

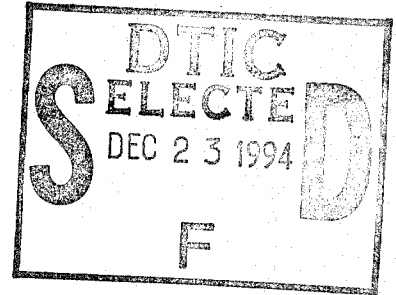


TECHNICAL REPORT  
NATICK/TR-92/043

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# LIGHTWEIGHT EXTREME WEATHER SHELTER MARKET INVESTIGATION

by  
Laura A. Ryan



August 1992

Final Report  
January 1990 - August 1990

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

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UNITED STATES ARMY NATICK  
RESEARCH, DEVELOPMENT AND ENGINEERING CENTER  
NATICK, MASSACHUSETTS 01760-5000

AERO-MECHANICAL ENGINEERING DIRECTORATE

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13. ABSTRACT (Maximum 200 words) <p>The U.S. Army Special Operations Forces (SOF) has the need for a backpackable extreme weather shelter. The shelter is to provide protection for three soldiers in the case of extreme weather conditions, such as sand storms, heavy winds, blowing rain and snow. The market investigation was requested to look at nondevelopmental items (NDI) available that would fill this need. U.S. Army Natick Research, Development and Engineering Center (Natick) conducted the market investigation through letters, telephone conversations, advertisements in the Commerce Business Daily (CBD), and visitations to manufacturers' facilities to acquire the necessary information to determine if any commercial tents are available today that could meet the requirements of the draft statement of Need Clothing and Individual Equipment for a three man extreme weather shelter. The findings of this investigation indicate that there are several commercially available, state-of-the-art tents capable of meeting all of the performance characteristics for a lightweight extreme weather shelter.</p>			
14. SUBJECT TERMS <b>SHELTERS, TENTS, LIGHTWEIGHT SHELTER, EXTREME WEATHER, SAND STORMS, BLOWING SNOW, RAINFALL, EXTREME ENVIRONMENTAL CONDITIONS, EXTREME COLD WEATHER, MARKET INVESTIGATION, MARKET RESEARCH, SPECIAL OPERATIONS FORCES</b>		15. NUMBER OF PAGES <b>81</b>	
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## Preface

This study presents a market investigation of Lightweight Extreme Weather Shelters (LEWS). The purpose of this study was to determine if there are any commercial tents available today that meet the requirements of the draft Statement of Need Clothing and Individual Equipment for a three man extreme weather shelter.

This effort was performed during the period January 1990 to August 1990 under Program Element P644713, Project No. DC40, Task No. 10.

## LIGHTWEIGHT EXTREME WEATHER SHELTERS (LEWS) MARKET INVESTIGATION

### INTRODUCTION

The U.S. Army Special Operations (SOF) has established a requirement for incorporating a Lightweight Extreme Weather Shelter (LEWS) into the system. The LEWS will replace the existing two-man Arctic Shelter which is not utilized due to weight and outdated materials.

A Statement of Need has been staffed to meet this requirement for the LEWS (Appendix A, 1) and was approved on 8 March 1990. The shelter will consist of a basic tent with three separate rainflies. The tent will be a brown shade, and the rainflies arctic white, camouflage green, and desert tan. These tents are to be operable in day and night conditions and in climatic zones hot, basic and cold, as defined in AR 70-38.

The Marine Corps (MC) has a Purchase Description (Appendix D, 1) for the Extreme Cold Weather Shelter (ECWS). The ECWS is a four man shelter to be used in extreme weather conditions for the same conditions as the LEWS. The ECWS is to weigh less than 18 lb and be carried on a sled or vehicle. Natick is assisting the Marine Corps with this effort and is providing them information gathered with the LEWS program.

### TASKING

A Non Developmental Item (NDI) program effort with an accelerated acquisition strategy is being requested by the U.S. Army Special Operations Command. As part of the program plan, a market investigation needed to be performed. Using the requirements listed in the SN-CIE, a market investigation was begun in January 1990 to determine the extent to which available commercial tents meet the requirements. Summaries of the individual responses for the market investigation are enclosed (Appendix D).

### MARKET INVESTIGATION

A literature search has been conducted to determine if there are NDI candidates which show sufficient promise of fulfilling the Special Operations Forces need for a three man shelter. This literature search included letters to the domestic and foreign commercial marketplaces, with the principle performance characteristics attached to assist industry in determining if their product can or cannot meet the general requirements (Appendix C, 2-4). The United States commercial companies contacted for this survey were located through the Thomas Register catalog, previous market investigations, and current trade magazines. The objective

of this investigation was to determine which commercial trade magazines. The objective of this investigation was to determine which commercial tents could meet most, if not all, of the SOF needs for an extreme weather shelter with minor modifications.

The Foreign Intelligence Office at Natick sent letters to foreign governments requesting information on a shelter they might have that would meet the needs of the SOF. In addition, Natick's files on foreign governments and on domestic and foreign commercial companies were used to locate tent manufacturers.

Another avenue that was utilized to locate commercial companies that manufacture backpacking tents were advertisements placed in the Commerce Business Daily (CBD). The ads consisted of requests for information and literature on a shelter that met the basic requirements defined by SOF (Appendix C, 1). The Marine Corps also requested information using the CBD advertisement (Appendix D, 2).

#### RESULTS OF THE MARKET INVESTIGATION

It was found that many different manufacturers meet the requirements that were listed in the CBD advertisements but none met all of the requirements as listed in the SN-CIE. Sixteen tent models were selected for purchase (Appendix C, 6). These tents will be purchased "as is" and then put through a series of inspections and tests to determine which tents best meet the requirements. This will be referred to as a down selection process. Once this down selection is completed, large test quantities will be purchased and undergo rigorous user and technical testing as defined in the LEWS SN-CIE.

#### Collective Summary of Foreign Tentage

Canada: The Canadian Forces (CF) do not have a tent that exactly meets the requirements. Although their tent is made of low cost material, it is not lightweight. Manta Industries Ltd manufactures this tent for the CF and they would be interested in producing a lightweight version. The tent exceeds our maximum height of 60" by 14".

France: The Ministry of Defense in France has a three man shelter. The information provided on the tent is written entirely in French and does not provide size and weight information. The tent is composed of several different poles of various lengths and is only 39" in height; this does not meet our minimum height requirement of 43" or our request to have our poles of equal length.

England: Information was received from England on a four man shelter. The tent weighs approximately 18 lb and exceeds our weight requirement by 6 lb.

## CONCLUSIONS

Tents that meet the basic need of the SOF are available on the current market. There is no single tent which meets all of their needs. Modifications can be made to the tents to meet most of the requirements. This market investigation was very successful in searching the commercial market for available shelters. The companies which meet most of the requirements will be requested to respond to a purchase offer.

## RECOMMENDATIONS

From the literature received, there are several tents that appear to meet successfully most of the SOF requirements for an extreme weather shelter. An NDI approach is recommended.

The companies who responded to the advertisement and did not successfully meet the requirements should be notified that their offering will not be further pursued. Simultaneously, purchase requests to procure an initial test quantity should be processed to those respondents that did meet the requirements as stated. The tents should then undergo an initial evaluation consisting of both and User and Technical Testing, so as to determine if they meet the operational needs of the SOF soldiers. This testing can also be used to determine modifications that could be made to improve the tents before a larger quantity of test items are procured.



APPENDIX A

1. Requirements Documents
2. Statement of Need -- Clothing  
and Individual Equipment



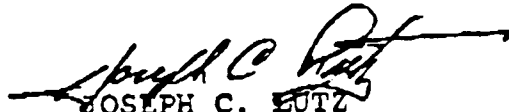
UNITED STATES SPECIAL OPERATIONS COMMAND  
OFFICE OF THE CHIEF OF STAFF  
MACDILL AIR FORCE BASE, FLORIDA 32508 6000

18 APR 1990

MEMORANDUM FOR: US ARMY JFK SPECIAL WARFARE CENTER AND SCHOOL,  
ATTN: ATSU-CD-ML, FORT BRAGG, NC 28307-5000

SUBJECT: Lightweight Extreme Weather Shelter (LEWS)

1. The requirement for a LEWS capability is valid.
2. The Draft Statement of Need - Clothing and Individual Equipment (SN-CIE), Lightweight Extreme Weather Shelter (LEWS) was distributed to the USSOCOM staff and component commands for review. The following comments are provided for your consideration.
  - a. The SON should state the airdrop survivability criteria.
  - b. The SON should state that the tent shall survive a minimum of 30 erections and strikes in a 30-day mission.
  - c. The SON should state that tents with similar characteristics as LEWS exist on the civilian market, i.e. the North Face VE 24/25 tent, and therefore, LEWS should be procured as a non-developmental item (NDI). Acquisition personnel are monitoring Natick Labs NDI approach to meet this requirement.
3. USSOCOM POC for LEWS is Maj Holloway, J3-RM, AV 968-2319.

  
JOSEPH C. LUTZ  
Major General, USA  
Chief of Staff



DEPARTMENT OF THE ARMY  
UNITED STATES ARMY JOHN F. KENNEDY SPECIAL WARFARE CENTER AND SCHOOL  
FORT BRAGG, NORTH CAROLINA 28307-5000



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ATTENTION OF:

ATSU-CD-ML (70-1f)

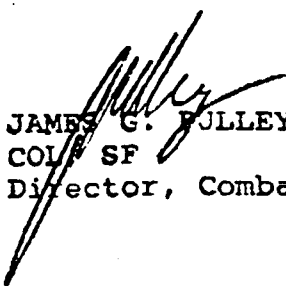
25 APR 1990

MEMORANDUM FOR Project Manager-Clothing and Individual Equipment  
(PM-CIE), ATTN: Mr. Don Greer, 14050 Dawson  
Beach Rd., Woodbridge, VA 22191-1419

SUBJECT: Lightweight Extreme Weather Shelter (LEWS)

1. The requirement for a LEWS capability was validated by Headquarters, U.S. Special Operations Command (USSOCOM). (See enclosure.)
2. The PM-CIE is authorized to release USSOCOM funds to Natick to begin Research and Development (R&D) on LEWS.
3. Congress gave Commander-in-Chief, U.S. Special Operations Command (USCINCSOC) the authority for developing and acquiring Special Operations-peculiar equipment. The USCINCSOC is chartered to validate requirements, establish priorities for requirements, and for ensuring the interoperability for equipment and forces.
4. Accordingly, use of the normal Army acquisition procedures and review process as specified in AR 700-86 is not applicable to development of USSOCOM Special Operations-peculiar equipment. Development of these items should be streamlined as much as possible.
5. My point of contact is MSG Voight, AV 239-1816/1039.

