DRAGNET®
TRUCK ARRESTOR SYSTEM FOR EMERGENCY TRUCK ESCAPE RAMPS
INSTALLATION PROCEDURES & MAINTENANCE MANUAL

CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>General Description/ Principles of Operation</td>
<td>5-9</td>
</tr>
<tr>
<td>Maintenance Instructions</td>
<td>10-11</td>
</tr>
<tr>
<td>Installation Instructions</td>
<td>12-13</td>
</tr>
<tr>
<td>Photos of Current Installations</td>
<td>14-20</td>
</tr>
<tr>
<td>Design Development of a Truck Escape Ramp</td>
<td>21-24</td>
</tr>
<tr>
<td>Newspaper Articles Re: Dragnet</td>
<td>25-27</td>
</tr>
</tbody>
</table>
INTRODUCTION

Large commercial vehicles which have lost control in hilly terrain present a major challenge to engineers concerned with highway safety. The desired criteria for constructing escape ramps is to stop a 90,000 lb. (36,400 kg) truck entering the ramp at 90 mph (129 km/hr) with a deceleration of 0.8 “G” or less.

The most common approach to this problem is the construction of truck emergency escape ramps employing deep-gravel arrestor beds. In this approach, a separate lane is constructed off the main road. This lane, or ramp is typically one hundred to two hundred meters in length and surfaced with either riverbed gravel or angular crushed gravel in depths varying from one to two meters. While these arrestor beds are generally effective in bringing an out-of-control truck to a stop, there are many serious drawbacks to their use. First there is the problem of extracting the stopped truck from the arrestor bed, since it is now mired up to its axles in deep gravel. A high-capacity tow truck is usually required. Even then some means of rigid under-wheel planking will be needed to distribute the load more evenly as the truck is being hauled out. The pitching and yawing of the truck as it enters the bed is yet another disadvantage of this type of escape ramp. Gravel arrestor beds also scatter rock debris into work areas. Finally, cargo shift is always a concern with a gravel type arrestor bed.

In their search for an improved truck arrestor system, Cushion & Barrier’s engineers have modified and tested a ramp equipped with a series of Dragnet Systems which can be easily erected on a paved surface equipped with longitudinal concrete median barriers on both sides.

The Dragnet System is currently manufactured by Cushion & Barrier, LLC in the New York Metropolitan area. The technology was first used by the Navy to stop aircraft landing on aircraft carriers. The system was adapted and tested for highway applications in the early seventies. Cushion & Barrier, LLC began marketing the device for roadside applications in the eighties. Since then the Dragnet System has been used for road closures for construction, movable bridge closures, HOV lanes and ferry terminals.

The first application for a truck escape ramp was in 1992 with an installation in Horseshoe Bay, British Columbia. Since then ramps have been installed in Hawaii, Biarritz, France, Williamstown, MA, North Bay, Canada, Buffalo, Wyoming and Avon, CT. Systems are currently under consideration in Australia, and other locations in Canada and America.
GENERAL DESCRIPTION

The Dragnet Emergency Truck Escape Ramp consists of a series of vehicle restraining devices (Energy Absorbers and Barrier Nets). The restraining devices are mounted in concrete median barriers located on each side of the escape ramp. Should an out-of-control truck enter the ramp, it will sequentially encounter the restraining devices. (Each absorber provides a constant restraining force throughout the allowed run-out distance. The force in the system increases until sufficient kinetic energy is absorbed to bring the truck to a safe stop.) The first net in the series is designed to stop out of control automobiles as well as trucks, and is different from the balance of the nets used in the system.

PRINCIPLES OF OPERATION

The vehicle restraining device includes a steel cable-type net, attached at each end to an Energy Absorber. The nets are held across the escape ramp in a vertical position by tensioning devices. The Energy Absorbers are embedded in the concrete footings.

