NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

August 12, 2008

On Board Audio/Video Recordings

Specialist's Study Report
by Douglass P. Brazy

NTSB Accident Number
LAX07MA231A/B

A. ACCIDENT

Location:	Phoenix, AZ
Date:	July 27, 2007
Time:	1246 Mountain Standard Time
Aircraft:	Eurocopter AS350-B2, registration N613TV
	Eurocopter AS350-B2, registration N215TV
Operators:	Mac America Communications
	US Helicopters, Inc

B. GROUP

N/A

C. SUMMARY

On July 27, 2007, about 1246 mountain standard time, Channel 3 (CH 3) and Channel 15 (CH 15) News helicopters, N613TV and N215TV, respectively, collided in mid air while maneuvering in Phoenix, Arizona. Each helicopter was an American Eurocopter AS 350 B2. Mac America Communications and US Helicopters, Inc., were operating the helicopters under the provisions of 14 CFR Part 91. The commercial pilots of both helicopters and one photojournalist in each helicopter sustained fatal injuries. Ch 15 departed Scottsdale, Arizona, at 1222, and CH 3 departed Scottsdale at 1232, as

local corporate flights. Visual meteorological conditions prevailed, and no flight plans had been filed. The main wreckage for both helicopters came to rest in a park about 75 feet from each other.

Both helicopters were equipped with an on-board video and audio system capable of transmitting the video/audio live, to a ground station. The vehicle recorder division received copies of recordings from both helicopters, as recorded by each ground station. This study report estimates several locations of the two accident helicopters, other helicopters operating in the area at the time, and the highway vehicle (truck) that was being observed by the helicopter pilots and photojournalists.

More information about the recordings, as well as a transcript of the audio content of the recordings from the accident helicopters, can be found under separate cover for this accident investigation entitled On Board Audio/Video Recording – Specialist's Factual Report.

D. DETAILS OF INVESTIGATION

Estimated Locations

An attempt was made to estimate the positions of each helicopter (and the truck) over time, during the 3 minutes preceding the collision.

Highway Vehicle (Truck)

While viewing the video recording from one of the helicopters, the truck's position was determined by selecting landmarks or roadway intersections that could be seen in the video, as well as identified in a geographical information system (GIS) program. As the truck passed an appropriate reference, the elapsed time of the video was noted and converted to Mountain Standard Time[1], and latitude and longitude of reference (or, the truck's location relative to the reference) was noted from the GIS program.

See figure 1.

[1] All times in this report are based on that clock, and are expressed in Mountain Standard Time and reflect the Air Traffic Control Transcript time reference.

Figure 1 - Truck Path

N613TV (Channel 3)

The locations of N613TV were estimated by triangulation or single line-of-sight using ground reference features that could be identified both in the video recording and the GIS program. Landmarks that fell along a sight line from the helicopter were identified in the video, and plotted in the GIS program. For example, if a telephone or light pole seen in the video obscured some portion of another landmark behind it, it follows that the camera must be located along a 'sight line' extending from the obscured object, through the light pole, out to the camera location. See Figure 2[1].

