

COMPARISON AND EVALUATION OF CRIME SCENE RECONSTRUCTION SOFTWARE USING VISUAL STATEMENT FX3, 3D EYEWITNESS AND CRIME ZONE



FORENSIC SCIENCE

Molly F. Corvo¹, Kerrie Cathcart^{1,2}, Ian Levstein¹, Steve Compton²

¹ Marshall University Forensic Science Program

²Huntington Police Department, Huntington, WV 25701

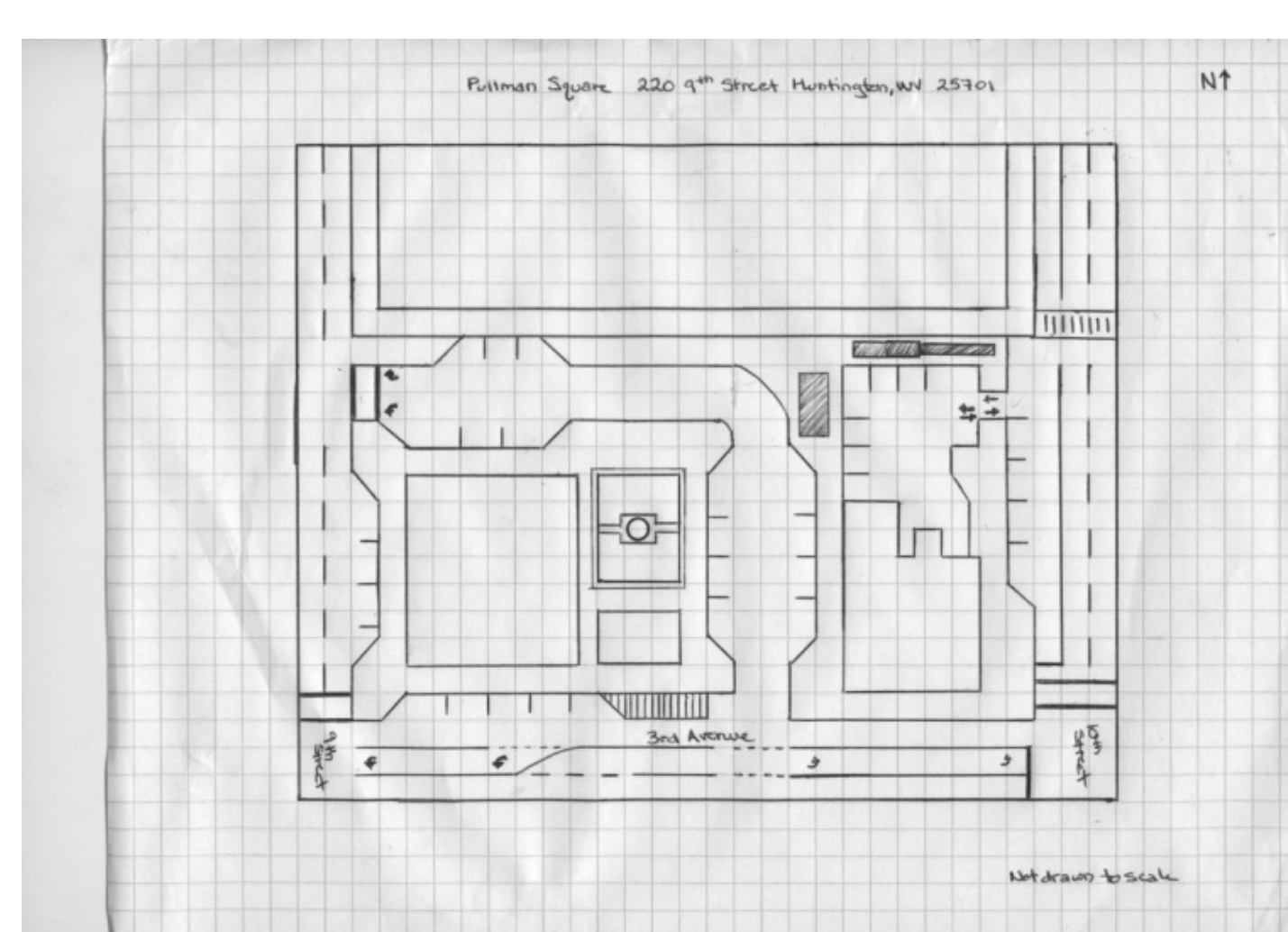
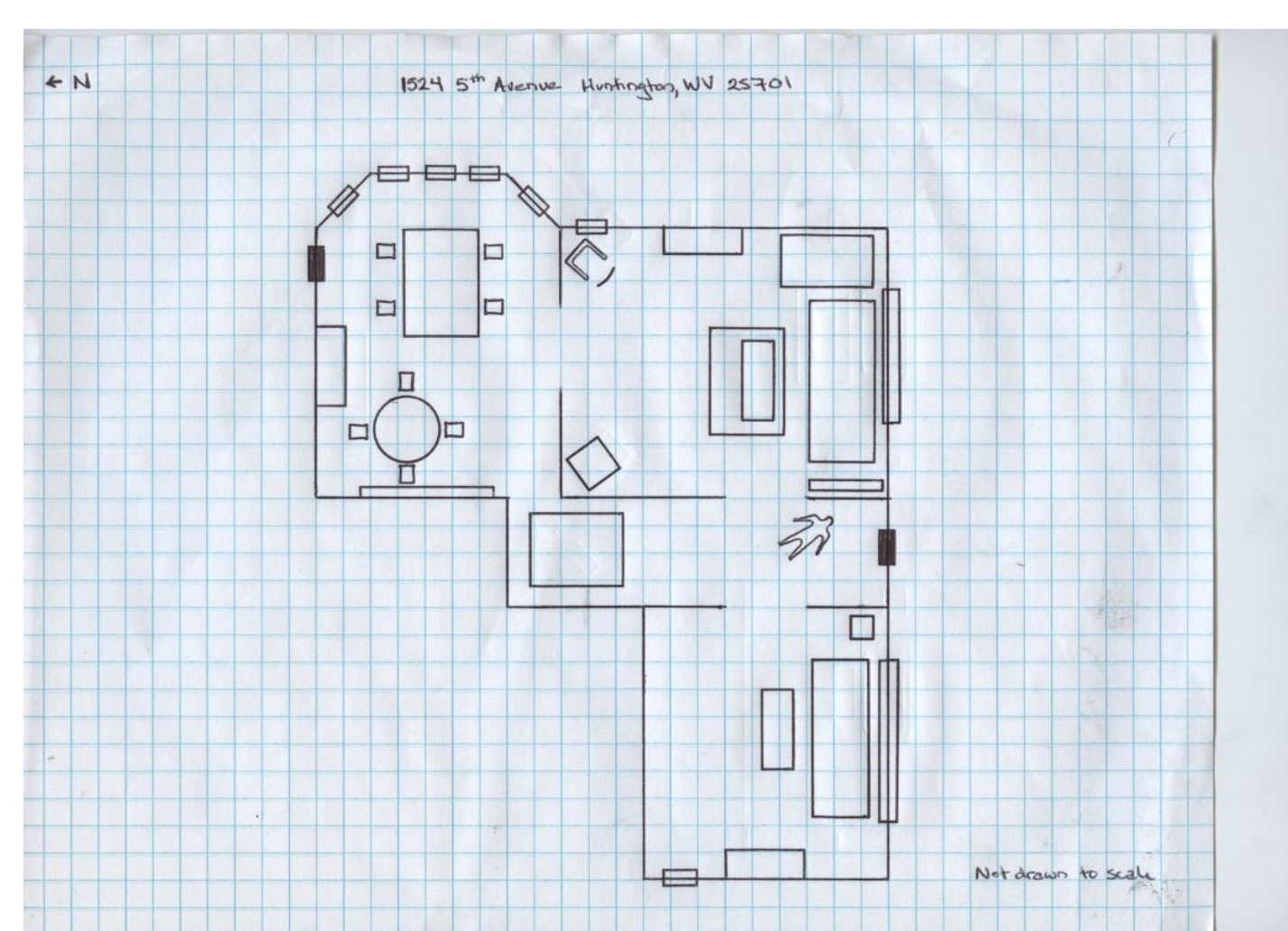


Introduction

Crime scene reconstruction programs should be used to depict the scene as found, or explain what could or could not have happened based on the evidence available. These software programs should not be used to recreate the events of the crime. The idea of crime scene reconstruction has been around longer than fingerprint identification [1]. Crime scene reconstruction is a procedure that involves taking all of the physical evidence, along with context of the scene, and trying to determine the actions that occurred. It is then the responsibility of the crime scene analyst to attempt to put an order to the events [2]. When trying to piece together what happened, an investigator must remember that every action had an effect on every other action and or condition that followed [3].