Each Energy Absorber is comprised of a stainless steel chamber with an enclosed 200 foot-long steel tape. When the barrier is truck, the steel tape is pulled from the Energy Absorbers over a series of five offset shoulder bolts, imparting a restraining (bending) force to the steel tapes, which in turn slows and stops the vehicles. The steel tapes MUST be replaced after each vehicle impact.
The **Dragnet System** energy absorber units are rated, first by the amount of force needed to initiate pull on the tape. The second consideration is the length of tape provided. The following is a list of our standard units.

<table>
<thead>
<tr>
<th>Rated Pull Out Force</th>
<th>Tape Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,500 pounds (20.017 Kn)</td>
<td>75 feet (22.86 M)</td>
</tr>
<tr>
<td>4,500 pounds (20.017 Kn)</td>
<td>200 feet (60.96 M)</td>
</tr>
<tr>
<td>18,000 pounds (80.068 Kn)</td>
<td>40 feet (12.19 M)</td>
</tr>
<tr>
<td>25,000 pounds (111.21 Kn)</td>
<td>100 feet (30.48 M)</td>
</tr>
</tbody>
</table>

The following chart has been developed for a standard unit, designed for 4,500 pound restraints at each terminal with a 200 foot tape. Larger units, with up to 25,000 lb. restraints, are available. As a result, the Dragnet can be designed to stop trucks and other heavy vehicles at high speeds with “G” forces well under the current Federal guidelines.

<table>
<thead>
<tr>
<th>PERFORMANCE AND SAFETY CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>USING FULL 200' FT. RUNOUT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vehicle Weight (Lbs.)</th>
<th>Maximum Velocity (MPH)</th>
<th>Maximum Average Acceleration (G’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,800 (816 Kg)</td>
<td>172 (277 Kph)</td>
<td>5</td>
</tr>
<tr>
<td>4,500 (2041 Kg)</td>
<td>109 (175 Kph)</td>
<td>2</td>
</tr>
<tr>
<td>20,000 (9072 Kg)</td>
<td>52 (84 Kph)</td>
<td>0.45</td>
</tr>
<tr>
<td>40,000 (18,144 Kg)</td>
<td>37 (60 Kph)</td>
<td>0.23</td>
</tr>
<tr>
<td>80,000 (36,287 Kg)</td>
<td>26 (42 Kph)</td>
<td>0.11</td>
</tr>
</tbody>
</table>

**NO OCCUPANT INJURY OR VEHICLE DAMAGE**

**DRAGNET PROVIDES FOR LOWER “G” FORCES**

Also of paramount importance in the design of any impact attenuator are the “G” forces involved in bringing the vehicle to a complete stop. Here the Dragnet has no equal. In addition to a multitude of instrumented tests at Federally approved testing facilities, Cushion & Barrier, LLC has performed several demonstrations using live drivers. In all of the impacts at speeds in excess of 60 mph (100 Kph), no occupant injury was experienced and vehicular damage was negligible.
Advantages of the Dragnet for Truck Escape Ramps

- **Safe, Controlled Deceleration of Vehicles:**
  The Dragnet System can stop vehicles of all sizes, from 1800 lb. compacts to a fully loaded eighteen wheeler, safely. Occupant ride down decelerations are well within FHWA standards. The system can be designed to maintain restraining forces below .5 “G” to alleviate trailer load-shift and jackknifing.

- **System Flexibility:**
  The arrestors can be designed for any speed or any vehicle weight within a range of drive-down deceleration rates. This allows the designer greater latitude in establishing design variables to manipulate ramp lengths. Our duel arrestor system enables a lightweight vehicle to use escape ramps and be stopped safely as well as fully loaded trucks. The Dragnet System may be utilized on positive or negative grades.

- **Economical Alternative:**
  The Dragnet can provide substantial savings from the cost of typical gravel bed designs by minimizing the amount of construction and fill that is typically required. Ramps generally can be shorter in length with the Dragnet and do not require adjacent paved service lanes or chain pull anchors for vehicle removal.

