



System Assessment and Validation for Emergency Responders (SAVER)

Extrication Devices Market Survey Report

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System Assessment and Validation for Emergency Responders

Prepared by the National Urban Security Technology Laboratory

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FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL). The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency responder equipment; and
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.

Information provided by the SAVER Program will be shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: “What equipment is available?” and “How does it perform?”

As a SAVER Program Technical Agent, the National Urban Security Technology Laboratory (NUSTL) has been tasked to provide expertise and analysis on key subject areas, including chemical, biological, radiological, nuclear, and explosive (CBRNE) weapons detection; emergency response and recovery; and related equipment, instrumentation, and technologies. In support of this tasking, NUSTL conducted a market survey of commercially available extrication devices. This equipment falls under AEL reference number 09ME-05-LITR titled Extrication Device.

Visit the SAVER website at <http://www.firstresponder.gov/SAVER> for more information on the SAVER Program or to view additional reports on extrication devices or other technologies.

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1. INTRODUCTION

An extrication device is a tool used by emergency responders to remove and transport casualties from the scene of an emergency. Whether the incident involves only one victim or mass casualties, acquiring scene awareness is a critical first step that emergency responders take to decide what extrication device to use. Scene awareness includes assessing the nature of the accident; the location, position, and condition of the victim; the number of casualties; and the type of environment. Extrication devices are available in various sizes, shapes, and configurations, and can be grouped into four different types, which differ in the way the patient is removed from the incident scene and transported to an ambulance. To provide emergency responders with information on extrication devices, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey.

This market survey is based on information gathered between July 2013 and October 2013 from vendors, Internet searches, industry publications, other SAVER reports, and a government-issued Request for Information (RFI) accessible from the Federal Business Opportunities website¹. Information included in this report has not been independently verified by the SAVER program.

For inclusion in this report, the extrication device had to be a commercial-off-the-shelf product and be one of the following four types:

- Carry
- Litter
- Drag
- Roll.

Motorized extrication devices are not included in this market survey.

2. EXTRICATION DEVICES OVERVIEW

Extrication devices are used in rescue operations to remove and transport casualties from the scene of the emergency to an ambulance. What used to be just a simple flat board with straps to secure the victim has evolved over time to more sophisticated devices that utilize improved materials and designs. One improvement was driven by the increased awareness of infection control, which prompted the change from porous (wood and fabric) to nonporous (synthetic) materials of construction. In addition, the increased attention to ergonomically designed devices led to using significantly lighter materials without compromising durability.

¹ Federal Business Opportunities, RFI-13-0011, *Extrication Devices*, www.fbo.gov/spg/DHS/OCPO/DHS-OCPO/RFI-13-0011/listing.html (August, 2013)

2.1 Current Technologies

The majority of extrication devices are carry type, while others are litter, drag, and roll type.

2.1.1 Carry-Type Devices

Carry-type devices, e.g., rescue vests, backboards, scoop-type stretchers, and folding stretchers typically require two rescuers to handle and are used to transport patients with suspected spinal injuries. Carry-type devices are used in conjunction with a cervical collar to reduce the possibility of injuring the head, cervical spine, or torso when the victim is moved to a supine position onto a medical stretcher. Figure 2-1 shows typical carry-type extrication devices, which include:

- *Rescue Vests* are specialized backboards commonly used when a patient is stable, but has an apparent spinal injury and is found in a confined space in a seated position, such as in an automobile accident.
- *Spine Boards or Backboards* are also used when the patient has a suspected spinal injury, but they can be applied more quickly than rescue vests, and therefore are used when the patient is unstable and needs to be moved and transported immediately or when the accident scene is unsafe.
- *Scoop Stretchers* are two-hinged devices with interlocking pieces that allow rescuers to gently scoop up a patient without rolling, thereby decreasing movement of the cervical spine.



Figure 2-1. Rescue Vest, Spine Board, Scoop Stretcher

Photo courtesy of Ferno Washington, Inc.

- *Folding Stretchers* are carry-type devices used to transport patients with no suspected spinal injury. They are typically lightweight and made of nonporous materials for easy decontamination. Also known as pole stretchers, they can be folded and stacked to save space in an ambulance, and are often used in mass-casualty incidents.

2.1.2 Litter-Type Devices

Litter-type devices are designed to be disassembled for easy carrying and are used to rescue patients from confined spaces, such as caves, or difficult-to-reach locations including mountains and bodies of water. After initial treatment on site, the victim is secured to the litter or Stokes basket and either lowered on ropes or hoisted by helicopter. Figure 2-2 shows a typical Stokes basket, which features unique tubular runner rails that cover the full length of the litter along the bottom and provide a strong, durable base.

