

DOES THE TIMING OF MARY MOORMAN'S
PHOTOGRAPH HELP PROVE THE DOUBLE
HEAD SHOT THEORY OF PRESIDENT
KENNEDY'S ASSASSINATION?

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Photogrammetry by W. Anthony Marsh

THE CLOSEST LIVING WITNESS: MARY MOORMAN

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SHOT THEORY OF PRESIDENT KENNEDY'S ASSASSINATION? ¹

THE GENESIS OF THIS PAPER

At the end of August 1999, Dr. Cyril H. Wecht sent me a copy of a privately circulated essay about "Moorman Photo #5," written by an assassination researcher from Youngstown, OH, with a request for comments. "Moorman Photo #5" refers to the very well known black-and-white Polaroid snapshot that was taken by Mrs. Mary Moorman during President Kennedy's assassination in Dallas. Moorman was one of the witnesses on Elm Street who stood closest to the President's limousine in the midst of gunfire, and at the very moment he received his fatal injuries. The focus of the researcher's interest is the timing of the photograph in relation to the fatal wounding of the president. I will presently define his issue more specifically; discuss the issue's significance to the assassination controversy; and then resolve it.

THE ISSUE

The researcher wonders whether Mrs. Moorman snapped her photograph immediately before or immediately after President Kennedy sustained a wound to his head. He also raises a question whether it makes a difference either way. He correctly notes that the timing issue appears to be another bone of contention between critics and proponents of the lone gunman thesis —. the critics maintaining that the photo was snapped after a shot to Kennedy's head, the proponents preferring that it came before.

The researcher attempts to relate this issue to the contention by many critics of the Warren Commission that Kennedy was shot in the head from the right front of his limousine as it proceeded along Elm Street. It is not clear how or why he believes the timing issue implicates the existence or non-existence of a grassy knoll gunman. He seems skeptical that a gunman was there and proposes that, if Gerald Posner is correct that the Moorman photo occurred before the

¹ The photo on the cover page of this report is an enlarged detail from frame 300 of the Zapruder film of the Kennedy assassination, which shows Mary Moorman aiming her Polaroid camera at President Kennedy's limousine less than one second before he was fatally shot.

head shot, it is less likely that a gunman appears in the photo.² On the other hand, according to the researcher, if the photo came after the shot, “the shooter premise becomes at least a consideration, even if not seen by everyone.”

Why can't there be a shooter preparing to take his shot during the fraction of a second before Mrs. Moorman snapped her photo? The researcher does not say. Having defined the issue's significance to himself, however, the researcher concludes that the photo was taken before a head shot. His chief argument for this conclusion is that the Moorman photo shows another eyewitness, William Newman, standing directly across Elm Street. Since Newman testified that he fell to the ground after seeing Kennedy shot in the head, and contemporary news photographs corroborate his testimony, therefore the researcher argues that the Moorman photo was snapped before President Kennedy was struck in the head.

SIGNIFICANCE OF THE ISSUE

Why is this issue of timing significant? If the photo ultimately proves that there was a shooter behind the fence, why should it matter to us whether it shows him before or after any head shot(s)? Some people might wish to use the issue as an indirect refutation of the grassy knoll gunman theory. They would argue that, if the photo occurred before any head shot, per force there is no genuine puff of smoke seen in the Moorman photo, hence (leap in logic), there is no shooter on the knoll.

On the other hand, proving that the photograph was taken after Kennedy received a shot to his head would not prove that this shot came from the knoll. Here the proponents of the grassy knoll gunman would appear to have some stake in when the photo was taken. They would want the photo to have been taken as close in time as possible after the head shot. They want a puff of smoke to emanate from the picket fence — not *before* the shot, in which case the grassy knoll gunman might have missed his target; not too long *after* the shot, in which case it would become difficult to explain why a puff of smoke would linger.

The problem for these critics, however, is that, if Moorman snapped her photograph after the head shot, why doesn't her photograph show massive destruction to the rear of Kennedy's head? Why is there no debris visible on the lid of the limousine's trunk? Although one of the two motorcycle police officers riding to the left and rear of the president's limousine later noticed blood on the windshield of his cycle, why can't we see it in Moorman's photo?³ His partner testified, “I was splattered with blood and brain, and kind of bloody water.”⁴ Why does no

² The researcher is actually mistaken about Gerald Posner's statement, which was that Moorman “snapped a Polaroid of the rear of the President's car *almost at the moment* of the fatal head shot.” Posner, *Case Closed* (1993) at 251 (emphasis added). This is not quite the same as saying she snapped it before or after. Deprived of Mr. Posner's assistance, the researcher cannot cite to another analyst of the assassination who agrees with his contention that the photo came before Z313.

³ 6H 292 (Testimony of B.J. Martin)

⁴ 6H 294 (Testimony of Bobby W. Hargis)

evidence of this appear on his motorcycle windshield or white helmet, both visible in the Moorman photo?

SYNOPSIS

Frame 313 of the Zapruder film is the first frame that indisputably shows an injury to President Kennedy's head. As researcher W. Anthony Marsh has demonstrated, it is possible to correlate the Moorman photograph with frame Z313 to determine whether Moorman snapped her camera before or after that frame. Such correlation indicates firmly that the Moorman photo coincides with the exposure of Zapruder frame 315, i.e., it clearly occurs after President Kennedy has been shot in the head. However, this is not the end of the story.

Close consideration of Mrs. Moorman's own recollections about the incident; the Zapruder film; and the nature of the wounds sustained by Kennedy, strongly corroborate that she took her photograph after Kennedy was first struck in the head, but before (and possibly at the very instant of) a second head shot. Mrs. Moorman, as the closest living witness to the assassination at the moment of Kennedy's fatal wounding, provides compelling evidence of the "double head shot" that requires a finding of conspiracy.