- **Ease of Maintenance:**
  A truck escape ramp utilizing the Dragnet System avoids the freeze/thaw problems which gravel beds experience. Roadway surfaces are bituminous paved so ramp performance is relatively unaffected by severe winter conditions. The Dragnet System component parts require only minimal periodic maintenance.

- **Ease of Repair:**
  After an impact the Dragnet System is easily repaired, often requiring only the replacement of the spool of tape used in the arrestors. Repair times are usually less than an hour/net and can be accomplished by local tradesmen without special tools.

- **Tested & Proven:**
  This technology was originally developed and used by the Navy to stop planes aboard aircraft carriers. It has since been adapted and tested under FHWA standards for a variety of applications on our nation’s highways and meets NCHRP 350 design criteria. The Dragnet has been tested for a wide range of vehicle sizes, design speeds and impact angles.

- **Minimal Engineering:**
  Specifications, plans, and drawings currently available can be easily modified to suit any particular site. The system easily accommodates variable design criteria such as vehicle speed and weight, angle of incidence and anchor requirements.

- **Approved & Refundable:**
  The Dragnet has been approved for use by the FHWA and qualifies under the federal 8020 funding program as an impact attenuator for 100% federal funding.
### SAMPLE DESIGN CALC. FOR A DRAGNET TRUCK ESCAPE RAMP

<table>
<thead>
<tr>
<th>STATION (ft.)</th>
<th>RESTRAINING FORCE (lb.)</th>
<th>DISTANCE BET. STATIONS (ft.)</th>
<th>SPEED ft./sec.</th>
<th>SPEED mph</th>
<th>AVERAGE &quot;G&quot; LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9000</td>
<td>40</td>
<td>88</td>
<td>60</td>
<td>0.1</td>
</tr>
<tr>
<td>40</td>
<td>18000</td>
<td>10</td>
<td>86.46</td>
<td>58.95</td>
<td>0.32</td>
</tr>
<tr>
<td>50</td>
<td>27000</td>
<td>10</td>
<td>85.26</td>
<td>58.13</td>
<td>0.74</td>
</tr>
<tr>
<td>60</td>
<td>36000</td>
<td>10</td>
<td>82.40</td>
<td>56.18</td>
<td>0.72</td>
</tr>
<tr>
<td>70</td>
<td>4500</td>
<td>130</td>
<td>79.55</td>
<td>54.24</td>
<td>0.73</td>
</tr>
<tr>
<td>200</td>
<td>4500</td>
<td>40</td>
<td>31.74</td>
<td>21.64</td>
<td>0.28</td>
</tr>
<tr>
<td>240</td>
<td>4500</td>
<td>10</td>
<td>17.03</td>
<td>11.61</td>
<td>0.17</td>
</tr>
<tr>
<td>250</td>
<td>4500</td>
<td>40</td>
<td>13.35</td>
<td>9.11</td>
<td></td>
</tr>
</tbody>
</table>

**ESTIMATED COST OF DRAGNET SYSTEM:**
- EIGHT NET & ARRESTER ASSEMBLIES = $16,500 X 8 = $132,000
- INSTALLATION: 2 MEN X 2.5 HR. / NET = 5 MAN HRS. X 8 NETS = 40 MAN HRS.
RAMP PLAN

CONCRETE BARRIER WALL

NET LOCATIONS

STA. 100
STA. 200
STA. 300
STA. 40
STA. 50
STA. 60
STA. 70
STA. 80
STA. 90
STA. 100

STEEL STRAP

STEEL CABLE

ARRESTOR ASSEMBLY SET IN SLOT IN CONCRETE BARRIER

TYPICAL NET ELEVATION
MAINTENANCE INSTRUCTIONS

- Scheduled Maintenance

1. Weekly
   a. Visual Inspection
      
      The purpose of this inspection is to spot any unusual conditions which would prevent the system from functioning as designed. These conditions include misalignment, loose fasteners, cable damage, corrosion, vandalism, etc.

   b. Check the barrier net for proper tension and proper height. The barrier net should be perpendicular to the roadway within 5 degrees.

   c. Check for any build up of trash or dirt around the Energy Absorbers which could interfere with proper operation.