In a court of law, crime scene reconstruction is considered demonstrative evidence. "Demonstrative evidence is evidence that illustrates or helps explain oral testimony, or recreates a tangible thing, occurrence, event, or experiment" [5]. Crime scene reconstruction gained popularity in the courtroom in the early 90's. Since then, computers using animation to reconstruct crimes have been used in place of hand drawn sketches and photography. These computer animations have enhanced the information for the jury, because people are five times more likely to remember what they have seen, rather than what they have heard [6]. It is also possible, while reviewing a visual representation of the scene, that eyewitnesses can be reminded of specific events or flaws can be pointed out and corrected [3]. The purpose of this research project was to compare and evaluate three crime scene reconstruction software programs. In order to do this, the products were obtained either by an available license or a demonstration license that provided the same features as a full license would. Crime Zone by CAD Zone, 3D Eyewitness by Design Ware Inc., and FX3 by Visual Statements all had similar features and either full copies or demonstration licenses were available. A survey was also sent to 149 law enforcement agencies. The comparison of the three different programs can provide information to law enforcement agencies looking to purchase a crime scene reconstruction software program.

Hand Drawn Sketches



Law Enforcement Questionnaire

A brief questionnaire was created with the assistance of Corporal Steve Compton of the Huntington Police Department that asked ten questions regarding the use of crime scene reconstruction software programs (see attached questionnaire). The questionnaire was electronically sent to 149 different law enforcement agencies of varying sizes in the United States. Additional attempts were made to contact law enforcement agencies that did not provide contact information on their websites. The data from the questionnaire was used to determine whether or not law enforcement agencies were using crime scene reconstruction programs, the most popular software program, and the problems and benefits of the different software programs.

Reconstruction Computer Programs

Visual Statements FX3

FX3 is a CAD based program that also uses simulation, and is one of the many products offered by Visual Statements. FX3 includes features such as SmartRoads and SmartRooms that allow for quick design, Linear Momentum analysis, and a vehicle specific library. FX3 is a fourth generation program and was first developed in 2005 but Visual Statements has been providing accident reconstruction programs for almost 20 years. The video cards must be Direct X 9.0+ compliant. There are several different levels of FX3 programming that can be used for crime scene reconstruction, and they range in price from \$1095 to \$6695.

3D Eyewitness

3D Eyewitness is a CAD based program, and is one of several programs offered by Design Ware Inc. Design Ware Inc. has programs for architectural design and programs designed for use in a laboratory setting to help teach physics and electronics. 3D Eyewitness is specifically designed for law enforcement, and is used for crime scene reconstruction, traffic accidents, and pre-raid planning. The entire program costs \$349 and comes with a training booklet and tutorial CD.

Crime Zone

Crime Zone is a CAD based program by CAD Zone and is one of many products offered by the company. CAD Zone offers a variety of programs that are designed with a particular user in mind, such as crime scene investigators, accident reconstructionists, and fire investigators. Crime Zone was first released in 1995 after the company worked with law enforcement personnel and attorneys who helped in the development. The entire program costs \$699, tutorial videos are available online, technical support is free, and there is also a \$600 training course that can be purchased. Crime Zone version 8.3 was used for comparison and evaluation.

Final Diagrams (Outside)