BACKGROUND

Mrs. Moorman came to Dealey Plaza that day with her friend, Jean Lollis Hill, to watch the President's motorcade and get a picture for her ten-year old son, who was in school. Her primary interest was in seeing Jackie Kennedy. Knowing that her Polaroid camera required her to be as close as possible to her subject, and that it would only allow one photograph of the Kennedys, Moorman, together with Hill, considered several vantage points within Dealey Plaza. Deciding that the street corners were too crowded, they finally settled on a spot on the South side

of Elm Street, roughly midway between Houston Street and the railroad overpass. They waited an hour and one-half for the President and Mrs. Kennedy to appear.⁵

The numerical designation “Moorman Photo #5” has been assigned as a convention by some critics to reflect that Mrs. Moorman took other photos earlier on the day of the assassination. The first two of these were undoubtedly “tryout” photographs as Moorman and Hill had just purchased a new roll of film and were considering their best vantage point for viewing the motorcade. From her final viewing station on the grassy reservation of Dealey Plaza, Moorman photographed the motorcade’s lead motorcycle escorts as they were rounding the curb from Houston Street onto Elm. In another snapshot, she focused on her friend, W. George Lumpkin (another motorcycle escort) but also caught the image of the Texas School Book Depository in

⁵ 25H 853, Warren Commission Exhibit 2582. In a book about the assassination that woefully eschews footnotes or citations to sources, writer Jim Marrs tells it differently. Apparently relying upon Jean Hill, who has drawn her role as “The Lady in Red” through the years for the benefit of researchers and writers, Marrs asserts that the women had come to Dealey Plaza to take pictures of a motorcycle policeman whom Moorman wanted Hill to date (Marrs, *Crossfire*, at 37). Elsewhere, Hill claimed that the policeman was her boyfriend of the moment (Summers, *Conspiracy* (2d ed., 1989), Chapter 3, “The Science of Conspiracy.” See also, Sloan, *The Last Dissenting Witness* (1992), a biography of Hill that claims she had been dating DPD motorcycle officer Billy Joe Martin for several weeks before the assassination.) Hill was going through a marital breakup at the time, which culminated with her divorce in August 1964. More recently, writer Richard B. Trask made the serious error of imputing motive to Moorman while actually relying on the dubious recollections of Hill. Although devoting almost an entire chapter to Moorman’s photographs, he tells her story largely through Hill’s eyes. He implies they thought it would be fun to see their officer friends, and maybe get a picture of them in the procession. Trask, *Pictures of the Pain* (1994) at 230. Yet, as Trask himself concedes, and Bill Sloan pointed out in his biography of Hill, their memories of the event do not necessarily coincide. Moorman’s 1964 interview with CBS News makes it clear that, she was more concerned that day with seeing Jackie Kennedy, and hopeful of getting a photograph of JFK waving at her. She never mentioned trying to fix Hill up with a police officer. (Transcript in possession of the author.) The differences in their attitudes and perceptions is graphically illustrated by the Zapruder film, which shows Mrs. Moorman intently focused on the Kennedys while Mrs. Hill looks in another direction, possibly Officer Martin’s.



Moorman’s actions at the time of the shooting reveal a total preoccupation with these goals, which is relevant to an understanding of her role as both a witness and as an amateur photographer, and to her recollections of the event.

the background.⁶ Jean Hill later testified that she assisted her companion by removing the exposed films from the camera, applying a fixative, and placing them in her coat pocket. Notwithstanding widespread speculation that the photograph was confiscated by authorities because it showed the southeast corner window of the 6th floor of the Depository, i.e., the alleged sniper's nest of Lee Harvey Oswald,⁷ author Harold Weisberg determined in 1967 that the authorities returned Mrs. Moorman's photographs to her.⁸

The fifth and final Moorman snapshot is unquestionably the most relevant, and, in conjunction with the Orville Nix motion picture film of the assassination, has prompted much controversy almost from the beginning of the debate between supporters and critics of the Warren Commission. The Warren Report gave its readers no indication that the Commission had ever seen, let alone considered, the photo, although, as we shall learn, they did have it for a brief time. Moorman was not called as a witness, although her companion the day of the shooting, Jean Hill, did give a deposition in Dallas to Commission counsel, Arlen Specter.

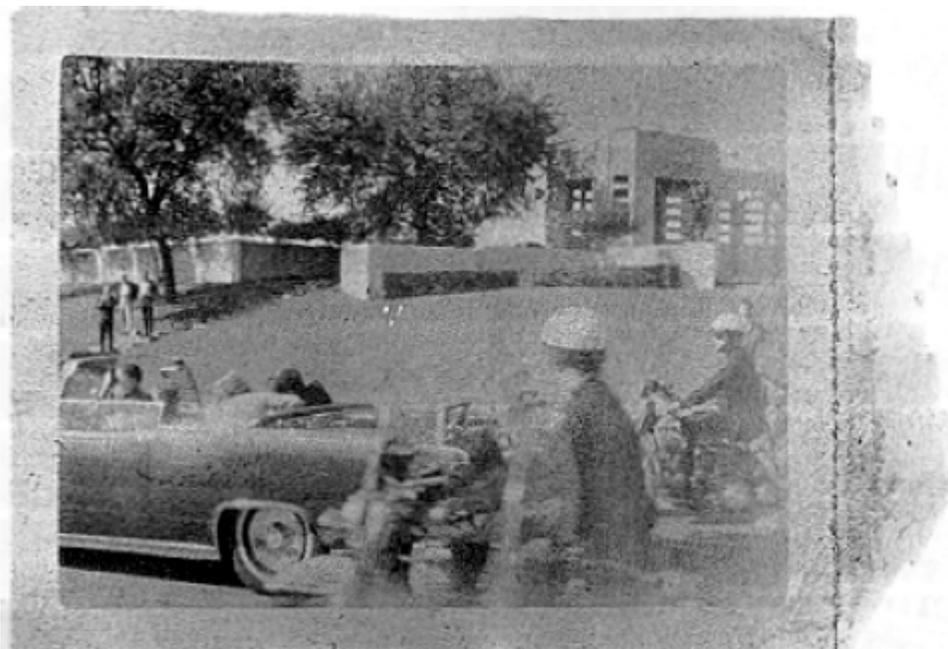


Figure 1 Moorman #5 Polaroid Photograph

In the foreground of the photograph, President Kennedy's limousine passes across Mrs. Moorman's field of view from right to left on Elm Street, flanked by two motorcycle policemen

⁶ Trask claims that Lumpkin told him that he knew at the time Moorman was taking a photo of him. Moorman gave him the photo in 1964 and he mislaid it. Trask, *op cit.* At 235.

⁷ See, e.g., Lane, *Rush to Judgment* (1966), Ch. 28 ("Some Mysterious Photographs"); Livingstone & Groden, *High Treason* (1989), Ch. 6 ("Tampering with the Evidence: More Missing Documents").

⁸ See note 23 and accompanying text, *infra*.

riding to the left and just off the tail bumper of the car. The head and upper torso of only one of the officers, Bobby Hargis, riding the “inside” position, is visible. The windshield of the second policeman’s motorcycle (B.J. Martin, riding the left “outside” position) is partially visible. There is nothing remarkable about their appearance, i.e., nothing about the windshields of their motorcycles or Hargis’s white helmet to suggest an encounter with blood.

Kennedy is in the rear seat of the limousine, leaning sharply leftward toward Jacqueline Kennedy in a posture that clearly indicates he is in distress. Mrs. Kennedy’s head and torso are angled and hunched over toward her right as she comes to the President’s aid. She gives the appearance of bracing her right elbow against the seat, although the evidence whether her elbow is actually touching the seat is equivocal. To the left of these images, in the jump seat area of the vehicle, Governor John Connally can be seen falling back into the arms of his wife, Nellie. Secret Service Agent Roy Kellerman is visible in the right front seat of the vehicle, facing forward.