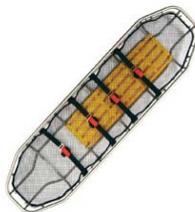


Figure 2-2. Typical Stokes Basket

Photo courtesy of Traverse Rescue

2.1.3 Drag-Type Devices

Drag-type devices are typically used for rescuing emergency workers, such as firefighters, who have become incapacitated. Emergency responders' protective garments may be equipped with drag and rescue devices, such as D-rings, that can be used by a rescuer to drag an unconscious person to safety. Figure 2-3 shows typical drag-type extrication devices, such as:

- *Rescue Harnesses*, which come with D-rings and are worn by rescuers working in confined spaces.
- *Half-Skeds* are used for rapid extrication of injured persons from spaces too tight for stretchers. These devices allow rescuers to bend the patient at the hips, allowing greater flexibility to turn corners in confined spaces.



Figure 2-3. Typical Drag-Type Devices

Photos courtesy of Cascade Rescue Company

- *Rescue Boards* can be used to drag incapacitated responders to safety, even when wearing a self-contained breathing apparatus.

2.1.4 Roll-Type Devices

Roll-type devices are built with rollers or wheels and include wheeled stretchers, such as stair and ambulance stretchers.

- *Stair Stretchers* are used to transfer patients without suspected spinal injuries up and down staircases. They are typically made of lightweight, high-strength aluminum alloys and can be easily folded and tucked away in an ambulance.
- *Ambulance Stretchers* are used to move injured victims from the casualty scene to the ambulance. When a spinal injury is suspected, the patient is first secured to a spine board or rescue vest before being placed on a stretcher for transport.

2.2 Applications

Extrication devices are used by emergency responders to rescue victims with limited or no mobility. Selecting which device to use depends on whether or not the victim is stable, has a spinal injury, and whether the extrication must be performed in a limited space. Overall, the primary consideration is to minimize the probability of further injuring the patient during removal and transport, while placing reasonable and manageable physical demands on the rescue workers.

2.3 Standards/Regulations

Several standards, specifications, and recommended practices relate to the use of extrication devices. The month/year in parentheses indicates the timing of the original adoption or last revision.

- NTEA AMD² Standard 004 (10/1998). *Litter Retention Test*.
This standard establishes requirements for the litter retention system, including installation in the vehicle, which is intended to minimize the possibility of system failure as a result of vehicle crashes and/or sudden driving maneuvers.
- ASTM International F1556-94 (2007). *Standard Guide for Spinal Immobilization and Extrication (SPINE) Device Characteristics*.
This guide covers minimum standards for devices, designated as spinal immobilization and extrication device(s) (SPINED), commonly referred to as short spine boards. The SPINED is designed to be used by emergency medical service personnel as the platform for immobilization and extrication of a patient with a potential spine or spinal cord injury.
- ASTM International F1555-94 (2007). *Standard Guide for Characteristics for Extremity Splints*.
This guide covers minimum standards for devices, designated as extremity splint(s) (ES), commonly known as splints. Extremity splints are designed to be used by emergency medical service personnel for the immobilization of an extremity.
- ASTM International F1559-94 (2007). *Standard Guide for Characteristics for Cervical Spine Immobilization Collar(s) (CSIC)*.
This guide establishes minimum standards for devices, designated as CSIC, commonly referred to as cervical collars. The CSIC is used by emergency medical service personnel as the initial device for immobilization of a patient's cervical spine.
- Mil Spec L-37957 (1/24/1992). *Military Specification for Litters, Rigid and Stokes*.
This specification covers three types of corrosion-resisting steel for litters, rigid and Stokes, suitable for high-line sea transfer and dynamic airlift of a patient from a ship's deck.
- NFPA³ 1917 (2013). *Standard for Automotive Ambulances*.
This standard defines the minimum requirements for the design, performance, and testing of new automotive ambulances used for out-of-hospital medical care and patient transport.

² NTEA AMD: National Truck Equipment Association, Ambulance Manufacturers Division

³ NFPA: National Fire Protection Association

- NFPA 1983-2012 (2012). *Standard on Life Safety Rope and Equipment for Emergency Services*.
This standard specifies minimum design, performance, testing, and certification requirements for life safety rope, escape rope, water rescue throwlines, life safety harnesses, belts, and auxiliary equipment for emergency services personnel.
- SAE⁴ J2917 (5/3/2010). *Occupant Restraint and Equipment Mounting Integrity — Frontal Impact System—Level Ambulance Patient Compartment*.
This SAE Recommended Practice describes the test procedures for conducting frontal impact occupant restraint and equipment mounting integrity tests for ambulance patient compartment applications. Its purpose is to establish recommended test procedures that will standardize restraint system and equipment mounting testing for ambulances.
- SAE J2956 (6/16/2011). *Occupant Restraint and Equipment Mounting Integrity —Side Impact System—Level Ambulance Patient Compartment*.
This SAE Recommended Practice describes the test procedures for conducting side impact occupant restraint and equipment mounting integrity tests for ambulance patient compartment applications. Its purpose is to describe crash pulse characteristics and establish recommended test procedures that will standardize restraint system and equipment mounting testing for ambulances.

