



ARCHITECTURE

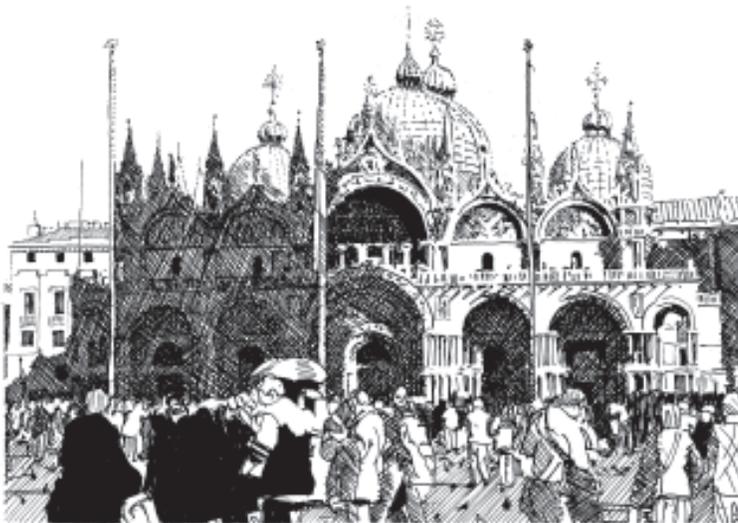
EHLINGER & ASSOCIATES

FOURTH QUARTER 2006



Ehlinger & Associates extends Seasons Greetings to all of our friends who receive the newsletter. Merry Christmas, Happy Hanukkah, and Happy New Year.

San Marco, Venice, Italy © 1999 Ladd Ehlinger



SAN MARCO, Venice, Italy

San Marco, or St. Mark, in Venice, Italy is the subject of this issue's limited edition print of a sketch by Ladd Ehlinger. This is the main cathedral of Venice that faces on the huge square famous for the pigeons that also inhabit it with the people.

The campanile (bell tower) is unseen in this view. However, one is aware of its presence because of the large shadow cast upon the facade of the church. Incidentally, the campanile has been totally rebuilt due to the collapse around 1912 of the original structure. It probably collapsed from failure of the pile supported foundation. Like New Orleans, most everything in

Venice is pile supported due to the weak soils, and consequently most campaniles lean because of overstressed piling due to unequal loading as well as overloading due to ignorance of the designer (soil mechanics is a 20th century science and engineering discipline).

St. Mark is built on the remains of a Basilican plan church on the same site dating back to 830 AD that burned in 976.. A Basilican plan has a long narrow nave that was useful for processions, whereas the the plan of the current St. Mark's is a Byzantine design of a Greek cross with equal arms in all directions, which is an

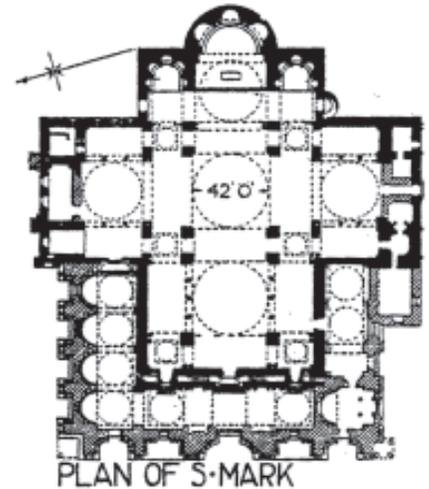
expression of a different spatial and religious theory. It emphasized the unity and one-ness of the creator by expressing the space as one-ness and as a division of a square instead of the then traditional long narrow rectangle.

On top of each arm of the cross are

domes and at the crossing is a dome larger than the others. From the inside, the domes appear equal, yet there are false domes fabricated of timber over the actual, structural masonry domes on the exterior to compensate for the angle of vision in the square, to raise the height visually to the external observer. The masonry domes would not be visible to an observer in the square otherwise and one would not know that there were domes over the spaces.

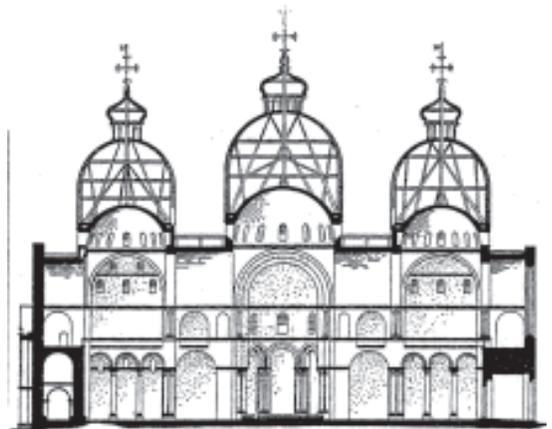
The interior of the church is a

typical Byzantine church with numerous mosaics and colored marbles everywhere, a polychromatic experience. The mosaics tell old and new testament stories in brilliant colors. Similar expressions were added to the exterior during the Renaissance period.



PLAN OF S-MARK

The exterior has numerous trophies of the many trading and military victories of the Venetians that have been blended to adorn the facade: bronze horses from the triumphal arch of Nero in Rome, columns of porphyry, alabaster and verde-antico from Constatinople and Alexandria. All of the sculpture, mosaics and color from the mosaics and marbles present a dazzling array for the observer that dominates the square.



