newton's Laws:

The occasion for Frank Greening's letter is correspondence with several physicists, chemists, and engineers discussing arguments I made in a video posted on the Architects and Engineers for 9/11 Truth YouTube page: http://www.youtube.com/watch?v=xG2y50Wyys4. This is my response to his letter.

FG:
Chandler concludes that the block was subject to a net force of 0.64M(upper)g. Prior to the collapse of WTC 1, the lower portion of the building was perfectly capable of holding up the upper block which we know exerted a downward force equal to M(upper)g. So why, once the collapse started, was the lower section of WTC 1 not able to support a load of 0.64M(upper)g?

Response:
You are confused on this point. It was the net force on the upper block which was 0.64g downward. The net force consists of the downward force due to gravity combined with the upwardly directed normal force. For the net force to come out 0.64g, the normal force had to have been 0.36g. By Newton's third law, the load on the lower section was also 0.36g.

FG:
Chandler's answer to this question: During the collapse of WTC 1, the only way the upper block could have accelerated at 64 % of g was for the lower section of the building to have continuously lost its load-carrying capacity, presumably through the occurrence of column failures ahead of the collapse front. The fact that the downward acceleration was not far below g shows that columns failed without significant resistance. This, concludes Chandler, proves that the destruction of WTC 1 was a controlled demolition.

Response:
Close, but you have turned my quantitative assessment based on evidence into a hand-waving general statement. In particular, the resistance force is measurably only 36% of the weight of the falling block. Since the lower section of the building was designed to carry 3-5 times the weight of the upper section, the lower section appears to have lost about 90% of its load carrying capacity. Some mechanism apart from the falling mass must have operated to account for this failure.

FG:
The main problem with Chandler's analysis is that he is ignoring what actually happens to a building during collapse.

Response:
My analysis here follows the general model laid out by Bazant and Greening, which is indeed far removed from what actually happened. The Bazant-Greening model postulates a coherent falling block which observations show did not exist. At most there was a falling mass of disassociated rubble from a top section of the building that largely disintegrated before the lower section of the building even started to descend. I adopt the Bazant-Greening model to show its internal contradictions. What I show is that EVEN IF the top block were an indestructible pile driver, it would deliver less force to the undamaged lower section of the building than it would if it merely remained motionless.

FG:
We no longer have *two* distinct masses, M(upper) and M(lower). We have M(upper) = M(Initial upper) + dM/dt, and we have M(lower) = M(Initial lower) – dM/dt. And this is strictly true only in the absence of mass shedding.

Response:
The equations you have written are clearly in error since the units of the terms do not even agree. It *appears* that you are trying to say, in pseudo-calculus terms, that the falling mass can be considered to grow as it sweeps up material that is crushed at the interface. I comment on the sloppiness of your equations because what I see you doing repeatedly is using mathematics to muddle the issue rather than clarify it. The reader shouldn't have to come to the rescue and infer what you probably mean by your equations. It is interesting that you do acknowledge that there is a neglected term for mass shedding which you do not attempt to quantify. Given that a majority of the mass of the building lands outside its footprint, this seems like a major oversight.

FG:
Obviously this situation greatly complicates momentum transfer calculations because you have to include a dM/dt term as well as a dv/dt (acceleration) term. I challenge David Chandler to re-do his WTC 1 collapse analysis with inclusion of a dM/dt term.

Response:
I have already done these calculations and they are included in my paper on the downward acceleration of WTC1 which is undergoing peer review for another journal, so cannot yet be published here. I assume the reason you throw this down as a challenge to me is you assume, wrongly, that turning this into a variable mass problem will "greatly complicate" the issue. Actually, it does not greatly complicate the issue. It takes only a few extra lines to modify the analysis. Briefly, the accreted mass is initially at rest, so it adds inertia but no momentum to the upper block. The net result is that the accretion of mass results in a DECREASE in the force of interaction with the lower section of the building. I might also note that the fact that you would challenge me to demonstrate something that actually strengthens my argument is pretty clear evidence that you have not done, and perhaps you are not able to do, the analysis yourself. Nevertheless you "up the ante." You brush aside adverse conclusions based on a simple model and seek refuge in a more complex model, even though you have not followed through and investigated the implications of the more complex model yourself. I must emphasize again that I am using YOUR model, which requires a rigid falling block. I adopt it to show its flaws, but it is your model nonetheless.