2. Yearly
   a. Open Energy Absorber Housing and inspect for severe corrosion. Excessive corrosion will necessitate the need for tape replacement. Excessive white milky substance on the tape or areas of rust larger than the size of a quarter are cause for replacement of the tape.

- Adjustments – Net Tension

1. Once the Barrier Net has been properly installed between the Energy Absorbers, the final adjustment is made by tightening the turnbuckles. The turnbuckles are located between the net end plates and the Energy Absorber foundations. A large screwdriver or a small pinch bar can be used to adjust the length of the turnbuckle and increase or decrease the tension in the net. Both ends of the net must be adjusted equally to balance the tension. Do not over tension the net. Tension should be such that the net is upright and stable, and the cable sag at the center is no greater than 1 ½”.
MAINTENANCE INSTRUCTIONS

Cont’d

- Refitting After Vehicle Impact

1. Replacing the Net

   The entire Barrier Net and Energy Absorbers can be replaced as follows:

   First, remove the net from the Energy Absorber by removing the \( \frac{1}{2}-13 \) bolt and nut at each end of the net with an open-end or box wrench.

   Second, remove the pipe from the concrete median barrier.

   The Energy Absorbers can now be lifted out from the slot in the median barrier. The Energy Absorber then needs to have a new replacement tape installed in the chamber.

   Tape replacement should be made in accordance with the Installation Instruction contained in this manual.
INSTALLATION INSTRUCTIONS

- **Energy Absorber Installation**

  1. Connect pipe cap to top of pipe.
  2. Insert Energy Absorber into the top slot of the concrete median barrier with spacer underneath.
  3. Line up spacer and Energy Absorber mounting hole with the hole in top of concrete barrier.
  4. Insert pipe with cap through holes in concrete barrier, Energy Absorber, and spacer.
  5. Insert Energy Absorber into the bottom slot of the concrete median barrier with spacer underneath.
  6. Line up spacer and Energy Absorber mounting hole with the hole in top of concrete barrier.
  7. Insert pipe with cap through holes in concrete barrier, Energy Absorber, and spacer.

- **Net Installation**

  1. Unroll the assembly across the ramp between the Energy Absorbers. Net #1 must have the bottom lower cable slanted away from oncoming traffic.
  2. Remove the ½-13 bolts and self-locking nut from the net attachment fitting at the end of each Energy Absorber tape. Connect this fitting to the net end plates as shown, using the same bolt and nut. Install turnbuckles, pivot plates and “L” brackets.
  3. Place the bottom cable into the net and replace the bolts and nuts.
4. Tighten turnbuckles enough to make the net stand up on the center support post.

5. Gradually tighten the turnbuckles, alternating from one end of the net to the other until the net sag is reduced to provide the clearances between the road surface and the bottom cable. Net #1 – bottom cable to road surface is 10” +/- 1 inch. For the other nets the bottom cable to road surface is approximately 20” +/- 1 inch.

- **Replacing Energy Absorber Tape**

  1. Remove the five 5/16-18 lock nuts from the bottom of the Energy Absorber and lift the five shoulder bolts from the top of the cover.

  2. Remove the fourteen ¼-20 hex-head screws and lock nuts from the Energy Absorber cover. Lift the cover from the chamber. Remove the expended tape.

  3. Remove the single ½-13 bolt and lock nut from the net fitting and save parts for re-use. Discard the expended tape.

  **CAUTION!**
  
  Energy absorber tapes are specially lubricated. Store only in a clean, dirt free, dry environment to ensure proper operation.

  4. Install the replacement tape **exactly** as shown in attached figure, drawing SK-5307, in order to provide the design restraining capability. Note carefully the position of the shoulder bolt holes and the preformed tape-end configuration. Replace the five shoulder bolts and lock nuts (do not tighten at this time) and reinstall the fourteen ¼-20 screws and lock nuts. Replace the salvaged ½-13 bolt, busing and lock nut from the expanded tape. Tighten all bolts. Replacement is now complete.