TRANSVERSE SECTION OF S-MARK

DISPELLING SOME 9/11 MYTHS

There's been a very disturbing trend recently, where some lies regarding the mechanics of the collapse of the World Trade Center have been propagated, and they are so widespread that many people are beginning to accept them. I'd like to do my best to dispel some of these ideas, and to bring a better understanding to people who may be misinformed.

1. The towers were designed to withstand impacts from airplanes of this size

Yes; the towers were designed to withstand the impact of a 707. The premise of the calculations were that the plane would be flying at landing speeds under foggy conditions, somehow off route from attempting to land at JFK or Newark. The calculations were done by hand, and no consideration at all was given to fire damage; they just wanted to make sure the building would stand. The landing speed of a 707 is 180 m.p.h. (250 ft./s). Low on fuel for landing, it would have weighed between 150,000 lbs and 250,000 lbs (fully fueled and loaded, a 707 weighs nearly 340,000 lbs).

The 767 is a slightly larger aircraft. Fully fueled and loaded, it weighs closer to 350,000 lbs (maximum takeoff weight of just under 360,000 lbs). The estimated speed of impact of both planes was near 500 m.p.h. (700 ft./s). The kinetic energy of the 767's impact was about 2.67 **billion** ft*lb's of force. The towers were designed for an impact of only about 250 *million* ft*lb's. That's a difference with a factor of 10. That's a big difference.

2. The fire wasn't hot enough to melt steel! (and, no other steel building has ever collapsed from fire damage!)

Steel begins to severely weaken at about 600 degrees Fahrenheit. It will quickly lose over 50% of its strength as the temperature climbs to 1000 degrees. Steel doesn't need to melt in order to fail, and the fires were well over 1200 degrees. There are actually several instances of structural steel failing in buildings due solely to fire, resulting in many *partial* collapses over the past 100 years. So, while it is true that no steel hi-rise building has completely

collapsed due solely to fire damage prior to 9/11, it does not lead to the conclusion that fire can not cause the collapse of a steel building. Claiming this also ignores the fact that it was fire *plus* impact damage which brought the buildings down (including WTC7).

Furthermore, WTC1 and WTC2 technically weren't standard steel frame construction: they were a unique and revolutionary steel *skin* construction with a concrete core, and composite (steel bar joist and concrete) floor decks. When huge gaping holes were introduced into the skin of the building, the weight of the floors above were transferred to unbreached areas of the exterior steel skeleton. Even if the fire insulation had not been knocked off of the steel that survived the impact, such insulation is only designed to withstand 4 hours of a 1000 degree fire under laboratory conditions, and the steel in question was already stressed beyond its design value from the additional, unbalanced weight of the floors above. While an additional 3 hours prior to collapsing would have saved numerous lives, it's really a miracle that the buildings lasted 1 hour.

The floor decks of the towers were concrete on a metal deck, supported by bar joists, and their only fire protection was provided by the ceiling system below them. In areas where the ceiling system was damaged, this steel was directly exposed to fire. What's also critical in the WTC design is that the outer skin of the building was held in place by the floor bar joist system, and when the bar joist system failed, there was nothing to hold the skin in place, which explains why it look as though the exterior walls of the building were peeling away during the collapse... because they were.

3. The collapses looked so much like a controlled demolition, there must have been a controlled demolition.

There was no controlled demolition. If you've ever seen video of controlled demolitions, the explosives are always detonated from the base of the building upwards. They are very bright, unmistakable white flashes. Nothing of the sort is seen in any of the videos of WTC1, WTC2 or WTC7. The collapses clearly aren't controlled, either. Every claim I've seen of demolitions

points to random puffs of smoke and fire in lower floors that are only apparent *after* the collapse has already begun (controlled explosive demolitions always detonate *prior* to the collapse), and are clearly the results of compression of air from the floors collapsing above that are blowing out the windows and forcing fire and smoke outward.

WTC2 collapsed first. It was not a pancake collapse of the floors, as is often seen in controlled demolitions. The entire section of the tower above the plane crash site (nearly 15 stories) collapses all at once, rotating prominently as it crushes the floors beneath it and is demolished itself. (very good photos: http://www.fromthebalcony.com/911/wtc2_collapse.html)

WTC1 collapsed in a similar manner, except, because fewer floors at the top began the collapse, we see a much more successive failure of the building structure as the floors impact each other on the way downwards. The floors weren't designed to withstand the impact of the weight of an entire floor above it; but, except for one other component, they might even have been able to do that. The skin of the building supported the floors, but when the collapse began, the skin of the building can be seen peeling outwards, away from the structure. This means the supports for the floors were not only being overstressed from the collapsed floors above, but the support was being torn away altogether as the exterior steel pulled away from the building.

WTC7 was severely damaged from the collapse of WTC1 and WTC2. The entire side of the building facing the square was on fire (though the side photographed and shown most frequently was not), and structural steel was weakened at the base from the impact of debris. It was allowed to burn for 7 hours, uncontrolled, before it collapsed, and again; no squibs (explosives) are seen prior to the collapse.

So, don't fall prey to any of the conspiracy theories floating around out there - what happened was very real, very deadly, and very tragic.

R. Perrin Ehlinger