

We pointed out in the paper that a bank of this order would be so unusual for a passenger plane that it would have astonished observers and would be unforgettable. In support of this opinion, an image of a plane banked at about 70 degrees is shown below (Fig. 2).³ It is obviously a remarkable sight, yet most witnesses made no comment about bank angle and those that did mention it said the angle was slight.⁴ The improbability of the many witnesses failing to comment on this extraordinary bank angle, had it occurred, was the basis for our conclusion that it did not occur and that the claimed north path could not have happened. If a south path is accepted, the observed damage is explained and there is no justification for invoking theories of flyover and faking of damage using explosives.



Figure 2: A passenger plane at a bank angle of about 70 degrees.

As stated above, an assumption was made in the previous calculations that the plane could complete its roll from a left to a right bank in 0.5 seconds. This very short period was chosen to avoid criticism that the calculation was biased against the north path. More relevant than roll rate would be the initial behavior of the plane when full control input was applied, as this plane, with its outboard engines and heavy fuel tanks in the wings, would have appreciable inertia. It seemed the initial roll action would be hard to discover, but an estimate may readily be obtained by studying the FDR file from United Airlines flight 93,⁵ a portion of which is shown in an a National Transportation Safety Board (NTSB) animation released under the Freedom of Information Act (FOIA) and available on YouTube.⁶

Full application of the control wheel produces no more than about 40 degrees of roll in the first second. A similar period would be required to decelerate the roll as it nears completion. Well over two seconds would thus be required for the complete roll, consuming a considerable portion of the time available for the left and right turns. The values shown above, a bank of 76.5 degrees and a wing loading of 4.3 g, are thus found to be substantial underestimations. This strengthens the claim that the plane would be highly unlikely to survive the maneuver required to pass north of the Citgo service station and still arrive in the vicinity of the impact point.

It seems likely that the north path theory was derived from the faulty recollection of the approach path by a small number of carefully selected witnesses.⁷ This is an important issue as many people apparently have not studied the evidence with care or have failed to recognize the implications of the evidence.

Witness Review

We now wish to return to the original discussion and focus attention on the best evidence available regarding the bank angle of the plane as it approached the Pentagon. All reports in which the bank has been described as slight contradict the north path theory as they indicate that the final few seconds of the flight must have been virtually straight, in agreement with the FDR file.⁸ All witnesses who report seeing the impact contradict the flyover theory in the most direct way possible.⁹ Among the many witnesses to impact are Albert Hemphill and Terry Morin. Hemphill says the plane was always on his right and descended straight to impact with the Pentagon.¹⁰ Morin says he stepped out from between the wings of the Naval Annex and watched the plane descending, going parallel with the Annex, and therefore straight;¹¹ see their lines of sight in the image above (Fig. 1, more clearly identified in Fig. 7).

Darrell Stafford and Darius Prather provide testimony which is particularly convincing because of the way they illustrate it, using a model plane.¹³ They describe the plane as flying with wings level, going over the roof of the Annex (Figs. 3 and 4). Their testimony is well known, but we are not aware of any thorough analysis of the implication of their observations.



Figure 3: Stafford: "Flat on top of the roof" [of the Naval Annex]



Figure 4: Prather: "This is the Navy Annex..." [referring to his left hand]

The information from Stafford and Prather, indicating that the plane was flying with wings level over the Naval Annex, is contrary to the calculation made in the main paper, which shows the plane steeply banked to the right. It is obvious from these illustrations and remarks that the right turn, if it occurred, did not commence until the plane had passed the Annex. In order to have the wings level at that moment, the plane must have been halfway through its roll from a left to a right bank.

There is another factor which must be considered. These witnesses indicate that the plane continued wings level for a short period after passing the Annex, while it descended.



Figure 5: Prather: "It dropped down a little bit."



Figure 6: Prather: "and then it started angling."

William Middleton supports these observations by saying “As it comes past me it was dropping” and showing a flat gesture with his right hand. He then shows with his arms that the plane banked slightly, both right and left, and says, “While descending, he was straightening”. His words and gestures contradict the concept of a steep bank angle.

As explained above, the roll period must be increased to over 2 seconds. Some additional time should be allowed so that the plane can fly wings level for a short distance after it passes the Annex to accommodate these reports. A calculation based on a roll period of 2.5 seconds is shown below (Fig. 7). This is still likely to be too short, thus easing the stress of the left and right turns. The long yellow line is the track as determined by radar, extended by the FDR data, which shows a straight course.¹⁴ The maneuver is shown in red where the plane is fully banked, in orange where bank is changing, and in yellow where the plane can be regarded as flying wings level.