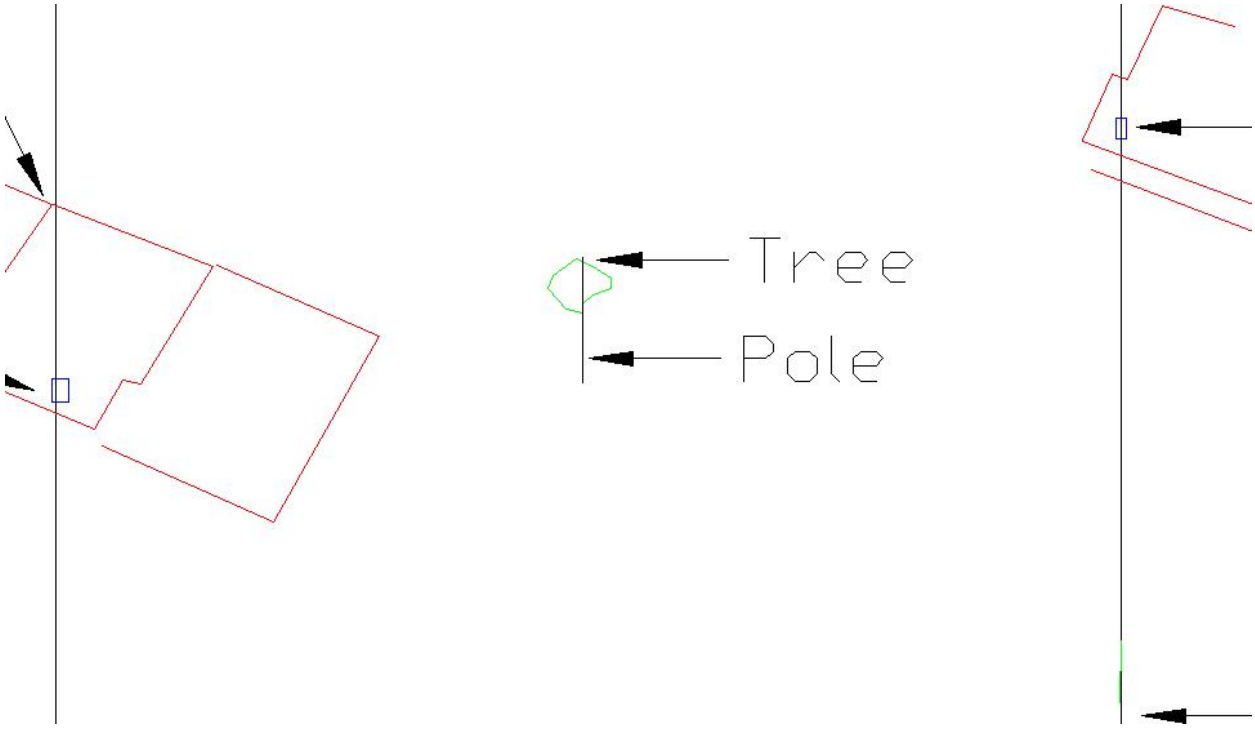

Figure 2 - Light pole obscuring center of tree

Similarly, vertical reference lines can be overlaid onto the image, at locations where easily identifiable landmarks align vertically.

[1] Figures 2 and 3 are overlays sketched onto the actual image recorded from the N613TV recording, at 12:45:47 MST. The overlaid drawing outlines key features seen in the image.

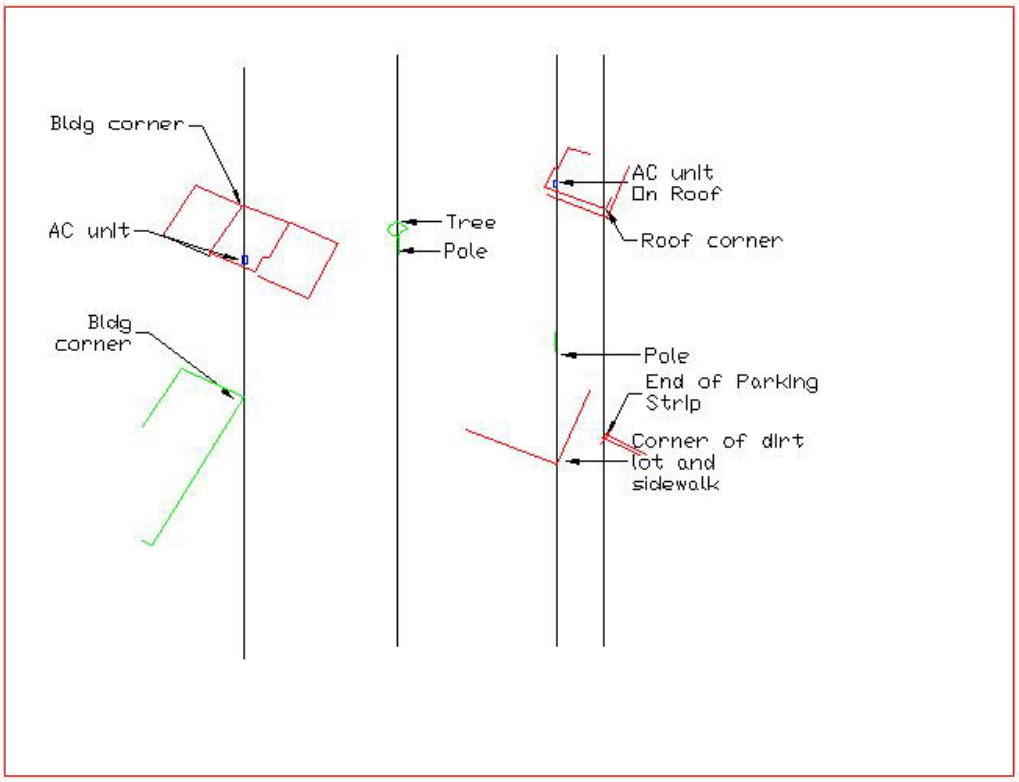

Figure 3 - Vertical reference lines

Using the GIS program, reference lines can be drawn through the same landmark features in an overhead view of the area.