The background of the photo contains an almost panoramic view of the notorious “grassy knoll,” including the white picket fence atop the knoll where some critics believe at least one or more shots originated during the assassination, and a concrete retaining wall adjoining the pergola, where others believe an assassin also may have lurked. Since Mrs. Moorman was stationed almost directly opposite the west end of the Pergola, her photograph also shows Dallas clothing manufacturer Abraham Zapruder in the process of making his famous home movie of the assassination. He is standing on a concrete pedestal and being steadied by his secretary, Marilyn Sitzman. This portion of the photograph was almost always cropped whenever it was reproduced in newspapers, magazines, and books during the 30 years following the assassination.

The photograph is faded, grainy, and of very poor contrast. This writer recalls that, at the time, the Polaroid self-developing process was time-sensitive (Moorman was using 10-second film), and required the user to immediately administer a fixative and protectant to the developed snapshot to prevent fading and peeling. This substance, which bore a somewhat pungent odor, was included in the form of a semi-solid applicator in each box of black-and-white Polaroid film.⁹ Whether Mrs. Moorman or anyone else actually did this to her final exposure under the trying circumstances is unknown. Her photo has been subjected to numerous attempts at enhancement. A school of assassination researchers claims to see the figure of a rifleman behind the picket fence on the knoll, and traces of smoke. They have dubbed him the “Badge Man.” This paper takes no position on this issue. There is credible and substantial circumstantial evidence of some human presence and activity at this location during the minutes preceding the assassination, and this has been amply detailed since the earliest years of controversy surrounding the Warren Report.

⁹ Trask incorrectly identifies it as a sponge applicator.



Figure 2 Area behind picket fence in Moorman photo where “Badge Man” stood.

CORRELATION OF MOORMAN #5 WITH ZAPRUDER FRAME 313

In his book, *Six Seconds in Dallas*, Josiah Thompson wrote: "Correlation of her picture with the Zapruder film shows that it was taken simultaneously with Z314-315. She took her picture no more than 1/5 second after the President was struck in the head."¹⁰ However, Dr. Thompson did not explain how he correlated the two films, he merely presented the conclusion as fact, just as I have quoted. Is there a way of verifying exactly when the Moorman photograph was taken? Researcher W. Anthony Marsh believes that there is, and the logic of his approach seems compelling.

The measurements and analysis by Tony Marsh demonstrate the value of the information contained between the sprocket holes in the Zapruder film. Marsh explains:

“In this case, we can see DPD motorcyclist Hargis' white helmet in the sprocket hole area of Z-313 and also at the extreme right of a full frame copy of the Moorman Polaroid. The fixed object in the background to use as a tie point is Mary Moorman, who can also be seen in the sprocket hole area of Z-313.”

¹⁰ Thompson, Josiah, *Six Seconds in Dallas* (1967) at 127.

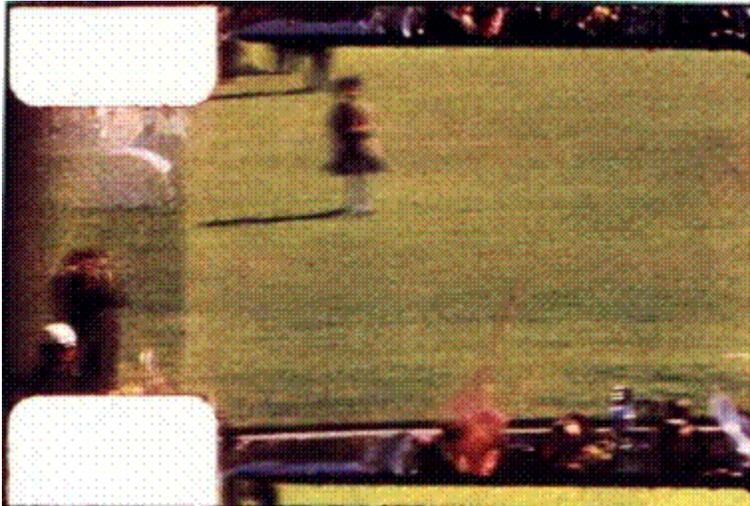


Figure 3 Frame 313 of the Zapruder film of the assassination

ESTABLISHING THE POSITION OF THE LIMOUSINE

“First we place the limousine in the proper position on Elm Street. Due to the blurring of Z-313 and the inherent inaccuracy of most maps, we can only get the limousine close to its true location with a margin of error of about 6 inches. 6 inches is also the size of each pixel on my computer map, so I have placed the limousine to within 6 inches of its true location.”

