ACCUMULATION OF AUTOMOBILE ACCIDENT RECONSTRUCTION EVIDENCE

by

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APPROVAL BY THESIS DIRECTOR

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Date

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ABSTRACT

This thesis is concerned with a major phase of the growing science of automobile accident reconstruction - the physical evidence of the collision. The pertinent evidence necessary to accurately reconstruct an automobile accident is discussed, and methods of obtaining and recording this evidence are set forth. The advantages of these recording methods over some of those presently in use by many law enforcement agencies are discussed. Recommendations are made for additional data to be recorded on the standard Arizona Traffic Accident Report form. Recommended procedures for courtroom presentation of the acquired evidence are also discussed.

Chapter I

INTRODUCTION

When an automobile is in motion, it possesses kinetic energy by virtue of its velocity and mass. Since the mass, or weight of a vehicle is relatively constant throughout an entire collision sequence, any loss of kinetic energy is necessarily accompanied by a loss of velocity. There are three ways in which energy is rapidly dissipated during the collision sequence. First, there is often a loss of energy before impact due to braking action. Secondly, the structural deformation of the vehicles during impact dissipates energy, and further reduces the velocity of the vehicles. Finally, all remaining energy is dissipated in various manners depending on how the vehicles reach their final positions of rest.

By accounting for all of these energy losses, a qualified accident reconstructionist can arrive at an opinion as to the speeds of the involved vehicles immediately before the collision. Knowing the speeds, the relative positions of the vehicles with respect to each other can then be approximated for reasonable increments of time preceding the impact. The determination of speeds and locations are the cruxes of the reconstruction process.

The Problem

When automobiles collide with sufficient force to cause substantial vehicle damage or bodily injury to passengers, a lawsuit often results. The testimony of witnesses and involved parties is usually conflicting and sometimes biased. The physical evidence of the collision therefore gives the only objective means of determining the true accident sequence. Before the accident evidence can be analyzed and interpreted by a reconstructionist, however, it must first be gathered and recorded.

The reconstruction of any collision will only be as accurate as the recording of the physical evidence. Very seldom does the reconstructionist get to the accident scene even within a few days of the collision. In fact, it is often weeks or months before he is called into the case. The police report is usually the only permanent record made of an automobile collision while the evidence is still fresh. This report should therefore be detailed and as complete as possible.

The data called for by the Arizona Traffic Accident Report (ATAR) form, Appendix A, which is used statewide by all law enforcement agencies, is not always adequate for accident reconstruction purposes. Further, in over three and one-half years of actively investigating and reconstructing automobile collisions, this author has noted a lack of uniformity among various law enforcement agencies and their personnel regarding the recording of accident evidence. This is an unfortunate situation for a number of reasons.

An accurate investigation is important to the law enforcement agencies themselves for the prosecution of criminal charges due to traffic law violations. It is also useful to traffic engineers for analyses of hazardous situations and locations, driving trends, and general accident statistics. The most important use of accident reports, however, arises from attorneys and insurance companies engaged in settlement of damage and injury claims resulting from the accident. Although only a small percentage of these damage claims actually go to court, it is often months or even years before they are tried. It is unreasonable to expect that a police officer who is called to testify regarding an accident he investigated many months before will recall all the facts in detail.

A standard procedure for investigating and recording all pertinent collision evidence is therefore obviously desirable. It is the purpose of this thesis to set forth a recommended guide.

The recommendations herein as to needed evidence, methods of recording, and courtroom presentation are made from the point of view of an expert witness in the field of automobile accident reconstruction, who is often called on to interpret evidence recorded by others many months or even years before. Many of the suggestions for improved techniques of investigation and preservation result from actual experiences encountered by the author in Federal and Superior courts during the course of expert testimony regarding automobile collisions.

One of the most prevalent types of urban automobile accidents (and by far the most often reconstructed) is the 90° intersection collision. This paper will use this type of collision for examples

and illustrations, although the same basic principles apply to other types of collisions.

The rather complex and lengthy phase of accident reconstruction which deals with the analysis and interpretation of the recorded evidence will not be included in the scope of this thesis.

Chapter II

DESIRED EVIDENCE

The physical evidence of a collision is made up of the characteristics, structural damage, and physical locations of the involved vehicles, all accident-caused marks on the road surface, as well as the nature and condition of the collision scene. Baker (1)* indicates that the following information, which is derived either directly or indirectly from the physical evidence, should be known in order to accurately reconstruct an accident:

A. Vehicle Information
    1. Structural Characteristics
    2. Collision Weight
    3. Undamaged Dimensions
    4. Nature of Impact Damage
    5. Tire Condition
B. Intended Paths of Travel
C. Nature of Skidmarks
D. Point of Impact
E. Points of Rest
F. Secondary Collisions
G. Nature of Accident Scene

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* Number in parenthesis refers to references at the end of the text.

Vehicle Information

As a matter of policy on the ATAR form, the year, make, and type of the vehicles involved in an accident are recorded, as well as the number and age of occupants. For the purposes of accident reconstruction, this should be carried a few steps further.

The make and the year of an automobile are sufficient information to tell the expert which of the three main types of vehicle construction (frame, unitized, or modifed unitized) is involved, and therefore the type of collapse characteristics to be expected for any given collision.

For accurate weight determinations, the manufacturer's model should be known. It has been noted by this author that under the "type" space in the ATAR form, investigating officers invariably note "two-door" or "four-door." This is not sufficient information, since most of the major manufacturers have at least three models of both two-door and four-door vehicles (Chevrolet's Biscayne, Bel Air, and Impala; Ford's Custom, Galaxie, Galaxie 500; Plymouth's Savoy, Belvedere, Fury, etc.) which vary in weight from model to model.

Weights of vehicles also vary with engine and transmission options, and these items could easily be recorded by an investigating officer. Whether an engine is an eight, six, or four cylinder model is apparent from observation. Horsepower, or cubic inch displacement, is almost always noted on the engine at some easily seen location such as the aircleaner or the valve covers. Whether a transmission is an automatic shift or manual shift is also readily apparent by observation of the car's interior. If manual shift transmissions are

involved, notation should be made as to whether or not they are three-speed or four-speed models. (Engine and transmission options also relate directly to a vehicle's acceleration capabilities, which may be important to the reconstructionist.)

Knowing the make, year, manufacturer's model, engine, and transmission types, there is standard reference material available which gives not only the unladen weight of the vehicle, but also other needed dimensions such as wheelbase, treadwidth, overall length and width, front and rear overhangs, and center of gravity (2). Since the number of occupants and the age of each is recorded for both of the involved vehicles, the collision weight (unladen weight plus occupant weight) can be approximated within a reasonable limit. When trucks or station wagons are involved, the nature, distribution, and weight of any loads are factors which must be considered, and should be determined as accurately as is possible.

Knowing the structural characteristics and weights of the involved vehicles as well as the extent of permanent deformation sustained by each, the reconstructionist can determine the approximate speed loss caused by the impact damage. A volumetric displacement of the structural components is the basis for the analysis (3 & 4). Methods of measuring the extent of deformation are discussed in Chapter III herein.

Since the tires of a vehicle are the primary means of maintaining road contact, they are worthy of some consideration in the accident reconstruction process. Any unusual tire conditions should be noted, particularly for vehicles which left skidmarks before or after impact.

Bald or nearly bald tires, extremely large or oversized tires, or unusually low inflation pressures can cause variances in the skid resistance and stopping distances. Baker (1) reports that for a given set of tire conditions (size, inflation pressure, tread depth, and similar vehicle) there is only slight variance in stopping distances between tires of different brand names, and the variance is negligible for all practical purposes.

Intended Paths of Travel

The intended direction of travel of each vehicle prior to the collision is the starting point for the accident reconstruction process. Witnesses or involved parties can usually be relied on to accurately supply this information. It can be determined, however, from the location of damage on each of the vehicles and the positions of final rest in relation to the point of impact.

Nature of Skidmarks

When the wheels of a moving automobile are locked by virtue of brake application, the friction developed between the road surface and that portion of the tire in contact with the road causes sufficient heat to exceed the melting point of the rubber. It is this transfer of molten rubber to the pavement which leaves the dark black marks called skidmarks. These marks will normally remain on the road surface for at least several days, and sometimes several months, depending on the weather and traffic conditions.

At very low speeds, particularly on very rough surfaces, there is often neither sufficient distance traveled, nor sufficient speed differential between the tire and road surface to develop enough heat to cause melting of the rubber, even when the wheels are locked (5). In this case, rubber is abraided off the tire by the roughness of the pavement, much as sandpaper works on wood. Due to the fineness of these rubber particles, very close inspection of the road surface is necessary to identify this type of skid. A very light grey shadow is the only clue to its presence. This type of skidmark is not at all durable, and often disappears within a few hours.

Since expert analysis of skidmarks is often necessary, it is desirable for the investigator to record these marks just as they are found, and avoid jumping to conclusions regarding their meaning. The overall length of skidmarks apparent on the road surface should be measured, since it is often difficult to locate where each wheel began to slide due to the overlapping of the rear wheel marks over those left by the front wheels. Shadows and dark areas should be distinguished in the recording of the lengths.

A typical recording of skidmarks is shown in Figure 1. As indicated in Figure 1, skidmarks occurring after the point of impact should be distinguished from those occurring before. The beginning or end point of skidmarks should always be noted with reference to some fixed point on or near the intersection. When no skidmarks are apparent, the investigating officer should so indicate on his diagram.

