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Vulnerability of Civil Aviation Infrastructure to Attacks by Explosive-Laden Vehicles

Motevalli, V., Lagos, A., Boivin, L., and Marzougui, D., The George Washington University Aviation Institute

Suicidal attacks using vehicles laden with explosives or by individuals carrying Improvised Explosive Devices (IEDs) continue to be a severe and pervasive threat around the world. It may be only a matter of time before this type of terrorism is successfully used in the United States to attack public transportation systems. Hijacking and commandeering attacks against commercial airlines have been addressed to a large extent since September 11, 2001. While concerns with MANPADS (Man-Portable Air Defense Systems) attacks remain high, possible attacks by vehicle bombs against the commercial civil aviation system pose a broad and equally damaging threat. Of particular concern are the nations' commercial civil aviation airports (over 430) due to their critical role in the air transport system as well as their symbolic value. These characteristics make airports a very attractive target for terrorists using explosives in the form of vehicle bombs whether in a suicidal or other forms of attack to produce great numbers of casualties and widespread fear.

Potential targets related to airports can be divided into the following categories:

- a. Airport terminal buildings
- b. Air Operating Area - all those parts of the airport where airplanes can move about, and includes runways, taxiways, ramps, alleyways, etc.
- c. ATC tower and other critical structures, such as: communication centers, navigation aids, and radars
- d. Intermodal terminals; trains carrying passengers between terminals
- e. Other critical infrastructure components, such as airport power stations, water mains, fuel farms, limited access airport entrances, etc.

A devastating scenario would be a suicide bomber driving an explosive-laden vehicle onto the air operating area with a number of planes waiting in a queue for departure. The explosion could start fires and possible secondary fuel explosions on several airplanes at the same time, making any response and rescue very difficult. In addition, airplanes committed to landing or take-off are quite vulnerable to an explosive-laden vehicle of any size colliding with it on the runway. Current airport perimeter barriers are often less than adequate to prevent such an attack.

This paper explores different potential threat scenarios using vehicle bombs to target airports and examines the use of barriers and other mitigation approaches to:

- a. Minimize damage to critical areas by use of barriers to increase stand-off distance and limit access of vehicles to potential high-value targets
- b. Mitigation to minimize the impact of explosions by addressing vulnerabilities, e.g. how to limit fires as a result of an explosion
- c. Management of the post-attack response

The use of finite-element computer simulation to design barriers and systems engineering combined with emergency management principles offers a thorough approach to address the threats discussed here.