3. PRODUCT DATA

The market survey identified 22 extrication devices from 6 companies. Within each type of device, the products ranged in price as follows:

- Carry Types (ten products): \$99 to \$999
- Litter Types (five products): \$670 to \$957
- Drag Types (three products): \$223 to \$900
- Roll Types (four products): \$3,063 to \$7,458.

Four of the products are designed for use on pediatric patients, while the rest are intended to be used on adults. Three of the models intended for adult use can be reconfigured to accommodate bariatric patients.

Although all vendors offer volume discounts, only two companies provide specific criteria for discounted pricing. Ferno Military Systems and Special Service and Supply, Inc., both offer up to 10 percent discounts for orders of 101 to 500 units and 15 percent discounts for orders of 501 to 1,000 units. Training literature is provided by the vendor. Additional training may be purchased, and the cost will depend on the customers' needs and location of the training (customer or vendor site).

Table 3-1 defines the product features and specifications used in Table 3-2.

Table 3-2, which compares product specifications, is grouped into the four types of extrication devices: Carry, Litter, Drag, and Roll.

⁴ SAE: Society of Automotive Engineers

Table 3-1. Definition of Product Features and Specifications

Product Features/Specifications	Description
Company	The manufacturer or vendor of the extrication device.
Product	The model name and number of the extrication device.
MSRP (\$)	The manufacturer’s suggested retail price of the basic unit expressed in United States dollars.
Warranty	The period of time, expressed either in years, months, or days that a manufacturer warrants their product.
Unit Weight (pounds)	The weight of the device in pounds.
Load Limit (pounds)	The maximum weight, in pounds, of the patient that can be secured to the device for transport. For roll-type devices, Load Limit at Load Position (indicated by †) and Load Limit at Lowest Position (indicated by ‡) are identified.
Minimum Responders Required	The minimum number of responders needed to transport the patient on the device.
Designed for Patients with Spinal Injury	Identifies if the extrication device is designed to accommodate patients with apparent or suspected spinal injury.
Parts of the Body that can be Immobilized	Identifies if the extrication device is designed to immobilize the head, neck, torso, limbs, or the patient’s entire body.
Deployed Size	The unit size (length, width, and height in inches) of the device when deployed. The maximum loading heights of ambulance cots (indicated by §) are identified.
Folded Size in Storage	The size (length, width, and height in inches) of the device when folded and stored. Devices that do not fold are indicated by “dnf”.
Shelf Life	The expected shelf life of the device as claimed by the manufacturer, in years.

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Product Features/Specifications	Description
Waterproof	Indicates that the device can be submerged in water without being damaged.
Operating Temperature Range (°F)	The temperature range under which the device can be used, measured in degrees Fahrenheit (°F).

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Table 3-2. Product Comparison Matrix

Company	Product	MSRP (\$)	Warranty	Unit Weight (pounds)	Load Limit (pounds)	Minimum Responders Required	Designed for Patients with Spinal Injury	Part(s) of the Body that can be Immobilized	Deployed Size (L x W x H in inches)	Folded Size in Storage (L x W x H in inches)	Shelf Life (years)	Waterproof	Operating Temperature Range (°F)
CARRY-TYPE DEVICES													
Ferno Military Systems	AllEvac™ Ape Litter (FM800A100)	999	1 year	19	350	2	•	torso, arm(s), leg(s)	91 x 19 x 6	14.5 x 19 x 6	10+	•	-40 to 150
Ferno Military Systems	AllEvac™ Mantis Backboard (FM840A106)	463	1 year	12.8	500	2		torso, arm(s), leg(s)	72 x 16 x 1	25 x 16 x 3	10+	•	-40 to 150
Ferno Washington, Inc.*	K.E.D. Kendrick Extrication Device (IE1250)	112	90 days	8	500	1	•	head, neck, torso	33 x 32	NA	NA		-40 to 150
Ferno Washington, Inc.*	MedKids® Baby Board (676 - BB6760)	536	90 days	6	15	1	•	full body	23 x 11 x 1	dnf	NA		-40 to 150
Ferno Washington, Inc.*	Najo® Lite Backboard (NB5500)	104g	2 years	14.5	450	2	•	full body	72 x 16 x 1.8	dnf	NA	•	-40 to 150
Ferno Washington, Inc.*	Pedi-Mate® (BB6780)	278	90 days	3	40	1	•	full body	32 x 19	4.5 x 19	NA	•	-40 to 150
Ferno Washington, Inc.*	Pedi-Pac™(IE7800)	334	90 days	6	90	1	•	full body	48 x 9 x 1	NA	NA		-40 to 150
Ferno Washington, Inc.*	Scoop EXL™ (PT6550)	871	1 year	18	350	2	•	full body	79 x 17 x 4	47 x 17 x 3	NA	•	-40 to 150