Encl

  
JAMES G. FULLEY  
COL SF  
Director, Combat Developments



DEPARTMENT OF THE ARMY  
UNITED STATES ARMY JOHN F. KENNEDY SPECIAL WARFARE CENTER AND SCHOOL  
FORT BRAGG, NORTH CAROLINA 28307-5000



REPLY TO  
ATTENTION OF:

S: 30 Mar 90

ATSU-CD-ML (70-1f)

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Draft Statement of Need-Clothing and Individual Equipment (SN-CIE), Lightweight Extreme Weather Shelter (LEWS), Part I

1. Reference AR 700-86, 23 Dec 86, Life Cycle Management of Clothing and Individual Equipment (CIE).
2. Purpose: To forward the enclosed draft SN-CIE for review, comment, and concurrence.
3. Recommendation: That comments and/or concurrences be provided to the U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS) NLT 30 Mar 90. Telephonic concurrences are acceptable.
4. Request addressees inform us if there is an interest in utilizing LEWS with the numbers that are required. This will facilitate us in drafting the acquisition strategy and cost estimate.
5. Point of contact this Directorate is MSG Voight, AV 239-1816/9901.

Encl

JAMES G. PULLEY  
COL, SF  
Director, Combat Developments

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US CENTRAL COMMAND, ATTN: CCJ3-S, MACDILL, FL 33608  
US ARMY FORCES, JAPAN, ATTN: AJGC-FDA, APO SC 96343  
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ACTION OFFICER

ATSU-CD-ML

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TRADOC COMBINED ARMS TEST ACTIVITY, ATTN: LT INF TST OFF,  
FORT HOOD, TX 76544  
U.S. ARMY ARMOR CENTER, ATTN: ATSB-CD-ML, FORT KNOX, KY  
40121-5215  
U.S. ARMY AVIATION CENTER, ATTN: ATZQ-CD, FORT RUCKER, AL  
36363-5000  
U.S. ARMY CHEMICAL RESEARCH AND DEVELOPMENT COMMAND, ATTN:  
SMCCR-~~PPI~~<sup>278</sup>, ABERDEEN PROVING GROUND, MD 21010  
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GA 30330-6000  
U.S. ARMY JUNGLE OPERATIONS TRAINING CENTER, ATTN: APZU-DT-CD,  
FORT SHERMAN, PM, APO MIAMI 34005  
U.S. ARMY LOGISTICS CENTER, ATTN: ATCL-M, FORT LEE, VA 23801  
U.S. ARMY MATERIEL COMMAND, ATTN: AMCDE-F/AMCPP-SPC/AMCEN-L,  
ALEXANDRIA, VA 22194  
U.S. ARMY NATICK RESEARCH, DEVELOPMENT AND ENGINEERING CENTER,  
ATTN: STRNC-AS/I/USOT, NATICK, MA 01760  
U.S. ARMY ORDNANCE CENTER AND SCHOOL, ATTN: ATSL-CD, ABERDEEN  
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U.S. ARMY SIGNAL CENTER AND FORT GORDON, ATTN: ATZH-CD,  
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U.S. ARMY SOLDIER SUPPORT CENTER, ATTN: ATSG-DSA, FORT BENJAMIN  
HARRISON, IN 46216  
U.S. ARMY TEST AND EVALUATION COMMAND, ATTN: AMSTE-TE-T/TA-G/  
CT-T, ABERDEEN PROVING GROUND, MD 21005  
U.S. ARMY TRAINING AND DOCTRINE COMMAND, ATTN: ATCD-SE,  
FORT MONROE, VA 23651  
U.S. ARMY TROOP SUPPORT COMMAND, ATTN: AMSTR-WD, 4300 GOODFELLOW  
BLVD, ST. LOUIS, MO 63120  
U.S. ARMY WESTERN COMMAND, ATTN: APLG-TR, FORT SHAFTER, HI 96858  
8th U.S. ARMY, ATTN: DJ-VE-R, APO SAN FRANCISCO 96301

ATSU-CD-ML SUBJECT: Draft Statement of Need-Clothing and Individual Equipment (SN-CIE), Lightweight Extreme Weather Shelter (LEWS), Part I

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U.S. ARMY AIR DEFENSE ARTILLERY SCHOOL, ATTN: ATSA-CB/CDM-L,  
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NC 28307 5000  
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07703-5511  
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AL 36205  
U.S. ARMY ENGINEER SCHOOL, ATTN: ATZA-CD, FORT BELVOIR, VA 22060  
U.S. ARMY FIELD ARTILLERY SCHOOL, ATTN: ATSF-CF/CML, FORT SILL,  
OK 73503  
U.S. ARMY INFANTRY SCHOOL, ATTN: ATSH-CD-MLS-C, FORT BENNING, GA  
31905  
U.S. ARMY MILITARY POLICE SCHOOL, ATTN: ATXN-MP-C,  
FORT MCCLELLAN, AL 36205  
U.S. ARMY ORDNANCE MISSILE AND MUNITIONS SCHOOL, ATTN: ATSK-CME,  
REDSTONE ARSENAL, AL 35897-6500  
U.S. ARMY QUARTERMASTER SCHOOL, ATTN: ATSM-CMD, FORT LEE, VA  
23801-5000  
U.S. ARMY TRANSPORTATION SCHOOL, ATTN: ATSP-CD-CS, FORT EUSTIS,  
VA 23604  
  
DIRECTOR, HUMAN ENGINEERING LABORATORY, ATTN: DRXHE-IS/  
DRXHE-CC-(LD)D, ABERDEEN PROVING GROUND, MD 21005  
  
PROJECT MANAGER-CLOTHING AND INDIVIDUAL EQUIPMENT, 14050 DAWSON  
BEACH RD, WOODBRIDGE, VA 22191-1419

STATEMENT OF NEED

CLOTHING AND INDIVIDUAL EQUIPMENT (SN-CIE)

12 May 1992

1. TITLE.

- a. Lightweight Extreme Weather Shelter (LEWS)
- b. CARDS Reference Number: TBD

2. NEED. A need exists for a Lightweight Extreme Weather Shelter (LEWS) to provide Special Operations Forces (SOF) protection from extreme environmental conditions while operating in harsh mountain, arctic, and desert environments. Increased environmental protection afforded by LEWS will result in decreased environmental stress, and a reduction in injuries, thus increasing operational effectiveness. The need was derived from deficiencies identified on pages 45, 47, and 53 of the Special Operations Mission Area Analysis, dated May 83 (SECRET/NOFORN). The proposed materiel solutions were identified on page B-7 of the Special Operations Mission Area Development Plan, dated Nov 87 (SECRET), and through an examination of the concept of operations and actual missions being performed by SOF in extreme environmental conditions. The LEWS will offer a new capability by providing shelter for three men. It will replace the existing 2 man \* Mountain Shelter for the SOF that is not currently used due to weight and outdated materials. The LEWS has no secondary mission.

a. Threat. The extent to which the LEWS will become a target for threat action depends upon its susceptibility to detection by threat forces when used during extreme adverse weather conditions. The threat force's ability to perform high resolution aerial reconnaissance encompasses the entire area of systems to include television, photography, infrared and radar imaging systems, all of which are limited by extreme weather conditions.

b. Operational Deficiency. Currently, SOF do not have adequate protection during extreme adverse weather conditions. A lightweight shelter is required to provide protection from high winds, blowing snow, dust, sand, and heavy rain. SOF are required to operate at extended distances forward of the Forward Line of Troops (FLOT), for up to thirty days without conventional modes of resupply. Operational A-Detachments must carry everything required to conduct their mission and survive in a hostile environment. Since mobility and secrecy are paramount in SOF operations the shelter should be compact, lightweight, fit inside external side pockets of the Field Pack, Large, Internal Frame, and be easily camouflaged.

c. Time Frame: Refer to Part II-(Material Developer-Statements/Requirements), Paragraph 2- Program Management Plan.

3. PROJECTED USE/BASIS OF ISSUE (BOI). The LEWS will be issued four per A-Detachment, and six per Company HQs for SOF. The option for use by other U.S. Army units and other Services will be evaluated. The LEWS will be designed for use by the 5th to 95th percentile of Special Operations Forces and Rangers soldiers (SOF soldiers) who are wearing the appropriate clothing-Battle Dress Uniform (BDU), Mission Oriented Protective Posture (MOPP), Arctic Wear, etc.

4. DESCRIPTION: LEWS will consist of a three man dome shaped shelter constructed of state-of-the-art lightweight, rip-stop, and fire resistant material. It will come with three separate rain flies, of varied solid colors. Both the tent and rainfly shall be low profile. Additional camouflage protection will be provided by Individual Camouflage Covering (ICC) carried by individual SOF soldiers. Tents with similar characteristics currently exist on the commercial market. LEWS should be procured as a non-developmental item (NDI). Acquisition personnel are monitoring Natick Labs NDI approach to meet this requirement.

a. Performance/essential characteristics:

1. The LEWS must:

a. Withstand 50 mph wind with gusts to 65 mph (ref. AR70-38).

b. Have a full integral tub floor constructed of flexible waterproof material and provide a minimum of 45 square feet of floor area. Waterproof is defined as initially meeting a minimum of 60 psi when tested per Test Method 5512 of Fed Std. 191, and after use meet a minimum of 35 psi. It must be provided with a waterproof fly which has an integral vestibule for cooking in inclement weather. The vestibule must provide a minimum of ten square feet of additional floor area and provide ventilation of fumes and gases produced from cooking in the vestibule. The basic tent excluding the tub floor will be water resistant. Water resistant is defined as initially having a spray rating equal to 100, and after use having a spray rating equal to 80 per Fed Std. 191 Test Method 5526.

c. Be capable of being erected, struck and packed by two SOF soldiers in ten minutes or less. Additionally, the shelter shall be erected, or struck and packed in ten minutes or less, under conditions of extreme cold, extreme heat, darkness, white outs and dust/sand storms without presenting any safety hazards.



d. Weigh no more than 12 lbs with a desired weight of 9 lbs, including one rainfly, but not including the carrying/packing bag.

e. Fit inside the external side pockets of the Field Pack, Large, Internal Frame when packed for transport with other mission essential gear.

f. Have frame poles for the basic tent of uniform shape and size. Pole(s) used for the vestibule must be of uniform shape and size, but not necessarily the same as the poles for the basic tent. All pole segments must be no longer than 21 inches and permanently connected via elastic cord or similar method.

g. Have a basic tent which will be a Brown Shade, cable No. 30324, per Fed. Std. 595A, and have three separate rainflies as follows:

1. Camouflage Green Shade, Cable Number 34094 per Fed Std 595.
2. Desert Tan Shade, No. 459.
3. Arctic White, Cable Number 37875, per Fed Std 595.

h. Have additional spare frame parts, spare hardware, and a repair kit. Items and amounts of spare parts will be defined after testing. Needed at a minimum per tent: 1-extra pole, 15% of required special hardware (clips, pins, grommets, etc., fabric swatches, thread, needle, duct tape, etc.).

i. Have all openings covered by a closable, no-see-um netting, (a fine mesh which keeps out very small insects) Mil-C-43352, Class 2.

j. Have overlap weather barriers or other weather barriers for all zippers, vents, and other closures. The zippers shall be designed for ease of operation by SOF soldiers wearing the appropriate hand gear (i.e., arctic mittens) and provide functional characteristics in the various extreme environments.

k. Provide ventilation for use in all operational environments.

l. Have integral spacers or other method to limit direct contact between the tent body and the rainfly.

m. Have all fabric made from fire resistant material in accordance with COMM CPAI 84, and mildew resistant in accordance with Plate Test, ASTM-G21-70 for fungal growth and ASTM-G22-70 for bacterial growth.

n. Be able to withstand snow loads of four pounds per square foot with the fly.

o. Have front and rear exits/entrances to allow the SOF soldier to ingress/egress the tent.

p. Have all hardware free of burrs or sharp edges.

q. Survive a minimum of 30 erections and strikes in a 30 day mission.

r. Be provided with a carrying bag for storage.

s. Be low profile - minimum interior height of 43" and a maximum exterior height of 60".

t. Survive airborne operations when packed in rucksack for transport.