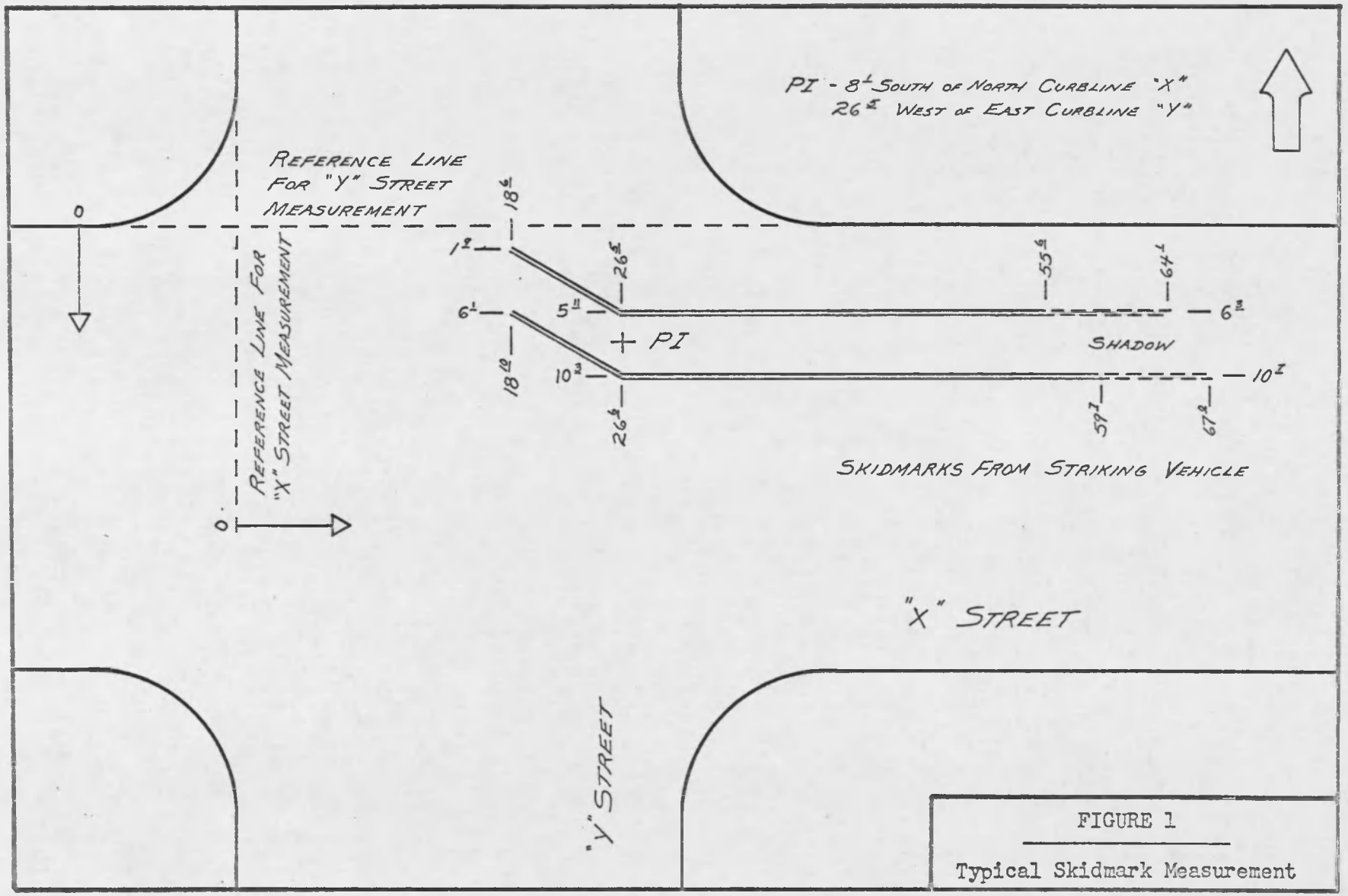


FIGURE 1

Typical Skidmark Measurement

Point of Impact

The point of impact is the location on the roadway over which the colliding vehicles make initial contact with each other. More exactly for reconstruction purposes, it is the location of the center of the front portion of the striking vehicle when initial contact is made with the struck vehicle. Marks on the road surface made by the front tires or undercarriage components of the striking vehicle are often used to locate the point of impact. Since the average full size automobile may have a front end overhang of as much as two and one-half feet (as measured from the center of the front wheels to the leading edge of the bumper), the portion of the vehicle leaving the identifiable mark on the road may be a substantial distance from the part which makes initial contact with the adverse vehicle. In addition, the striking vehicle usually penetrates the struck vehicle to a substantial degree before collision forces reach sufficient intensity to leave marks on the roadway. The reconstructionist must make allowances for these conditions to more accurately locate the point of impact. It is obviously not possible to locate this point to the exact inch; therefore "point" of impact is really a misnomer. It is actually a relatively small area on the road surface that is important, as opposed to one exact spot.

On almost all police reports examined by this author, there is a notation as to the location of the point of impact. However, as just pointed out, the true location of impact is a result of the investigator's interpretation of the physical evidence, and may be subject to challenge or argument in court. Therefore, the investigator

should always note what physical evidence was used to determine the point of impact.

Physical evidence which can be used to determine the point of impact are:

1) Sudden Change in the Direction of Skidmarks. When the wheels of a vehicle are locked, and the tires are leaving skidmarks at the time of impact, a sudden change of direction of the skidmarks indicates the location of the tires when maximum penetration has occurred, and collision forces become sufficient to alter the original travel path. The investigator should indicate on his notes whether he measured to the right skid, left skid, or center of the two skids at the point where the direction change occurred. The latter method is illustrated in Figure 1.
2) Scuff Marks. A wheel that is rolling will often leave a short but definite mark on the road when it is suddenly moved sideways or downward by the force of an impact. As shown in Figure 2, a scuff, or "scrub" mark locates the wheel leaving the mark at the time of maximum engagement. Vehicles impacted in the side near a wheel usually leave an identifiable scuff mark.
3) Gouge Marks. Very often gouge marks or scratches will be seen in or on the pavement at an accident scene, as shown in Figure 3. These marks are caused by collapsed or deformed structural components of the vehicle or vehicles which are forced downward onto the pavement during

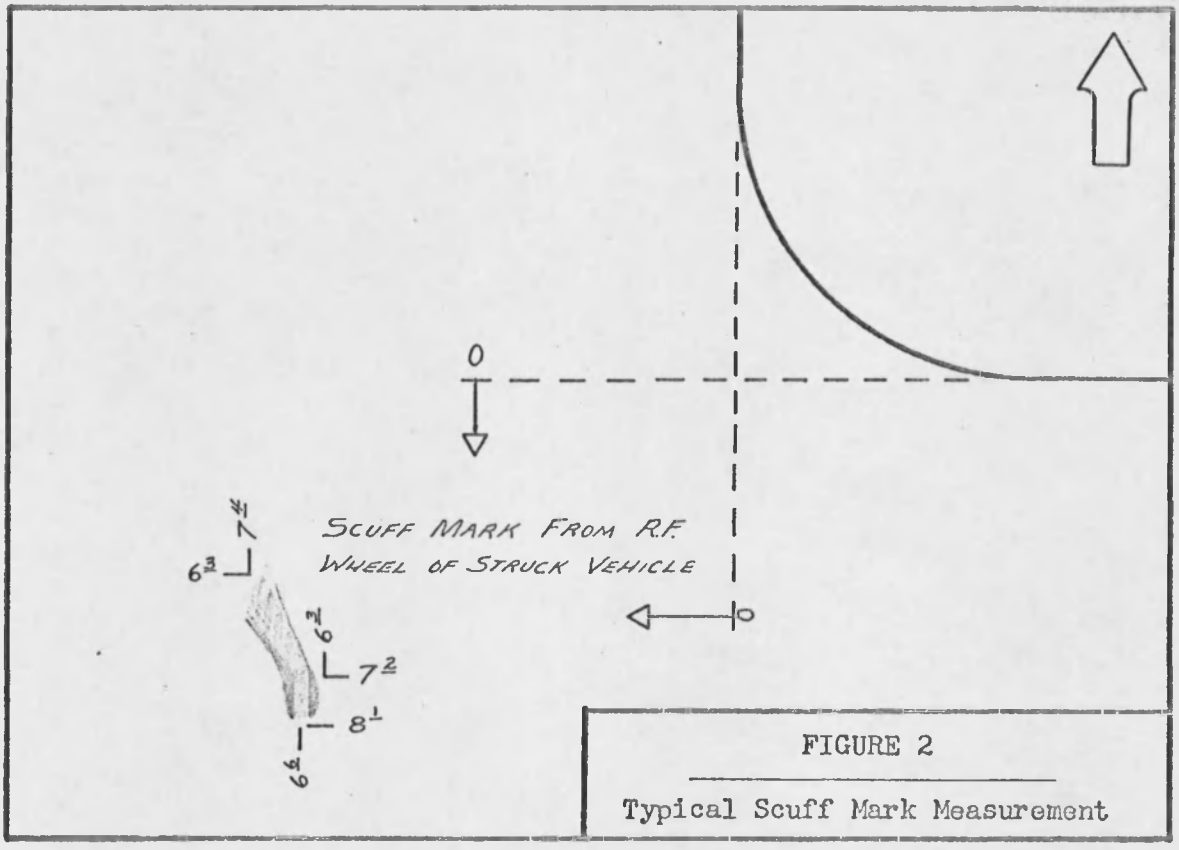


FIGURE 2

Typical Scuff Mark Measurement

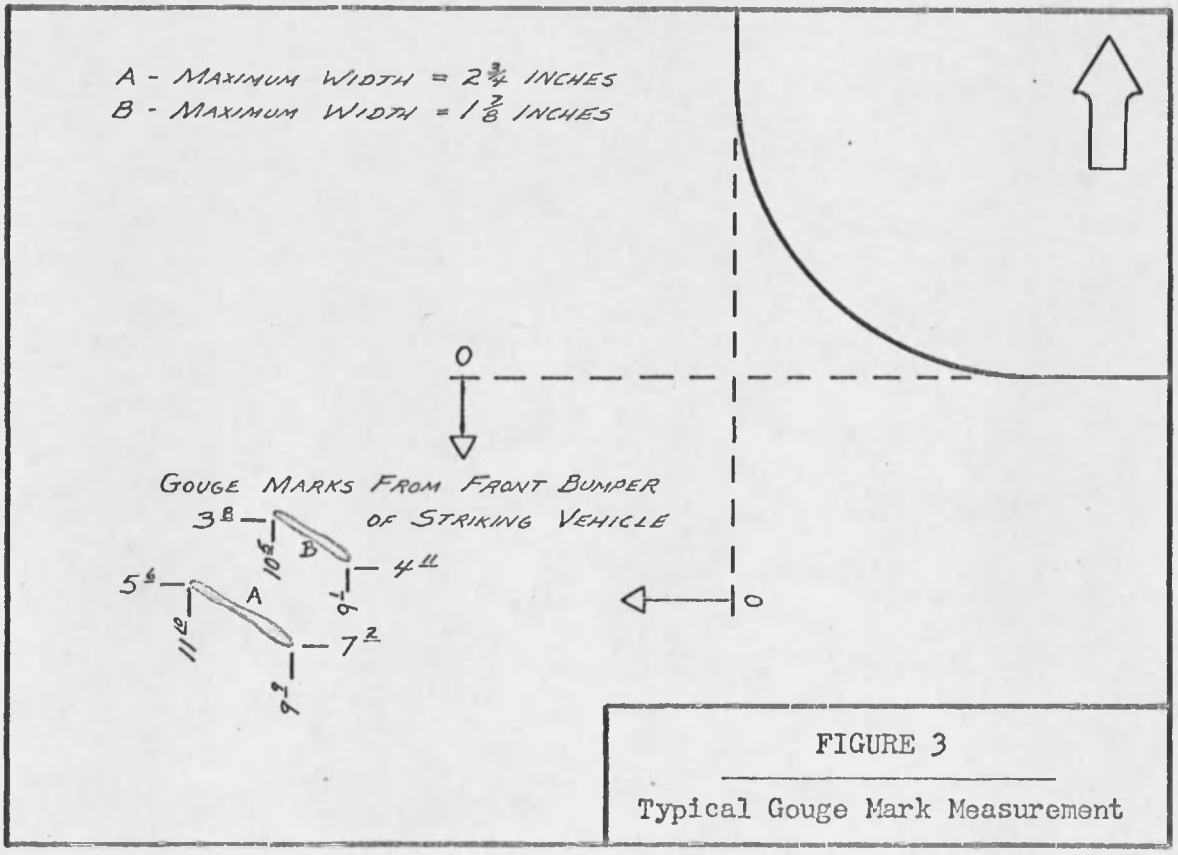


FIGURE 3

Typical Gouge Mark Measurement

maximum engagement. The collapsed part on the vehicle can usually be identified by abrasive marks thereon. Knowing which component made the gouge, the position of the vehicle can then be established at the time of maximum engagement by relating it to the beginning of the gouge mark.

4) Debris. Very often in low speed accidents, collision forces do not reach sufficient intensity to cause any of the first three items of evidence. However, in almost any collision, underbody dust and dirt is knocked loose, and falls to the pavement. This debris can be used as a clue to the point of impact.