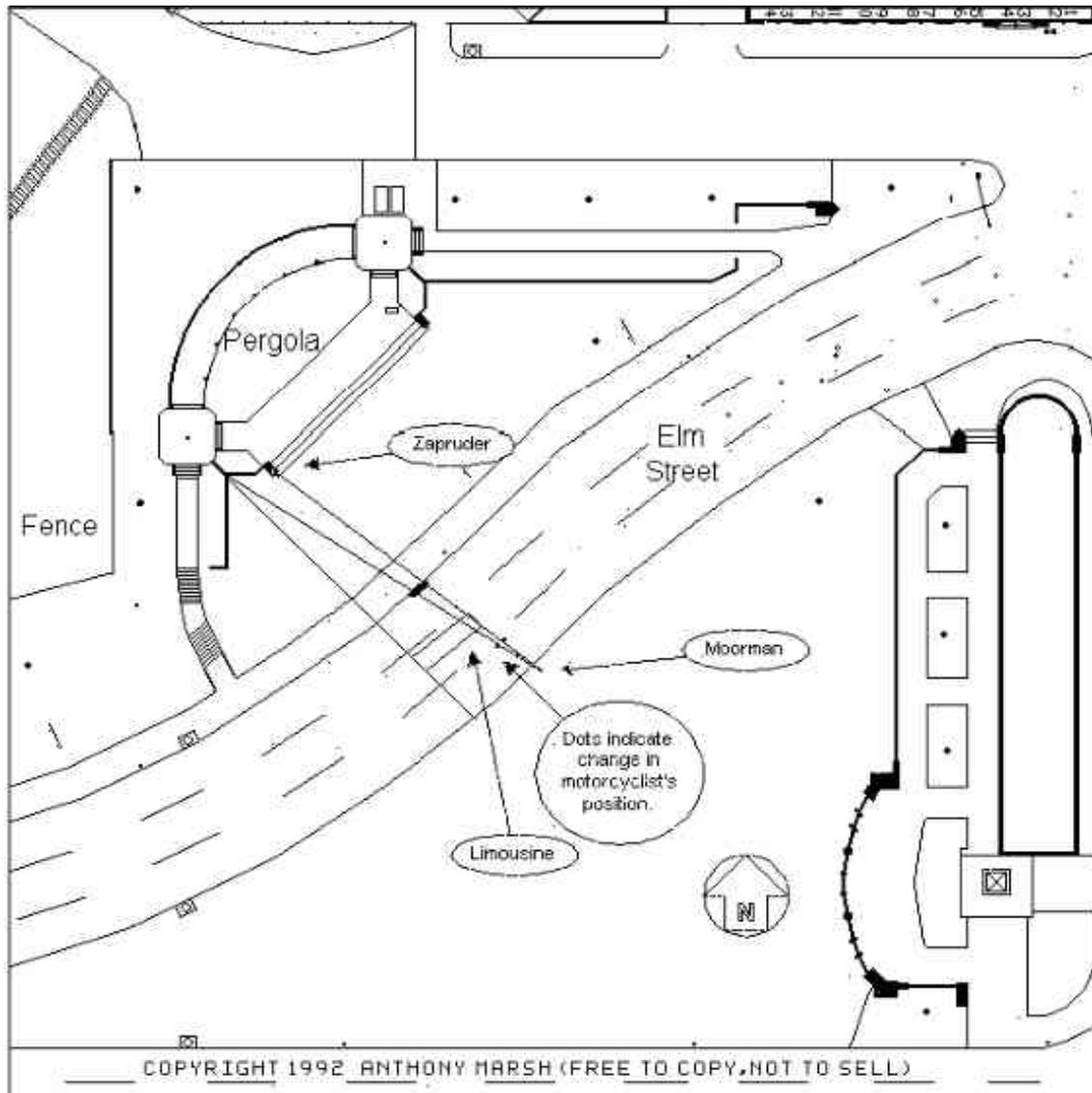


Figure 4 Scale Diagram of Dealey Plaza

“One key to locating the position of the limousine is to draw a straight line from the right front bumper at approximately a 45 degree angle towards the pergola. The line should intersect the east edge of the north run of the retaining wall before the retaining wall intersects (like an upside down Y) with the adjoining wall. The limousine is about 6 and 1/2 feet wide and about 21 feet long. At Z-313 the right front edge of the limousine is about 15 feet away from the north curb of Elm Street. The right rear edge of the limousine is about 15 and 1/2 feet away from the north curb.”

“Now that the limousine has been placed on the map, a straight line can be drawn from Zapruder's camera position to Mary Moorman's camera position. In Figure 5, frame Z-313, that line is represented by a purple line in the sprocket hole area. Hargis' white helmet is just to the left of that line, or generally east of the line. Mary Moorman was standing about 3 feet away from the curb. The line just barely falls behind the left rear edge of the trunk of the limousine. Hargis is about 11 feet away from the south curb of Elm Street. A small dot on the map touching the line from Zapruder to Moorman represents Hargis' helmet.”¹¹



Figure 5 Frame 313 of the Zapruder Film with line of sight in relation to Hargis.

By now, the reader can probably see where Tony Marsh is taking us. He is going to place the Moorman photo in time by examining the movements of both the limousine and the police motorcycle escort, Officer Hargis, using both Mrs. Moorman and an easily identifiable feature on the pergola opposite her as his fixed points for comparison. As seen above in Z313 (Fig. 5), Hargis's helmet is to the left of Mr. Zapruder 's line of sight to Mrs. Moorman, and to the right of her line of sight to Zapruder. By the time Mrs. Moorman has snapped her photograph, however, this situation is reversed, as Marsh continues to explain.

¹¹ All quotes are taken from Marsh, W. Anthony, "A Photogrammetric Method to Calculate When the Moorman 5 Photo Was Exposed." (1998)

EXAMINING THE MOORMAN PHOTOGRAPH

“When a line is drawn from Moorman to the point of intersection of the retaining wall with the adjoining wall, the line touches the back of Hargis' helmet. In the Figure 6 that line is represented by a purple line. Thus in the Moorman photo, we see that Hargis is to the west of the line. Thus Hargis' helmet is farther to the west in the Moorman Polaroid than in Z-313.”

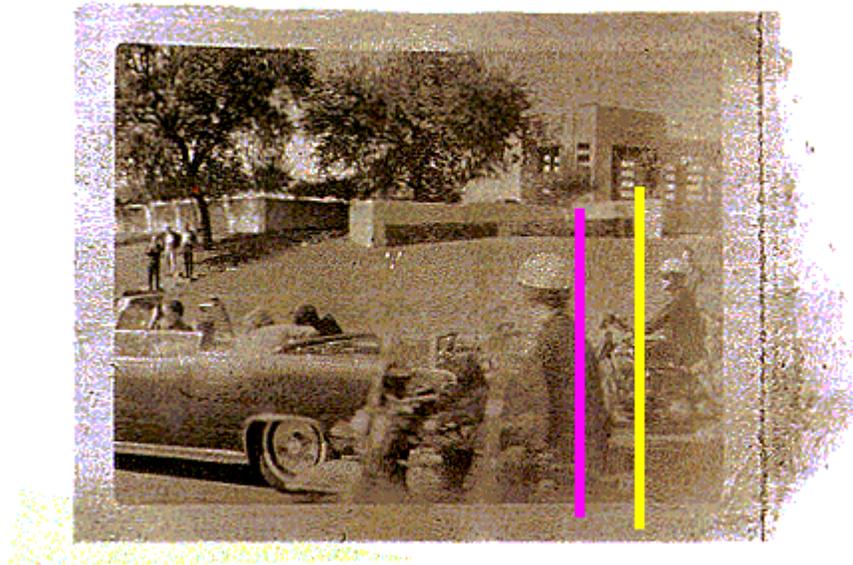


Figure 6 Moorman photo with lines of site to wall abutment and Zapruder.

Since Tony Marsh originally analyzed a copy of the Moorman photo that had been cropped, I have inserted an additional yellow line pointing directly from Moorman to Abraham Zapruder. This clearly shows what has already been outlined on the map in Figure 4. The line of sight from Moorman to the retaining wall abutment is west of the line from Zapruder to Moorman. Without a doubt, then, by the time Moorman snapped her photo, Hargis has moved further west since frame Z313.

HOW MUCH LATER WAS THE MOORMAN PHOTOGRAPH TAKEN?

To determine just how much later the Moorman photo was taken, Marsh next estimates how far Hargis traveled, how fast he was going, and how long it took him to travel “from Z313 to the Moorman photo.”