  **CAUTION!**
  
  The Energy Absorber and Barrier Net System described above is part of a highly loaded system, designed to safely stop out of control cars and trucks. In order for this system to operate properly, each part must have the form, fit, function, and reliability that was designed and specified by the manufacturer. Replacement parts should always be obtained from the original supplier of this equipment to assure proper operation. Common hardware items procured locally may look the same as those being replaced, but may not perform properly when subject to the loads imposed on the system.
British Columbia, Canada
British Columbia, Canada
Buffalo, Wyoming
Buffalo, Wyoming
Avon, Connecticut
THE DRAGNET SYSTEM

The Dragnet Truck Arrester System is patented and manufactured by Cushion & Barrier, LLC of the New York Metropolitan area. The system is an outgrowth of the crash nets formerly used on aircraft carriers.

It has seen widespread use in the United States to safely stop passenger vehicles from intruding into perilous areas such as construction zones, open drawbridges, reversible traffic lanes, railroad crossings, emergency road closures, etc. It is designed to stop errant vehicles with very low accelerations and minimal damage. A typical system consists of a net made of a continuous steel cable and chain link fence attached at each end to energy absorbers. The energy absorbers are supported by anchor posts that are embedded into the pavement or the road shoulder or attached to longitudinal barriers. These energy absorbers, which are the heart of the Dragnet System, are steel chambers containing a series of staggered rollers around which a long length of metal tape or strap is bent back and forth as it is pulled through this deformation chamber. Each end of the net is attached to one end of these metal tapes protruding from the energy absorber case. These energy absorbers are designed so that a specific force is required to pull the tape through the chamber. This force is constant and not dependent on the impact velocity or environmental conditions. It is rather a function of the geometry and the material properties of the tape material. Basically, the capability of the system to absorb kinetic energy is the product of the restraining force of both energy absorbers and the runout distance of the metal tapes.

Equation 1 where:

\[ C = T (R_1 = R_2) \]

- **C** = capacity of Dragnet
- **T** = pullout force of one energy absorber
- **R_1** = runout distance of left side absorber
- **R_2** = runout distance of right side absorber

Dragnet System absorber units are rated first by the amount of force needed to initiate pull of the tape. The absorber units are provided in differing lengths as follows:

<table>
<thead>
<tr>
<th>Rated Pull Out Force</th>
<th>Tape Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,500 pounds (20.016 kilonewtons)</td>
<td>75 feet (22.86 meters)</td>
</tr>
<tr>
<td>4,500 pounds (20.016 kilonewtons)</td>
<td>200 feet (60.96 meters)</td>
</tr>
<tr>
<td>18,000 pounds (80.064 kilonewtons)</td>
<td>40 feet (12.19 meters)</td>
</tr>
<tr>
<td>25,000 pounds (111.20 kilonewtons)</td>
<td>100 feet (30.44 meters)</td>
</tr>
</tbody>
</table>
As there is one absorber at each end of the fence or net assembly, a hit automatically activates both absorbers. Therefore, to calculate total capacity, the combined energy force of two absorbers must be used. By reference to Equation 1, we can then determine the attenuating capacities for these standard units as follows:

2 Units of 4500 lbs with 75 foot tapes…… 675,000 ft lbs  (915.132 kn m)
2 Units of 4500 lbs with 200 foot tapes…… 1,800,000 ft lbs (2440.351 kn m)
2 Units of 18,000 lbs with 40 foot tapes….. 1,440,000 ft lbs (1951.960 kn m)
2 Units of 25,000 lbs with 100 foot tapes… 5,000,000 ft lbs (6778.753 kn m)

By equating these capacities to the kinetic energy of an impacting vehicle we can calculate the maximum permissible impact velocity of a given weight car. This has been done for a range of vehicles in Table 1 for the 4500 lb Energy Absorber with 75 foot tapes and in Table 2 for the 4500 lb Energy Absorber with 200 foot tapes. Tables 1A and 2A report the same data in the metric system. It should be noted that these values are somewhat conservative since only the restraining force of the tapes has been considered effective in stopping the vehicle. Other factors such as tire friction, braking, and aerodynamic drag have been ignored.