When debris is knocked loose, it retains the forward velocity of the vehicle as it falls, and therefore scatters when it strikes the road surface. The pertinent point to locate is the place where the debris first struck the ground, which is the apex of the scatter angle as indicated in Figure 4. By locating the part of the undercarriage from which the debris fell, the time required to fall can be calculated. Knowing the point at which the debris struck the road, the vehicle can be backtracked at a given speed to compensate for the elapsed falling time, thus locating the approximate point of impact. This method of determining the point of impact is less accurate than the three methods mentioned previously. In many cases, it is the only clue to the point of impact in automobile-pedestrian collisions.

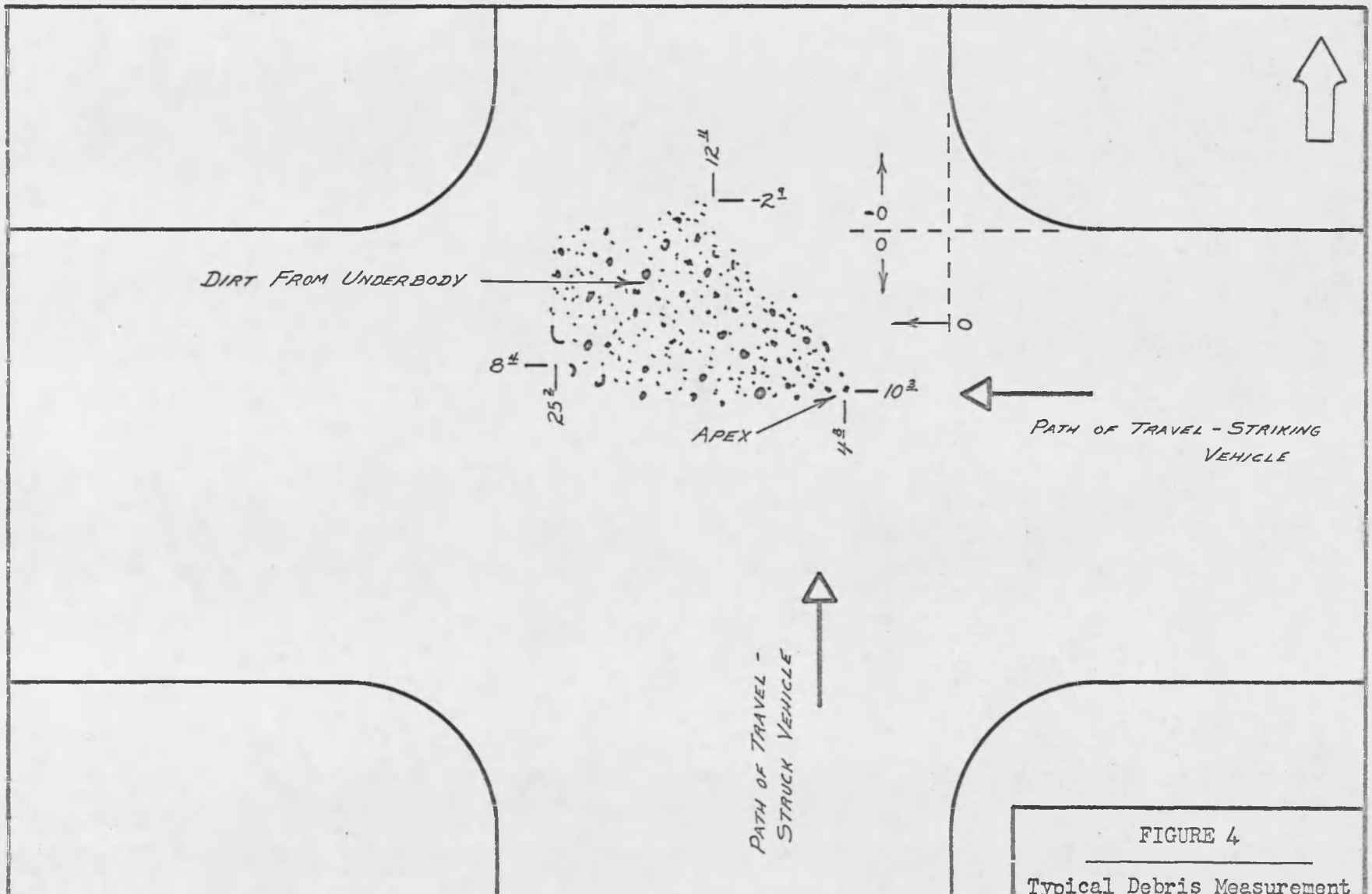


FIGURE 4

Typical Debris Measurement

5) Projected Paths of Intended Travel. Occasionally, there are low speed collisions which leave no discernible evidence with which to locate the point of impact. For this case, the vehicles are assumed to have been located in the center of their respective lanes of travel at the time of impact. Since the collision damage indicates the relation of the two vehicles with respect to each other at the time of initial contact, the point of impact can be approximated to a reasonable degree.

Often, a combination of two or more of the previously mentioned items are available for analysis. The more of these items which are known, the more accurate the determination of the point of impact will be.

Points of Rest

Experience has shown that investigating officers sometimes fail to record the locations of rest of vehicles involved in a collision (6). The points of rest are pertinent to the reconstruction of the accident since they tell the reconstructionist three very important things about the collision. In relation to the point of impact, the locations of rest indicate how far the vehicles traveled after impact; the direction of travel after impact with respect to the original intended paths of travel; and the amount of vehicle rotation (about a vertical axis) occurring while coming to rest. These items can be converted to energy losses for speed estimations.

When a police officer arrives at an accident scene, he often finds the vehicles unmoved from their original points of rest, and possibly blocking the flow of traffic. At this point, a yellow lumber crayon, which is quite easily carried, can be used to great advantage. By marking the location of the wheels where they rest on the road, he can clear the vehicles from the traffic lanes, and then measure to these points at his convenience. The position of any two wheels, preferably one front and one rear, is sufficient to adequately locate the vehicle when two axes of measurement are used.

When the vehicles have been moved prior to the arrival of the investigating officer, points of rest can be determined by other methods, although with less accuracy. Fluid runoff from broken radiators or batteries, the end of continuous skid or scuff marks, furrows in unpaved surfaces such as lawns or shoulders, or secondary collisions with curbs, poles, fences, or shrubs are some of the indications of approximate points of rest.

Secondary Collisions

After the colliding vehicles separate, it is not uncommon for them to strike other objects before coming to rest, particularly in urban areas. Curbs, street or traffic control signs, fire hydrants, power poles, trees and shrubs, and fences or residences are common items which are struck by out-of-control vehicles coming to rest. Secondary collisions such as these affect the expected behavior after impact, and absorb energy which would normally be expended by the

vehicle in moving farther or rotating more in arriving at its final position of rest.

Any structural damage to the vehicle sustained in collisions of this nature has to be accounted for in the same manner as the initial collision damage. Curb heights, pole diameters, damage to fixed objects, etc. should also be recorded as they relate to the secondary impact.

Nature of Accident Scene

There are a number of factors regarding the scene of an automobile collision which can have a direct bearing on the accident and should be recorded:

1) Width of Streets and Radius of Curb Returns. These factors are important primarily for the preparation of an accurate scale diagram, and showing the available room to accomodate traffic. Curb returns (the joint at the radius tangent) make very good reference points for measurement of accident scenes.
2) Slope of Streets. A downhill grade increases the stopping distance of a vehicle while an uphill grade decreases the stopping distance. For slight grades of about 3% or less, the effect on skid resistance is negligible for all practical purposes. The only exception to this is heavily laden vehicles, in which case even a slight downslope can substantially increase brake lag time. Accurate measurement of slopes requires special equipment, and since the

slope of a street is relatively permanent, it can be recorded at some time following the collision if and when it is deemed necessary.

3) Nature of Road Surface. The nature of the road surface is very important, particularly when skidmarks are part of the evidence being recorded. It is not sufficient for accident reconstruction purposes to designate a road surface simply as asphalt. The skid resistance of any asphaltic surface depends primarily on the aggregate and the manner in which it is set into the binder. Depending on the size, shape, sharpness, spacing, and polish of the aggregate, the skid resistances for a dry pavement surface can vary from 0.67 to 1.05, as determined by the results of full scale skid tests conducted by the author (5). As a general rule, the rougher and sharper the aggregate, and the wider the spacing between them (within limits), the higher the value of skid resistance for a clean and dry pavement, and the quicker a vehicle will stop from any given speed. Asphalt surfaces should therefore be designated as either rough, average, or smooth.

The degree of traffic polish of a road surface is another factor which is often not considered in the estimation of skid resistance values. On heavily traveled streets, the constant rolling action of vehicle tires cause a wearing down and rounding of the aggregates, as well as a gradual sinking of the aggregate into the binder. As

this action decreases the roughness of a surface, it usually decreases the value of skid resistance for that surface. Therefore, traffic polish should also be noted, and designated as either none, slight, medium, or heavy. In order to establish a basis for individual evaluation of various road surface properties, comparative examples should be included in the police officer training programs. The presence of any foreign material on the road surface such as sand, gravel or moisture affects the skid resistance of the road, and such conditions should be noted.

The reconstructionist will often conduct skid tests at the accident scene in order to evaluate the properties of the road surface. The value of skid resistance thus obtained takes into account, slope, roughness, traffic polish, and speed of skid, and is obviously more accurate than estimating the effect of all of these factors.

4) Location and Nature of Sight Restrictions. The nature and location of objects which could have obstructed the view that the drivers would have had of each other should be recorded. Common items located near intersections which often cause view restrictions are shrubs, bushes, trees, residences, fences, signs, large diameter poles, and parked vehicles. The windshield post or rearview mirror of a driver's own car can constitute a sight restriction.

5) Control Devices. Traffic signals, stop or yield signs, speed limit signs, and advisory or warning signs are often found at or near accident scenes. All such devices should be noted when reasonably close to the accident scene and situated on the travel paths of the involved vehicles. Although the reconstructionist obviously cannot determine whether a given vehicle ran a red signal, he can often determine whether a given vehicle responded to stop, yield, warning, or speed limit signs, as this information is directly related to impact speeds and the acceleration or deceleration capabilities of that vehicle.

Extent of Investigation

Some collisions call for a more detailed investigation than others, depending on the severity of damage and injury. The author has pointed out only what data are necessary from the reconstructionist's point of view for the most accurate possible reconstruction of the collision. Obviously, minor collisions involving little or no injury or damage do not warrant time consuming and expensive investigations. The people immediately involved, such as police officers and/or insurance people, must use their own discretion in determining the approximate extent of injury and damage, and the subsequent degree of investigation needed. It should go without saying that any collision involving a fatality requires a complete and thorough investigation.

Chapter III

RECORDING METHODS

Rectangular Coordinate System - Scene

In order to minimize notation problems and reduce the time connected with accident investigation and yet record all necessary and pertinent data, a diagram system made up of rectangular coordinates has been developed. This system has been found to be very effective, and it lends itself to the easy preparation of a scale diagram if needed for courtroom presentation.

The process is as follows: The investigator draws a free-hand diagram of the scene and the accident evidence. He then designates any convenient fixed point, such as a curb return, curb line, power pole, etc. as a reference point. With the "zero" end of the tape measure placed at the reference point, the entire length of the tape (a 100' tape is suggested) is run out along a curbline or parallel to the curbline of the street in one direction. If the investigator is working alone, a lead weight with a hook attached can be used to hold the zero end of the tape. Notations as to the location of desired evidence, such as beginning of skids, end of skids, point of impact, points of rest, sight restrictions, etc. are made by lining up the designated points on a sightline perpendicular to the tape. The tape will sometimes have to be moved an additional tape length in one direction or the other along the same axis in order to record all pertinent data.