“A rough estimate can be made by measuring the distance between the lines at 11 feet from the curb, which measures the travel path of Hargis's helmet from Z-313 to the Moorman photo. This distance is approximately 18 inches. Hargis's helmet is approximately 1 foot long, so the total distance covered is about 2.5 feet. Although the Alvarez study showed that the Presidential limousine slowed from approximately 12 MPH to approximately 8 MPH at about Z-300, the escort motorcycles kept traveling at about 12 MPH, which is equal to about 17.6 fps. In fact, in the Nix film we see that Hargis keeps pace with the limousine, staying ahead of Martin to his left and gaining on the limousine.

2.5 ft/17.6 fps = 0.142 secs.

*0.142 secs. * 18.3 frames per sec. = 2.6 frames*

313 + 2.6 = 315.6

Thus, according to this estimate, Mary Moorman snapped her photograph during the exposure of frame 315 of the Zapruder film. This was after the President had already received a bullet wound to his head. But if this is true, why don't we see in Moorman's photo something of the same horrific halo of blood that clearly appears on the Zapruder film after frame Z312? There are at least two answers to this. First, by the time Moorman's photo was exposed, the halo had already mostly dissipated. As the following comparison shows, the halo is far less pronounced in frame Z315 than in frame Z313, and by frame Z316 it is almost completely gone.

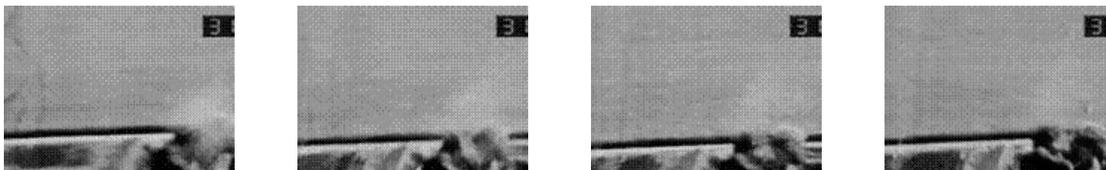


Figure 7 Comparison of “halo effect” in frames 313-316 of the Zapruder film

Tony Marsh adds: “Also, the halo may appear much more visible in color than in black and white. I think there are also differences in the exposure and contrast of Moorman versus Zapruder that make the halo more vivid in the Zapruder film than the Moorman Polaroid.”

However, placing the Moorman photo accurately within the assassination chronology is not the end of the matter. It is apparent, not only from her photo, but from the Zapruder and Nix motion pictures that, while President Kennedy sustained a gaping wound on the right front side of his head at Z312-313, at that moment there was no apparent damage to the top of his head. Yet we know that he suffered such damage in the assassination. The damage is obvious in photographs taken during the President's autopsy at Bethesda Naval Medical Center on the night of the assassination. To illustrate, here is one of the photographs that was allegedly given to researcher Mark Couch by former Secret Service Agent James Fox, who was involved in the process of developing the photographs. It clearly shows an exposed defect involving bone loss at

the vertex of the skull. This portion of the head, as seen in the Moorman photograph and the Nix film, however, appears still intact, covered by the late President's abundant reddish-brown hair.¹²



Figure 8 Post-mortem photograph of John F. Kennedy viewing head superiorly

This same area of damage to the skull is also strongly implied by a frame Z333 of the Zapruder film. To illustrate this as clearly as possible without elaborate computer enhancement, I have reproduced this frame both in color and in a contrast-adjusted grayscale rendition, so that the reader may compare the Zapruder frame to the autopsy photograph shown above.

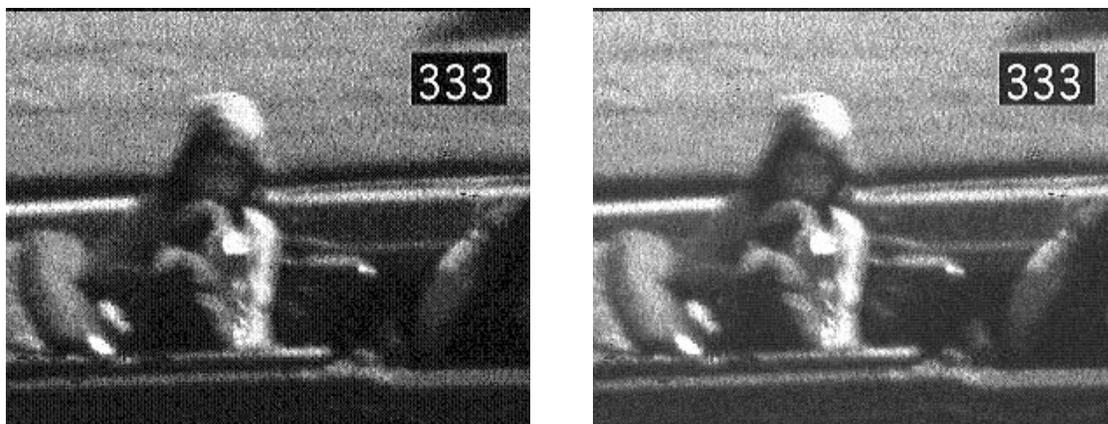


Figure 9 Frame 333 of the Zapruder film in both color and contrast-adjusted grayscale

In frames Z312 through Z314, all taken after the moment when it is universally agreed that President Kennedy sustained a shot to his head, the hair on the back of his head seems

¹² Trask, who purports to have made an extensive study of assassination photography, concedes that the President's "full bushy hair" is discernable in the photo. He also agrees that the photo was exposed after frame Z313. Trask, *Pictures of the Pain* (1994) at 246.

undisturbed, notwithstanding the major wound in the right-front. The same appears to be the case in Mary Moorman's photograph. However, in frame Z333 (the only frame clear enough to demonstrate the point) the vertex of the skull appears fleshy and exposed.

Simply put, the reason why this additional damage does not appear in Mary Moorman's photograph is because, at the time she snapped it, the damage had not yet occurred. It occurred an instant after her photo was exposed. Moorman's own account of what she saw and heard as she took her famous picture strongly support this conclusion.

THE CONTEMPORANEOUS RECOLLECTIONS OF MARY MOORMAN

During the minutes immediately following the assassination, reporter James Featherston of the Dallas Times Herald learned that Mrs. Moorman had taken a photograph of the shooting. Taking her forcibly by the arm, he brought both Mrs. Moorman and Mrs. Hill to the press room of the nearby Dallas County Criminal Courts Building, which also housed the Sheriff's Department. There, on the afternoon of the assassination, Moorman gave several statements to official investigators and members of the press. Within a year, she gave a more expansive interview to CBS News as it prepared to broadcast a documentary timed to coincide with the release of the Warren Report. Examination of all her statements indicates that they were internally consistent, and consistent with each other. She never changed her story.