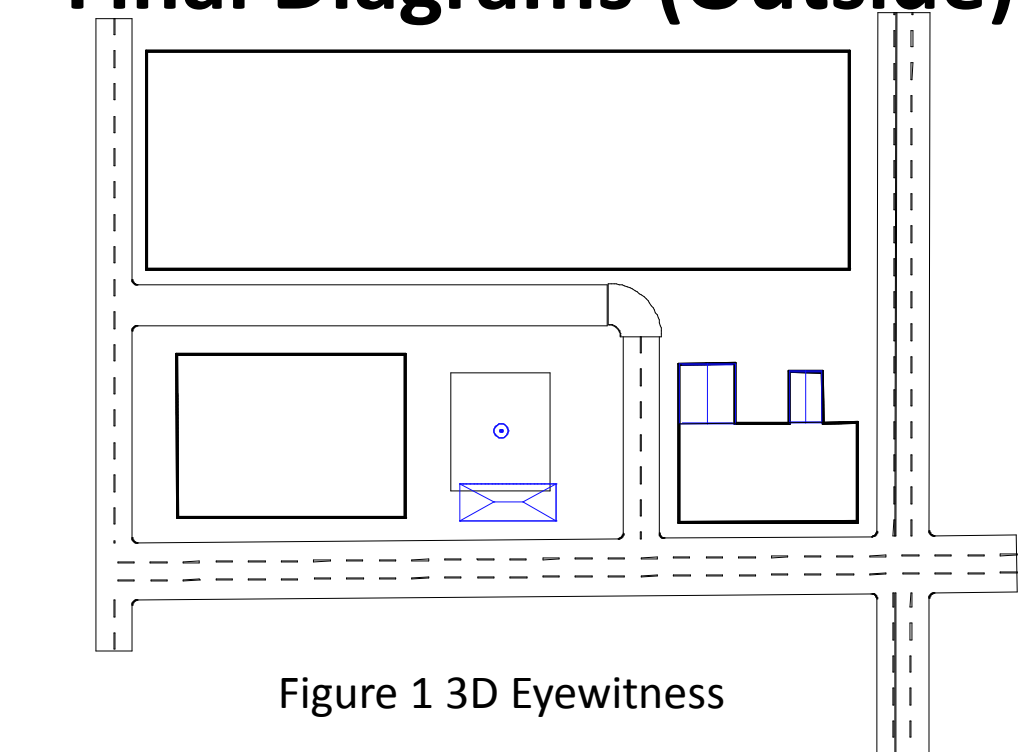


Figure 1 3D Eyewitness

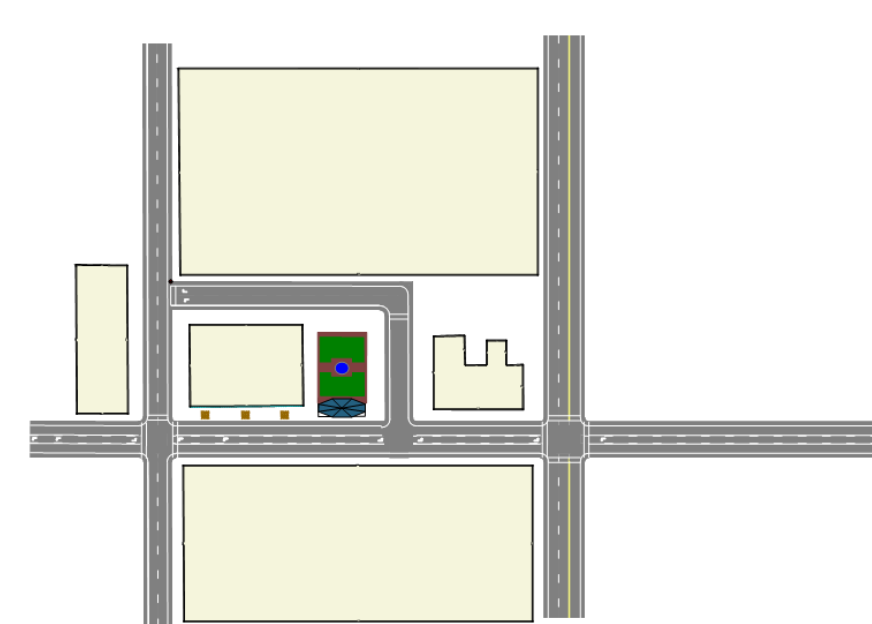


Figure 2 FX3

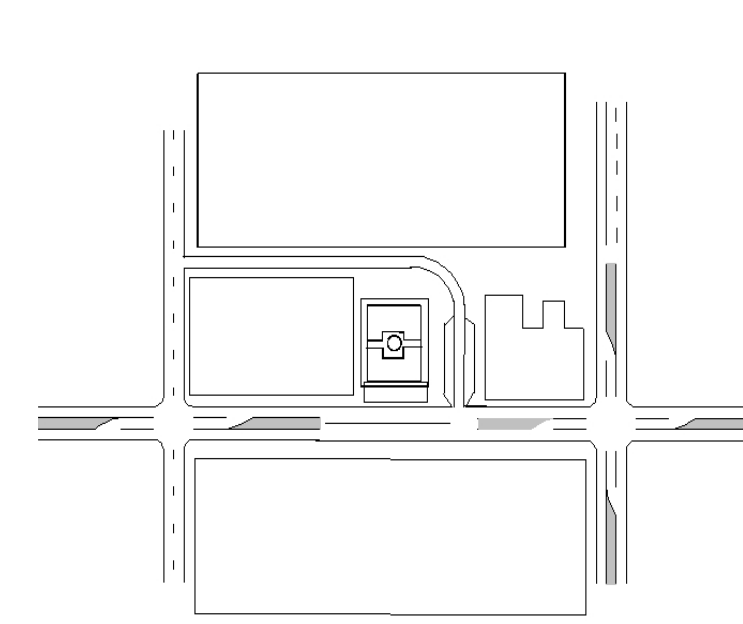


Figure 3 Crime Zone

Survey Results

Total Number of Surveys Sent: 149*	Total Number of Responses: 80	Response Rate: 53.7%
Total Number of Responses: 80	Total Number of LE Agencies That Do Not Use a Program: 21	Percentage: 26.3%
Total Number of LE Agencies That Use a Program: 59	Number of LE Agencies That Use More Than One Program: 15 (Combined total of programs used: 79)	Percentage: 25.4%
Program:	Number of Agencies Using the Program:	Percentage:
Crime Zone	21	26.3%
Visual Statements (FX3)	18	22.8%
Crash Zone	9	11.4%
Map Scenes	5	6.3%
Microsoft Visio	5	6.3%
Auto Sketch	4	5.1%
Scene PD	3	3.8%
CAD Zone	3	3.8%
ARAS 360	2	2.5%
3D Eyewitness	2	2.5%
Smart Draw	2	2.5%
Canvas	1	1.3%
Pocket Zone	1	1.3%
Auto CAD	1	1.3%
Photo Modeler	1	1.3%
3D Home	1	1.3%

Table 1.1 Survey Results for Programs Used in Law Enforcement Agencies

Program	Likes	Dislikes
CAD Zone Programs (Crash Zone, Crime Zone, and Pocket Zone)	-Quick exchange between 2D and 3D -Interaction with Total Station -Provides nice diagrams -Only one program is required for all diagramming needs	-Not intuitive/ user friendly -Needs more pre-drawn symbols in the libraries -No free updates available -Expensive to get additional licenses
FX3	-Ease of "walking" through the scene -Finished diagrams look very professional -Easily import photos/ images	-Not specifically oriented to crime scene -Expensive to obtain extra software components -Requires a powerful computer
Microsoft Visio	-Once mastered, it is easy to use -Clarity of the end product	-Lengthy learning curve -Lack of refined 3D capabilities
Map Scenes	-Program flexibility (measurements) -Interaction with Total Station -Allows for thorough documentation	-Not intuitive/ user friendly -Lengthy learning curve
AutoSketch	-Allows for quick sketching -Ease of use	-Lack of 3D capabilities

Table 1.2 Survey Results of Likes and Dislikes of Popular Programs

Final Diagrams (Inside)