The maximum theoretical acceleration is simply the restraining force in the tapes divided by the weight of the vehicle and can only be approached when the tapes are parallel to the velocity vector of the impacting vehicle. Initial accelerations are much lower.

The Dragnet System has been extensively tested for a wide variety of vehicle weights up to speeds of 70 mph (112.7 km/hr) and it impacts angles up to 30°. Many in-service reports have substantiated the excellent performance of the Dragnet System in the field.
### Table 1
Capacity of 4500 lb Energy Absorbers with 75 foot tapes

<table>
<thead>
<tr>
<th>Vehicle Weight (lbs)</th>
<th>Max Permissible Velocity (ft/sec)</th>
<th>Max Velocity (mph)</th>
<th>Max Theoretical Acceleration (G’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>155.4</td>
<td>106.0</td>
<td>5.0</td>
</tr>
<tr>
<td>4500</td>
<td>98.3</td>
<td>67.0</td>
<td>2.0</td>
</tr>
<tr>
<td>20000</td>
<td>46.5</td>
<td>31.8</td>
<td>0.45</td>
</tr>
<tr>
<td>40000</td>
<td>33.0</td>
<td>22.5</td>
<td>0.23</td>
</tr>
</tbody>
</table>

### Table 1A
Capacity of 20 kn Energy Absorbers with 22.85 m tapes

<table>
<thead>
<tr>
<th>Vehicle Weight (kgs)</th>
<th>Max Permissible Velocity (km/hr)</th>
<th>Max Theoretical Acceleration (G’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>549</td>
<td>170.6</td>
<td>5.0</td>
</tr>
<tr>
<td>1372</td>
<td>107.8</td>
<td>2.0</td>
</tr>
<tr>
<td>6096</td>
<td>61.2</td>
<td>0.45</td>
</tr>
<tr>
<td>12192</td>
<td>36.2</td>
<td>0.23</td>
</tr>
</tbody>
</table>

### Table 2
Capacity of 4500 lb Energy Absorbers with 200 foot tapes

<table>
<thead>
<tr>
<th>Vehicle Weight (lbs)</th>
<th>Max Permissible Velocity (ft/sec)</th>
<th>Max Velocity (mph)</th>
<th>Max Theoretical Acceleration (G’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>253.8</td>
<td>173.0</td>
<td>5.0</td>
</tr>
<tr>
<td>4500</td>
<td>160.5</td>
<td>109.4</td>
<td>2.0</td>
</tr>
<tr>
<td>20000</td>
<td>76.1</td>
<td>51.9</td>
<td>0.45</td>
</tr>
<tr>
<td>40000</td>
<td>53.8</td>
<td>38.7</td>
<td>0.23</td>
</tr>
<tr>
<td>80000</td>
<td>38.1</td>
<td>26.0</td>
<td>0.11</td>
</tr>
</tbody>
</table>

### Table 2A
Capacity of 20 kn Energy Absorbers with 60.9 m tapes

<table>
<thead>
<tr>
<th>Vehicle Weight (kgs)</th>
<th>Max Permissible Velocity (km/hr)</th>
<th>Max Theoretical Acceleration (G’s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>549</td>
<td>278.4</td>
<td>5.0</td>
</tr>
<tr>
<td>1372</td>
<td>176.0</td>
<td>2.0</td>
</tr>
<tr>
<td>6096</td>
<td>83.6</td>
<td>0.45</td>
</tr>
<tr>
<td>12192</td>
<td>59.1</td>
<td>0.23</td>
</tr>
<tr>
<td>24384</td>
<td>41.3</td>
<td>0.11</td>
</tr>
</tbody>
</table>
A successful demonstration of a piece of high-speed safety equipment, based on that used to stop aircraft on aircraft carriers, has been completed in France.