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Company	Product	MSRP (\$)	Warranty	Unit Weight (pounds)	Load Limit (pounds)	Minimum Responders Required	Designed for Patients with Spinal Injury	Part(s) of the Body that can be Immobilized	Deployed Size (L x W x H in inches)	Folded Size in Storage (L x W x H in inches)	Shelf Life (years)	Waterproof	Operating Temperature Range (oF)
Special Service and Supply, Inc.	Wooden Backboard - Long (B-3)	116	1 year	10	< 250	2	•	head, neck, torso, arm(s), leg(s), full body	60 x 16 x 0.6	dnf	25 - 50	•	-60 to 125
Special Service and Supply, Inc.	Wooden Backboard - Short (B-2)	99	1 year	5.75	< 250	2	•	head, neck, torso	32 x 16 x 0.6	dnf	25 - 50	•	-60 to 125
LITTER-TYPE DEVICES													
Cascade Rescue Company	Advance Series Rescue Litter (200)	825	1 year	19	2,500	1	•	head, neck, torso, arm(s), leg(s), full body	82 x 21.5 x 5.5	42 x 21.5 x 5.5	50+	•	-100 to 500
Ferno Washington, Inc.*	Basket Stretcher (71 Series)	753	1 year	23	1,000	2		None	86 x 24 x 8	dnf	NA	•	-40 to 150
Cascade Rescue Company	Professional Series Litter	670	1 year	32	> 1,000	1	•	None	83 x 25.5 x 6.3	43 x 25.5 x 10.3	50+	•	-100 to 500
Ferno Washington, Inc.*	Spartan Split-Apart Basket Stretcher (0108036)	957	1 year	35	2,500	1		None	86 x 24.5 x 7.5	41.5 x 24.5 x 12.5	NA	•	-40 to 150
Traverse Rescue	Titan Stainless-Steel One-Piece Regular Stretcher (RE1101)	705	1 year	31	2,500	2		None	83 x 23 x 7.3	dnf	dnf		-40 to 150
DRAG-TYPE DEVICES													
Ferno Washington, Inc.*	Manta™ Transfer Sheet (PT1320)	223	1 year	5	800	2		None	78 x 45	NA	NA	•	-40 to 150

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Company	Product	MSRP (\$)	Warranty	Unit Weight (pounds)	Load Limit (pounds)	Minimum Responders Required	Designed for Patients with Spinal Injury	Part(s) of the Body that can be Immobilized	Deployed Size (L x W x H in inches)	Folded Size in Storage (L x W x H in inches)	Shelf Life (years)	Waterproof	Operating Temperature Range (oF)
Cascade Rescue Company	Rapid Extrication Device "RED Sled"	700	1 year	15	400	1	•	head, neck, torso, arm(s)	42 x 23 x 5	dnf	25		-100 to 250
Traverse Rescue	Traverse® RescueStretcher (RE1900)	900	1 year	17.5	900	1		None	79.5 x 33	dnf	NA		-40 to 150
ROLL-TYPE DEVICES													
Ferno Washington, Inc.*	EZ Glide® Evacuation Stair Chair (59T - PT5909)	3,591g	15 years	36	500	1		None	37.5 x 16.5 x 51	37.5 x 16.5 x 10	NA	•	-40 to 150
Ferno Aviation*	Patient Transporter Cot (28A-1)	3,063	1 year	70	700	2		torso, arm(s), leg(s)	75 x 25 x 27§	80 x 25 x 9	10 +	•	-40 to 150
Ferno Washington, Inc.*	PowerFlexx® Powered Cot (PT5600)	7,458g	2 years	133	700† - 1,000‡	2		None	83 x 24 x 33§	83 x 24 x 13	NA	•	-40 to 150
Ferno Washington, Inc.*	ProFlexx® Ambulance Cot (35X - PT3570)	5,300	2 years	92	700† - 1,100‡	2		None	79 x 24 x 35§	79 x 24 x 14	NA	•	-40 to 150

• The product has this feature

* Product information was provided by the manufacturer in response to a Request for Information.

NA Information not available

g GSA price

† Load Limit at Load Position

‡ Load Limit at Lowest Position

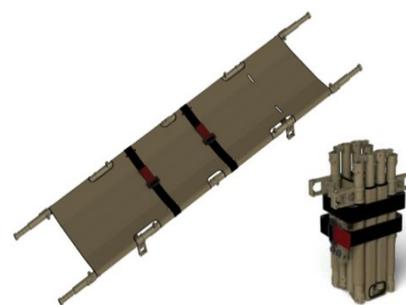
§ Maximum Loading Height of Stretcher

dnf Device does not fold

3.1 Carry-Type Devices

3.1.1 Ferno Military Systems: AllEvac™ Ape Litter (FM800A100)

Intended for adult patients, the AllEvac Ape Litter (FM800A100) is a quad-folding NATO⁵ style litter utilized in the DOD TCCC CASEVAC⁶ Program. It is an all-platform evacuation litter, and its design includes Berry Compliant⁷ parts, such as a removable and replaceable black polypropylene mesh bed, two sets of two-piece patient restraints with anodized aluminum buckles, folding handles, and frame sections that can be removed and replaced in the field, as necessary. Accessories include the 1,000 denier litter carrier (Backpack) with modular lightweight load-carrying equipment (MOLLE) for \$148. This litter, as well as other extrication devices, can be decontaminated using cleaning agents, such as soap, warm water, alcohol, and diluted bleach, followed by cold water rinsing and air drying.