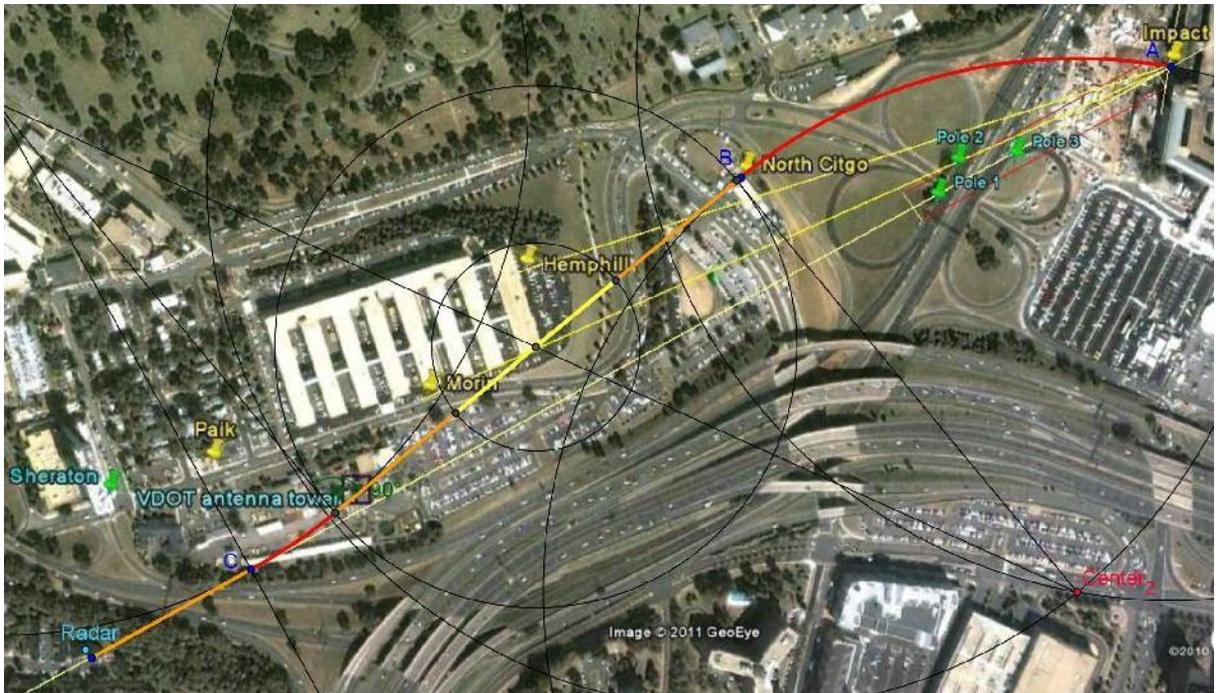


Figure 7: Turn with roll time of 2.5 seconds, allowing wings level for about 1 second, centered at the edge of the Naval Annex.

The radius of turn is found to be 1,999 feet. The official speed is 530 miles per hour. This gives a bank angle of 83.9 degrees with a wing load of 9.45g. Clearly, survival with that wing load is absolutely impossible. The reader is invited to confirm the radius of turn using Google Earth. The method for calculating the bank angle and g -force from speed and radius is set out in the main paper.¹⁵

Let us now consider how this path fits in with the various witness statements. The plane would be flying level as it passes the Sheraton, just commencing its left bank. That is in accord with Deb Anlauf, who saw the plane clearly from the 14th floor of the hotel, but made no mention of bank.¹⁶ As the plane passed the workshop of Ed and Shinki Paik, it would be fully banked, but Ed only caught a glimpse of it as he dropped his head to peer upward through his shop window. The plane passed very close to the VDOT antenna tower, so may have damaged it, as the Paiks speculated, after noticing an aerial appeared to be bent and seeing some repairs being done the next day.¹⁷ The plane would be flying level again as it passed Terry Morin, who made no mention of bank.¹⁸ As the plane continued past the Annex it would be able to remain wings level for half a second as it descended, in accord with Stafford, Prather and Middleton.

The path set out appears to fit the witness testimony remarkably well. There is just one problem: the path is shown to be physically impossible due to the very high wing loading required to make the turn.

Witnesses say the plane was "spooling up", "full throttle" and "in a powered descent." The sound was described as "absolutely deafening".¹⁹ These remarks indicate that the plane was travelling fast and speeding up, as shown by radar (Fig. 8) and the FDR file, where we not only find the speed, 480

knots (552 mph) average for the last 4 seconds, but also see that the throttles were pushed fully forward for the last 30 seconds.²⁰ A plane which has been traveling at a normal cruise speed, and then is diving at full throttle, must be accelerating and soon will be moving very fast. There is therefore no justification for claims that the turn might be possible because the plane was flying at some lower speed. If the speed is assumed to be only 300 knots (345 mph), the bank angle is still 79 degrees and quite out of the range of possibility. If the bank was 30 degrees, the highest value suggested by any witness, and then only very briefly (see Prather), the speed would be 102 knots, (117 mph). This is below the stalling speed for the plane in take-off configuration, hence quite impossible clean, with flaps and slats retracted.