After recording the evidence along one axis, the same procedure is repeated on the intersecting street, or a reference plane 90° removed from the initial axis. Thus all prescribed points are accurately located with respect to each other and the reference point in a two dimensional plane. Once an investigator becomes familiar with this system, he can accurately record all pertinent evidence at an accident scene in a surprisingly short time.

A typical accident scene measured by this system is shown in Figures 5 & 6.

The recording diagram prepared by the investigating officer can be made part of the permanent record of the accident kept by the police department. If the damage claims are settled, or if liability is clear, it would probably never be used for reconstruction purposes. If the accident is litigated, however, there will be ample information regarding the evidence and to prepare a scale diagram.

Rectangular Coordinate System - Vehicle Damage

The volumetric displacement of the structural components of the colliding vehicles is the primary basis for determining the speed losses due to impact damage. The recording of this displacement can be aided by use of a rectangular coordinate system.

For impact damage to the side of a vehicle, the penetration or displacement should be measured in two planes; the structural plane composed of the relatively rigid door sill and frame area, and the more readily crushable sheet metal expanses (doors, fenders, quarter-panels) directly above. The height of each plane should be determined

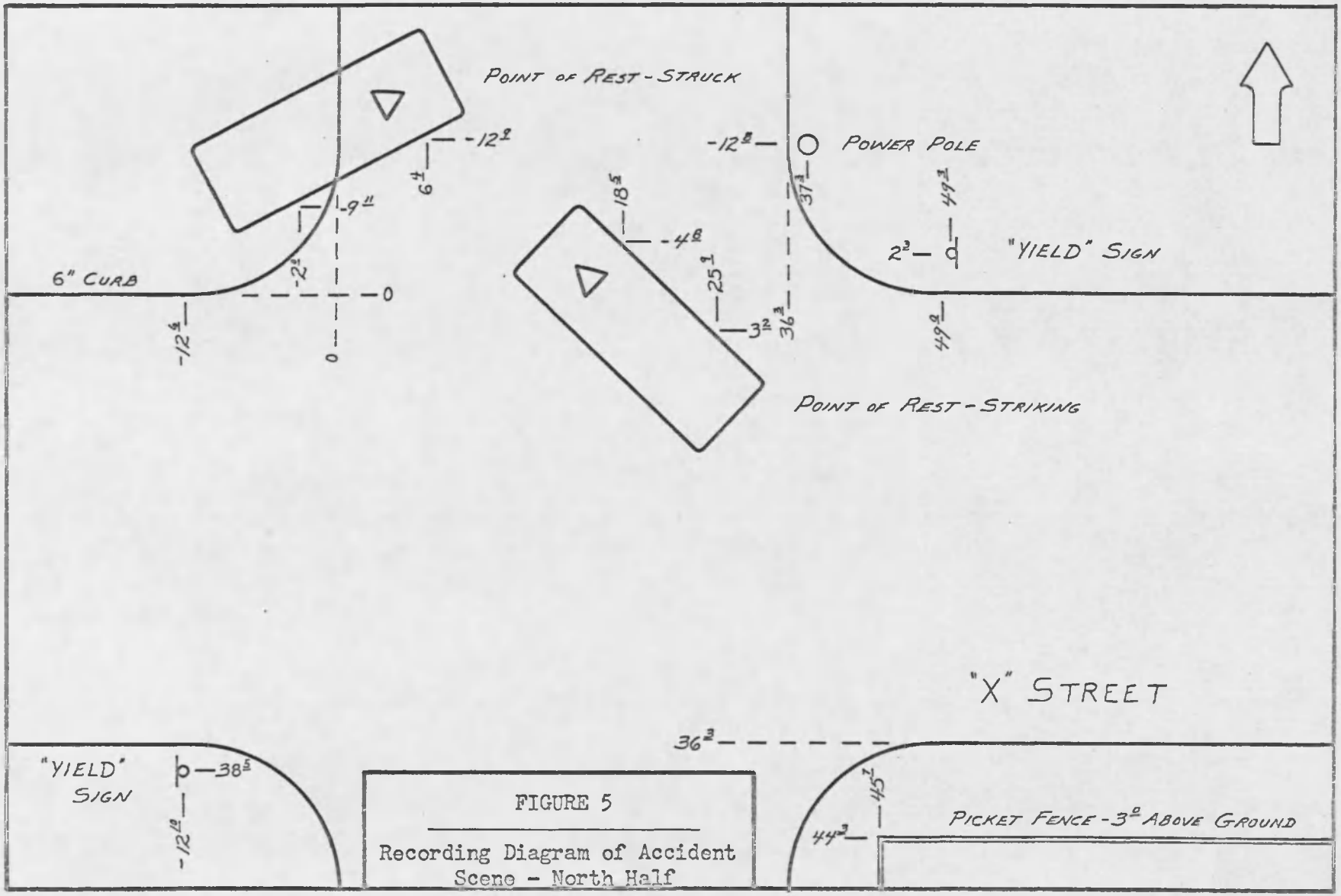


FIGURE 5

Recording Diagram of Accident Scene - North Half

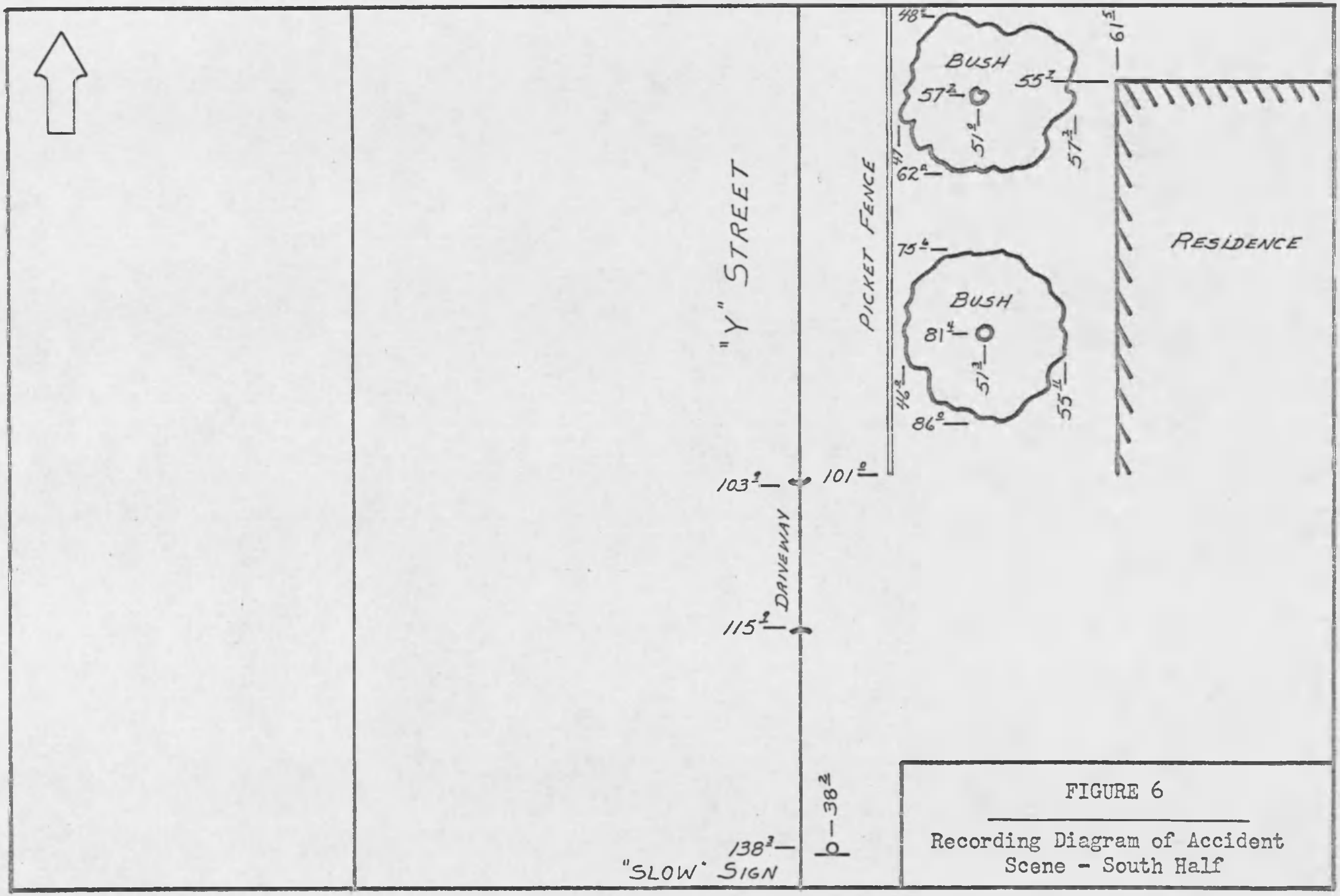


FIGURE 6

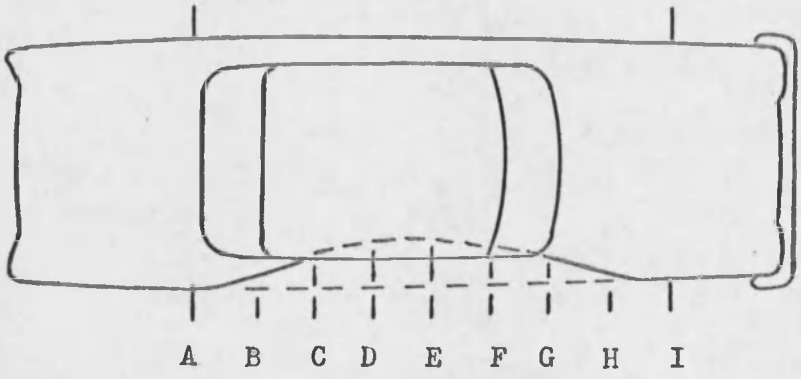
Recording Diagram of Accident Scene - South Half

by the center of the area of maximum collapse. The depth of collapse should be measured approximately every 12 inches along the horizontal plane as shown in Figure 7. A string or rod can be used to approximate the original vehicle side line for measurement of the penetration depths. Based on the measurements of height, width, and depth of collapse, the volumetric displacement can be calculated. Spindle and hub locations (center of wheels) should be located in the measurements for reference purposes.