FG:
I note too that Chandler gives no consideration to energy transfer in the collapse of WTC 1 & 2. Energy balance requires that:

$a = g - E1/3.7M(upper)$, …….. where E1 is the energy needed to collapse one floor

Response:
Multiply this equation through by M and you get $Ma = Mg - F$, where F is the average force of resistance. This is exactly the equation I use in my analysis. Contorting it around to express the force in terms of energy adds nothing to the analysis. It is certainly not any kind of "energy balance" and it does not represent something I have left out of my analysis.

FG:
The fact that *a* is observed to be approximately constant means E1/M is also ~ constant. That E1/M should be more or less constant is consistent with the design of WTC 1 & 2, or indeed any tall building.

Response:
All you are doing is agreeing with me that the acceleration is approximately constant for the period under observation, which proves that the resistive force is approximately constant. There is nothing profound in this. In fact it is an artifact of the Bazant/Greening assumption

that the upper block remains intact. The significant thing, as I've shown, is that the force of resistance is significantly less than the weight of the falling block. If you assume the upper block is accreting mass, as you have challenged me to consider, even the statement that the resisting force is constant is no longer true.

FG, in a lengthy paragraph, shortened here:
When I say that E1 is "the energy to collapse one floor" please note that E1 includes all the energy consumed during the descent of the upper block through one floor height (~ 3.7 meters). Etc. …. Thus we see that E1/M is indeed approximately constant for the floors of interest.

Response:
You are using circular reasoning. You are not dealing with the reality. You are dealing with consequences of your simplifying assumptions. More to the point, none of this is relevant to the issue at hand. I have laid out a clear, coherent argument that the falling block could not deliver the force needed to crush the bottom section of the building while it continued to accelerate downward. None of what you say in the previous paragraph or the remainder of your letter even addresses this issue.

FG:
On the question of energy transfer, deceleration and all that, I would say…etc.

Response:
What on earth do you mean by "energy transfer, deceleration, and all that…"? Many of the fragments in this paragraph are true enough, but they don't go anywhere. They don't advance your argument. They don't challenge mine. They are not illuminating. There's nothing here to respond to.

FG:
The collapse of WTC 1 is best studied by considering how potential energy was converted to kinetic energy and dissipated at the crush front and subsequently within the steadily growing debris/rubble layer. This debris layer was not only a sink for potential energy, but a source of random fluctuations in the motions of the individual debris particles. These fluctuations cannot exert a net resultant force against the downward motion of the upper block but rather serve to control the gravitational work rate. In fact, if this type of collapse should attain a state of dynamic equilibrium, there will be a balance between the production of fluctuation energy at the crush front and the conversion of this energy to heat within the debris layer through the dissipating effects of many random collisions of debris particles. It is considerations such as these that help to quantify the complexities of the WTC 1 collapse, not naïve applications of Newton's 3rd Law of motion.

Response:
You are engaging in pseudo academic obfuscation. In my video I have made the argument that the constant acceleration of the top section of the building implies that the resistive force is much less than the weight of the falling block. If I'm wrong, show me how. You seem to be hoping non-technical readers will assume what you have said is profound. It is not profound. It is incoherent.

Unsuspecting readers may not understand the significance of your last line. They should be informed that the reason you view the application of Newton's 3rd Law of motion as naïve, is because, as you have clearly and repeatedly stated in both private correspondence and public forums, that **you believe Newton's 3rd Law does not apply to falling buildings**. That, of course, is utter nonsense. Your entire letter needs to be read and understood in the light of this concluding statement. Your argument is not with me; it is with Isaac Newton.