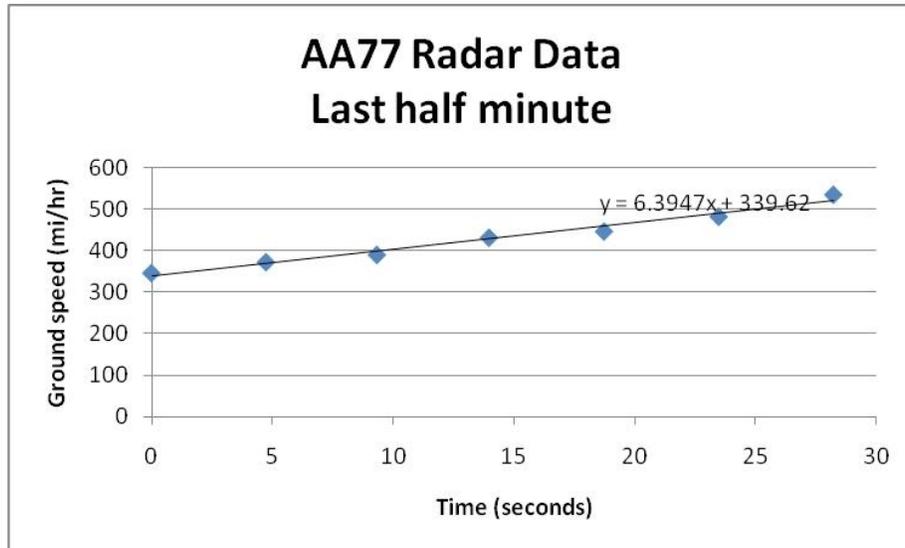


Figure 8: Spacing of radar position reports enables calculation of speed and acceleration.

It is now apparent that the testimony of Stafford and Prather contains self-contradictory information. On the one hand they say the plane passed over the Naval Annex and some distance beyond, flying wings level, and on the other hand they say it passed north of the Citgo service station on its way to the impact region on the Pentagon. These concepts cannot both be right. It appears they misjudged the position of the plane and did not realize that it was south of the Naval Annex. This is not surprising, as they were poorly placed to judge the distance, being near the cemetery, but the angle of bank near the Annex would have been very obvious and easy to correctly assess. As they described in detail watching the plane descend, it is inconceivable that they could have missed seeing the plane perform the required steep right bank. What they are describing is a track in which the plane is mostly wings level, then briefly banks slightly to the right, and hence must deviate little. The FDR file shows a very brief bank of 6 degrees to the right, which produces no noticeable change of direction.²¹ If the claim that the plane passed north of the Citgo service station is abandoned, assessment of all the other evidence leads comfortably to the conclusion that the plane passed to the south of the Naval Annex and the service station, flying close to wings level, and hit the Pentagon.

Albert Hemphill, at his window in the Naval Annex, was the witness to impact who was in the best position to see the alignment and straightness of the track. He was asked if the plane was turning or banking. He replied, “Diving ... right over the bridge.” There is only one bridge in the vicinity, the

overpass of VA27 over Columbia Pike, which is on the direct line between the last radar position and the impact point. He asserted that the plane was always on his right and that “It didn’t pull up, it didn’t turn right, it didn’t turn left, it went right into the Pentagon”. When asked about the prior path of the plane he said it “seemed to come directly over the annex, as if it had been following Columbia Pike”. When asked whether the track could have been as far south as the VDOT antenna tower, he said “That would be a little bit far.”²² He also mentioned “ground effect,” implying that he saw the plane descend very low and with wings level. He made no mention of significant bank.

Attempts have been made to cast doubt on Hemphill’s testimony using a remark he made in one interview, years later. When asked if the plane flew north of the Citgo service station he said “It’s hard to say”, then agreed that it might have passed over the station or a little north of it. As he was not standing at the same window when being interviewed it is not surprising that he was uncertain. In all his written statements and interviews, he contradicts the north path, stating that the plane was on his right and flew straight to the Pentagon, placing the path on the south. It is easy to see how he could have made this mistake as, shortly after the plane passes the service station, his view of it does in fact pass over its roof, but the plane does not. This can be seen in an animation available online.²³

If we accept the testimony of these credible witnesses regarding the bank angle of the plane and note the wing loading required, the north path is seen to be both contrary to witness reports and physically impossible. The north path theory must have arisen from faulty recollection of something that would not have seemed important at the time. The only reasonable position to hold is that the plane flew on the south path, virtually straight. There is thus no case for denying impact and no need for explosives to do the observed damage. It follows that there is no need for the flyover theory, a theory which does not have a single witness to support it. No claim is made, however, that explosives were not used to augment the destruction. It is also important to note that proof of the south path and impact provides no support to other aspects of the official report, many of which are extremely suspicious.²⁴