The busy highway between France and Spain at Biarritz was the site for the test, which was carried out under the auspices of the Autoroutes du Sud de la France.

Roadway International, which markets the Dragnet vehicle arresting system, says the demonstration was successful, using the system patented and manufactured by the Entwistle Corporation.

During the demonstration, a 40,000kg articulated lorry was driven into a series of Dragnets at 88km/hr, and the vehicle was safely stopped in under 40m without harm to the driver or vehicle, which was then driven away under its own power.

Entwistle, a major source of products and technology for the various branches of the US armed forces, says the Dragnet system is based on the principle used to arrest aircraft on aircraft carriers.

The design of the vehicle arresting system at the Biarritz site is based on an existing design currently in use on ferry ramps operating in Hawaii, Canada and Puerto Rico. One of the latest systems is used in the Traffic redirection and access Control System for reversible lanes on the Kennedy Expressway in Chicago, USA.

The company is also developing a prototype system for use at railroad crossings in the state of Illinois.

The Dragnet used at Biarritz employs a series of nets at staggered stations along a barrier wall enclosed traps. Each net is attached to two energy absorbers which provide a progressive resistance to the impacting vehicle per net.

An energy absorber is a chamber enclosing 10m of coiled steel tape, and when a vehicle hits a net the system pulls this coiled tape through a series of offset rollers. The vehicle energy is slowly absorbed by friction and the deformation of the metal tape.

It is said that the G forces on the driver and cargo remain at a relatively low 0.5g throughout the slow down.

Since it is desirable to capture both a small vehicle and a large and the first net in the series is a net specially designed to stop a car and a 40,000kg tractor-trailer.

The Dragnet system is said to be extremely flexible, and it can be installed anywhere with suitable bollards, it is also claimed it can be installed and removed in minutes and can be adapted to any road width.

Additionally it can be located in median areas and on road shoulders parallel to the existing road, thus eliminating what are claimed to be the harsh and dangerous entry angles of many existing lorry traps.

The Biarritz system encompasses a series of eight staggered nets located within the Biarritz road toll plaza, and it is said to be capable of stopping a 40,000kg vehicle travelling at 100km/hr on a 5% downhill.

Roadway International says that with thousands of lorries each day crossing this busy border with Spain, the Dragnet is "sure to be tested."

Apart from Entwistle Corporation, Roadway International’s other partners in the test were Soditel and Roadway Safety Service.

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Fax: +1 718 225 2845

Or Enter Enquiry Code 1984
New Road for Military Technology

Defense conversion a boon to civilian transportation projects

New York Times

Washington

A steel net used on aircraft carriers to stop jet fighters from plunging into the sea is being tested at Illinois railroad crossings to stop cars from driving into the path of oncoming trains.

Materials involved in the production of Stealth bombers are being used in the construction of a San Diego bridge, and a technology developed to simulate tank battles is being tested for the study of automobile traffic in urban areas.

The beating of swords into plowshares is booming—in the world of transportation, where military technology is being applied to an array of new projects.

Technology was the big winner in President Clinton’s budget, and the Transportation Department proposed $832 million for research and development, a 14 percent increase over current spending.

Of this amount, $425 million was for projects designed to enhance commercial applications of defense-related technology.

“We think transportation technologies are the most ripe for defense conversion,” Transportation Secretary Federico Peña said in a recent interview.

Transportation researchers are developing civilian uses for the Global Positioning System, a $10 billion network of 24 satellites that provides navigation information to American troops.

The researchers hope to make this technology available to aircraft pilots, motorists, transit systems and ships.

The researchers also hope to use satellites to track civilian aircraft all over the world, replacing radar. They are steadily improving their ability to amass weather and flight information instantaneously, and give air traffic controllers a better sense of when and where to reroute aircraft.

Military technology involving sensors and computer information systems is also being used in the development of so-called “smart cars,” whose sensors and computers exchange information with similarly equipped highways, enabling motorists to avoid traffic jams by using alternate routes. The new budget earmarks $289 million for this project.