Figure 1.1a FX3



Figure 1.1b FX3

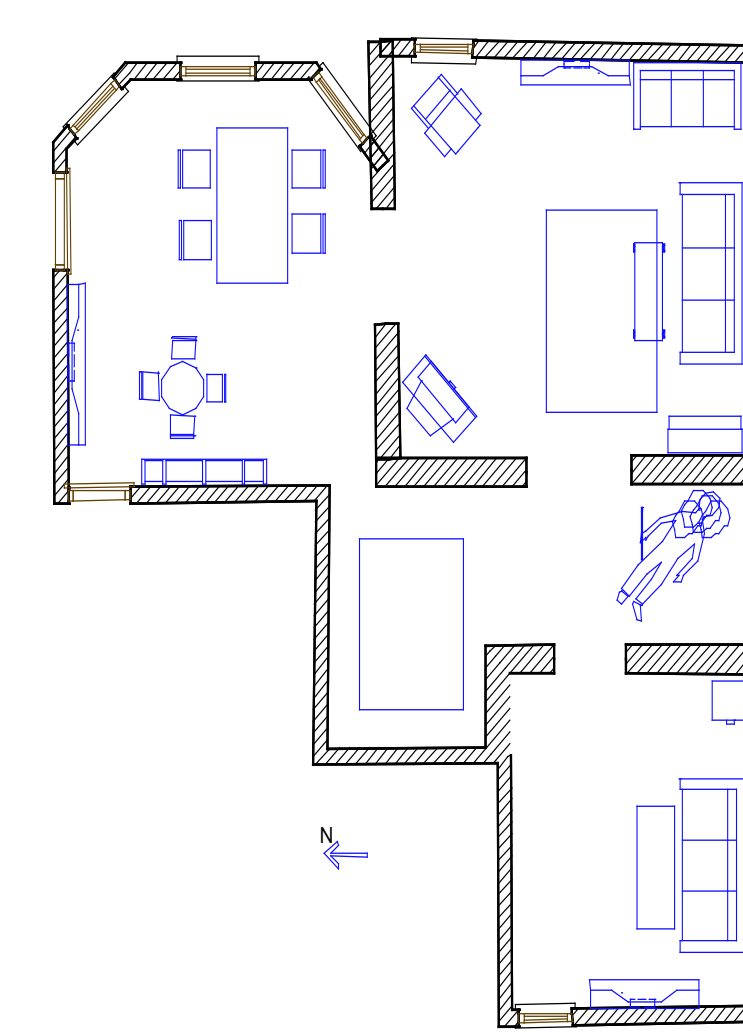


Figure 2.1 a 3D Eyewitness



Figure 2.1b 3D Eyewitness

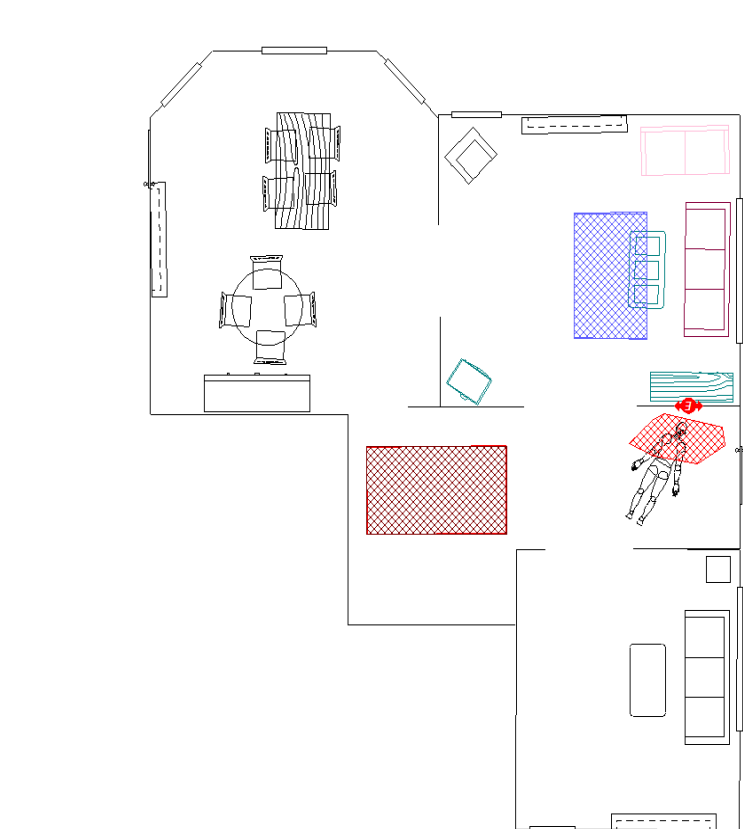


Figure 3.1a Crime Zone



Figure 3.1b Crime Zone

Conclusion

All three of these programs can take a 2D sketch and quickly convert it into 3D. FX3 is the only one that offered animation, but using animation in a courtroom setting requires extensive knowledge of the program as well as the physics behind any simulation. FX3 can also become quite expensive in order to have all the features associated with the demo, and requires an expensive computer for use. Crime Zone was not intuitive and was the most difficult to use, especially without much technical support.

When the law enforcement agencies were contacted for help with the questionnaire, several requested results when the comparison and evaluation were completed. Based on the three programs evaluated, if the funds are available and animation is required, FX3 by Visual Statements would provide the best graphics and offer the most capabilities. If budget is an issue and the agency wants a program for sketching and 3D rendering only, 3D Eyewitness is the most user friendly and provides professional looking sketches with 3D visualization that should suit any courtroom needs.

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Acknowledgements

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