In a signed statement submitted to the Sheriff's Department, and printed in the Warren Commission's 26 volumes of hearings and exhibits, Moorman described what she saw and heard:

"As President Kennedy was opposite me, I took a picture of him. As I snapped the picture of President Kennedy, I heard a shot ring out. President Kennedy kind of slumped over. Then I heard another shot ring out and Mrs. Kennedy jumped up in the car and said, 'My God, he has been shot.' . . . I heard three or four shots in all."¹³

In her testimony before the Warren Commission, Jacqueline Kennedy acknowledged saying, "Oh, my God, they have shot my husband." Governor John Connally remembered hearing her say "They have killed my husband."

Mrs. Moorman's statement to the FBI that day was memorialized in the third-person tense by Special Agents Curtis L. Perryman and Robert P. Gemberling.

¹³ 24H 217, Warren Commission Exhibit 2003. (Also reproduced in Decker Exhibit 5323 at 487.)

“She took a second photograph of the President as his automobile passed her, and just as she snapped the picture, she heard what she at first thought was a firecracker and very shortly thereafter heard another similar sound which she later determined to have been gunfire. She knows that she heard two shots and possibly a third shot. She recalls seeing the President ‘sort of jump’ and start to slump sideways in the seat, and seems to recall President KENNEDY’S wife scream, ‘My God, he’s been shot!’ (sic)”¹⁴

On the afternoon of the assassination, Moorman told Bill Lord, a television interviewer for ABC affiliated station WFAA-TV that,

"My picture when I took it was at the same instant that the President was hit, and that does show in my picture . . . it shows the President he, uh, slumped. Jackie Kennedy was leaning towards him to see I guess. It all happened so suddenly, I don't think anyone realized, you know, what had happened."

As is customary in the recording of television news interviews, where reporters attempt to give their producers a choice among possible quotes, Moorman was then asked a repetitive question: “Did you realize what had happened when you heard the shots?” She answered:

"No, I didn't. There was, oh, three or four real close together, and it must have been the first one that shot him, because that was the time I took the picture, and it was during that time after I took the picture, and the shots were still being fired, I decided I better get on the ground. . . . I was no more than fifteen foot from the car and in line of fire evidently."

Her statement that the first shot she heard was the first to hit Kennedy is entirely consistent with the statement she gave to CBS News less than a year later.

¹⁴ 22H 838, Warren Commission Exhibit 1426. (Originally part of the FBI Dallas Field Office’s DL 89-43 file.)

“And as they neared where we were standing, I stepped in the street in order to get a closer picture of him, and I . . . turned the camera I was focusing it was, oh I guess, three or four seconds that I moved with the car in order to be sure that I was getting a real clear picture for my son. And the moment that I snapped the picture was the moment of the first shot --- that’s when he was hit. He slumped at that very instant. And I stepped back up on the curb in time enough to see him shot again. He – his arm flew up and you know, his hair kind of jumped. And my first thought was, there’s a firecracker in the car and the way he jumped and moved, well, he’s trying to get away from the firecracker. And there was another shot, and I told my friend, I said, Jean, they shooting something. Get down. And I whirled around and fell and by then of course the shots were all over, and just pandemonium. Everybody was running in all directions. And I looked and Jean was gone. She had took off across the street, and I ran across to catch her and nearly ran over by a policeman, who was trying to get off his motorcycle.”

There are several contemporaneous assassination films that show Moorman and Hill in Dealey Plaza. These include the Zapruder, Orville Nix, and Marie Muchmore home movie films, and still photographs by Wilma Bond, Charles Bronson, and others. A photo by Bronson shows Mrs. Moorman panning her Polaroid camera as the presidential limousine approaches her location, just as she later recalled.¹⁵ From all the films, however, it does not appear that she ever stepped out into the street. In fairness to her, she does seem in frame Z313 (and several preceding frames) to be in the act of stepping forward. Since she did not take her eyes from the camera viewfinder during this time, she may well have had the sensation that she was stepping into the street, even though her feet actually never left the grass.

As I will presently discuss, the Zapruder film does show President Kennedy’s hair fly up, just as Mrs. Moorman reported she saw. This was also noted by two other eyewitnesses in close proximity to the limousine, Jean Hill¹⁶ and Charles Brehm.¹⁷

Moorman also told CBS that, a few minutes after the shooting, when she removed the film from the camera, she was surprised and upset by the picture that she had actually taken. She had thought, wishfully, that she snapped the picture when the President was looking in her direction.

“I took it out and to my astonishment, it was taken at the same instant that the gun . . . that he was hit.”

¹⁵ A color enlargement appears in Groden, *The Killing of a President* (1993) at 207.

¹⁶ 25H 854 (Warren Commission Exhibit 2582)

¹⁷ Warren Commission Exhibit 1425.

This statement is entirely consistent with one that she gave to ABC, as previously quoted, and to an NBC interviewer on the day of the assassination. In the NBC interview, which was broadcast, Moorman said she did not know immediately that the President had been shot.

What I understand Moorman to have said is this: She never heard any of the other shots fired during the assassination, including the earlier shots that wounded both President Kennedy and Governor Connally. She was too excited and too preoccupied with focusing her camera to realize what was happening, and her position in Dealey Plaza may well have prevented her from hearing the earlier gunshots. The first shot she is aware of having heard was the first shot that struck Kennedy in the head, and she snapped her photo almost simultaneously. She saw him hit again, and this was the second shot to the head that caused JFK's violent reaction. She described this vividly to CBS in 1964. This for her was the "second shot." She heard one additional shot after that, which is possibly a missed shot, and that is when she told Jean Hill to get down.

THE ZAPRUDER AND NIX FILMS SUPPORT MOORMAN'S ACCOUNT

In 1975, the Itek Corporation, a photo-analytical concern in Lexington, Mass., was asked by CBS News to study the Zapruder film in the area surrounding frame Z313 using techniques of analysis such as digital image processing, which were unavailable in 1963-64. This processing included the enhancement of the film's resolution and the sharpening of its imagery. It should be noted that, in several studies related to the assassination since the late 1960's, Itek has consistently supported the government's official case for a lone assassin, and that those persons who supervised its 1975 study for CBS were former employees of the Central Intelligence Agency, which has been widely discussed as a possible suspect in the assassination. In discussing the Zapruder film and straining to support the official findings, Itek omitted to mention and assess the significance of some key details in the film. Nevertheless, one may differentiate between Itek's speculative interpretations that lay outside their area of expertise, yet still adopt certain of their objective mathematical measurements from the film as correct for the purpose of analysis.

Itek made the following relevant findings:¹⁸

- At frames Z312-313, the President's head and shoulders are impelled forward. By frame Z314, his head moved just slightly (0.3 inch) to the rear of its 313 position.
- Frame 313 shows his head with a massive distortion in the upper right area, above and slightly forward of the ear. A cloud of matter, mistlike in appearance, is dispersed in all directions but primarily forward of the President's head. This spray of fine matter dissipates fairly rapidly.