2. The LEWS will:

a. Not be required to provide NBC protection, because the item is not mission essential and will be discarded if contaminated.

b. Not provide Infra Red (IR) protection, because the LEWS will be used only at times of extreme weather conditions, which degrade IR capabilities.

3. MAINTENANCE. Maintenance will consist of manufacturers care instructions at Detachment level. If a higher level of maintenance is required, the tent will be sent to higher echelon maintenance to determine if it is economically feasible to repair.

4. MANPRINT ISSUES

a. SAFETY and HEALTH HAZARDS. The LEWS shall not create any system safety or health hazards.

b. HUMAN FACTORS ENGINEERING. The ease of use of the LEWS by the soldier is critical to it's success when fielded. The LEWS shall meet the requirements of Human Engineering Design Criteria for Military Systems, Equipment and Facilities, MIL STD 1472.

c. MANPOWER. The LEWS shall not increase manpower requirements in the Special Operations Forces (SOF).

d. PERSONNEL. The LEWS shall not increase the personnel requirements of the SOF either in training or physical characteristics.

e. TRAINING. Additional training required for the adoption of the LEWS shall be minimized.

## 5. OPERATIONAL/ORGANIZATIONAL CONCEPT.

a. The LEWS will be carried by one A-Detachment member and used to service three Detachment members. It will be utilized during extreme weather conditions while conducting operations in all worldwide mission contingency areas and will be subjected to climate and environmental conditions consistent with those mission areas. This does not include tropic environments.

b. The IR requirements are eliminated because threat capabilities will be degraded during extreme weather conditions. The LEWS will be used with all existing and developmental hot, temperate, and extreme cold weather uniform items. If LEWS becomes contaminated it will be discarded.

c. The LEWS will be stowed/carried in rucksack during mission for 6 to 8 hours (30%) in a 24 hour period. It has the potential of being utilized 16 to 18 hours (70%) in a 24 hour period. Failure will result if components are damaged beyond field expedient repair. Small tears, 2 inches or less, will be field expediently repaired with tape. The tears will be repaired with state-of-the-art methods/materials by Detachment members at the Special Forces Operational Base (SFOB) or Forward Operational Base (FOB). Shelters with tears which cannot be repaired by Detachment members will be sent to intermediate/direct support for repair. LEWS shall be durable enough to withstand a minimum of 30 erections and strikes in a 30 day mission. Failure shall result if shelter is no longer able to provide protection from wind blown snow, sleet, rain, dust and sand.

d. LEWS will be stored, in garrison, in covered buildings with humidity and temperature compatible with inside work area for a period up to five years.

STATEMENT OF NEED-CLOTHING AND INDIVIDUAL EQUIPMENT

LIGHTWEIGHT EXTREME WEATHER SHELTER (LEWS)

PART II-Material Developer- Statements/Requirements

1) TECHNICAL ASSESSMENT.

The commercial state-of-the-art in outdoor shelters reflects a capability of providing protection from extreme environmental conditions such as those encountered in harsh mountain, arctic, and desert regions. The Lightweight Extreme Weather Shelter (LEWS) will provide sufficient shelter for three men. LEWS shall be a development for Special Operations Forces and other Army services as required, who currently do not have adequate protection from adverse weather conditions. Direct results from the increase in environmental protection afforded by the LEWS will be a reduction in injuries and an overall increase in operational effectiveness. Specifically, the following areas of concern will be addressed in the development of the LEWS:

a. Design, Color, Camouflage.

(1) Design: LEWS will consist of a three-man dome shaped tent with an integral tub floor, and a fly with an integral vestibule for cooking in inclement weather. Construction shall be of state-of-the-art lightweight, rip-stop, fire resistant, material. LEWS will come with rain flies of varied colors. Both the tent and rainfly shall be low in profile. (Maximum exterior height of 60")

(2) Color: The basic tent will be Brown Shade, Cable No. 30324, per Fed. Std. 595A. The LEWS will have three separate rainflies as follows:

1-Camouflage Green Shade, Cable No.34094, per Fed Std. 595.

2-Desert Tan Shade, No. 459.

3-Arctic White, Cable No. 37875, per Fed Std 595.

(3) Camouflage Capability: Camouflage protection will be provided by Individual Camouflage Covering (ICC) carried by individual SOF soldiers.

b. Performance Characteristics.

The performance characteristics described below are attainable with the current state-of-the-art.

(1) Environmental Requirements: The LEWS will withstand 50 mph wind with gusts to 65 mph, providing that the item is properly erected. The tent and fly will withstand a snow load of four pounds per sq. foot.

(2) Construction: The tent will have a full integral tub floor of flexible waterproof material and provide a minimum of 45 square feet of floor area. It will have a fly with an integral vestibule to provide an additional ten square feet or more of floor area. The flies will be waterproof and the basic tent water resistant. The seams and zippers may require the application of a seam sealer to insure that they provide water resistant capability. All fabric will be fire resistant in accordance with commercial standard CPAI 84, and mildew resistant in accordance with plate test ASTM-G21-70 for fungal growth and ASTM-G22-70 for bacterial growth. All hardware shall have no burrs or sharp edges.

(3) Erect/Strike: The shelter will be capable of being erected or struck and packed by two soldiers who fall within the 5th to the 95th percentile of the Special Forces and Ranger Soldiers. The shelter will be capable of being erected or struck and packed in ten minutes or less under conditions of extreme cold (with gloves), extreme heat, darkness, white outs and dust/sand storms without presenting any safety hazards (providing proper use and care instructions are followed).

(4) Weight Limitation: The LEWS will be within the 12.0 lb limitation and perhaps close to the desired 9.0 lbs, including one rainfly.

(5) Space Requirement: Packable inside of the external pockets of the new Field Pack Large, Internal Frame. Upon the unavailability of the new Field Pack Large the LEWS will be packable inside the ALICE large pack currently being used.

(6) Frame Pole Specification: Aluminum or aluminum alloy frame poles are common in the current commercial tent market, the size and shape of the poles will have to be designed to the overall floor space and height of the tent itself. The poles will be permanently connected via elastic cord or similar method.

(7) Opening and Closure Specifications: Front and rear exits/entrances will be available to allow the 95th percentile Special Forces and Ranger Soldier, in operational uniform, to ingress/egress. Testing will be performed to verify adequate space for the soldier to ingress/egress. The openings will be covered by a closable, no-see-um, mosquito netting in accordance with Mil C 43352 Class 2. All zippers, vents, and other closures shall include an overlap weather barrier or other weather barrier currently available in the commercial market. The zippers will have to be tested to determine which type will be most efficient

with respect to operational/functional characteristics in the various extreme environments.

(8) Maintenance: The user will perform normal care, cleaning and simple repair, such as applying 100 mph tape to small tears in the field operation. Maintenance of the LEWS at the organizational level will consist of replacement of poles and applying small patches. Additional spare frame parts and spare hardware will have to be available at Special Forces Operational Base (SFOB).

(9) MANPRINT/Other Human Factors:

(a) Ventilation: Efforts will be made to incorporate a passive ventilating system for use in all operational environments. Ventilation of fumes and gases produced from cooking in the vestibule will be provided.

(b) Safety and Health Hazards. The LEWS will create no system safety or health hazards. The unpacking/erection or striking/packing of the LEWS shall not place the soldier in any unsafe or hazardous situations caused directly or indirectly by the shelter. The repeated use of the LEWS shall not place the soldier at risk of any injury or acquired ailment due to the use of this shelter.

(c) Human Factors Engineering. The ease of use of the LEWS by the soldier is critical to it's success when fielded. Therefore, the shelter shall have a simple design, be easy to erect/strike, have easily read and understood instructions and labels, be easy to maintain, and be safe. Specifically, the LEWS, as a minimum, shall meet the requirements of Human Engineering Design Criteria for Military Systems, Equipment and Facilities, MIL STD 1472, with special consideration to the following sections: 4 - General Requirements (4.1, 4.2, 4.4, 4.6, 4.8, 4.9), 5 - Detailed Requirements (5.5 Labeling [5.5.1, 5.5.4], 5.9 Design for Maintainer [5.9.1], 5.13 Hazards and Safety [5.13.1, 5.13.7.4.1]).

(d) Manpower. As cited previously in the Performance/essential characteristics, the shelter shall be capable of being unpacked/erected and struck/packed by two SOF soldiers. Additionally, the soldiers shall be capable of unpacking/erecting, or striking/packing the shelter, within the time constraints under conditions of extreme cold, extreme heat, darkness, white outs and dust/sand storms.

(e) Personnel. The LEWS shall not require any new military occupational specialties (MOS's), or Army skill indicators. Additionally, no new maintenance MOS's shall be required.

(f) Training. As listed in the above paragraph, no new MOS's or Army skill indicators will be created by the adoption of the LEWS. Training for the unpacking/erecting & striking/packing of this shelter shall be minimized through a design allowing for ease of erection/strike. Additionally, a

training manual will be provided for unpacking/erecting and striking/packing. The full instructions can be sewn onto the inside of the LEWS carrying bag.

(10) Service Life and Shelf Life: With proper care and use, the tent shall survive a minimum of 30 erections and strikes in a 30-day mission, and shall have a shelf life of at least five years when properly stored. The LEWS will survive airborne operations when packed properly in a rucksack for transport. If the tent experiences damages it will be turned in for repair or replacement.

(11) NBC Survivability and Decontamination: The LEWS will not be NBC survivable. The composition of the components, as determined by other requirements, will not be, agent resistive or capable of decontamination.

(12) Accessories. Integral spacers or other method to limit the direct contact between the tent body and the rainfly will be provided for the LEWS. A repair kit may be needed to include a seam sealer to maintain waterproof protection at the seams and zippers, tape, and other accessories for minor repairs, to be defined after some testing. The LEWS will be provided with a carrying bag for storage.

(13) Infrared: The LEWS will not be protected for Infrared detection, the tent will be used only at times of extreme weather conditions, which degrade IR capabilities.

(14) Instruction Pamphlet: The LEWS will be accompanied by a "USE and CARE" instruction pamphlet or sheet containing the procedures to properly strike, erect, pack, repair, and care for the tent. Permanently attached instructions will be included on the packing bag or case. The instructions will be included in the Technical Testing and User Testing.

#### d. Operational/Organizational Concept.

(1) General: The LEWS will be employed when adverse weather conditions force the SOF soldier to find shelter. Since it is not a direct replacement for an active item presently in the system, provision will be required for carrying the LEWS tent in the rucksack.

