



## Zussman Village Fort Knox, Kentucky

### ■ Project:

Zussman Village Fort Knox, KY Pyrotechnics Project

### ■ Project Completion:

May 25, 2000

### ■ Project Description:

Design, engineered and installed control system to handle all pyrotechnics at facility. Ware also built the pyrotechnic devices. The system was built to work under conditions that were completely unique. Vaporized propane was used because it was a lot easier to control and since propane wants to hold to the ground, it was easier and safer to create the mushroom or fireball effect. Propane would be shot up into the air to create a bellow back down to the ground, creating a spectacular effect.

WARE engineers and system consultants re-worked the original design plans and were able to create an exploding gas station, burning buildings and exploding cars that performed safely and reliably.

Portable systems were also built to move throughout the facility to help create an environment that was not the same every time.



Case Study: Zussman Village – Urban Combat Training Facility  
Ft. Knox, Ky.

Design/Build – Vaporized Propane Flame Effects & Pyrotechnics Controls  
Construction began 1997, Facility opened for Training October 1999, Official Grand Opening  
May 25, 2000

### **WARE Plays Crucial Role in Preparing Troops for Urban Combat**

*WARE Engineers Created “Safe” Fires and Explosions at Zussman Village, Ft. Knox, Ky.*

**Louisville, Ky.** – The U.S. Army has estimated that casualty rates for untrained soldiers in urban combat can range from 25 to 30 percent, which is why all four branches of the military currently train their soldiers in urban combat to improve their ability to succeed and survive.

One of the most realistic urban combat training facilities in the U.S. is located right here in Kentucky. Zussman Village in Ft. Knox, Ky. encompasses 30 acres and is home to some of the most devious and realistic urban warfare scenarios that the Army’s top personnel can concoct. Deafening explosions that rattle your body, gun toting guerillas, the odor of raw sewage, the chaos and confusion of civilians on the street, burning buildings and large, fiery explosions all await those soldiers who train at Zussman Village.

The genesis of Zussman Village can be traced back to 1988 when Major General Tom Tait identified the need to train the armored force in an urban setting. A group of Vietnam veterans were charged with the task of creating design guidelines for how the site would look and operate.

“There were a lot of meetings and a lot of scribbling on bar napkins involved,” chuckled Andy Andrews, Zussman Village Range Manager. “We reviewed all the urban combat scenarios that our units have faced in the past. Everything from World War II to Somalia. We also learned a lot from British forces and their dealings in Northern Ireland, Lebanon and Syria. It was extremely important that our MOUT site (military operations in urban terrain) be as realistic as possible. We wanted it to be dirty and nasty – the way war really is.”

One of the realities of war and urban combat, as witnessed currently in Iraq, is unexpected explosions and lingering fires. Andy Andrews envisioned exploding gas stations, burning buildings and burning cars. The goal is to produce a realistic, highly stressful situation that teaches troops how to navigate a hostile, urban landscape. Zussman Village is currently the only MOUT site to incorporate pyrotechnics into training scenarios.

“We are talking about soldier’s lives,” said Andrews. “Urban warfare has a much higher rate of casualties than in the open battlefield. The action and the violence are much closer and much faster. Most of the units that train here have to take the crawl, walk, run approach, meaning that they get better and learn more with each successive scenario.”

OPFOR (opposing forces) can sometimes eliminate up to 80% of rookie training squads.

“There is no doubt that soldiers who have trained here have a much higher rate of success in combat,” said Andrews. “We are seeing the results currently in the war with Iraq. I’ve actually gotten feedback from troops deployed in Iraq and one unit who fought in Basra mentioned that the training probably saved their lives.”

A major component of successful and realistic training is the addition of pyrotechnics.

“One of the reasons why the fire effects are so crucial is that most of our military operations are conducted at night,” said Andrews. “When an explosion occurs and a soldier is wearing night vision goggles, his vision goes blank. Soldiers need to learn how to react to this type of situation and also to resist the urge to have his concentration lapse. It’s just human nature to take that second to stare at a fire or explosion, but in combat, soldiers need to react quickly to their changing surroundings.”