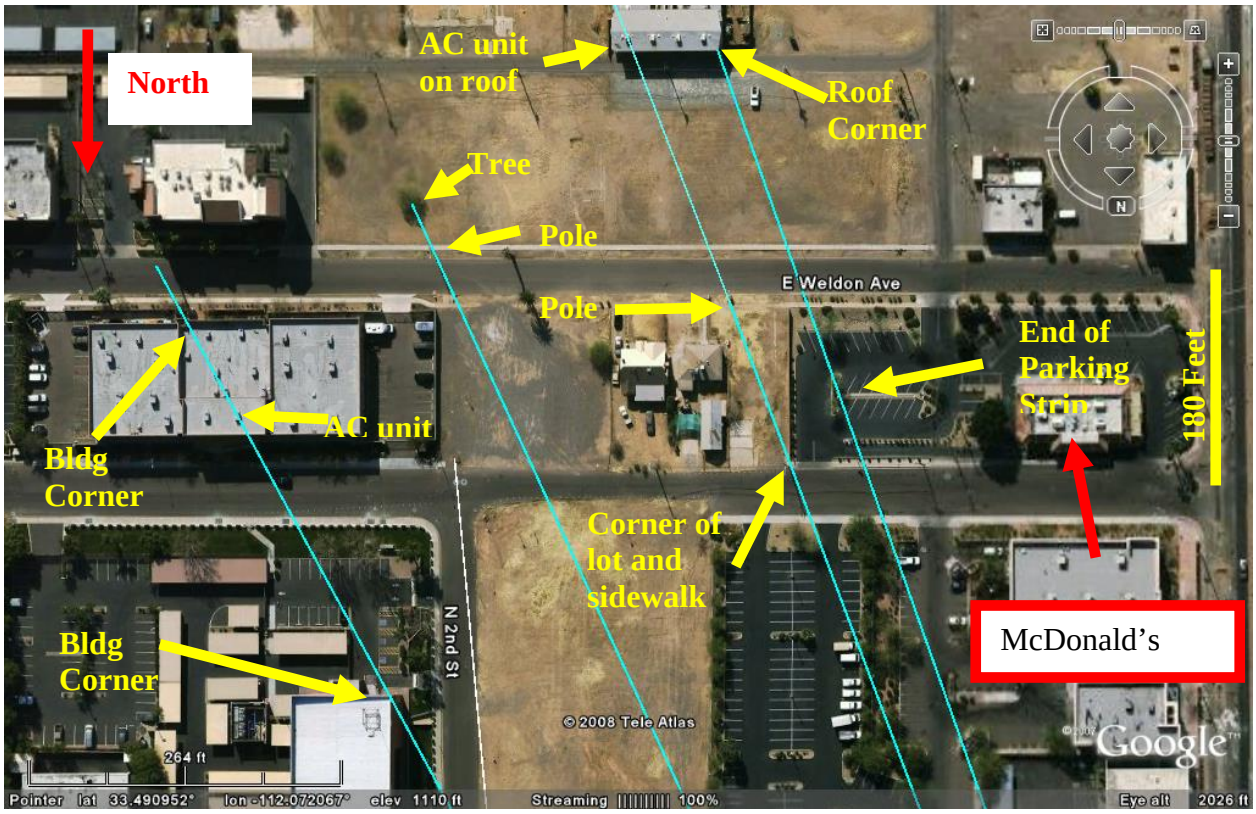

Figure 4 - Reference lines in GIS program

Extending theses reference lines to where they intersect one another, yields a triangulation estimate of the camera's location.

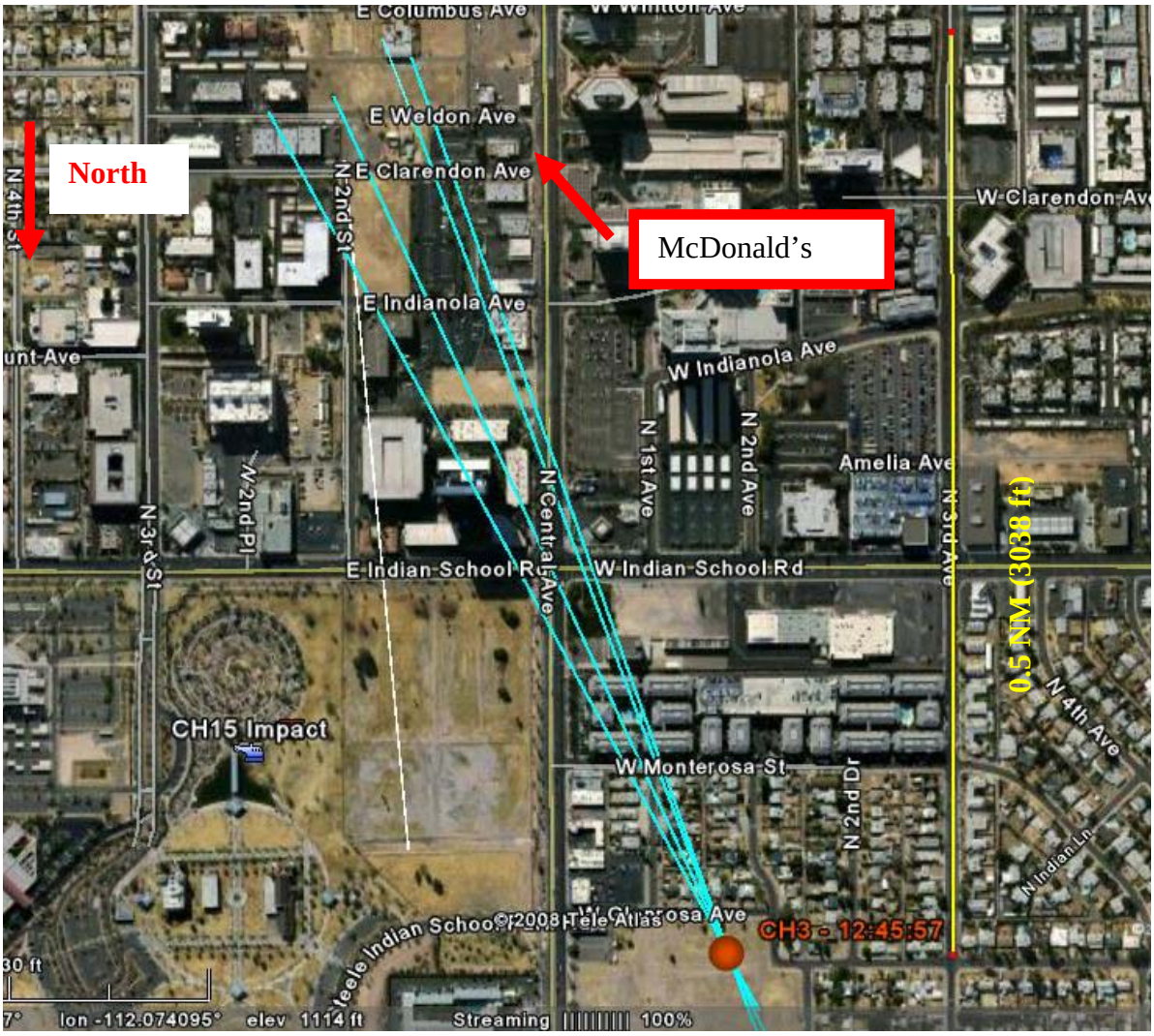

Figure 5 - Reference lines extend to camera location

The orange circle in Figure 5 shows the estimated location of the N613TV's camera at 12:45:57 MST. This illustrated example exhibits the most favorable conditions for estimating location using this triangulation method:

- Multiple reference lines could be established
- The reference lines were relatively widely distributed across the width of the image
- Multiple features could be identified along several of the reference lines

This approach was used to estimate the location of N613TV over the 1 minute period prior to the collision. The aircraft's location could not be calculated at all times, nor over a regular interval, due to the nature of the changing camera view. At times, no appropriate ground references were available. At other times, only a single reference line could be constructed, providing a sight line along which the helicopter was most likely located, but the location along that line could not be determined. A lack of suitable ground references in the view precluded any location estimates to be made after 12:46:05, which is about in the 13 seconds prior to the collision. Figure 6 shows all of the location information computed for N613TV, in which orange circles mark a location that could be estimated, and orange lines mark sight lines where only a single reference line could be established.

The white line extending to the north northwest from the point where the truck stops (marked with a yellow triangle) is a sight line at the time of the collision[2].

[2] This line was established using the N215TV (channel 15) recording.

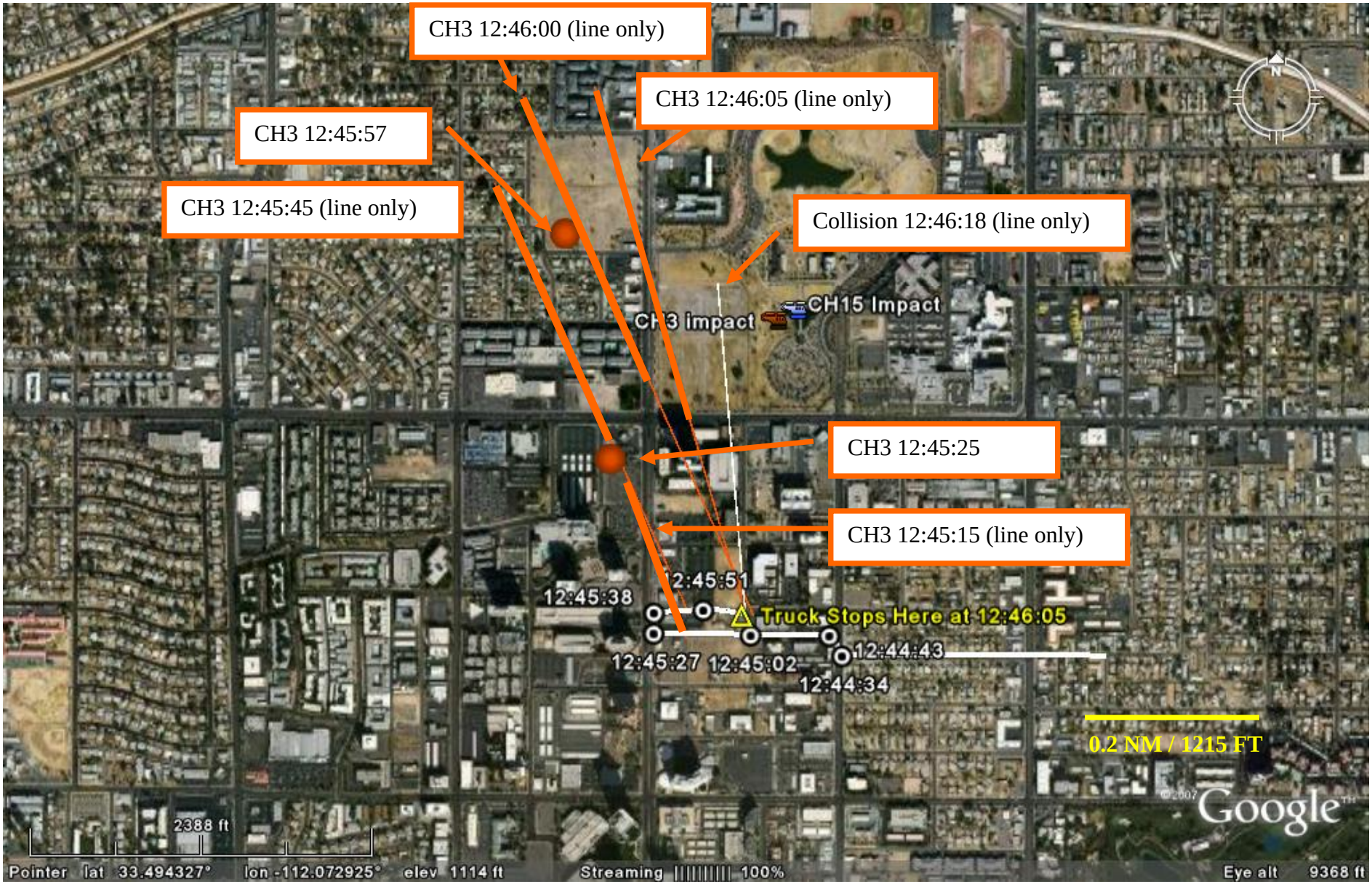

Figure 6 - Locations and sight lines for N613TV(Channel 3)

N215TV (Channel 15)

Using the same techniques, location information for N215TV (Channel 15) was also estimated, as seen in Figure 7. Similar to the recording from N613TV, a lack of ground references in the camera view precluded making any location estimates after 12:46:08 (about 10 seconds prior to the collision) except for the single sightline estimate at the moment of the collision (12:46:18).