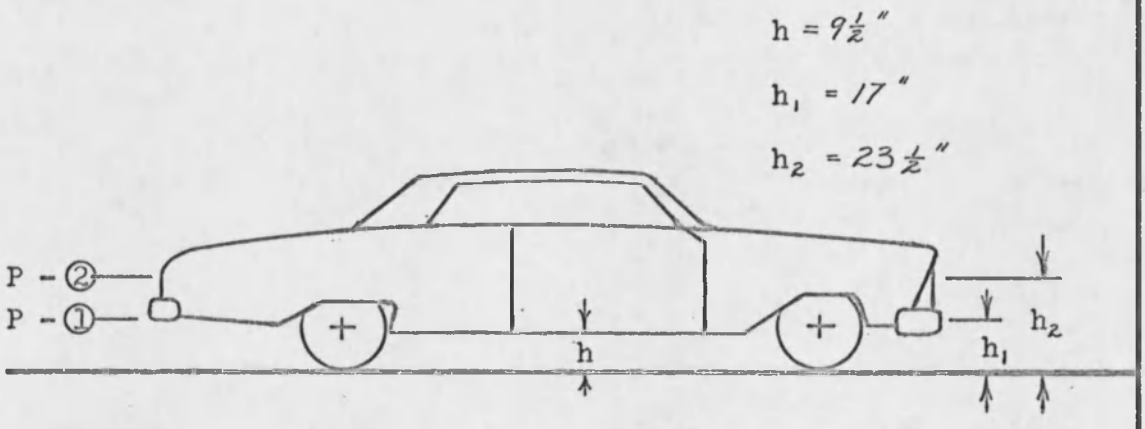
For damage to the front of a vehicle, the centers of the front wheels (or rear wheels depending on the severity of damage and the resulting displacement of the front wheels) can be used as reference points to determine the degree of collapse. As in the case of side impacts, damage should be recorded in at least two planes; the structural plane composed of the bumper and frame components, and a plane formed by the more readily crushable grille, fender, and hood areas. Also as before, heights of the planes of measurement should be determined by the location of maximum collapse in each plane. A rod or string can be used to approximate a front reference line for measurement purposes. See Figure 8 for illustrative examples.

Photographs

Photographs are by far the best means of permanently preserving all evidence, as they are unbiased and record exactly what the camera sees (7). They are particularly effective when supported by actual measurements.



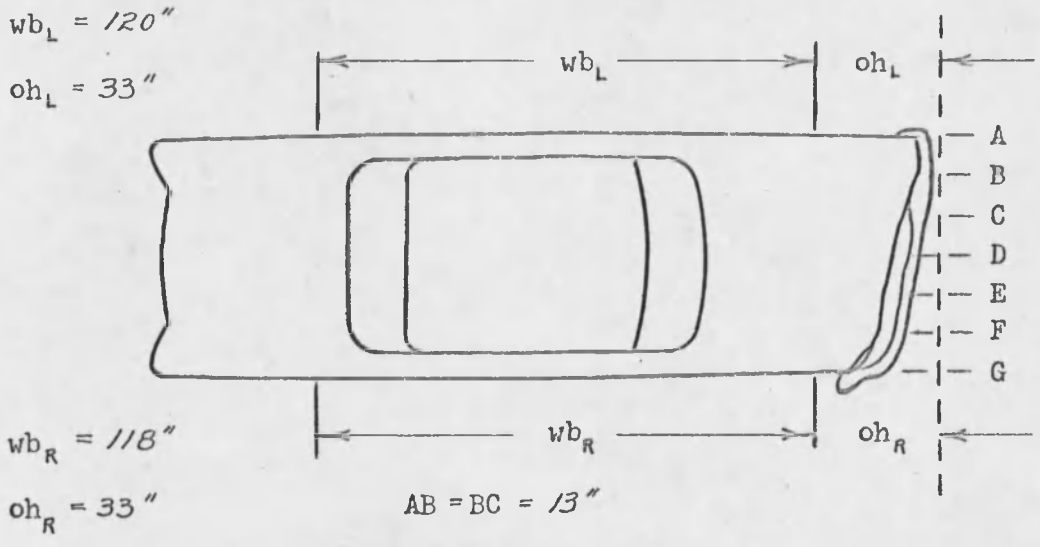
AB = BC = 15"

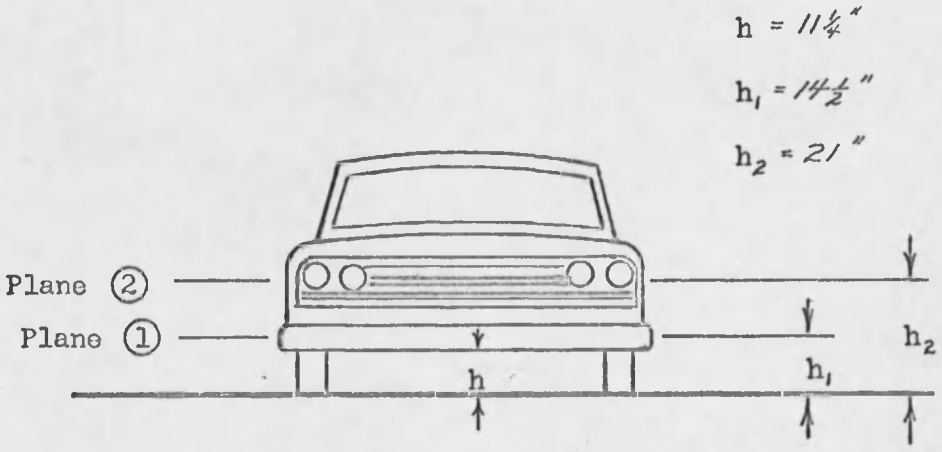


Depth of Penetration @	A	B	C	D	E	F	G	H	I
Plane ①	0"	¾"	3"	3⅜"	4⅛"	2⅞"	1"	¼"	0"
Plane ②	0"	2⅞"	4½"	8"	11¼"	7¼"	3¼"	1⅜"	0"

FIGURE 7

Vehicle Damage Measurement: Side Impact





Depth of Penetration @	A	B	C	D	E	F	G
Plane ①	1"	½"	1¾"	2½"	3⅞"	5"	7¼"
Plane ②	0"	0"	¾"	2⅛"	5¼"	8⅛"	10"

FIGURE 8

Vehicle Damage Measurement:
Front Impact

There are three major classifications of photographs which should be taken regarding any collision.

1) Photographs of the Immediate Evidence. It is the feeling of this author that every patrol car should be equipped with a camera and flash unit, and that officers should be schooled to some degree on the use and operation thereof. When accidents involve serious or fatal injuries to occupants, the officer should take photographs immediately after arrival at the scene, second only to giving aid to the injured. In this manner, a permanent record is made of the evidence before it is dissipated or altered by traffic, onlookers, or removal of the vehicles. Photography of the immediate evidence is of particular importance for officers who lack training or experience in the field of accident investigation, and for under-manned police departments who simply do not have the time to conduct a detailed investigation.

Photographs should include vehicles at their points of rest, as well as skidmarks, gouges, and debris. Every photograph should incorporate at least one and preferably two fixed points, such as curblines, curb returns, pavement edges, street signs, or power poles for reference purposes. In the event that the point of impact and the points of rest are not located by measurement at the time of the accident, they can be determined later by scaling the photographs with reference to these fixed objects.

The photographer should always note the approximate position from which each picture was taken. Counting paces from some reference point is usually sufficient. A standard procedure for selecting the locations from which pictures are to be taken can be very helpful. A suggested procedure is illustrated in Figure 9.

Figure 10 is an example of photographic recording of the points of rest of two vehicles in relation to two 90^{o} axes of reference. Figures 11 and 12 are typical of other immediate evidence which should be photographed.

2) Photographs of Vehicle Damage. Vehicle damage does not necessarily have to be recorded by the investigating officer at the scene of the collision, since involved vehicles are usually stored for several days following an accident. Interested parties, be they police, insurance people, or reconstructionists, therefore have ample time to record the damage.

When a reconstructionist has examined the vehicles and made measurements and notes regarding the nature and extent of damage, only a few photographs are necessary for use in describing the meaning of the collision damage to a jury. If a reconstructionist is not available to analyze the vehicles before they are scrapped or repaired, photographs should be adequate for analysis by a reconstructionist at a later date. If ample photographs of a damaged vehicle are available, the reconstructionist can

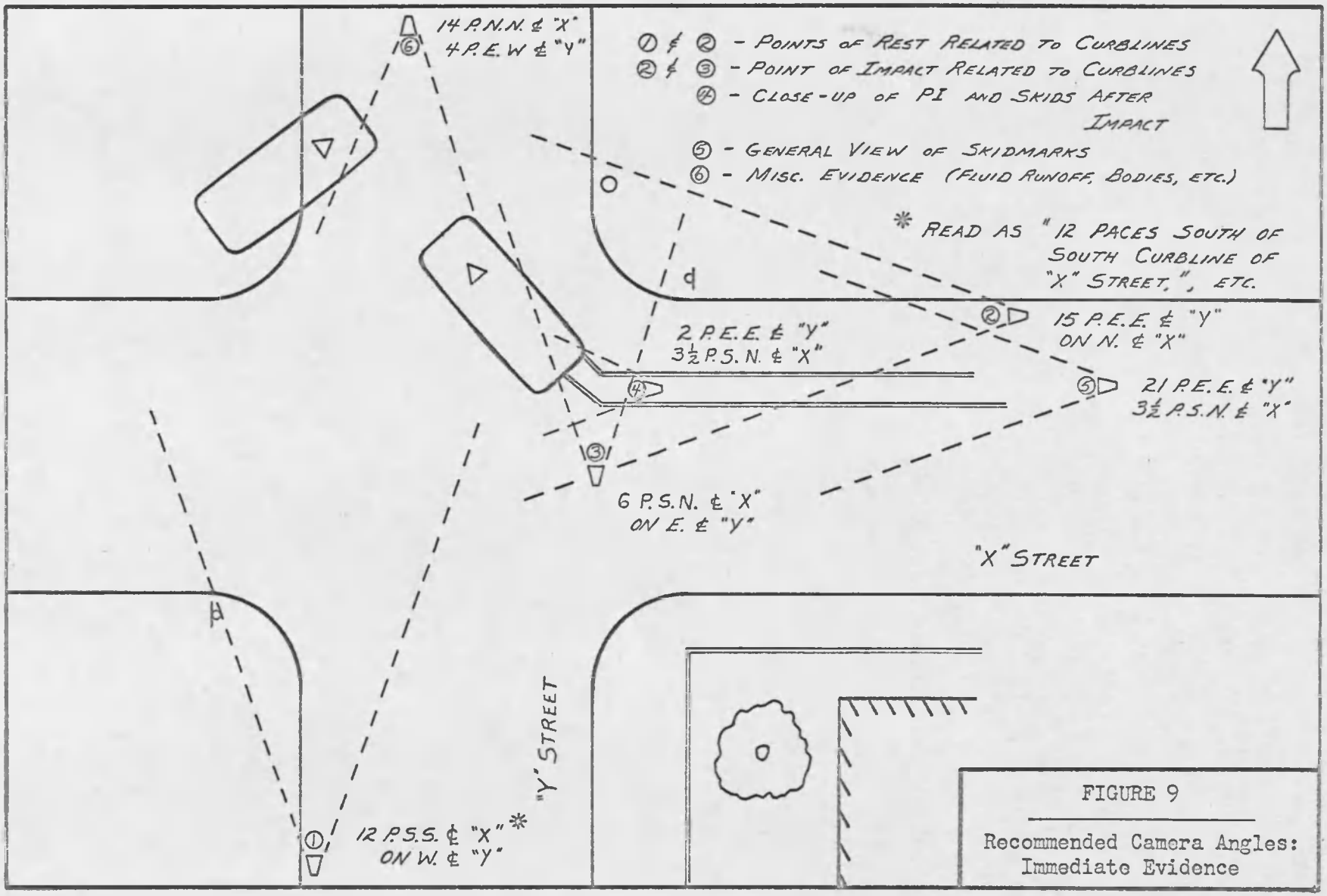


FIGURE 9

Recommended Camera Angles: Immediate Evidence

NORTH-SOUTH AXIS: WEST CURBLINE OF "Y" STREET
CAMERA: 25 PACES N.N. & "22ND" STREET

EAST-WEST AXIS: CENTER OF OUTSIDE WESTBOUND LANE OF "22ND" ST.
CAMERA: 25 PACES W.W. & "Y" STREET

FIGURE 10

Typical Photographic Recording of Points of Rest

FIGURE 11

Photographic Recording of Point of Impact
(Corresponds with photograph (4) in Figure 9)