¹⁸ Itek Report on Zapruder film analysis (unpublished) (1976)

- The major, or large particles ejected from the President's head at frame Z313 that Itek actually measured on the film, and which have contiguous boundaries which hold together during flight, radiate (travel) in an upward and forward direction, and his head moves forward about 2.3 inches between frames Z312-313 under the impact of an obvious blow. Itek found "two major trajectories" radiating upward and forward in this frame. In the next frame, Z314, Itek discerned two other trajectories radiating forward and downward into the car. Itek could only hypothesize about how many particles there actually were, since only two particles of matter might appear in the same frame as several particles if they were spinning and reflecting light as they moved.
- Itek found that the President's head received a second impulse backward between Z315 and Z316, evidenced by a significant change in the backward velocity and acceleration between Z315-316 and Z314-315.
- Itek measured the ratio of the most rapid forward movement of the President's head to the most rapid backward movement as being approximately 1.25:1.¹⁹
- From frame Z315, the President's whole body follows the backward lurch of his head. The backward motion continued on for several frames (at least to Z321) until he slumped into his seat.

Leaving aside the Itek analysis, viewing the Zapruder film in slow motion demonstrates clearly that the President sustained two separate shots to his head. At frame Z315 one easily discerns a marked difference in the President's situation from the immediately preceding frame Z314. In Z314, after the initial impact to his head, the hair on the back of his head still appeared neatly groomed. His head was seen in almost full profile leaning forward and downward. In frame Z315, the hair on the entire portion of his head not obscured by matter extruding from the wound he sustained at Z313, has suddenly become tousled and disheveled. His facial features, visible in profile just two frames earlier (and during preceding frames), are now distorted beyond recognition, much more so than the other animate or inanimate objects in the same frame.

¹⁹ Trask, who can barely conceal his antipathy toward critics of the official lone assassin theory, quotes extensively from CBS's interview with the president of Itek's Optical Systems Division, John Wolfe. Trask fails, however, to inform his readers that Itek's subsequent written report represented a correction of the statements made by Wolfe during that interview regarding the velocity of the backward movement. [See Trask, *Pictures of the Pain* (1994), 126-127.] Since Trask did have the available source materials, his failure to advise his readers of this crucial point suggests his intellectual dishonesty. Wolfe had indicated to interviewer Dan Rather that the backward movement was slower than the forward movement by a ratio of 2:1. Trask was eager to take the Warren Commission critics to task for criticizing that very point, but the fact is that Itek corrected its measurements to show the forward and backward motions nearly equal in velocity. Moreover, Itek advised CBS News of this correction more than two weeks before the broadcast in a memo that was provided to the producers of the CBS broadcast. Itek Interoffice Memorandum dated November 4, 1975, from Frank Corbett to Howard Hall. CBS did not incorporate the correction into its broadcast. Trask, by the way, seems also to have failed to inform his readers that black-and-white copies of frames Z314 and Z315 were transposed when printed in the Warren Commission's Hearings and Exhibits, CE 885 (18H1-80). See Letter of J. Edgar Hoover dated December 14, 1965, reproduced in Weisberg, *Photographic Whitewash* (1967) at 145.

Furthermore, in Z315-316, his head rotates violently leftward and upward, the hyperextension of the muscles on the right side of his neck being visible. This is also observed by tracking the movement of his ear, the back of his head, and the shadow of his head, as well as by juxtaposing the frames. It is at this precise point, according to what Itek measured, the president's head and shoulders underwent a dramatic change in velocity and acceleration backward. The backward movement then continued.

The motion picture film taken by another assassination eyewitness, Orville Nix, gives us a view of the fatal sequence from a different perspective. This further assists us toward gaining a fuller understanding of what occurred. In contrast to what Itek found about the movement of particles ejecting from the head, the Nix film demonstrates unequivocally a major particle flying rearward over the trunk of the presidential limousine.²⁰ The fact of this rearward movement of a portion of the President's head over the rear seat and onto the trunk of the limousine stands in stark contrast to Itek's analysis of frame Z313, in which all major particles move forward.

The movements of the President's head and upper torso, and the ejection of a major particle rearward, further demonstrate a second strike to the head.

In both the Nix and Zapruder films (more clearly in Zapruder), Mrs. Kennedy is seen climbing onto the trunk of the limousine. She appears to brace herself with her left hand, reach out with her right hand, retrieve the particle of matter that has flown backward across the trunk of the vehicle (as seen in the Nix film), and take it back into the car.²¹ As she retreats into the vehicle, Secret Service Agent Clinton Hill jumps from the follow-up security car and climbs onto the trunk of the limousine. He barely touches her forearm as she climbs back into the car by herself. The nature, purpose and accomplishment of her actions are clear from viewing the film.

To summarize, what the naked eye observes on the best available films taken during the fatal sequence of events in Dealey Plaza is exactly what the objective mathematical measurements of independent photoanalysts, and Mary Ann Moorman, tell us happened. Two separate impacts occurred upon President Kennedy's head within a very brief interval of time. I have already alluded to the medical facts pointing to two separate shots. It is therefore an inescapable fact that the President was killed by more than one assassin.

CONCLUSIONS

The researcher's query that prompted me to write this paper indicates that, in the telling and retelling of the Kennedy assassination, much basic facts seem to have gotten lost. His essay did not cite to a single primary source of information, relying instead on three secondary sources:

²⁰ Attested to by eyewitnesses Charles Brehm in a tape-recorded interview with Mark Lane, *Rush to Judgment* (1966) at 56, and in sworn testimony by Secret Service Agent Hill (2H 140)

²¹ See also, SS Agent Clinton Hill's testimony at 2H 138.

books by Richard Trask (1994), Gerald Posner (1993), and Jim Marrs (1989), all part of the third generation of assassination literature, and all eminently flawed. The public and university libraries of the State of Ohio hold some of the largest collections of assassination literature available anywhere. It is enough that knowledgeable critics must contend with the misrepresentations and obfuscation of fact by the Warren Commission and its apologists. How is the general public to understand what really happened to the United States on November 22, 1963, and thereafter, when we are continually compelled to argue and prove elementary principles?

To sustain a finding of conspiracy, it is not necessary to prove the image of an assassin behind the fence or the retaining wall. Beset by old habits, critics have assumed a burden of proof inappropriate to their role or resources, and have fallen into a trap set for them long ago by apologists for the Warren Commission. Thus, for example, Trask is able to write: "The Moorman picture, like so much else with the case, does not appear to give us simple, definitive answers," and that it is "a less than ideal piece of evidence."²² Writers such as Trask find safety in the epistemological quest for absolute certainty, and comfort in parsing the evidence while scrupulously avoiding its powerful confluence. However, Mary Moorman's simple Polaroid snapshot of a presidential assassination is not an ambiguous enigma. It proves a conspiracy even without revealing a mug shot of Badge Man. Extracting such an image would be nice, even extraordinary. Certainly, the best scientific knowledge in the world should be brought to bear in order to enhance and preserve it. In the meantime, we may be thankful for what we have.