Other Helicopters

Location estimates were also calculated from another Electronic News Gathering (ENG) helicopter operating in the area (Channel 12), and are presented in Figure 8. These estimates were calculated from the copy of Channel 12's on-board recording.

Additionally, shadows could be seen on the ground at two different times from unidentified helicopter(s). One shadow was visible in the in the N613TV (Channel 3) recording at 12:45:57 – 12:46:00, the other in the Channel 12 recording between 12:45:11 and 12:45:15. The locations of these shadows are depicted in Figures 9 and 10. According to the U.S. Naval Observatory[1] at 12:45:00 pm Mountain Standard Time on the day of the accident, the sun's elevation angle was 71.9 degrees, at an azimuth of 139.1 degrees (true heading). Therefore the locations of the helicopters causing the shadows should be at some distance to the southeast of the shadow locations. The helicopter's lateral distance from the shadow location is a function of the helicopter's height above the ground; the higher the helicopter is the further it is laterally from its shadow location. For example, a helicopter 1000 feet above the ground would be located about 325 feet (0.053 nm) southeast if its shadow position.

Figure 11 shows all of the computed location information together.

[1] http://aa.usno.navy.mil/data/docs/AltAz.php. Location used was 33.490117N 112.072187W

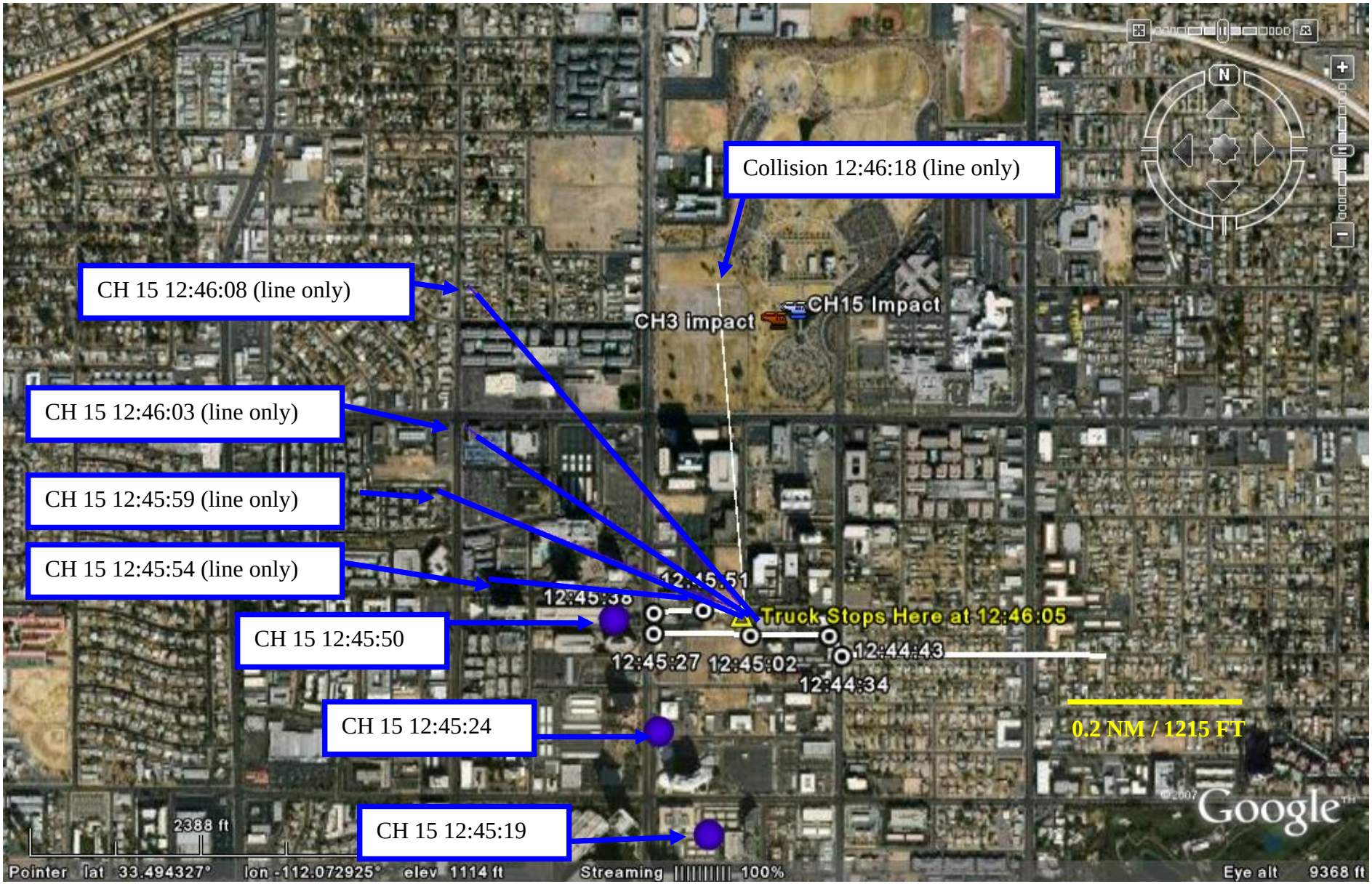

Figure 7 - Locations and sight lines for N615TV (Channel 15)