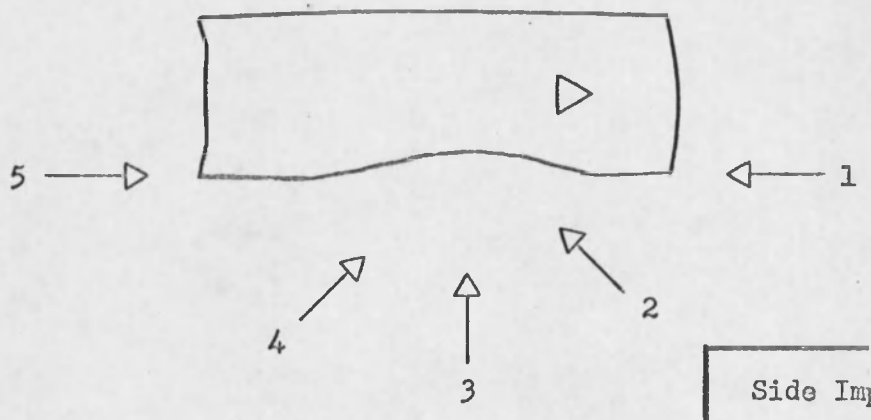
FIGURE 12

Photographic Recording of Skidmarks
(Corresponds with photograph (5) in Figure 9)

arrive at an opinion as to the extent of damage by a comparison with photographs of cars with similar damage which has been measured. The recommended photographic angles necessary to properly record all vehicle damage information are illustrated in Figure 13. Figure 14 is representative of typical vehicle damage encountered in relatively low speed urban intersection collisions.

3) Photographs of the Approach. Photographs of the approaches to the accident scene taken from the direction of travel of each vehicle graphically illustrate the nature and locations of pertinent sight restrictions which would affect the drivers. These pictures also show the locations of traffic control devices. They should be taken as soon as possible following the collision in order to record the locations of parked vehicles which may be moved, or the exact nature of the sight restrictions created by vegetation which is subject to seasonal change. This procedure is illustrated in Figure 15.

After reconstructing an accident and arriving at opinions as to approximate speeds and locations of the involved vehicles immediately prior to the collision, the expert will often take additional photographs from the driver's eye positions of similar vehicles at pertinent locations on the road. In all cases, however, the position from which photographs were taken should always be measured in relation to the intersection or collision scene.



Side Impact

Front Impact

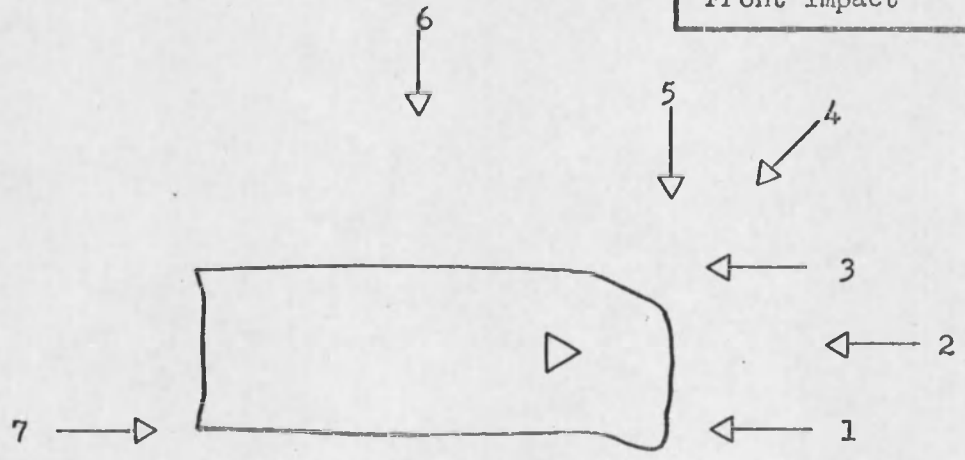


FIGURE 13

Recommended Camera Angles:
Vehicle Damage

Side Impact Damage
(Corresponds with photographic angle ② on Figure 13)

Front Impact Damage
(Corresponds with photographic angle ④ on Figure 13)

FIGURE 14

Photographic Recording of Vehicle Damage

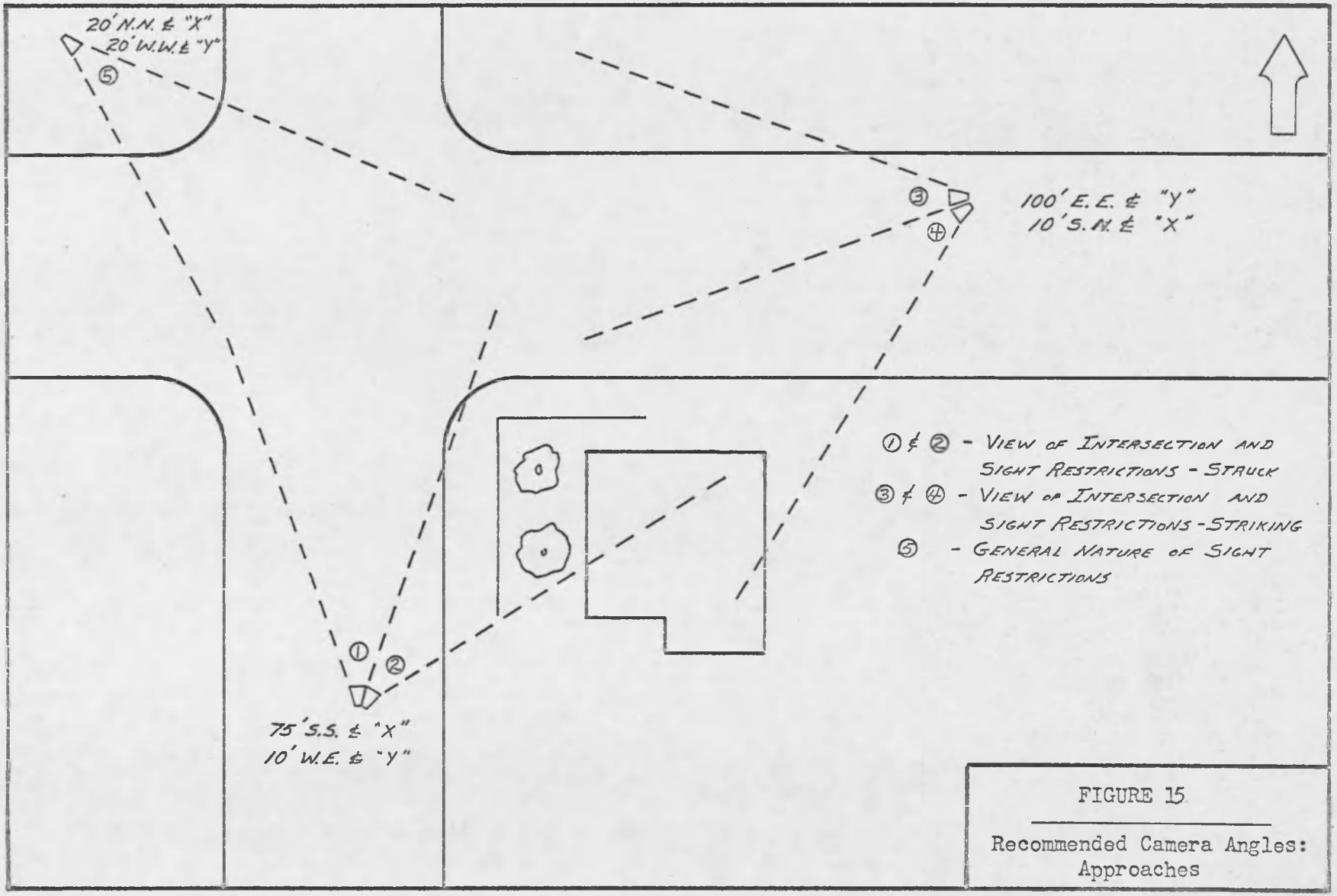


FIGURE 15

Recommended Camera Angles: Approaches

Chapter IV

COURTROOM PRESENTATION

Scale Diagrams

The best presentation of all measurements taken at an accident scene is a plan view scale diagram, which is quite easily prepared from the accident scene diagram previously described. A scale diagram shows sizes and distances in true comparison to each other, whereas a hand drawn diagram is often out of scale and misleading in that respect. Since the diagram is drawn to exact scale, dimensions need not be shown thereon, as they can be scaled directly when needed.

It must be remembered that a courtroom is a very large place. Besides the twelve members of a jury who must be made to see and understand the situation in detail, the judge, court reporter, and attorneys should also be able to view the diagram as it is being used by witnesses. A large enough scale should be used in preparation of the diagram to facilitate easy viewing by all. Minimum size should be a scale of one inch equals ten feet. Even more desirable is the larger HO gauge scale of three and one-half millimeters equals one foot. Very accurate model cars, about two and one-half inches long, are available in HO scale at most hobby shops, and can be used very effectively in combination with the diagram. When the diagram is mounted on a sheet metal backing, and the scale cars are magnetized,

the diagram can be mounted vertically for ease of viewing, yet the vehicles will remain where placed by witnesses.

The overall size of a scale drawing should depend on the circumstances of the accident and the amount of roadway which needs to be shown. A twenty-four by thirty-six inch diagram is usually sufficient for most intersection collisions.

Scale diagrams for courtroom presentation should incorporate locations of prominent landmarks near the collision scene such as power poles, houses, driveways, alleys, signs, etc. since the litigants may use these points to relate where their vehicles were located at any given time preceding the accident. Locations of items set in or painted on the pavement, such as meter or manhole covers, center and lane lines, or crosswalk lines should be indicated. Not only do they add to the completeness and realism of the diagram, but past experience has shown that the locations of skidmarks or vehicles can sometimes be related to these objects when exact locations were not recorded at the time of the accident.

It is generally good procedure for the expert witness to prepare the scale diagram of the accident scene with none of the collision evidence shown thereon. In this manner, witnesses can use the diagram to illustrate their testimony without being biased by the reconstructionist's notations. By the use of previously prepared acetate overlays, the expert can then illustrate his testimony and introduce the pertinent evidence. When overlays showing actual vehicle positions at pertinent times during the accident sequences

are compared with positions indicated on the diagram by witnesses in prior testimony, the result can either verify or disprove the witness's account of the accident.

Photographs

In order for an expert witness to render an opinion, a foundation consisting of the items noted in Chapter II herein must be laid by the attorney. Eight by ten inch enlargements of the previously described photographs are quite useful to the expert witness in explaining to the court and jury how he arrived at his opinions. While black and white prints are adequate, color photographs provide much more realism. Color slides have been found to be quite effective for courtroom presentation since they can be blown up as large as a wall for explanation purposes. Prints are easily prepared from slides if the need arises.

Another very effective use of photographs for courtroom presentation is a panoramic or wrap-around view of a scene. This effect is accomplished by taking several pictures from the same location, but at different camera angles. The prints are then joined together to give a very realistic view of the desired scene. An example of this technique is shown in Figure 16.