(2) Specific Consideration: Commercially available tents fulfill most of the requirements for the LEWS as specified in the Part I, with the exception of color. The tent will go through the initial evaluation as an NDI item with no modifications, this includes the color. When the final prototypes are purchased the color will be modified for military use. Therefore, an NDI approach is anticipated with low risk expected.

## 2. PROGRAM MANAGEMENT PLAN.

Event	Estimated Time Frame
ACEB/CSA CONCEPT APPROVAL	3Q FY 90
PROGRAM INITIATION*	3Q FY 90
DESIGN REVIEW MEETING	3Q FY 90
PREPARE AND AWARD CONTRACTS (Issue Slips)	3Q FY 90-4Q FY 90
OBTAIN TEST ITEMS	4Q FY 90
INITIAL PROTOTYPE EVALUATION	1Q FY 91-2Q FY 91
DESIGN REVIEW MEETING	2Q FY 91
AWARD CONTRACTS WITH MODIFICATIONS	2Q FY 91
OBTAIN FINAL TEST ITEMS	3Q FY 91-4Q FY 91
FINAL UT/TT	4Q FY 91-3Q FY 92
EVALUATE TEST RESULTS	1Q FY 92-3Q FY 92
ITEM READY FOR TC	3Q FY 92
TDP	4Q FY 92-3Q FY 93

\*Depending on availability of funds.

Schedule is compressed to the maximum. It will require the utmost in work effort and cooperation by all involved parties.

## 3. PROJECTED USE/BASIS OF ISSUE (BOI).

The developer concurs with the Projected Use/Basis of Issue statement in Part I.

## 4. STANDARDIZATION.

Prior to initiation of engineering development, the developer will identify foreign items, commercial items, and other service items for consideration. Each military service will be apprised of the requirements to solicit comments, approval, and participation in the program. The Marine Corps is currently evaluating a dome shaped tent to be used for 4 men, Natick is keeping involved in this effort.

### ANNEX A - Care and Maintenance Instructions

It is anticipated that care and maintenance will consist of normal care, cleaning, and replacement of worn components. It is expected that maintenance will be effected at the following levels:

a. Operator Maintenance - Normal care, cleaning and simple replacement or repair of components.

b. Organizational and Direct Support Maintenance - Maintenance and repair instructions for organizational and direct support units will be incorporated in applicable technical manuals.



ANNEX B -Cost Analysis

	FY 90	FY 91	FY92	FY93
TEST ITEMS	\$60K	\$30K		\$10K
PERSONNEL	\$50K	\$70K	\$70K	\$40K
TRAVEL & MISC	\$10K	\$20K	\$20K	\$20K
TESTING		\$100K	\$60K	\$30K
TOTAL	\$120K	\$220K	\$150K	\$100K

UNIT COST

It is estimated that the cost of the LEWS will be \$700 in production.

LIGHTWEIGHT EXTREME WEATHER SHELTER (LEWS)

PART III- CIE-TEST AND EVALUATION MASTER PLAN (CIE-TEMP)

A. Description:

1) Mission

A need exists for a Lightweight Extreme Weather Shelter (LEWS) to provide Special Operations Forces protection from extreme environmental conditions while operating in harsh mountain, arctic, and desert environments. The LEWS will be carried with one individual and provide shelter for three men. It will fit inside the outer pockets of a large field pack, (internal frame). This mode of transport will allow for easy retrieval when faced with adverse weather conditions.

2) Item

The LEWS consists of a three man dome shaped shelter constructed of state-of-the-art lightweight, ripstop, fire resistant, nylon taffeta material. It comes with light tight rain flies of varied solid colors. Both the tent and rainfly are low profile.

3. SN-CIE Required Technical and Operational Characteristics.

<u>Requirement</u>	<u>Standard</u>	<u>Data Source</u>
Environmental	The LEWS shall withstand 50 mph wind with gusts to 65 mph. The tent and fly will withstand a snow load of four pounds per sq. foot. It shall provide protection from driving rain, sand dust, and blowing snow.	TT/UT
Construction	The tent shall have a full integral tub floor of flexible waterproof material and provide a minimum of 45 sq. ft. of floor area. The LEWS shall have a fly with an integral vestibule which will provide a minimum additional ten square feet of floor area. All fabric shall be waterproof, fire resistant in accordance with COMM CPAI 84, and mildew resistant in accordance with plate test ASTM-G21-70 for fungal growth and ASTM-G22-70 for bacterial growth. All hardware shall have no burrs or sharp edges.	TT/UT
Color/Camouflage	The basic tent shall be a brown shade Cable No. 30324, per Fed. Std. 595A.	TT

The LEWS shall have three separate rainflies 1-Camouflage Green Shade, Cable No. 34094, per Fed. Std 595, 2-Desert Tan Shade, No. 459. 3-Arctic White, Cable No. 37875, per Fed Std. 595. Camouflage protection will be provided by the Individual Camouflage Covering.

Ventilation	The LEWS shall provide for proper ventilation for cooking in the vestibule as well as ventilation for use in desert/arid environments.	TT
Erect/Strike	The LEWS shall be capable of being erected or struck and packed by two soldiers who fall within the 5th to 95th percentile of the Special Forces and Ranger Soldiers in ten minutes or less under conditions of extreme weather.	TT/UT
Weight	The LEWS shall not weigh more than 12.0 lbs including one rainfly, 9.0 lbs is desired.	TT
Packing	The components of the LEWS shall be packable inside of the external pockets of the new Field Pack Large, Internal Frame. It shall be no more than 1.1 cubic feet when packed for transport, including one rainfly.	TT
Frame Poles	The LEWS shall have aluminum or aluminum alloy frame poles permanently connected via elastic cord or similar method and the pole segments shall not exceed 21" in length.	TT
Openings and Closures	Front and rear exits/entrances shall be available to allow the 95th percentile soldier, in operational uniform, to ingress/egress. The openings shall be covered by a closable, no-see-um, mosquito netting in accordance with Mil C 43352 Class 2. All zippers, vents and other closures shall include an overlap weather barrier or other weather barrier. The zippers shall be designed to provide the best operational/functional characteristics in the various extreme environments.	TT/UT

Maintenance	The LEWS shall be easy to clean and maintain. User maintenance will consist of cleaning and simple repair or replacement of components. Organizational maintenance will consist of replacement of poles, grommets, and applying small patches.	UT
Service Life	The LEWS shall have a service life of at least 30 erections and strikes in a 30 day mission.	TT/UT
Shelf Life	The LEWS shall have a shelf life of 5 years minimum.	TT
NBC Protection	The LEWS will not be NBC survivable. The composition of the components, as determined by other requirements, will not be agent resistive or capable of decontamination.	-----
Accessories	Integral spacers or other method to limit the direct contact between the tent body and the rainfly shall be provided for the LEWS. A carrying bag for storage and a repair kit shall be provided for the LEWS.	TT/UT
Instructions	The LEWS shall have instructions that are easy to understand and will provide care, use, repair, and packing instructions.	UT/TT
Use	The LEWS shall survive airborne operations when packed in rucksack for transport.	UT

B. Program Summary:

1. Management: The program will be conducted IAW AR 700-86, Life Cycle Management of Clothing and Individual Equipment.

a. User Testing and Evaluation (UT&E). The U.S. Army JFK Special Warfare Center and School (USAJFKSWCS) is responsible for initial UT directing, determining operational issues and evaluating those issues based on all available test data. TECOM is responsible for detailed planning, conducting, and reporting all User Tests.

b. Technical Testing and Evaluation. The U.S. Army Test and Evaluation Command (TECOM) is responsible for directing

technical tests and determining technical issues. The U.S. Army Yuma Proving Ground (YPG), and Cold Regions Test Center (CRTC), Fort Greeley are responsible for detailed planning, conducting, and reporting technical tests. Other Field Operating Activities may be assigned portions of technical testing at the discretion of HQ TECOM. TECOM is responsible for evaluating the terminal issues based on all available test data.

2. Integrated Test Schedule. See Annex A.

C. Technical Test & Evaluation (TT&E) Outline. The LEWS will be tested for compliance with the following technical issues.

1. Technical Assessment Issues.

a. Environmental Performance. Does the LEWS provide a shelter for three soldiers to obtain relief from extreme weather conditions and perform some cooking?

Criteria. The LEWS shall:

- 1) have a minimum floor area of 45 square feet with an additional 10 square feet in an integral vestibule in which to cook in inclement weather;
- 2) have uniform shape and size frame poles not to exceed 21" in length and be interconnected via elastic cord or similar;
- 3) have the basic tent be a brown shade, cable No. 30324 per Fed. Std. 595A
- 4) provide proper ventilation for cooking with a MISS (multi-fuel individual squad stove);
- 5) have one of each solid (camouflage green, tan, arctic white) rainflies with an integral vestibule;
- 6) have uniform size, connected frame poles of lightweight aluminum or aluminum alloy with spare frame parts;
- 7) have all openings covered by no-see-um netting;
- 8) all zippers, vents, and other closures must have overlap weather barriers;
- 9) full integral tub floor constructed of flexible and waterproof material;
- 10) two men shall be able to unpack/erect or

strike/pack the LEWS in ten minutes or less in each of the environment extremes;

11) have floor and flies which are waterproof and other fabrics which are water resistant (does not allow water penetration to the extent that user comfort is degraded)

12) be low profile minimum interior height 43" and maximum exterior height of 60"

b. Compatibility. Is the LEWS compatible with the full range of current and developmental clothing and individual equipment?

Criteria. The LEWS shall be:

- 1) Camouflage compatible;
- 2) accommodate wearing of the ECWCS inside;
- 3) able to be struck and erected using leather gloves and ICWG;
- 4) able to fit inside a one-man rucksack and have a maximum volume of 1.1 cubic feet when packed for transport and carried in cold/extreme cold environment while carrying all mission clothing and equipment;
- 5) compatible with the Extreme Cold Weather Sleep System (ECWSS)

c. HFE. Are the human factors engineering characteristics of the LEWS satisfactory?

Criteria. The LEWS shall:

- 1) be usable by 5th to 95th percentile Special Forces or Ranger Soldier on appropriate dimensions including accommodation, erection, striking, and stowage;
- 2) weigh no more than 12 pounds;
- 3) capable of being erected and struck by two SOF soldiers in 10 minutes or less;
- 4) provide ventilation for use in desert/arid environments

d. Durability. Are the durability characteristics of the

LEWS adequate for field operations in all climatic design types?

Criteria.

- 1) The LEWS shall be durable for a service life of at least one mission with 30 erections/strikes.
- 2) The LEWS shall have fabric which is mildew and tear resistant and which is resistant to puncturing and abrasion that would be normally expected to occur in field use.
- 3) The LEWS zipper must be suitable for use in desert/arid environments such that it is not degraded by exposure to the sand and wetness;

e. Safety. Have the safety and health hazards associated with the use/operation of the LEWS been eliminated or otherwise minimized?

Criteria

- 1) The LEWS fabric must be flame resistant and must present no electrostatic shock potential or hazard from toxic fumes if ignited or from cooking;
- 2) The LEWS shall be constructed of non-hazardous materials
- 3) The LEWS shall pose no uncontrollable safety hazards;

f. ILS. Is the LEWS logistically supportable in the field?