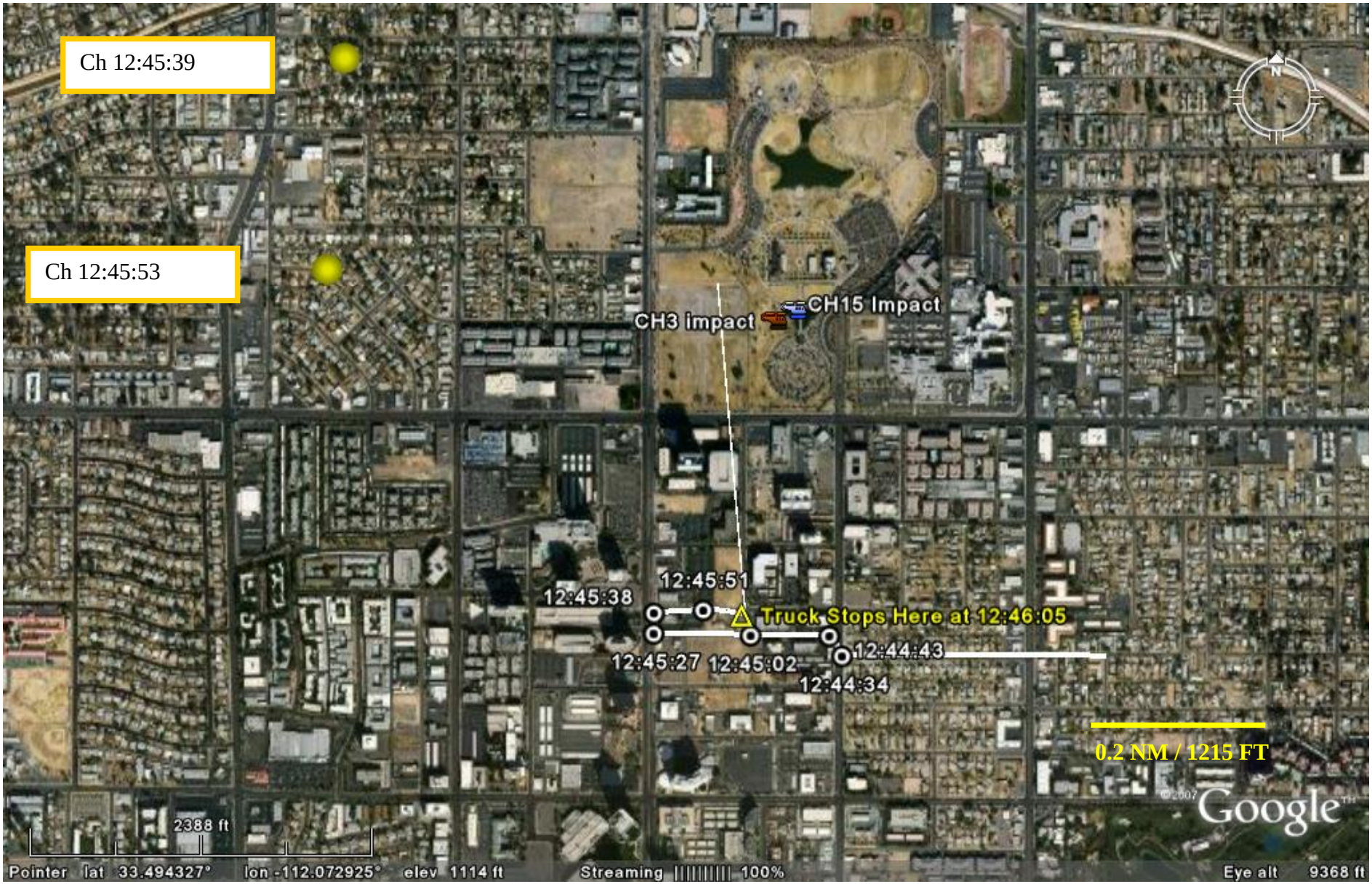

Figure 8 - Locations of Channel 12 helicopter

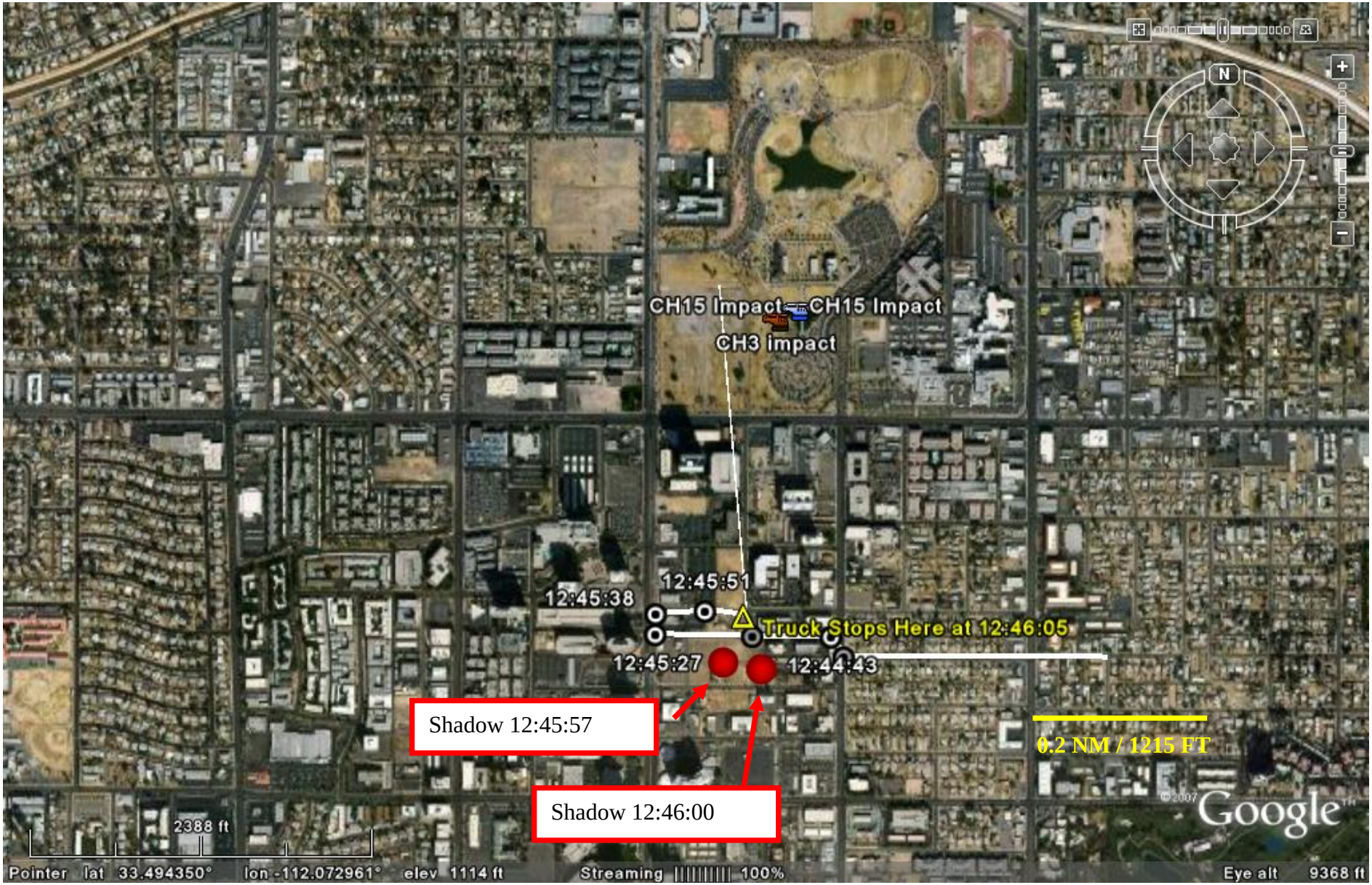