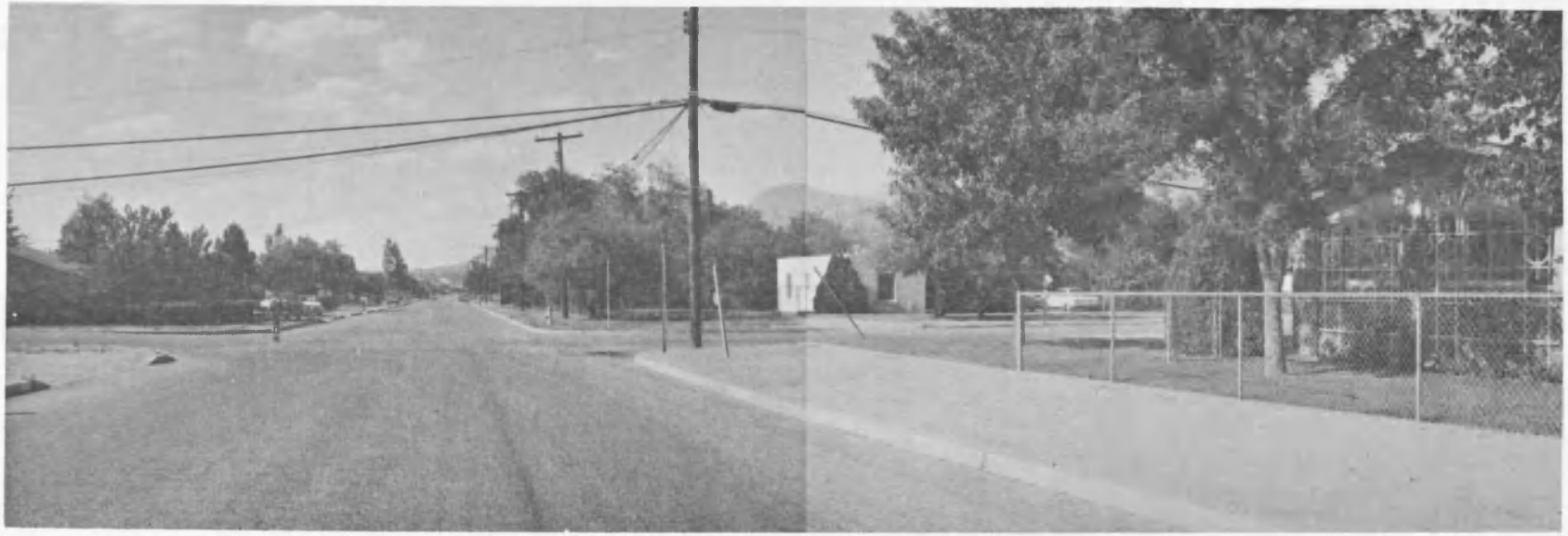


FIGURE 16

Typical Panoramic View of Sight Restrictions
(Corresponds with photographs ① & ② in Figure 15)

Chapter V

SUMMARY

It is recognized at the present time that the investigating police officer at an accident scene has an obligation to record only the immediate evidence, and he is apparently at his own discretion as to what evidence should be recorded. The nature of the accident scene and the analysis of vehicle damage is usually pursued by involved insurance personnel a few days following the collision.

In any case, there should be no reason for either duplication of investigation, or deletion of pertinent items which should have been recorded. If the investigating officer has a standard to follow in his investigation of the immediate non-permanent evidence, and the follow-up man (whether he is a police officer or insurance investigator) records the necessary semi-permanent evidence, there should be ample evidence between the two investigations for a reconstructionist to accurately reconstruct the collision.

In this regard, police departments should consider the establishment of follow-up teams to complete initial investigations by evaluating vehicle damage and making photographs and measurements of the accident scene. In this manner, all pertinent evidence would be contained in one file. This procedure could be carried one step farther, and special squads for accident investigation could be established. These units could be on call to handle the entire investigation from start to finish.

In view of the increased man-hours required to make complete investigations, an increased price schedule should be considered by the involved departments. At the present time, police departments make a very nominal charge ($2.00 in Tucson) for a copy of the accident report. The lawyers and insurance people should be more than glad to go along with a price increase for more thorough investigations, since the outcome of a lawsuit can depend either directly or indirectly on the accuracy and completeness of the initial investigation.

Recommendations

After over three and one-half years of active participation in the field of accident reconstruction, the author feels that standardized methods of obtaining and preserving automobile collision evidence are both desirable and necessary from legal and moral points of view. The following recommendations are made in the hope that improvements can be made in present accident investigation procedures.

1) Standard procedures and methods of recording evidence should be used not only by law enforcement agencies, but also by private investigators, insurance adjusters, and experts engaged in this field.
2) Notations or indications on diagrams as to the physical evidence used to determine the point of impact should be required of all investigators.
3) Points of rest of involved vehicles, located to at least two wheels and in two axes of measurement, should always be recorded.

4) Cameras should be standard equipment in police patrol vehicles, and photographs should be taken as a part of the investigation of all injury-producing collisions.

5) The diagram and rectangular coordinate system should be used as standard procedure in the recording of accident scene information.

6) As regards the Arizona Traffic Accident Report form presently in use, the space provided thereon for the accident diagram is not at all adequate. At least one full page should be provided for the diagram, and supplemental pages should be added by the investigator when needed.

7) Spaces should be provided on the ATAR form for the following information:

   a. Manufacturer's model number or name
   b. Number of cylinders of engine (4, 6, 8, other)
   c. Engine horsepower or cubic inch displacement
   d. Type of transmission (automatic, 3 speed manual, 4 speed manual)
   e. Unusual tire conditions
   f. Pavement roughness (smooth, average, rough)
   g. Traffic polish (none, light, medium, heavy)

8) For evaluation of pavement roughness and traffic polish, portable friction test machines might be considered as standard equipment for patrol vehicles.

9) In addition to the recommended additions to the ATAR form, a checklist could be provided on the diagram page which would aid the investigating officer in recording the necessary data. Such a checklist should include:

   a. Reference points for measurement
   b. Point of impact
   c. Evidence used to determine point of impact
   d. Points of rest
   e. Skidmarks
   f. Secondary collisions
   g. Sight restrictions
   h. Camera locations
   i. Street widths
   j. Radius of curb returns

10) Police departments should definitely consider the establishment of special teams to specialize in accident investigation, along with increased charges for the investigation results.

Appendix

ARIZONA TRAFFIC ACCIDENT REPORT FORM

ARIZONA TRAFFIC ACCIDENT REPORT

FORWARD COPY TO:
TRAFFIC SAFETY DIVISION
206 S. 17th AVE., PHOENIX

ADDITIONAL REPORTS ATTACHED
For Dept Use
☐ SUPPLEMENTAL VEHICLE & CASUALTY
☐ HIT RUN REPORT
☐ SCALE DIAGRAM
☐ SKID MARK CHARTS
☐ WITNESS STATEMENTS
☐ VEHICLE DAMAGE DIAGRAM
☐ CASUALTY INJURY DIAGRAM
☐ MEDIATE - DIRECT CAUSE ANALYSES
☐ PHOTO FILM
☐ OTHER

NAME OF AGENCY FILING THIS REPORT | ACCIDENT NO. | TSD. NO.
HIT AND RUN OR FATAL DR NUMBER | BOOKING NUMBER
ON STREET NAME AND/OR HIGHWAY NO. ☐ INTERSECTION ☐ NON-INTERSECTION
AT INTERSECTING STREET OR HIGHWAY NO. | MILEPOST OR CENSUS TRACT NO.
IN CITY ☐ OUTSIDE | COUNTY | DISTRICT
HOUR ☐ A.M. ☐ P.M. | DATE | DAY OF WEEK

GOVERNMENT PROPERTY INVOLVED
1 ☐ Federal
2 ☐ State
3 ☐ County
4 ☐ City

ROAD SYSTEM
1 ☐ State Controlled Access Highway
2 ☐ State Highway—Other
3 ☐ County Road or Highway
4 ☐ Local Street or Other
5 ☐ Federal Agency Road

TYPE OF ACCIDENT
Collision of Motor Vehicle With:
1 ☐ Pedestrian
2 ☐ Other Motor Vehicle
3 ☐ Railroad Train
4 ☐ Animal-Drawn Vehicle
5 ☐ Bicycle
6 ☐ Animal
7 ☐ Fixed Object
8 ☐ Other Object _____
Non-Collision, Motor Vehicle:
9 ☐ Overturned in Road
10 ☐ Ran Off Road
11 ☐ Occupant Fell From Vehicle
12 ☐ Other

ACCIDENT LOCALE
1 ☐ Business
2 ☐ Resident
3 ☐ Farms, Fields
4 ☐ Undeveloped Area, Desert
5 ☐ Mountainous Area
6 ☐ School Crossing

ACCIDENT SEVERITY
1 ☐ Fatal
2 ☐ Non-Fatal Personal Injury
3 ☐ Property Damage Only

CASUALTIES
_____ Number Injured
_____ Number Killed

RESIDENCE OF DRIVER MILITARY
If Military Also Indicate Residence

1	2		1	2
1	☐	Local Resident	A	☐
2	☐	Resides Elsewhere in State	N	☐
3	☐	Non-Resident	M	☐
4	☐	Unknown	AF	☐

SEX OF DRIVER

1	2	
1	☐	Male
2	☐	Female
3	☐	Unknown

AGE — DRIVER — OCCUPATION

1	2		1	2	
1	☐	15 and under	1	☐	Professional
2	☐	16	2	☐	Businessman
3	☐	17	3	☐	Clerical or Sales
4	☐	18-19	4	☐	Skilled Worker
5	☐	20-24	5	☐	Laborer
6	☐	25-34	6	☐	Farmer
7	☐	35-44	7	☐	Housewife
8	☐	45-54	8	☐	Student
9	☐	55-64	9	☐	Military
10	☐	65-74	10	☐	Other
11	☐	75 and Older	11	☐	Retired
12	☐	Unknown	12	☐	Unknown

PHYSICAL CONDITION OF DRIVERS OR PEDESTRIAN

1	2	
1	☐	Had Been Drinking—Ability Impaired
2	☐	Same—Ability not Impaired
3	☐	Obviously Intoxicated
4	☐	Sleepy, Fatigued
5	☐	Other Bodily Defects—Infirmities
6	☐	Affected by Exhaust Fumes
7	☐	No Defects Apparent
8	☐	Unknown

CLASSIFICATION OF CASUALTY

VEH 1 DR A B C D E	VEH 2 DR F G H I J	
1 ☐	☐	Driver
2 ☐☐☐☐☐	☐☐☐☐☐	Passenger
3 ☐	☐	Pedestrian
4 ☐	☐	Motorcyclist
5 ☐	☐	Bicyclist
6 ☐	☐	Motorscooter
7 ☐☐☐☐☐	☐☐☐☐☐	Unknown

AGE OF CASUALTY

VEH 1 DR A B C D E	VEH 2 DR F G H I J	
1 ☐☐☐☐☐	☐☐☐☐☐	0-4 years
2 ☐☐☐☐☐	☐☐☐☐☐	5-9 "
3 ☐☐☐☐☐	☐☐☐☐☐	10-14 "
4 ☐☐☐☐☐	☐☐☐☐☐	15-19 "
5 ☐☐☐☐☐	☐☐☐☐☐	20-24 "
6 ☐☐☐☐☐	☐☐☐☐☐	25-34 "
7 ☐☐☐☐☐	☐☐☐☐☐	35-44 "
8 ☐☐☐☐☐	☐☐☐☐☐	45-54 "
9 ☐☐☐☐☐	☐☐☐☐☐	55-64 "
10 ☐☐☐☐☐	☐☐☐☐☐	65-74 "
11 ☐☐☐☐☐	☐☐☐☐☐	75 and Older
12 ☐☐☐☐☐	☐☐☐☐☐	Unknown