WARE, headquartered in Louisville, Ky., was hired to produce the pyrotechnics for the simulation. There were challenges to producing safe and reliable fire effects.

“It was not as simple as lighting a spark to produce the desired effects,” said Barry Stanfield, WARE Systems Consultant. “There were a lot of safety issues to consider, as well as the fact that Andy Andrews wanted it to look a certain way. Natural gas was out because the flame looks blue and Andy wanted a realistic yellow/orange wood burning fire. Liquid propane was considered because it produced the right color and it sticks and lingers. However, it simply was not a safe option and at that time, there was new code being implemented for fire effects performed in front of an audience. We really had to design a system to code that would work under conditions that were completely unique. Ultimately, vaporized propane fit the bill. It was a lot easier to control and since propane wants to hold to the ground, it was easier and safer to create the mushroom or fireball effect. The propane would be shot up into the air and it would bellow back down to the ground, creating a spectacular effect.”

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Zussman Village officially opened May 25, 2000. It was originally intended for armored Army personnel training, however all four branches of the military (Army, Navy, Air Force, Marines), the Coast Guard as well as Special Operations, SEALs, Rangers and foreign military units from around the globe train at the facility. Civilian groups such as local law enforcement, emergency medical services and SWAT teams have also trained at the facility – simulating everything from Sarin gas attacks to hostage situations. The site can host up to 1,500 participants at a time. Last year the facility was in use 300 days and trained over 27,000 soldiers. Since its opening, over 60,000 troops have gone through the urban combat training program.

“Hollywood has nothing on us,” said Daniel Hawkins, Zussman Village Systems Engineer. “Whatever scenario you can imagine, we can create here. We’ve paid attention to the smallest detail – everything from our sewer ‘smell-o-vision’ to fully furnished hotel rooms. We also have several rigged ‘surprises’ like blowing up the bridge, knocking down a utility pole or springing a

dummy from behind furniture in a building. While this is a very interesting and exciting to work, we all understand the greater purpose. This is not just a paycheck, we all believe in what we do here. We want to scare the soldier here, so he'll be more careful over there in combat.”

Zussman Village cost \$15 million to complete and this includes 20 concrete-block buildings with varying levels of simulated damage, a junkyard, soccer field, an open air market, church/mosque, cemetery, gas station, electrical substation, train tracks and bridge. The site continues to expand and offer new challenges. The site also boasts an impressive a perfect safety record with trainees – 0 accidents.

“It can't be stated enough that safety was a major goal,” said Hawkins. “We have a three step safety process, particularly because we are dealing with fire. WARE was great to work with on this project. They have an excellent reputation nationwide and it is well deserved. I can't conceive of another company that could have produced fire effects as realistic as they are while still being safe to use.”

Andrews echoes those thoughts.

“WARE brought the ability to provide solutions,” said Andrews. “WARE also ingrained the safety process transparently. Soldiers are not really aware of the safety measures and that's the way we want it. It looks real, and that's real important. The feedback that we get from soldiers has been very positive. Soldiers that have faced urban combat have told us that this training helped save their life.”

The public can checkout WARE's handiwork as well as all the other effects at Zussman Village by volunteering to be a civilian on the battlefield (COB). Any interested person is encouraged to contact Zussman Village Training Coordinator – Leigh Ann Harwell at (502) 624-6194 to join the COB email registry.

WARE was founded in 1952 by Ivan Ware as a residential heating and air conditioning company in Louisville, Ky. Over the years, WARE has expanded to become a major commercial and industrial boiler and chiller service, sales, rental and valve company in the Southeast. WARE has recently grown to be one of the largest rental boiler companies in the United States. WARE has offices in Louisville, Lexington and Owensboro, Ky. as well as Chattanooga, Tenn. and Atlanta, Ga.