Criteria.

- 1) The LEWS poles shall be connected so as to minimize loss;
- 2) The LEWS shall be repairable and maintainable with provided repair kit;
- 3) The LEWS shall be issued with full instructions for safe use, erecting, striking, cleaning, maintenance, and repair;

2. TT&E to Date  
None

3. Future TT&E  
Future TT&E are listed in the Test Schedule, Part III

LEWS, SN-CIE-TEMP (ANNEX A).

4. Special Requirements for Item Retest  
None

5. Critical TT&E Items See Test Resources Summary  
(paragraph E).

D. User Testing & Evaluation (UT&E) Outline. The LEWS will be tested for compliance with the following operational issues and criteria.

1. Critical Operational Issues.

a. ISSUE. Does the Lightweight Extreme Weather Shelter (LEWS) provide protection during extreme adverse weather conditions?

SCOPE. The LEWS should provide Special Operations Forces (SOF) soldiers protection from extreme adverse weather conditions to include high winds, blowing snow, sand, dust and heavy rain. The LEWS should withstand wind up to 50 mph with gust of 65 mph.

CRITERIA.

(1) The LEWS must provide protection and withstand winds of 50 mph with gusts of 65 mph.

(2) The LEWS must provide protection from driving rain.

(3) The LEWS must provide protection from sand dust.

(4) The LEWS must provide protection from blowing snow.

b. ISSUE. Does the LEWS provide ease of entry and exit?

SCOPE. This issue will evaluate the ability of the SOF soldier to enter the LEWS and provide for quick exits during SOF related missions to preclude the possibility of entrapment.

CRITERIA. The LEWS must provide ease of entry and exit during SOF related missions.

c. ISSUE. Does the LEWS accommodate and provide shelter for three men fitting the 5th through the 95th percentile Special Forces and Ranger Soldiers.

SCOPE. This issue will evaluate the ability of the



LEWS to accommodate the SOF soldier during adverse weather.

CRITERIA. The LEWS must provide sufficient room for three SOF soldiers (5th through 95th percentile) to comfortably lay in a sleeping bag.

d. ISSUE. Is the LEWS easy to erect and disassemble?

SCOPE. This issue will address the ability of the SOF soldier(s) (not to exceed two men) to erect and disassemble the LEWS.

CRITERIA. In both daylight and night condition, in varied weather conditions, the SOF soldiers must be able to erect and strike the LEWS within ten minutes or less.

e. ISSUE. Can the LEWS be maintained in the field?

SCOPE. This issue will evaluate the maintainability of the LEWS in a field environment.

CRITERIA. None. This issue is investigative in nature.

## 2. Critical Operational Criteria.

### NOTE:

(1) Criteria are total system measures. As such, they inherently cover hardware, software, personnel, doctrine, organization, and training effectiveness and suitability. Individual system characteristics of operational capability, survivability, RAM, organization, doctrine, tactics, logistics support, training, and manprint (which includes the domains of manpower, personnel, training, human factors engineering, system safety, and health hazards) related to these criteria will be addressed in the independent operational evaluator's independent evaluation plan.

(2) Criteria are not provided as absolute pass/fail measures. Rather, they represent estimates of performance for which breach would require a careful management reassessment of cost and cost effectiveness and program options during the program milestone review.

### 3. UT&E to Date

None.

### 4. Future UT&E

Future UT&E are listed in the Test Schedule, Part III LEWS, SN-CIE-TEMP (ANNEX A).

5. Critical UT&E Test Items See Test Resources Summary (paragraph E).

E. Test Resources Summary

1. Test Articles and Test Sites.

a. Initial Evaluation Testing

<u>SITE</u>	<u>#ITEMS</u>
NRDEC	5 ea Manufacturer *
USAJFKSWCS	5 ea Manufacturer

This testing will be done to see if the tents meet the basic requirements, size, weight, shape, ease of erection, etc., without expanding into a full UT/TT. This testing will be done with strictly NDI items selected from manufacturers who respond with interest from the Market Investigation. Therefore these tents will not meet the criteria for color and are not expected to. Color will be evaluated when modifications are made to the tents, in the final UT/TT testing.

\* This number is based upon tents per manufacturer selected from original design review.

b. Technical Testing

Approximately 32 LEWS per each manufacturer will be required for TT to be apportioned as follows:

<u>SITE</u>	<u>#ITEMS</u>
NRDEC (Rain Room evaluation, static, wind)	6 ea
CSTA (Toxic fumes, non-hazardous material, rain course)	6 "
USACRTC (Compatibility, performance, HFE, safety, ILS, durability, environmental)	10 "
YPG (Compatibility, performance, HFE, safety, ILS, durability, environmental)	10 "

c. User Testing

Approximately 12 LEWS per each manufacturer will be required for UT to be apportioned as follows.

<u>SITE</u>	<u>#ITEMS</u>
USAJFKSWCS	12 ea

Exact location for testing will be determined.

2. Funding Requirements.

Estimates for TT:

Natick	\$10K
CRTC	12K
CSTA	20K
YPG	60K

Estimates for UT:

Natick OFIG	\$20K
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3. Special Requirements The special requirements will be:

a. The use of the new Individual Camouflage Cover now being developed.

b. The use of the new field pack large, internal frame currently being prepared for issue.

F. Bibliography

MANPRINT Report, STRNC-YBF, 20 Dec 89, subject: MANPRINT Comments on the Lightweight Extreme Weather Shelter (LEWS), Statement of Need - Clothing and Individual Equipment (SN-CIE).

AR 700-86, Life Cycle Management of Clothing and Individual Equipment, 15 JAN 87.

MIL STD 1472, Human Engineering Design Criteria for Military Systems Equipment and Facilities.

TEST AND EVALUATION MASTER PLAN

<u>Primary Points of Contact</u>	<u>Organization</u>	<u>Phone No.</u>
Material Developer: Ms. Laura A. Ryan	NRDEC, ATTN: STRNC-USOT	AV 256-5252
Combat Developer MSGT Lyle Voight	USAJFKSWCS, ATTN: ATSY-CD-ML	AV 239-1816
Technical Tester Mjr. Ralph Perrino	TECOM, ATTN: AMSTE-TA-T	AV 298-3640
Technical Independent Assessor Ms. Terri Kocher	TECOM, ATTN: AMSTE-TA-G	AV 298-5221
User Tester Mr. Steve Davidson	USAJFKSWCS, ATTN: ATSU-CD-TE	AV 239-6527
User Independent Evaluator Mr. Steve Davidson	USAJFKSWCS, ATTN: ATSU-CD-TE	AV 239-6527
PM-CIE, Action Officer Lt. Colonel Taylor	ATTN: AMC-PM-CIE	AV 356-2209

COORDINATION:

*[Signature]* CONCUR/NONCONCUR 6 MAR 90 DATE  
AMC/PM-CIE

*[Signature]* CONCUR/NONCONCUR 6 Mar 90 DATE  
HQ TRADOC

*Laura A. Ryan* CONCUR/NONCONCUR 6 Mar 90 DATE  
NRDEC

*Terri Kocher* CONCUR/NONCONCUR 6 Mar 90 DATE  
TECOM/TESTER

*Terri Kocher* CONCUR/NONCONCUR 6 Mar 90 DATE  
TECOM/ASSESSOR

*Steve Davidson* CONCUR/NONCONCUR 6 MAR 90 DATE  
USA JFK SWCS/TESTER

*Steve Davidson* CONCUR/NONCONCUR 6 MAR 90 DATE  
USA JFKSWCS/EVALUATOR

Annex A - LEWS Integrated Test Schedule

1. Technical Test and Evaluation

<u>Critical Issues</u>	<u>Proponent</u>	<u>Location</u>	<u>Timeframe</u>	<u>*Cost</u>
a. Rain Room Evaluation Static, Wind	NRDEC	NATICK	Aug 91- March 92	\$10K
b. Toxic Fumes, non-hazardous materials, rain course	TECOM	CSTA	April 91-June 91	10K
c. Compatibility, Performance, HFE, Durability, Safety, ILS	TECOM	CRTC	Oct 91- March 92	70K
d. Compatibility, Performance, HFE, Durability, Safety, ILS	TECOM	YPC	July 91-Sep 91	50K

2. User Test and Evaluation

a. Performance, MANPRINT, Ease of Erection, Maintainability	JFK	TBD	Aug 91-March 92	20K
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APPENDIX B  
Responses to the Market Investigation

ADVENTURE 16, INC.  
4620 ALVARADO CANYON RD.  
SAN DIEGO, CA 92120  
TEL (619) 283-2362  
ATTN: BOB RUDOLF, OPERATIONS MANAGER

ORDERED

ALASKA TENT & TARP, INC.  
529 FRONT STREET  
FAIRBANKS, ALASKA 99701

TENT EXCEEDS  
WEIGHT (27#)

ANCHOR INDUSTRIES  
1100 BURCH DRIVE  
P.O. BOX 3477  
EVANSVILLE, IN 47733  
TEL (812) 867-2421  
ATTN: JOHN H. WEBER, VP

NOT PRESENTLY FABRICATING TENT  
LISTED. WOULD BE INTERESTED  
WHEN WE DETERMINE WHAT WE WANT  
AND HAVE THE DRAWINGS AND SPECS,  
HAPPY TO ENTERTAIN AN RFQ FOR A  
VOLUME CONTRACT.

BIBLER TENTS  
954-A PEARL STREET  
BOULDER, CO 80302  
TEL (303) 449-7351  
ATTN: SUSAN

DOES NOT HAVE  
SEPARATE FLY

BROWN ENGINEERING  
(TELEDYNE)  
CUMMINGS RESEARCH PARK  
300 SPARKMAN DRIVE NW  
P.O. BOX 070007  
HUNTSVILLE, ALABAMA 35807-7007  
TEL (205) 726-1000  
TWX (810) 726-2103  
FAX (205) 726-1033  
ATTN: R.D. THOMPSON, MANAGER  
CAMOUFLAGE, CONCEALMENT AND DECEPTION

PRODUCES CAMOUFLAGE FOR  
THE U.S. ARMY AND HAS  
BUILT SEVERAL TENTS FOR  
COMMERCIAL USE.

NOT CURRENTLY  
FABRICATING A  
TENT

CAMEL OUTDOOR PRODUCTS  
5988 PEACHTREE PLACE  
P.O. BOX 7225  
NORCROSS, GA 30071  
ATTN: COMMERCIAL SALES REPRESENTATIVE

MANUFACTURES OUTDOOR  
EQUIPMENT, CAMPING,  
BACKPACKING.

SAME TENT  
OFFERED BY  
FLEX BAND  
(ORDERED)

CANNONDALE  
9 BROOKSIDE PLACE  
GEORGETOWN, CT 06829  
TEL (203) 838-4488 EXT 424  
MATT JEWETT

NOT FREE  
STANDING

DAISY MANUFACTURING CO., INC  
P.O. BOX 220  
ROGERS, AK 72757  
TEL (800) 643-3458

EXCEEDS WEIGHT  
REQUIREMENT

DIAMOND BRAND USA  
HIGHWAY 25  
NAPLES, NC 28760  
TEL (704) 684-9848  
(800) 258-9811  
ATTN: ARNOLD KEMP, PRESIDENT

MANUFACTURES TENTS FOR  
BACKPACKING, CAMPING,  
EXPEDITION.