SEX OF CASUALTY

VEH 1 DR A B C D E	VEH 2 DR F G H I J	
1 ☐☐☐☐☐	☐☐☐☐☐	Male
2 ☐☐☐☐☐	☐☐☐☐☐	Female
3 ☐☐☐☐☐	☐☐☐☐☐	Unknown

SEVERITY OF CASUALTY

VEH 1 DR A B C D E	VEH 2 DR F G H I J	
1 ☐☐☐☐☐	☐☐☐☐☐	Fatal
2 ☐☐☐☐☐	☐☐☐☐☐	Visible Signs of Injury; Bleeding Wound, Distorted Member, Carried from Scene, etc
3 ☐☐☐☐☐	☐☐☐☐☐	Other Visible Injury; Bruises, Abrasions, Swelling, Limping, etc.
4 ☐☐☐☐☐	☐☐☐☐☐	No Visible Injury but complaint of pain or momentary unconsciousness

VEHICLE LOCATION

1	2	
1	☐	At Scene, Unmoved
2	☐	At Scene, Moved from Trafficway
3	☐	Hit Run
4	☐	Moved from Scene—Reported

TYPE OF MOTOR VEHICLE

1	2	
1	☐	Passenger Car—Regular
2	☐	Passenger Car—Compact
3	☐	Passenger Car and Trailer
4	☐	Truck or Truck Tractor
5	☐	Truck Tractor and Semi-Trailer
6	☐	Other Truck Combination _____
7	☐	Farm Tractor or Farm Equipment
8	☐	Taxicab
9	☐	Bus
10	☐	School Bus
11	☐	Motorcycle
12	☐	Motorscooter or Motor Bicycle
13	☐	Other Vehicle _____
14	☐	Military Vehicle

VEHICLE CONDITION

1	2	
1	☐	Defective Brakes
2	☐	No Trailer Brakes
3	☐	Defective Steering
4	☐	" Headlights
5	☐	" Taillight
6	☐	" Turn Signal
7	☐	Puncture or Blowout
8	☐	Fire
9	☐	Other Defects _____
10	☐	Defects Not Known
11	☐	No Defects Apparent

SEAT BELTS

	VEH 1 Yes	VEH 1 No	VEH 2 Yes	VEH 2 No
Installed	☐	☐	☐	☐
In Use	☐	☐	☐	☐

ORIGINAL

DIRECTION OF TRAVEL

1	2	Vehicle was Going:
1	☐	North
2	☐	South
3	☐	East
4	☐	West

DIRECTION OF TRAVEL—TWO OR MORE VEHICLES
Both Vehicles ENTERED INTERSECTION:
1 ☐ At Angle
2 ☐ From Same Direction
3 ☐ From Opposite Direction
NON-INTERSECTION, Both Vehicles Going:
4 ☐ In Opposite Direction
5 ☐ In Same Direction
6 ☐ At Angle

VEHICLE ACTION

1	2	
1	☐	Going Straight Ahead
2	☐	Making Right Turn
3	☐	Making Left Turn
4	☐	Making U Turn
5	☐	Slowing/Stopped in Trafficway
6	☐	Entering Parking Position
7	☐	Parked
8	☐	Leaving Parking Position
9	☐	Backing
10	☐	Overtaking, Passing
11	☐	Entering Alley or Driveway
12	☐	Leaving Alley or Driveway
13	☐	Other _____
14	☐	Skidding
15	☐	Avoiding Vehicle, Object, Pedestrian
16	☐	Unknown

PEDESTRIAN ACTION

2		
1	☐	Crossing Road at Intersection
2	☐	Crossing Road—No Intersection
3	☐	Walking in Road With Traffic
4	☐	Walking in Road Against Traffic
5	☐	Standing in Road
6	☐	Getting On or Off Vehicle
7	☐	Working On or Pushing Vehicle
8	☐	Working On or In Road
9	☐	Playing In Road
10	☐	In Road—Other Reason
11	☐	Not In Road

VISION OBSCUREMENT

1	2	
1	☐	Rain, Snow, Fog on Windshield
2	☐	Windshield Obscured—Other
3	☐	Vision Blocked by Load on Vehicle
4	☐	" " " Trees, Bushes
5	☐	" " " Building
6	☐	" " " Embankment
7	☐	" " " Signboards
8	☐	" " " Hillcrest
9	☐	" " " Parked Vehicle
10	☐	" " " Moving Vehicle
11	☐	Driver Blinded by Headlights
12	☐	" " " Sunglare
13	☐	Vision Obscured—Other
14	☐	Vision Not Obscured

TRAFFIC CONTROL

1	☐	Stop Sign
2	☐	Stop-and-Go Signal
3	☐	Officer or Flagman
4	☐	Warning Sign
5	☐	Railroad Signal
6	☐	Flashing Signal
7	☐	No Traffic Control Present

LIGHT CONDITION

1	☐	Daylight
2	☐	Dawn or Dusk
3	☐	Darkness, No Street Lights
4	☐	Darkness, Street Lighted

WEATHER CONDITION

1	☐	Clear
2	☐	Raining
3	☐	Snowing
4	☐	Fog
5	☐	Dust
6	☐	High Wind
7	☐	Other

ROAD CHARACTER

1	☐	One-Lane Road or Alley
2	☐	Two-Lane Road
3	☐	Three-Lane Road
4	☐	Four-Lane Road
5	☐	Divided Road or One Way Street
6	☐	Freeway
7	☐	Unpaved Road, Any Size

ROAD DESIGN

1	☐	Straight Road
2	☐	Slight Curve
3	☐	Sharp Curve
4	☐	Intersection
5	☐	Freeway Interchange

ROAD SURFACE

1	☐	Concrete
2	☐	Asphalt
3	☐	Oil
4	☐	Gravel
5	☐	Dirt
6	☐	Other

ROAD GRADE

1	☐	Level
2	☐	Upgrade
3	☐	Hill Crest
4	☐	Downgrade
5	☐	Dip

ROAD SURFACE CONDITION

1	☐	Dry
2	☐	Wet
3	☐	Snowy, Icy
4	☐	Other
5	☐	Unknown

ROAD CONDITION

1	☐	Under Construction or Repair
2	☐	Obstruction—Unlighted at Night
3	☐	Obstruction—No Warning in Day
4	☐	Obstruction—Previous Accident
5	☐	Loose Material on Surface
6	☐	Holes—Ruts—Bumps
7	☐	Defective Shoulder
8	☐	Reduced Road Width
9	☐	No Defects Apparent

CONTRIBUTING CIRCUMSTANCES

1	2	
0	☐	No Improper Driving
1	☐	Exceeded Lawful Speed
2	☐	Speed Too Fast For Conditions
3	☐	Failed To Yield Right-of-Way
4	☐	Drove On Wrong Side of Road
5	☐	Improper Passing/Overtaking
6	☐	Passed Stop Sign
7	☐	Disregarded Traffic Signal
8	☐	Followed Too Closely
9	☐	Made Improper Turn
10	☐	Faulty Equipment
11	☐	Inattention
12	☐	Other Improper Driving
13	☐	Unknown

POLICE ENFORCEMENT ACTION

1	2	
1	☐	DWI Arrest with Chemical Test
2	☐	DWI Arrest—No Chemical Test
3	☐	Cited for Accident Cause
4	☐	Cited—Other Cause
5	☐	Arrested—Other
6	☐	No Enforcement Action

NOTICE TO INVESTIGATING OFFICER
A.R.S. 28-667 requires that a copy of this report shall be forwarded to the Arizona Highway Department when
a Total property damage exceeds $100
b A person is injured or killed

VEHICLE NO. 1

COLOR _____ YEAR _____ MAKE _____ TYPE _____ REGISTRATION NO. _____ STATE _____ YEAR _____

☐ NORTH ☐ SOUTH

GOING ☐ EAST ☐ WEST ON _____

DRIVER | OFFICER

EST'D SPEED BEFORE ACC _____ | _____ SAFE SPEED _____

PARTS DAMAGED _____ REMOVED TO _____ BY _____ REPAIR EST. _____

OWNER (NAME) _____ ADDRESS _____ CITY _____ STATE _____

DRIVER (NAME) _____ ADDRESS _____ CITY _____ STATE _____

DRIVER'S LICENSE STATE _____ NO. _____ ☐ OPERATOR ☐ CHAUFFEUR SPECIFY RESTRICTIONS _____ BIRTH DATE _____ MONTH, DAY, YEAR

AGE	SEX	INJURY

DRIVER'S OCCUPATION _____

OCCUPANTS

	NAME	ADDRESS (STREET)	CITY	STATE	AGE	SEX	INJURY
A - FRONT CENTER							
B - FRONT RIGHT							
C - REAR LEFT							
D - REAR CENTER							
E - REAR RIGHT							

TOTAL VEH'S ☐

VEHICLE NO. 2, PEDESTRIAN

COLOR _____ YEAR _____ MAKE _____ TYPE _____ REGISTRATION NO. _____ STATE _____ YEAR _____

☐ NORTH ☐ SOUTH

GOING ☐ EAST ☐ WEST ON _____

DRIVER | OFFICER

EST'D SPEED BEFORE ACC _____ | _____ SAFE SPEED _____

PARTS DAMAGED _____ REMOVED TO _____ BY _____ REPAIR EST. _____

OWNER (NAME) _____ ADDRESS _____ CITY _____ STATE _____

DRIVER (NAME) _____ ADDRESS _____ CITY _____ STATE _____

DRIVER'S LICENSE STATE _____ NO. _____ ☐ OPERATOR ☐ CHAUFFEUR SPECIFY RESTRICTIONS _____ BIRTH DATE _____ MONTH, DAY, YEAR

AGE	SEX	INJURY

DRIVER'S OCCUPATION _____

OCCUPANTS

	NAME	ADDRESS (STREET)	CITY	STATE	AGE	SEX	INJURY
F - FRONT CENTER							
G - FRONT RIGHT							
H - REAR LEFT							
I - REAR CENTER							
J - REAR RIGHT							

INJURED TAKEN TO _____ BY _____

WITNESSES

NAME _____ ADDRESS _____ AGE _____ SEX _____

NAME _____ ADDRESS _____ AGE _____ SEX _____

NAME _____ ADDRESS _____ AGE _____ SEX _____

OTHER PROPERTY DAMAGE _____ REPAIR EST. _____

NAME AND ADDRESS OF OWNER _____

DESCRIBE WHAT HAPPENED (REFER TO VEHICLE BY NUMBER) _____

INDICATE NORTH BY ARROW ◯

ACCIDENT DIAGRAM

ACCIDENT MEASUREMENTS

ARREST: NAME _____ CHARGE _____ CITATION NO. _____

ARREST: NAME _____ CHARGE _____ CITATION NO. _____

INVESTIGATED AT SCENE ☐ NO ☐ YES DATE INVESTIGATED _____ TIME _____ ☐ A.M. ☐ P.M.

PHOTOS TAKEN? ☐ NO ☐ YES BY WHOM? _____

INVESTIGATOR _____ SIGNATURE I.D. NO. STATION OR DEPARTMENT DATE _____

AHD 1-641 (100M 2-67)

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