Figure 9 - Locations of helicopter (unk 1) shadows

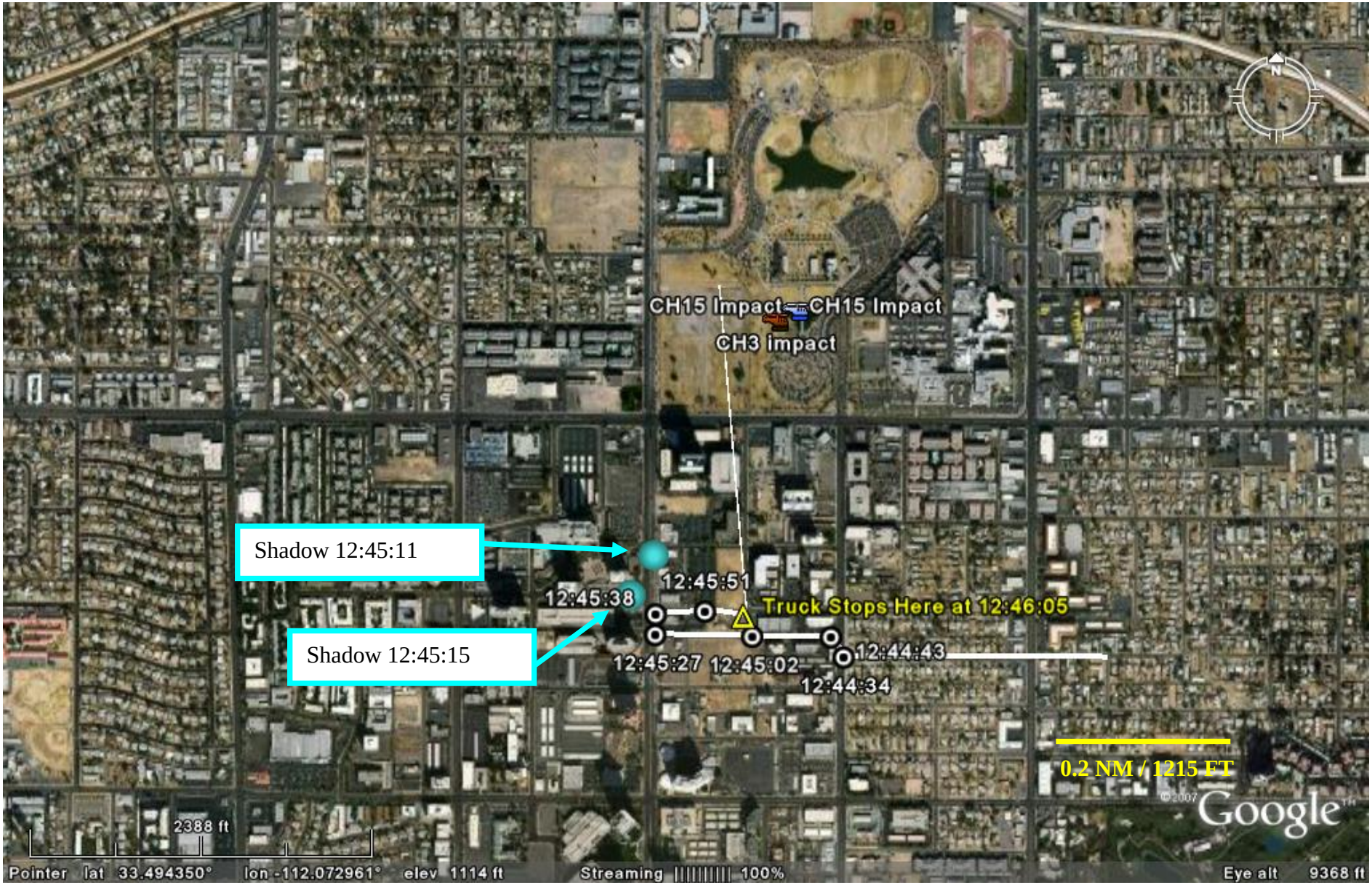

Figure 10 - locations of helicopter (unk2) shadows