ORDERED

EARLE KINLAW ASSOCIATES, INC.  
534 MEDLOCK ROAD  
SUITE 201  
DECATUR, GA 30030  
ATTN: EARLE KINLAW, SR., CEO  
TEL (404) 377-2058

MILITARY MARKETING AGENCY  
FOR DAISY QUICK PITCH DOME  
TENTS AND FAMOUS TRAIL DOME  
TENTS.

ORDERED

FAMOUS TRAILS  
3804 MAIN STREET, SUITE 1  
CHULA VISTA, CA 92011  
TEL (619) 422-8810

ORDERED

FLEX BAND  
20 FEDERAL PLAZA WEST  
SECOND FLOOR  
YOUNGSTOWN, OH 44503  
TEL (800) 344-3539  
(216) 747-4100  
ATTN: DICK HARTZELL  
VICE PRESIDENT

FITNESS EQUIPMENT

ORDERED

GENERAL MACHINE  
PRODUCTS COMPANY, INC.  
3111 OLD LINCOLN HIGHWAY  
TREVOSE, PA 19047-4996  
TEL (215) 357-5500  
FAX (215) 357-6216  
W.U. TELEX: 755380  
ATTN: WENDY J. SIEMINSKI  
INTERNATIONAL SALES CORRESPONDENT

TENTS AND CANVAS PRODUCTS

NOT EXTREME  
WEATHER  
3-MAN

GRANITEVILLE COMPANY  
GRANITEVILLE, SC  
TEL (803) 663-7231  
RICHARD D. SAMSON  
DIRECTOR OF RESEARCH

MANUFACTURES  
FABRIC FOR  
TENTS

GREGORY MOUNTAIN PRODUCTS  
100 CALLE CORTEZ  
TEMECULA, CA 92390  
TEL (800) 458-3420  
FAX (714) 676-6777

MOUNTAIN PRODUCTS

ORDERED



HUMPHRY'S TEXTILE PRODUCTS CO. MANUFACTURES TENT NOT TENTS  
A DIVISION OF FLYS AND OTHER  
D.C. HUMPHRY'S CO., INC. TENT COMPONENTS.  
5744 WOODLAND AVENUE  
PHILADELPHIA, PA 19143  
TEL (215) 724-8181  
(800) 523-4503  
ATTN: FRED HOGE  
VICE PRESIDENT OF SALES

HIGH SIERRA NO RESPONSE  
880 CORPORATE WOODS PARKWAY  
VERNON HILLS, IL 60061-3112  
TEL (708) 913-1100  
ATTN: BRIAN KINSLEY

KELTY CUSTOMER SERVICE NO VESTIBULE  
1224 FERN RIDGE PKWY 500 N. INDUSTRIAL RD  
ST. LOUIS, MO 63141 ST. GEORGE, UTAH 84770  
TEL (800) 423-2320  
ATTN: DENNIS ROONEY  
TERRY POQUE

KOMMA GRAPHIC FORMERLY VESELY CO. NOT TENTS  
P.O. BOX 399 MANUFACTURES REPLACEMENT  
LAPEER, MI 48446 CANVAS FOR ALL OF THE  
TEL (313) 664-4264 VESELY PRODUCTS.  
ATTN: MARILYNN KOLENDA, OWNER

L.L. BEAN SELLS EUREKA, GLACIER, NOT MANUFAC-  
FREEPORT, ME WALRUS, BAY, NORTHFACE, TURER  
ATTN: GUY LADOUCEUR AND MORE.  
TEL (800) 341-4341  
X3500 OR 3100 8AM-4PM

LOVELACE ENTERPRISES TENT IS TOO  
8069 NORTH ANGUS HIGH  
FRESNO, CA 93710  
TEL (209) 438-8368  
ATTN: DON LOVELACE

MILITARY MARKETING, INC. REPRESENTATIVE FOR ORDERED  
MILITARY RECREATION HEADQUARTERS EUREKA! TENT AND MOSS.  
P.O. BOX 17749  
TEL (800) 826-0446  
(205) 286-0700  
ATTN: HENRY COBB

MOSS TENTS  
MT. BATTLE STREET  
CAMDEN, ME 04843  
P.O. BOX 309  
TEL (207) 236-8368  
(800) 341-1557  
FAX (207) 236-6301  
ATTN: TED DISHNER  
SALES MANAGER

MANUFACTURES BACKPACKING  
TENTS FOR EXPEDITIONS AND  
MORE.

ORDERED

NELSON/WEATHER-RITE  
125 ENTERPRISE AVE  
SECACUS, NJ 01094-2367  
TEL (201) 348-0400  
FAX (201) 348-2252  
ATTN: PETER BOYLE, VP SALES

CAMPING EQUIPMENT, TENTS.

NOT INTERESTED

THE NORTH FACE  
999 HARRISON STREET  
BERKELEY, CA 94710  
TEL (415) 527-9700  
(800) 888-9991  
ATTN: SALLY MCCOY  
EXTENSION: 253

MANUFACTURES SEVERAL TENTS  
AND A LOT OF BACKPACKING  
ITEMS.

ORDERED

OUTBOUND  
21068 CABOT BLVD.  
HAYWARD, CA 94545-1110  
TEL (800) 338-8143  
ATTN: PAUL WILLIAMS  
(415) 372-8281

ORDERED

PACIFIC NORTHWEST SUPPLY CO.  
410 SHERMAN AVE  
COEUR d'ALENE, ID 83814

TENT IS  
MANUFACTURED  
BY CAMEL

T.A. PELSUE COMPANY  
2500 S. TEJON  
ENGLEWOOD, CO 80110  
TEL (303) 936-7432  
FAX (303) 934-5581  
ATTN: BRADLEY A. PELSUE  
PRESIDENT

MANUFACTURES A LIGHTWEIGHT  
TENT, SET UP LESS THAN  
1 MINUTE.

ORDERED

RECREATIONAL EQUIPMENT INC.  
P.O. BOX 88126  
SEATTLE, WA 98138-2126  
TEL (206) 395-3780  
(206) 395-7105  
ATTN: DAWN COLTON  
COMM SALES REPRESENTATIVE

MANUFACTURES TENTS, BACK-  
PACKING EQUIPMENT.

NOT INTERESTED  
(MODS)

SIERRA DESIGNS  
2039 FOURTH STREET  
BERKELEY, CA 94710  
TEL (415) 843-0923  
MARTIN ZEMITIS  
DESIGNER

4/3 MARTIN ZENITHS

NOT INTERESTED

STEPHENSONS  
WARMLITE EQUIPMENT  
RFD 4 #145, HOOK RD  
GILFORD, NH 03246  
TEL (603) 293-7016  
ATTN: JACK STEPHENSON

ENGINEERING-THERMAL-AERO-  
STRUCTURAL-PROGRAMMING  
WARMLITE CUSTOM MOUNTAINEER  
EQUIPMENT.

NOT FREE-  
STANDING

WALRUS, INC.  
929 CAMELIA ST  
BERKELEY, CA 94710  
TEL (415) 526-8691  
BOB SWANSON

NOT INTERESTED

WILD COUNTRY USA  
27 WHITELAW DR.  
CENTR CONWAY, NH 03813  
TEL (603) 356-9316  
ATTN: BILL KANE

ORDERED

K-CON INC.  
P.O. BOX 70904  
CHARLESTON HEIGHTS, SC  
29416-0904  
TEL (803) 745-0434  
MIKE KIERNAN

NO RESPONSE

M.C. GENERAL INC.  
METAL PRODUCTS  
840 PENN ST.  
SELLERSBURG, ID 47172  
TEL (812) 246-3339  
SUSAN KNIES

NO RESPONSE

## APPENDIX C

### Market Investigation

1. Commerce Business Daily Advertisements
2. Letters to the Commercial Marketplace  
with Principle Performance Characteristics
3. Commercial Marketplace Follow Up Letter
4. Letters to Foreign Governments
5. Complete List of Companies
6. List of Tents That Met Requirements

1. Commerce Business Daily Advertisements

U.S. Department of Commerce (CBD)  
Commerce Business Daily  
P.O. Box 5999  
Chicago, IL 60680

1. R!!
2. 0226!!
3. 90!!
4. 21XR!!
5. 01760-5011!!
6. 78!!
7. US Army Natick Res, Dev and Eng Center, Natick Procurement  
Division, Natick, MA 01760-5011!!
8. 78 - Lightweight tent, 3 man!!
9. N/A!!
10. N/A!!
11. Contact, Jeanine Duhamel, Contract Specialist, 508/651-  
5028!!
12. N/A!!
13. N/A!!
14. N/A!!
15. N/A!!
16. N/A!!

17. Manufacturers of tents sought. The U.S. Army Natick Research, Development, and Engineering Center (NRDEC) is conducting a market investigation to identify commercial suppliers of small tents. The tent will be used by the military in the field as a lightweight extreme weather shelter for a crew of three. The tent should be dome shaped, lightweight-not to exceed 12 lbs., quickly erectable, provide approximately 45-50 sq ft of floor space, have a waterproof fly with an integral vestibule and be fire resistant. If your company has a commercial item, either stocked or a catalog item to be manufactured, this center would be very interested in reviewing your product literature and discussing any suggestions concerning materials and designs you may wish to provide. Interested firms are requested to provide within 30 days from the date of this publication, information on their previous related experience, descriptive brochures, unit cost and any other specific information the firm believes demonstrates its ability to provide this equipment, and indicate weather or not they are a small or small disadvantaged concern. Please reference Market Survey No. 29MX009-90N. This notice is for information purposes only. No solicitation documents are available at this time.\*\*\*\*\*