Summary and Conclusion

Revision of the calculations and witness testimony surrounding the flight path of the plane on approach to the Pentagon strengthens the previous conclusions set out in the original paper. Previously, the failure of the many witnesses to mention a steep bank was taken as proof that it did not happen, while the survival of the aircraft, if it deviated round the service station, was regarded as unlikely. With this new analysis of the witness testimony, showing the plane was flying wings level near the Naval Annex, survival of the plane is now found to be absolutely impossible. There is thus no rational explanation of the event other than that the plane flew virtually straight past the Naval Annex and the service station to the impact point.

As calculation shows the flight path proposed by CIT to be impossible, the north path claim must be seen to be based on nothing more than a few faulty recollections of the approach path. Without the north path claim, the flight path is in accord with the path set out in the official account. There is thus no reason to doubt that the flight terminated by collision with the Pentagon, as reported by the majority of witnesses and as seen in the FDR file, where the low level approach and impact is

recorded. The north path is refuted and must be abandoned. This removes the need for explosives to create the illusion of impact and also removes the need for the flyover theory. Nothing has been found to disprove the official description of the final seconds of the flight and the impact.

¹ Frank Legge and David Chandler, “The Pentagon Attack on 9/11: A Refutation of the Flyover Hypothesis Based on Analysis of the Flight Path,” *Foreign Policy Journal*, September 6, 2011, <http://www.foreignpolicyjournal.com/2011/09/06/the-pentagon-attack-on-911/>.

² Frank Legge and Warren Stutt, “Flight AA77 on 9/11: New FDR Analysis Supports the Official Flight Path Leading to Impact with the Pentagon,” *Journal of 9/11 Studies*, Vol. 30, January 2011, http://www.journalof911studies.com/volume/2010/Calibration%20of%20altimeter_92.pdf.

³ Achimspok, who also studied bank angle, provides this image at the Pumpitout forum, <http://s1.zetaboards.com/pumpitout/topic/3490445/7/>.

⁴ Pentagon witness spreadsheet (Excel file), <http://sites.google.com/site/wtc7lies/PentWitnesses.xls>; available from <http://sites.google.com/site/wtc7lies/911pentagonflight77evidencesummary>.

Arabesque classifies witness statements, “9/11 and the Pentagon Attack: What Witnesses Described,” *Arabesque: 9/11 Truth*, April 2, 2007, <http://arabesque911.blogspot.com/2007/04/911-and-pentagon-attack-what.html>.

⁵ “Volo UA 93 – Animazione NTSB,” *Google Video*, <http://video.google.it/videoplay?docid=2289343926945551469>.

⁶ “Volo 93 – Animazione NTSB (sintesi) 4a parte,” antibufala, *YouTube*, July 13, 2007, <http://www.youtube.com/watch?v=Kq2T6xXRpMg>.

⁷ Legge and Chandler.

⁸ Legge and Stutt.

⁹ Arabesque, <http://arabesque911.blogspot.com/2007/04/911-and-pentagon-attack-what.html>

¹⁰ Legge and Chandler.

¹¹ Ibid. Terry Morin, “Eyewitness Account of Pentagon Attack,” September 2001, http://remember911.albertarose.org/survivor_pentagonwitness.htm.

¹³ “National Security Alert: 9/11 Pentagon Attack,” Video, *Citizen Investigation Team*, <http://www.citizeninvestigationteam.com/nsa.htm>.

¹⁴ Legge and Chandler. Legge and Stutt.

¹⁵ Legge and Chandler.

¹⁶ Eyewitness testimony of Deb Anlauf, “Eyewitnesses Accounts,” *9/11 Research*, <http://911research.wtc7.net/pentagon/evidence/witnesses/sgydk.html>.

¹⁷ Erik Larson, “Shinki and Ed Paik Accounts vs. CIT Methods,” *9/11 Reports*, February 3, 2010, <http://911reports.wordpress.com/2010/02/03/shinki-and-ed-paik-accounts-vs-cit-methods/>.

¹⁸ Morin.

¹⁹ Legge and Chandler.

²⁰ Legge and Stutt.

²¹ Ibid.

²² Interview of Albert Hemphill by Craig Ranke, May 24, 2010, <http://www.citizeninvestigationteam.com/1/Albert-Hemphill-5-24-2010.mp3>.

²³ Achimspok provides this animaged GIF image, <http://i1210.photobucket.com/albums/cc402/gravity980/Hemphill-blue.gif>.

²⁴ “Pentagon,” *Science of 9/11*, <http://www.scienceof911.com.au/pentagon>.