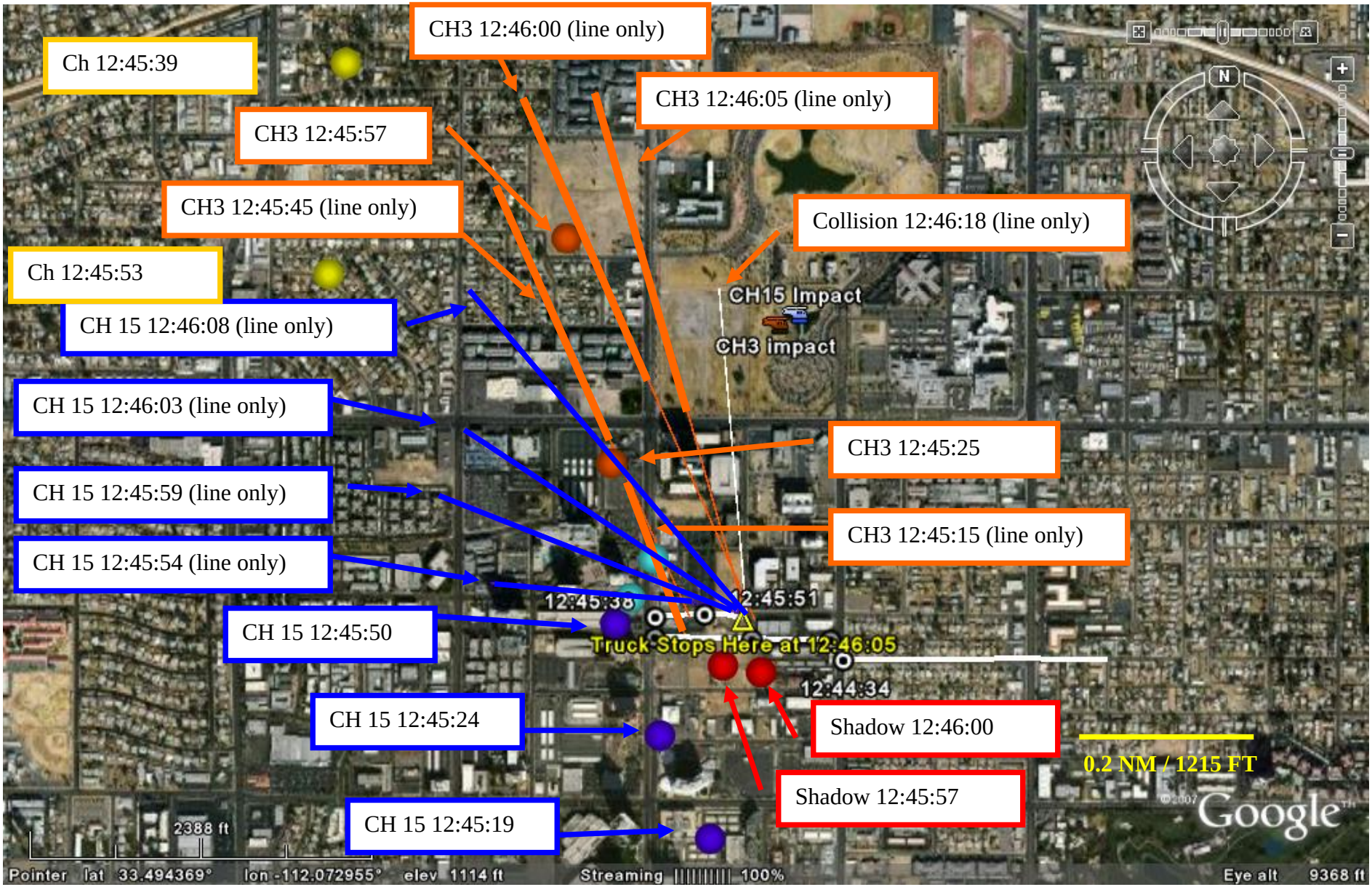

Figure 11 - All position/line information

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