Analyzing the fatal wounding sequence in the Kennedy assassination through the photograph and perceptions of its closest eye- and earwitness, Mary Moorman,, it is abundantly clear that they are consistent with and supportive of what can also be derived from the Zapruder and Nix films, and the nature of President Kennedy's wounds. President Kennedy was struck twice in the head by two separate shots. Mary Moorman heard both of them, and snapped her photograph in between. Then she heard an additional shot, and told her companion, Jean Hill, to get down.

A review of the other eye- and earwitness evidence pertaining to the fatal sequence, and a detailed treatment of the medical evidence proving that President Kennedy sustained two shots to the head, are beyond the scope of this paper, as is a detailed consideration of the "Badge Man" issue. Critics will still debate whether the second head shot originated from the grassy knoll or elsewhere. This question, although neat, is secondary in importance to the main point that more than one assassin killed the president. The point is frequently lost that, because the alleged official investigations of this crime were in truth politically oriented whitewashes, the overall structure of the assassination controversy precludes critics from carrying such issues to full closure. It is not the critic's obligation to supplant the role of law enforcement and completely solve all "loose ends" of the crime in order to achieve credibility. Without the missing autopsy evidence, or additional photographic evidence that has not yet come to light, this question of source cannot be determined conclusively, still the plain, "simple, definitive" fact remains that there were two separate hits to the head.

²² Trask, *op cit.* At 259.

PRIVATE OWNERSHIP AND PUBLIC POLICY

Beyond this urgency, however, the American people and their elected representatives must also consider the weight to be accorded private property interests as against the public's entitlement to every man's (or woman's) evidence in a national calamity such as the murder of a president. Many new students of the Kennedy assassination are either too young to remember or too inexperienced to appreciate that the struggle of private citizens to uncover the evidence, and the painfully slow unfolding of that evidence into public view, are as revealing of the story as the evidence itself.

Mary Moorman sold the reproduction rights to her photograph of the assassination that same afternoon to the Associated Press and United Press International for \$600. It appeared in many newspapers, and was later reprinted in many books about the assassination, but not the Warren Report.²³ She did make it available to the Federal Bureau of Investigation. Therefore, the photo has been a matter of public knowledge and available to researchers for many years.

The analysis presented in this paper would not have been possible, however, thirty or even twenty-five years ago. That is not because the evidence did not exist. It is because clear renditions of the Zapruder film frames were not then available for serious study. None of the autopsy photography was available except to a handful of medical experts who were either commissioned by the Justice Department or granted special permission by a representative of the Kennedy family. Officially, they are still sequestered from public view in the National Archives according to an agreement between the Kennedy family and the General Services Administration. Mary Moorman's interview with CBS News less than a year after the assassination, except to the extent that they broadcast excerpts from it, remains the private property of CBS (now Viacom). It is locked away in that company's film archives in Fort Lee, New Jersey, together with the contemporaneous statements of many other witnesses, including some no longer living. Thus, for many years after the assassination, the public was not permitted to consider most of the material presented here, even though it has been well known to assassination researchers. In the interim, the body politic made important political decisions without the full benefit of the best information available about the assassination of an American president and the violent change in political administration. Clearly, a serious and lasting injury was inflicted upon the American system of self-government. On a more human scale, it has grown increasingly likely through the years that the widow and two infant daughters of the accused assassin were unfairly stigmatized for the rest of their lives.

²³ Incredibly, the Warren Commission did see Moorman's photographs, but sent them back to her and never entered them into evidence. See Letter dated March 18, 1964 from J. Lee Rankin to J. Edgar Hoover, reproduced in Weisberg, Harold, *Photographic Whitewash* (1967) at 170, and Letter dated April 3, 1964 from Rankin to Hoover, *ibid.*, at 173. By 1978, Moorman still had custody of her photos and lent them to a panel of photographic experts appointed by the House of Representatives Select Committee on Assassinations. However, the panel did no work to enhance the detail near the stockade fence.

The Government should have seized all of this evidence 35 years ago. On the other hand, by recently compensating the family of Abraham Zapruder more than \$16 million for taking the camera original of his film, while leaving their copyright intact, the Government may have seriously compounded the difficulty of persuading individual photographers of the assassination to come forward with their materials in the public interest.²⁴ These people may well anticipate garnering similar windfall profits, or lucrative media deals, before parting with their treasures. Indeed, we do not know whether all film of this event has been publicly revealed, or whether even clearer pictures still exist in private hands. The policy that the Government established with the Zapruder family does not reflect the values that organized society should encourage and instill in its members. In its wake, one could conjure up a scenario where an obscure private photographer of a sensational crime refuses to come to the aid of a wrongfully accused defendant because he believes that the economic value of his film is certain to appreciate over time, like fine artworks.

There is another side to this coin, and it bears the coat of arms of the Kennedy family. From the beginning, the Government has ceded to them virtually complete authority over the artifacts of the president's autopsy. During the Review Board proceedings, President Kennedy's children also refused to permit the release of William Manchester's many tape-recorded interviews for his book, *The Death of a President*. Their role changed from silent acquiescence to active concealment. This abdication of responsibility on both sides has also served the official cover-up.

Although the elemental truth that there was a conspiracy to kill the President of the United States on November 22, 1963, can no longer be denied, still there is no accountability for the prolonged and continued cover-up. I submit that Mary Moorman, every other witness in Dealey Plaza who was subjected to similar trauma, and the American people, are entitled to accountability, the failure of which will surely mark our era as the beginning of the decline in America's stature as the greatest nation on earth.

²⁴ Due to shrinkage and other ravages of time, the camera original copy of the Zapruder film can no longer be run through a projector. Pending the development of new technologies that will permit further study of the film, it is highly unlikely that the physical reel itself will serve any practical use within the lifetimes of any person who was living on November 22, 1963. It remains in a cold storage vault at the National Archives. The copyright is the instrument of suppression here. By leaving it in private hands, the Government left dissenting voices exposed to penalties and private censorship in the pursuit of truth. While its owners have never won a single action to restrain publication, their exorbitant demands for licensing fees and royalties chill commercial publishers from reproducing frames unless these are paid, usually out of authors' advances. This notwithstanding the fact that the film was evidence in the 1969 trial of Clay Shaw in New Orleans, as dramatized in Oliver Stone's "JFK," and is therefore part of a judicial proceeding. In truth, the entire assassination sequence is subject to "fair use," except if used as some bizarre form of entertainment. While the Zapruders aren't owed a dime, publishers would rather pass their costs onto authors than risk costly litigation to vindicate this principle.