Transmission via CBD Express V. 3.0  
U.S. Army Troop Support Command

1. P!!
2. 0405!!
3. 90!!
4. 21XR!!
5. 01760-5011!!
6. 78!!
7. U.S. Army Natick RD&E Center, Natick Procurement Division, Natick, MA 01760-5011!!
8. 78 -- LIGHTWEIGHT TENT, 3 MAN!!
9. W13PPH-0095-2901!!
10. 042590!!
11. Jeanine Duhamel, Contract Specialist, 508-651-5028
12. N/A!!
13. N/A!!
14. N/A!!
15. N/A!!
16. N/A!!
17. The U.S. Army Natick Research, Development and Engineering Center (NRDEC) is proposing to buy and evaluate lightweight extreme weather shelters (LEWS). The tent will be used by the military in the field as a lightweight extreme weather shelter for a crew of three. The requirements for the tent is that it be a free standing dome shaped design with the height not to exceed 55", have an integral waterproof tub floor, provide 45-50 sq ft of floor area, have a waterproof fly with an integral vestibule which will provide an additional 10 sq ft or more of floor area. The tent is to weigh less than 12 lbs with the fly and poles included, be less than 1.1 cubic feet when packed and the poles are to be permanently connected with shock cording or similar method. The openings on the tent are to be covered by a "no-see-um" netting. The tent shall withstand extreme weather conditions of 50 MPH winds with gusts to 65 MPH, blowing snow, sand, and rain and be easily erectable in less than 10 minutes. It is intended to purchase an initial 10 tents from companies who have a tent that will meet these basic design needs and are interested in participating in this program. The initial 10 tents shall be off the shelf items and will be evaluated to determine if the tents meet the basic criteria. The companies who meet the requirements may then be solicited to provide an undetermined quantity, not to exceed 100 tents, with some modifications based on performance requirements. The basic tent will be one color and three flies will be required, each a different color. These tents will undergo rigorous technical and user testing. An evaluation will be performed and the firms whose tent(s) meet the requirements will be considered to compete for a Technical Data Package that could result in the single tent design for Army use. Due to the extensive testing to be performed by the Government, firms which do not participate in the initial competition will not be considered for further program activities as testing will not be duplicated. Interested firms are requested to provide within 15 days from the date of this publication, information on their previous related experience, descriptive brochures, unit cost and any other specific information and indicate whether or not they are a small or small disadvantaged concern.\*\*\*\*\*

**2. Letter to Commercial Marketplace  
with Principal Performance Characteristics**





**DEPARTMENT OF THE ARMY**  
**U.S. ARMY TROOP SUPPORT COMMAND**  
**NATICK RESEARCH, DEVELOPMENT AND ENGINEERING CENTER**  
**NATICK, MA**  
**01760-5017**

REPLY TO  
ATTENTION OF

Tentage Section

Gentlemen:

Natick Research, Development and Engineering Center is currently making a market survey of commercial tents for use as a lightweight extreme weather shelter for a crew of three. The tent should be dome shaped, lightweight-not to exceed 12 lbs., quickly erectable, provide approximately 50 sq ft of floor space, have a waterproof fly with an integral vestibule and be fire resistant. If your company has a tent presently available that meets these requirements, or meets these requirements with slight modifications, this Center would be very interested in reviewing your product literature.

This information is being collected for planning purposes only and will be reviewed along with similar input from other sources. This is not a solicitation for procurement purposes. In order for your product to be considered for this market survey, response to this letter in a timely fashion is requested. Should you require any further information, I can be reached at (508) 651-5252.

Sincerely

A handwritten signature in cursive script that reads "Laura A. Ryan".

Laura A. Ryan  
Electrical Engineer  
Aero-Mechanical Engineering Directorate

3. Commercial Marketplace Follow-Up Letter

Tentage Section

9 April 1990

NAME OF COMPANY  
STREET ADDRESS  
CITY, STATE ZIP

Gentlemen:

Your quick response to our letter, in reference to a 3-man lightweight extreme weather shelter, dated 12 March 1990 was much appreciated. The literature that was supplied has been reviewed and we want to inform you of the current program plan. An announcement has been placed in the Commerce Business Daily stating our proposed program and a copy of this announcement is enclosed. If you are interested in participating in this program, we would like to hear from you. Should you require any further information, I can be contacted at (508)651-5252.

Sincerely

Encl

Laura A. Ryan  
Engineer  
Aero-Mechanical Engineering  
Directorate

4. Letters to Foreign Governments

27 March 1990

MEMORANDUM FOR Director, Engineering Program Management  
Directorate, ATTN: Marie Hennrikus

SUBJECT: Performing a Market Survey of Foreign Manufacturers of  
Tents for Lightweight Extreme Weather Shelter (LEWS) Program

1. Currently Natick is performing a Market Survey of Manufacturers of Lightweight Extreme Weather Shelters that would be available as a Non-Developmental Item (enclosure 1).
2. Enclosed is a copy of the synopsis placed in the Commerce Business Daily (CBD) and a Market Survey letter sent to Domestic producers of tents (enclosure 2).
3. Request that a Foreign survey of Manufacturers of tents be performed. The format used for Domestic producers may be used, some modifications can be made if needed.
4. Point of contact for this action is Ms. Laura Ryan, X5252.

Encls

LAURA A. RYAN  
Electrical Engineering/Tentage Section  
Aero-Mechanical Engineering Directorate

C, TS \_\_\_\_\_



DEPARTMENT OF THE ARMY  
U.S. ARMY TROOP SUPPORT COMMAND  
NATICK RESEARCH, DEVELOPMENT AND ENGINEERING CENTER  
NATICK, MA  
01760-5017

9/15

REPLY TO  
ATTENTION OF

Tentage Section

March 6, 1990

Gentlemen:

Natick Research, Development and Engineering Center is currently making a market survey of commercial tents for use as a lightweight extreme weather shelter for a crew of three. The tent should be dome shaped, lightweight-not to exceed 12 lbs., quickly erectable, provide approximately 50 sq ft of floor space, have a waterproof fly with an integral vestibule and be fire resistant. If your company has a tent presently available that meets these requirements, or meets these requirements with slight modifications, this Center would be very interested in reviewing your product literature.

This information is being collected for planning purposes only and will be reviewed along with similar input from other sources. This is not a solicitation for procurement purposes. In order for your product to be considered for this market survey, response to this letter in a timely fashion is requested. Should you require any further information, I can be reached at (508) 651-5252.

Sincerely

Laura A. Ryan  
Electrical Engineer  
Aero-Mechanical Engineering Directorate

10-1-1990

U.S. Department of Commerce (CBD)  
Commerce Business Daily  
P.O. Box 5999  
Chicago, IL 60680

1. R!!
2. 0226!!
3. 90!!
4. 21XR!!
5. 01760-5011!!
6. 78!!
7. US Army Natick Res, Dev and Eng Center, Natick Procurement Division, Natick, MA 01760-5011!!
8. 78 - Lightweight tent, 3 man!!
9. N/A!!
10. N/A!!
11. Contact, Jeanine Duhamel, Contract Specialist, 508/651-5028!!
12. N/A!!
13. N/A!!
14. N/A!!
15. N/A!!
16. N/A!!
17. Manufacturers of tents sought. The U.S. Army Natick Research, Development, and Engineering Center (NRDEC) is conducting a market investigation to identify commercial suppliers of small tents. The tent will be used by the military in the field as a lightweight extreme weather shelter for a crew of three. The tent should be dome shaped, lightweight-not to exceed 12 lbs., quickly erectable, provide approximately 45-50 sq ft of floor space, have a waterproof fly with an integral vestibule and be fire resistant. If your company has a commercial item, either stocked or a catalog item to be manufactured, this center would be very interested in reviewing your product literature and discussing any suggestions concerning materials and designs you may wish to provide. Interested firms are requested to provide within 30 days from the date of this publication, information on their previous related experience, descriptive brochures, unit cost and any other specific information the firm believes demonstrates its ability to provide this equipment, and indicate whether or not they are a small or small disadvantaged concern. Please reference Market Survey No. 29MX009-90N. this notice is for information purposes only. No solicitation documents are available at this time.\*\*\*\*\*



4 APR 25 1990 (DCGEM)

DEPARTMENT OF THE ARMY  
UNITED STATES ARMY RESEARCH, DEVELOPMENT AND STANDARDIZATION GROUP - CANADA  
NATIONAL DEFENCE HEADQUARTERS  
MGEN GEORGE R. PEARKES BUILDING  
OTTAWA, CANADA  
K1A 0K2

AMXSN-C (70-1gg)

23 April 1990

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Foreign Market Investigation - Tents for the US Army Lightweight Extreme Weather Shelter (LEWS) Program

1. Reference memorandum STRNC-EMSM (34-1d), subject: Tents for the Lightweight Extreme Weather Shelter (LEWS) Program, undated (copy attached).
2. The US Army is conducting a market investigation to determine the commercial availability of tents meeting the enclosed requirements.
3. Request you forward this information to any firm you think may be able to meet this need, or forward us a listing of companies that might have equipment meeting this requirement.
4. Request responses be forwarded direct to US Army Natick Research, Development and Engineering Center, ATTN: STRNC-EMSM, Natick, MA, with an information copy to this office.

*Mullen*  
George M. Mullen  
Colonel AV  
Commanding

Encl:  
as

DISTRIBUTION:

- ① NDHQ/DCGEM
- NDHQ/DLR
- NDHQ/CRAD
- NDHQ/DDSS
- Department of External Affairs, ATTN: Sylvie Bedard
- Canadian Commercial Corporation, ATTN: Mr. P. Nadon

③ A/4-2  
Perhaps Mark  
or Mike could  
give us some  
input  
cc Sanders  
4  
2 May 90

④ ME  
Please review this  
drafting as to be  
the Director to sign  
Please keep me informed as  
- when it comes off the  
file

~~② DCGEM 4~~  
for action  
APR 27 1990





**DEPARTMENT OF THE ARMY**

**U.S. ARMY TROOP SUPPORT COMMAND  
NATICK RESEARCH, DEVELOPMENT AND ENGINEERING CENTER  
NATICK, MA**

REPLY TO  
ATTENTION OF

STRNC-EMSM (34-1d)

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Tents for the Lightweight Extreme Weather Shelter  
(LEWS) Program

1. The U.S. Army Natick Research, Development and Engineering Center (Natick) is conducting a market investigation to determine the availability of Tents for the Lightweight Extreme Weather Shelters (LEWS) program. The tent should be dome shaped, lightweight - not to exceed 12 lbs., quickly erectable, provide approximately 50 sq ft of floor space, have a waterproof fly with an integral vestibule and be fire resistant.
2. We would like to obtain a tent for evaluation. If the tent cannot be furnished, any applicable photographs, materials, design or information on physical characteristics would be appreciated.
3. The point of contact is Mrs. Marie Henrikus, DNS (AUTOVON) 256-4086 or FAX 256-4045. -- The Soldiers' Command

FOR THE COMMANDER:

  
for DENNIS GORDON  
Director, Engineering Programs  
Management Directorate

DISTRIBUTION:

- U.S. ARMY RESEARCH, DEVELOPMENT AND STANDARDIZATION GROUP-CANADA,  
NATIONAL DEFENCE HEADQUARTERS, ATTN: MR. CAMPBELL, OTTAWA  
ONTARIO, CANADA K1A 0K2
- U.S. ARMY SECURITY AFFAIRS COMMAND, U.S. ARMY MATERIEL COMMAND,  
REPRESENTATIVE-FRANCE, OFFICE OF DEFENSE CORPORATION,  
ATTN: LTC RUSSELL, APO NEW YORK 09777

27 March 1990

MEMORANDUM FOR Director, Engineering Program Management  
Directorate, ATTN: Marie Henrikus

SUBJECT: Performing a Market Survey of Foreign Manufacturers of  
Tents for Lightweight Extreme Weather Shelter (LEWS) Program

1. Currently Natick is performing a Market Survey of Manufacturers of Lightweight Extreme Weather Shelters that would be available as a Non-Developmental Item (enclosure 1).
2. Enclosed is a copy of the synopsis placed in the Commerce Business Daily (CBD) and a Market Survey letter sent to Domestic producers of tents (enclosure 2).
3. Request that a Foreign survey of Manufacturers of tents be performed. The format used for Domestic producers may be used, some modifications can be made if needed.
4. Point of contact for this action is Ms. Laura Ryan, X5252.