AllEvac Ape Litter
*Photo courtesy of
Ferno Military Systems*

3.1.2 Ferno Military Systems: AllEvac Mantis Backboard (FM840A106)

Intended for an adult patient, the AllEvac Mantis Backboard is a lightweight, trifold evacuation board designed for use in remote or harsh environments, for vehicle extrication, and for situations where rapid transport of the patient is necessary. All parts and accessories of this device are Berry compliant. Anodized aluminum restraints are available for \$37 additional.



**AllEvac Mantis
Backboard**
*Photo courtesy of
Ferno Military Systems*

3.1.3 Ferno Washington, Inc.: K.E.D.® Kendrick Extrication Device (IE1250)

Intended for multiple patient sizes, including children and pregnant women, the K.E.D. is used to extricate and immobilize patients from auto accidents and confined spaces. The wrap-around design provides horizontal flexibility and vertical rigidity to support the spine, neck, and head during extrication. The K.E.D. immobilizes the torso, head, and neck, enabling extrication while minimizing risk of further injury. X-rays or advanced life-support procedures can be performed with the K.E.D. in place.



**K.E.D. Kendrick Extrication
Device**
*Photo courtesy of
Ferno Washington, Inc.*

⁵ NATO: North Atlantic Treaty Organization

⁶ DOD TCCC CASEVAC: Department of Defense Tactical Combat Casualty Care Casualty Evacuation

⁷ BERRY COMPLIANT: Applicable only to DOD purchases, Berry compliant items are those articles such as food, clothing (including military uniforms), fabrics (including ballistic fibers), stainless steel, and hand or measuring tools that DOD must acquire only from American sources.

3.1.4 Ferno Washington, Inc.: MedKids® Baby Board (676-BB6760)

Intended for pediatric use, the MedKids Baby Board maintains a neutral cervical alignment in infants with the self-contained Pneumatic Positioning Device (PPD). It has crescent-shaped head blocks that secure cervical spines for infants too small for standard-size cervical collars. It can accommodate central lines, umbilical lines, chest tubes, urinary catheters, other invasive and noninvasive equipment, and thoracic elevation requirements. This device is X-ray translucent.



MedKids Baby Board

*Photo courtesy of
Ferno Washington, Inc.*

3.1.5 Ferno Washington, Inc.: Najo® Lite Backboard (NB5500)

Intended for adult patients, the NAJO Lite Backboard features a central slot in the lower half of the board that permits separate immobilization of each leg. It also features two handholds at the tapered end to allow stable transport and angled edges for easy log-rolling. Its one-piece high-density polyethylene (HDPE) construction is impervious to all bodily fluids and provides 100 percent X-ray translucency. The board is also buoyant and can be used to float a patient in the water. The MSRP for this model is \$129 (GSA pricing is \$104). Available accessories include the 445 Head Immobilizer (IE4450) for \$112 and the Fastrap Quick Restrain System (RS7700) for \$155.



Najo Lite Backboard

*Photo courtesy of
Ferno Washington, Inc.*

3.1.6 Ferno Washington, Inc.: Pedi-Mate® (BB6780)

Intended for pediatric use, the Pedi-Mate Pediatric Restraint System quickly adapts any ambulance cot to safely transport children ranging in size between 10 and 40 pounds (4.5 to 18 kilograms). It comes with a fully adjusting five-point harness system that securely holds the patient. The manufacturer claims that the Pedi-Mate meets standards SAE J2956 and SAE J2917.



Pedi-Mate

*Photo courtesy of
Ferno Washington, Inc.*

3.1.7 Ferno Washington, Inc.: Pedi-Pac® (IE7800)

Intended for pediatric use, the Pedi-Pac® provides spinal immobilization for children between 18 and 54 inches tall and weighing between 20 and 90 pounds. The individual leg restraints allow one leg to be immobilized while a medic attends to the other leg. It has an adjustable head support, and the color-coded straps quickly conform to the size of the patient. The sewn-in lifting handles at both ends provide easy handling in confined areas, and the built-in fastening loops connect to existing cot straps for safe transport. The pack includes head and chin straps and a carrying case.