Transportation researchers also hope to use lightweight, high strength material developed by the military to develop the first generation of “clean cars” with high gas mileage and low emissions, high technology safety devices and super sophisticated air traffic controls.

They are conducting studies on alternative fuels, lightweight buses and magnetic levitation trains. But Peña stressed that the administration is also committed to commercialization. He noted that many technologies developed in the United States are later commercialized abroad, including railroad technologies like magnetic levitation and the tilt trains.

“We’re now trying to buy them from the Swedes and the Spaniards,” Peña said of the two train technologies. “Let’s not make that mistake again.”

The secretary noted that the federal government had a history of financing transportation programs, including the transcontinental railroad, the highway system and aerospace programs.

“Investment in technology and in transportation systems has been critical to developing the vast continental economy of the United States ever since Colonial times,” he said.

In addition to the Transportation Department’s research programs, civilian transportation projects make up half the $475 million awarded last year for Technology Reinvestment Project programs overseen by the Pentagon’s Advanced Research Projects Agency.

These programs are matched by private sponsors on a 50-50 basis.

“Industry has to perceive that there is a market,” said Noah Rifkin, the Transportation Department’s director of technology deployment.

“It helps us validate the importance of the technology, and therefore represents true defense conversion and dual-use capability.”

The Technology Reinvestment Project received 2,600 applications last year requesting a total of more than $9 billion in grants.

Last October, the president announced the first round of selections, 41 projects involving 272 industrial sponsors.

Peña noted that transportation accounts for 21 percent of the nation’s economy, 50 percent of its petroleum consumption and 61 percent of ambient air pollution.

“We can’t simply buy, build or invest our way out of these problems,” Peña said. “We must turn to technology for solutions.”
Net makes railroad crossing safer

Although collisions and injuries at the USA's 250,000 rail crossings continue to decline, fatalities remain high. The 'dragnet' is one suggested method to prevent accidents at railroad crossings. How it works:

1. Net, which spans from one to six lanes of a highway, lowers as train approaches.
2. Cable attached to 'energy absorbers' runs through top and bottom of net.
3. Absorbers' steel tape extends.

White House blows whistle on rail dangers

By Erin Einhorn
USA TODAY

Saying too many people are dying in "senseless, outrageous and unnecessary" car-train collisions, the Clinton administration Monday called for new measures to improve safety at rail crossings.

"Thousands of lives can be saved and it is up to us to save them," says Transportation Secretary Federico Pena.

More than 5,000 rail crossing accidents last year claimed 628 lives and injured 1,837 others.

Pena's strategy: New federal laws, education programs and better rail crossing protection.

Pena's announcement was good news to CSX engineer Paul Sorrow.

Since he began working on the railroad in 1965, Cleveland train engineer Sorrow, 47, has been in seven fatal crashes with cars that crossed the path of his train. "I've been horrified every time," Sorrow said.

Experts say new rail crossing technology could help Pena meet his goals. More than half of all accidents are caused by drivers who ignore signals. Among new developments:

- For rural areas with nothing more than a sign to warn of an incoming train, Ohio engineers have developed an inexpensive signal that uses mirrors to mimic flashing lights.

The "Buckeye crosstuck" can be installed for $600.

- Because more than half of all collisions are caused by motorists who ignore signals, a Virginia-based company has adapted military technology to design a barrier that pops out of the ground. Because of its $1 million cost, it would primarily be used at major intersections with high-speed trains.

- Already used to help airplanes land safely on carriers arresting nets drop in front of a vehicle, bringing it to a stop within 60 feet. They could be used to stop drivers who ignore warning signals. Cost: $150,000.

- Florida engineers have designed a pre-fabricated overpass for two-lane rural roads. Cost: $400,000 versus more than $1 million for a conventional bridge.

Though none have been tested extensively, safety advocates are hopeful. "Our organization is supportive of anything to save lives," says Dawn Soper of rail safety group Operation Lifesaver.
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