Pedi-Pac

*Photo courtesy of
Ferno Washington, Inc.*

3.1.8 Ferno Washington, Inc.: Scoop EXL™ (PT6550)

Intended for adult patients, the Scoop EXL is designed to accommodate patients that require spinal immobilization. It eliminates the need for log-roll maneuvers, which significantly decreases movement to the cervical spine. The two hinged, interlocking pieces allow operators to bring the two halves together beneath the patient to scoop the patient up. It is made from a composite material that is X-ray translucent. Available accessories include the 445 Head Immobilizer (IE4450) for \$112.



Scoop EXL
*Photo courtesy of
Ferno Washington, Inc.*

3.1.9 Special Service and Supply, Inc.: Wooden Backboard–Long (B-3)

Intended for adult use, the Wooden Backboard–Long is designed to fit into tight spaces and provide the patient with cervical, thoracic, and lumbar support during rescue operations and transport. The patient is secured using any combination of the eight strap slots and ten handhold slots built into the backboard. The ten handholds provide rescuers with multiple handholds and the ability to pass the patient from one rescuer to another. Available accessories include a 2-inch adhesive tape or a Kerlex-type gauze bandage, each for \$1, that may be used to secure the patient. Web-type straps may also be used to secure the patient for between \$5 and \$10 per unit. The vendor offers 10 percent discount for bulk purchases of between 50 and 499 units, and a 15 percent discount for bulk orders of between 500 and 1,000 units.



Wooden Backboard–Long
*Photo courtesy of
Special Service and Supply, Inc.*

3.1.10 Special Service and Supply, Inc.: Wooden Backboard–Short (B-2)

Intended for adult use, the Wooden Backboard–Short is constructed of birch plywood and is designed to fit into tight spaces. It provides cervical, thoracic, and lumbar support during extrication procedures. This device has 13 combination handhold/strap slots and 14 strap-support grooves to provide multiple patient restraint configurations for different rescue scenarios. Available accessories include a 2-inch adhesive tape or a Kerlex-type gauze bandage, each for \$1, that may be used to secure the patient. Web-type straps may also be used to secure the patient for about \$10 per unit. The vendor offers a 10 percent discount for bulk purchase of between 50 and 499 units and a 15 percent discount for bulk order of between 500 and 1,000 units.



Wooden Backboard–Short
*Photo courtesy of
Special Service and Supply, Inc.*

3.2 Litter-Type Devices

3.2.1 Cascade Rescue Company: Advance Series Rescue Litter (200)

Intended for adult patients, the Advance Series Rescue Litter is crafted of hand-laminated composites and is lightweight and versatile. The product shape, handrails, and brackets provide victim protection and comfort as well as maneuverability for the litter attendant. A backboard is not needed with this litter because the straps immobilize the patient to the bed of the litter. It may be used on snow, rock, ice, or asphalt, and comes complete with the patented Articulating Lift Points (ALPs). Available accessories include a two-piece unit priced at \$225, Fast Pax Rails at \$90, abrasion guard at \$70, and snow handles and fins at \$290.



**Advance Series
Rescue Litter**
*Photo courtesy of
Cascade Rescue Company*

3.2.2 Ferno Washington, Inc.: Basket Stretcher (71 Series)

Intended for adult patients, the Basket Stretcher (71 Series) is made with a high-density polyethylene shell supported by an aluminum frame. It has molded-in runners and handholds, brass grommets with adjustable lifting bridle, and tag lines that should always be used when lifting the basket stretcher. The shell is chemical, ultraviolet, rust, and corrosion resistant, and a replaceable closed-cell foam pad is attached to the inside the stretcher for patient comfort. The quick-release patient restraints permit the rescuers to adjust the position of the straps to fit each patient. Available accessories include a floatation collar (Item Number CA4710) for \$334, a carrying case (Item Number BG3870) for \$256, and a lifting bridle (Item Number RS4199) for \$315.



Basket Stretcher
*Photo courtesy of
Ferno Washington, Inc.*

3.2.3 Cascade Rescue Company: Professional Series Stainless Litter

Intended for adult patients, the Cascade Professional Series Stainless Litter is constructed with a $\frac{3}{4}$ -inch tubular frame and $\frac{3}{8}$ -inch supporting cross members. It is powder coated for durability and resistance to the elements. The manufacturer claims that the device has been field tested by Underwriters Laboratories and also meets NFPA standard 1983-2012.

Each litter includes four articulating lift points for either horizontal or vertical lifts, four quick-tab patient straps, an integral patient-contour padded-back support, and a heavy-duty high-density polyethylene mesh liner. The two-piece version, which offers rapid takedown and reassembly, is priced at \$320. Also available as an accessory is the Fast System, which is priced at \$209. It features metal-to-metal buckles and comes with adjustable foot stirrups to secure patients. Use of the Fast System requires only one attendant to secure a patient to the litter.



Professional Series Stainless Litter
*Photo courtesy of
Cascade Rescue Company*

3.2.4 Ferno Washington, Inc.: Spartan Split-Apart Basket Stretcher (0108036)

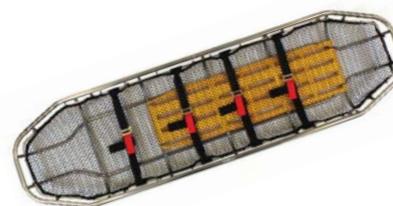
Intended for an adult patient, the Spartan Split-Apart Basket Stretcher has a stainless-steel frame with a 1,100 kilogram strength rating. The full-length recessed sliding surface on the bottom can handle rough terrain while protecting the frame. The completely exposed top rail allows multiple rescuers to grab the rail at any location. The split-apart design has LocSafe™ connectors that provide fail-safe connection without the use of pins or tubes. This feature allows the stretcher to be assembled in about 15 seconds.



Spartan Split-Apart Basket Stretcher
Photo courtesy of Ferno Washington, Inc.

3.2.5 Traverse Rescue: Titan One-Piece Stainless-Steel Basket Stretcher (RE1101)

Intended for adult patients, the Titan One-Piece Stainless-Steel Basket Stretcher designed to be used in raise/lower operations. It is made with all-carbon steel and has MIG⁸-welded 19-millimeter tubular frame construction. The replaceable durathene netting, priced at \$50, is corrosion resistant and provides safety and comfort to the patient and rescuer. It is available in regular, tapered, and confined-space versions. The manufacturer claims that this product meets Mil Spec L-37957.



Titan One-Piece Stainless-Steel Basket Stretcher
Photo courtesy of Traverse Rescue

3.3 Drag-Type Devices

3.3.1 Ferno Washington, Inc.: Manta™ Rescue Aid/Transfer Sheet (PT1320)

Intended for adult patients, the Manta Rescue Aid/Transfer Sheet folds for easy storage and can be used to transfer bariatric patients weighing up to 800 pounds. It can also be used to evacuate patients, e.g., fallen firefighters, or to cover patients during window extractions. The pockets at both ends hold the backboard, patient's feet, and head. This drag-type device is ideal for rescue from confined areas. It is fire retardant and it has holes at each end for water drainage.



Manta Rescue Aid/Transfer Sheet
Photo courtesy of Ferno Washington, Inc.

⁸ MIG: Metal Inert Gas

3.3.2 Cascade Rescue Company: Rapid Extrication Device “RED Sled”

Intended for use on adult patients, the Rapid Extrication Device "RED Sled" features a rigid outer shell. It is used to extricate patients in confined spaces, such as from burning buildings, autos, tree wells⁹, and all locations difficult to reach with conventional equipment. The device can be dragged across rough surfaces like rebar, crushed rock and block, glass, etc., and can withstand extremely high temperatures. The RED Sled includes the Cascade Rescue Patient Protection System, which allows the rescuer to "package" and immobilize the patient for rapid transport, and even lift the patient in a vertical orientation.



Rapid Extrication Device “RED Sled”

*Photo courtesy of
Cascade Rescue Company*

3.3.3 Traverse Rescue: Traverse[®] Rescue Stretcher (RE1900)

Intended for adult patients, the Traverse Rescue Stretcher (TRS) is designed for both horizontal and vertical casualty evacuations. Its lightweight and compact roll-up design makes this stretcher suitable for high-angle and confined-space rescue, as well as backcountry wilderness and helicopter operations. The wraparound design protects the patient’s arms and sides from further injury during evacuation procedures. The stretcher includes a Cordura storage bag with backpack shoulder straps. An optional adjustable lifting bridle (Item Number RS4199) for the basket stretcher is priced at \$256. It comes with locking steel carabiners that attach to the lifting points of the stretcher.



Traverse[®] Rescue Stretcher (RE1900)

Photo courtesy of Traverse Rescue

3.4 Roll-Type Devices

3.4.1 Ferno Washington, Inc.: EZ Glide[®] Evacuation Stair Chair (59T - PT5909)

Intended to transport adult patients, the EZ Glide Evacuation Stair Chair can transport patient loads up to 500 pounds down stairways without the responder having to carry or lift the load. The 1-inch track-to-ground clearance and front swivel wheels provide maneuverability over carpet and in confined spaces such as stair landings. Accessories include an IV Pole (Item Number 0821976), priced at \$152; headrest (Item Number 0314000), priced at \$93; wall bracket (Item Number 0822073), priced at \$94; 59T Storage Cover (Item Number 0314023), priced at \$140; and rear-locking lift handles (Item Number: 0821975), priced at \$129.



EZ Glide Evacuation Stair Chair

*Photo courtesy of
Ferno Washington, Inc.*

⁹ Tree well: a hollow or depression created around the base of a tree that can contain low hanging branches, loose snow, and air

3.4.2 Ferno Aviation: Patient Transporter Cot (28A-1)

Intended for adult use, the Patient Transporter Cot is a featherweight patient transporter commonly used in civilian aeromedical flight operations in the United States under FAA¹⁰-approved STC installations¹¹. It is compatible with several civilian and military aircraft models and can also be made compatible with ground emergency medical service vehicles using the Ground Compatibility Kit, an option available at a price of \$2,000. Additional accessories include the NATO Transporter Kit (NTK), which allows NATO litters to interface for transport (\$850), and standard (\$25) or FAA-approved restraints (\$102).



Patient Transporter Cot
Photo courtesy of Ferno Aviation

3.4.3 Ferno Washington, Inc.: PowerFlexx® Powered Cot (PT5600)

Intended for adult use, the PowerFlexx Powered Cot delivers 700-pound unassisted lift capacity. The cot supports the patient's weight, reducing the possibility of operator back injury. This product includes a power management feature, "in-the-fastener charging," that ensures the cot is always powered without having to carry extra batteries. It has a 24-volt DC POWERPack with hydraulic actuator and dual-lifting cylinders that provide easy lifting. Available accessories include telescoping lift handles (Item Number 0822140), priced at \$580; an integrated charging system, priced at \$1,901; and SofNet (Item Number 0821996), priced at \$88. In addition, Ferno also offers accessories for this device for bariatric patients. The manufacturer claims that this product meets the KKK-A-1822F¹², NFPA 1917, SAE J2956, SAE J2917, and AMD 004 standards.



PowerFlexx Powered Cot
Photo courtesy of Ferno Washington, Inc.

3.4.4 Ferno Washington, Inc.: ProFlexx® Ambulance Cot (35X - PT3570)

Intended for adult patient use, the ProFlexx Ambulance Cot is made of a rigid C-channel with a frame geometry design that reduces the chance of tipping or flipping the cot. The EZ-Pull™ release handle reduces wrist strain and helps responders position themselves before assuming the weight of the cot. This model is reconfigurable to accommodate bariatric patients. The manufacturer claims that this product meets the KKK-A-1822F, NFPA 1917, SAE J2956, SAE J2917, and AMD 004 standards.



Proflexx® Ambulance Cot (35-X PT3570)
Photo courtesy of Ferno Washington, Inc.

¹⁰ FAA: Federal Aviation Administration

¹¹ STC Installations: Supplemental Type Certificate issued by the FAA attesting approval to modify an aircraft from its original design.

¹² U.S. General Services Administration standard KKK-A-1822F provides guidelines for construction of ambulances.

4 VENDOR CONTACT INFORMATION

Additional information on the products included in this market survey report can be obtained from the vendors listed in Table 4-1.

Table 4-1. Vendor Contact Information

Company Name	Address	Website/ E-mail/Phone Number
Cascade Rescue Company	1808 Industrial Drive Sandpoint, ID 83864	www.cascade-rescue.com djordan@cascade-rescue.com (208) 263-2484
Ferno Aviation	735 B. Branch Drive Alpharetta, GA 30004	www.fernomilitarysystems.com cchinn@ferno.com (770) 521-1506
Ferno Military Systems	735 B. Branch Drive Alpharetta, GA 30004	www.fernomilitarysystems.com cchinn@ferno.com (770) 521-1506
Ferno Washington, Inc.	70 Weil Way Wilmington, OH 45177	www.ferno.com b.jenkins@ferno.com (937) 283-2822
Special Service and Supply, Inc.	1730 13th Street Steamboat Springs, CO 80487	www.specialserviceandsupply.com gar@gar-sss.com (970) 879-5810
Traverse Rescue	2460 Tedlo Street Mississauga, ON Canada L5A 3V3	www.traverserescue.com b.jenkins@ferno.com (937) 283-2822

5 SUMMARY

This market survey addresses commercially available extrication devices. The 22 products included are grouped into four major types: carry, litter, drag and roll.

Prices vary between \$99 and \$999 for carry-type extrication devices, between \$670 and \$957 for litter-type devices, between \$223 and \$900 for drag-type devices, and between \$3,063 and \$7,458 for roll-type devices.

All 22 products do not require special storage except that the storage area should be dry, clean, and free of fumes and corrosives. Five products are waterproof, but all are claimed to be unaffected by high humidity.

While this report provides a representative sample of the current market at the time of publication, extrication devices are in a constant state of evolution. As technology advances, these types of equipment will continue to evolve and be able to assist emergency responders.

6 REFERENCES AND RESOURCES

SAVER Report: *Market Survey for Responder Assessment/Validation of User Equipment (RAVUE)–Extrication Devices*, August 2004

SAVER Report: *Focus Group Evaluation and Criteria Recommendations for Extrication Devices*, August 2004

SAVER Report: *Assessment Report of Non-Motorized Extrication Devices*, August 2004

ASTM F1556 - 94(2007): *Standard Guide for Spinal Immobilization and Extrication (SPINE) Device Characteristics*

Congressional Research Service Report: *The Berry Amendment: Requiring Defense Procurement to Come from Domestic Sources*, February 24, 2014