Encls

LAURA A. RYAN  
Electrical Engineering/Tentage Section  
Aero-Mechanical Engineering Directorate

C, TS \_\_\_\_\_

5. Complete List of Companies

ABCOFAB INDUSTRIES  
 ABERCROMBIE & KENT  
 ABILENE TENT & AWNING  
 ACADEMY TENT & CANVAS  
 ACE CANVAS & TENT  
 ACE CANVAS & TENT CORP.  
 ACME CANVAS CO., INC.  
 ADVENTURE 16  
 APLENLITE  
 ARMBRUSTER MFG CO.  
 ENVIRONMENTS  
 RIPPETOE CANVAS PRODUCTS  
 CHATTANOOGA TENT CO.  
 TENNESSEE AWNING & TENT CO.  
 CAMEL MFG. CO  
 B-J MFG. CO.  
 CROWN TENT & AWNING  
 NASHVILLE TENT & AWNING  
 FRONTIER ALLOYS & MFFG.  
 CBF INDUSTRIES  
 CAPP TENT & AWNING  
 DALLAS TENT & AWNING  
 EL PASO TENT & AWNING CO.  
 BARNARD, B.S.  
 BARNETT AWNING & TENT CO.  
 BATTLE CREEK TENT & AWNING  
 BENTON HARBOR AWNING & TENT CO.  
 H. BERNBAUM CO.  
 BIBLER TENT  
 BLACK ICE  
 BLUE PUMA  
 BROOK TENT  
 BRUNSWICK CORPORATION  
 BUFFALO AWNING & TENT MFG  
 BURCH MFG.  
 BURLINGTON TENT & AWNING  
 CALIFORNIA INDUSTRIAL FABRICS  
 CAMEL OUTDOOR PRODUCTS INC.  
 CAMEL MFG.  
 CAMPWAYS  
 CANNONDALE  
 CANVAS CENTER UNLIMITED  
 CANVAS SPECIALTY  
 CAROLINA AWNING & TENT MFG.  
 CEDAR RAPIDS TENT & AWNING CO  
 CENTERVILLE TENT & AWNING  
 CHEYENNE TENT & AWNING  
 COLEMAN CO.  
 CRITERIA PRODUCTS, INC.  
 CUSTOM CANVAS MFG CO.  
 DANVILLE TENT & AWNING  
 DARBY TENT CO.  
 DEBROVY, HYMAN & SONS  
 FLUSHING, NY  
 OAKBROOK, IL  
 ABILENE, TX  
 LOS ANGELES, CA  
 DETROIT, MI  
 JERSEY CITY, NJ  
 MALDEN, MA  
 SAN DIEGO, CA  
 VENTURA, CA  
 SPRINGFIELD, IL  
 TREVISE, PA  
 DILLON, SC  
 CHATTANOOGA, TN  
 CHATTANOOGA, TN  
 KNOXVILLE, TN  
 MEMPHIS, TN  
 NASHVILLE, TN  
 NORTH NASHVILLE, TN  
 ARLINGTON, TX  
 DALLAS, TX  
 DALLAS, TX  
 DALLAS, TX  
 EL PASO, TX  
 NEW YORK, NY  
 BAY CITY, MI  
 BATTLE CREEK, MI  
 BENTON HARBOR, MI  
 NORTHBROOK, IL  
 BOULDER, CO  
 NAPA, CA  
 ARCATA, CA  
 LAPLACE, LA  
 DELAND, FL  
 BUFFALO, NY  
 FORT DODGE, IA  
 BURLINGTON, IA  
 SANTA ANA, CA  
 NORCROSS, GA  
 KNOXVILLE, TN  
 LOS ANGELES, CA  
 GEORGETOWN, CN  
 MILTON, FL  
 LOS ANGELES, CA  
 ROCKY MOUNT, NC  
 CEDAR RAPIDS, IA  
 CENTERVILLE, IA  
 CHEYENNE, WY  
 WICHITA, KS  
 KEANSBURG, NJ  
 BUFFALO, NY  
 DANVILLE, IL  
 FLUSHING, NY  
 LOUISVILLE, KY

DENVER TENT CO.  
DIAMOND BRAND  
DORCHESTER AWNING CO., INC.  
DURACOTE CORPORATION  
EARLY WINTERS  
EATON BROS. CORP.  
ECONOMY AWNING CO. INC.  
EHMKE MANUFACTURING CO., INC.  
ELD EQUIPMENT  
EMS  
ERO INDUSTRIES INC.  
EUREKA!  
FABRI-TECH, INC  
FLAGG CO.  
FLINT TENT & AWNING CO.  
FORREST MT.  
FOSTER CO., INC.  
FOX TENT & AWNING CO.  
FROSTLINE, INC.  
GENERAL MACHINE PRODUCTS CO.  
GERRY DIVISION  
GILA RIVER INDIAN ENTERPRISES  
GODSKE COMPANY  
GOODWIN COLE CO.  
GOSS, J.C., CO.  
GRAWE MFG. CO.  
HANSEN WEATHER PORT CORP.  
HEDGY, INC.  
HENDERSON CAMP PRODUCTS  
HOFFMAN CANVAS PRODUCTS, INC.  
HOIGARD'S INC.  
HUMPHRY'S TEXTILE PRODUCTS  
INDUSTRIAL TEXTILE & FAB  
JANAK & SCURFIELD, INC.  
JANSPORT  
JEFFERSON TENT & AWNING  
JEWELL MANUFACTURING CO., INC.  
JOHNSON CAMPING, INC.  
JOHNSON TENT  
KANOPY DEALER  
KEARNS TENT & AWNING  
KELTY  
KENTUCKY TENT & AWNING  
KOKOMO, TENT & AWNING CO.  
LAFAYETTE TENT & AWNING CO.  
LANGDON MFG. CO.  
LLOYD'S TENT & AWNING  
LODI TENT & AWNING  
LOVELACE ENTERPRISES  
MAMAUX, A. & SON  
MASON CITY TENT & AWNING  
McLAUGHLIN AWNING CO., INC.

DENVER, CO  
NAPLES, NC  
PEMBROKE, MA  
RAVENNA, OH  
SEATTLE, WA  
HAMBURG, NY  
MIAMI, FL  
PHILADELPHIA, PA  
OLYMPIA, WA  
PETERBOROUGH, NH  
CHICAGO, IL  
BINGHAMTON, NY  
NOBLESVILLE, IN  
WORCESTER, MA  
WARREN, MI  
DENVER, CO  
NEW ORLEANS, LA  
ANN ARBOR, MI  
BOULDER, CO  
TREVISE, PA  
DENVER, CO  
COOLIDGE, AZ  
RACINE, WI  
SACRAMENTO, CA  
DETROIT, MI  
DAYTON, OH  
GUNNISON, CO  
RESTON, VA  
CHICAGO, IL  
BALTIMORE, MD  
MINNEAPOLIS, MN  
PHILADELPHIA, PA  
MASON CITY, IA  
SACRAMENTO, CA  
EVERETT, WA  
ST. LOUIS, MO  
TEWKSBURY, MA  
BINGHAMTON, NY  
CHICAGO, IL  
LEGRAND, IA  
HIGH POINT, NC  
SUN VALLEY, CA  
LOUISVILLE, KY  
KOKOMO, IN  
LAFAYETTE, IN  
WICHITA, KS  
BARTLESVILLE, OK  
LODI, CA  
FOSTER CITY, CA  
PITTSBURGH, PA  
MASON CITY, IA  
WORCESTER, MA

MICHIGAN TENT & AWNING  
MOBIFLEX SHELTER SYSTEMS  
MOONSTONE MOUNTAINEERING  
MOSS TENT WORKS  
MOUNTAINSMITH INC.  
MUSCATINE TENT & AWNING  
NATIONAL PARACHUTE INDUSTRIES  
NEW ENGLAND TENT & AWNING CO.  
NEWTEL, INC.  
THE NORTH FACE  
NORVELL, D.W., TENT MFG.  
OHIO AWNING CO.  
O'HENRY TENT & AWNING  
OK TENT & AWNING  
OPTIMUS  
OSHKOSH TENT & AWNING  
OTTUMWA TENT & AWNING  
OUTDOOR VENTURE  
PACIFIC TENT/ ASCENTE  
PARA-GEAR INTERNATIONAL  
PATTON, R.J.  
PELSUE, T.A.  
PENTHOUSE MANUFACTURING, INC.  
PHOENIX TENT & AWNING  
PRICE INDUSTRIES, INC.  
PUEBLO TENT & AWNING  
QUEEN CITY AWNING CO.  
REI  
RECREATIONAL EQUIPMENT INC.  
RIVENDELL MOUNTAIN WORKS  
RIVERSIDE TENT & AWNING  
ROLOSON TENT & AWNING  
SERVICE CANVAS CO., INC.  
SCHUMAN EXPROT CORP.  
SHAFFER TENT & AWNING  
SHELTER SYSTEMS  
SHERIDAN TENT & AWNING CO.  
SIERRA DESIGNS  
SIERRA WEST  
SIERRA CORP  
SKI TOW MANUFACTURING  
SNYDER MANUFACTURING INC.  
SOUTH AKRON AWNING CO.  
SOUTH SIDE AWNING CO.  
SOUTHERN TENT & AWNING  
S & S MFG. CO., INC.  
STEPHENSON WARMLITE  
SULLIVAN CO.  
TELEDYNE BROWN ENGINEERING  
TENSAR STRUCTURES, INC.  
TENT CITY CANVAS SPECIALTIES  
TERRE HAUTE TENT & AWNING

DETROIT, MI  
ST. LOUIS, MO  
ARCATA, CA  
CAMDEN, ME  
GOLDEN, CO  
MUSCATINE, IA  
FLEMINGTON, NJK  
BRUNSWICK, ME  
MIAMI, FL  
BERKELEY, CA  
GREENSBORO, NC  
CLEVELAND, OH  
CHICAGO, IL  
LOUISVILLE, KY  
BRIDGEPORT, CT  
OSHKOSH, WI  
OTTUMWA, IA  
STEARNS, KY  
FRESNO, CA  
SKOKIE, IL  
CINCINNATI, OH  
ENGLEWOOD, CO  
CARLINVILLE, IL  
PHOENIX, AZ  
PITTSBURGH, PA  
PUEBLO, CO  
AKRON, OH  
TUKWILLA, WA  
SEATTLE, WA  
VICTOR, ID  
RIVERSIDE, CA  
LIMA, OH  
BUFFALO, NY  
MAMARONECK, NY  
COSHOCOTON, OH  
CARMEL VALLEY, CA  
SHERIDAN, WY  
OAKLAND, CA  
SANTA BARBARA, CA  
FORT SMITH, AR  
ELKHART, IL  
DOVER, OH  
AKRON, OH  
COLUMBUS, OH  
LEXINGTON, KY  
NEWTON, AL  
GILFORD, NH  
SONOMA, CA  
JACKSON, AL  
AKRON, NY  
ALLEN PARK, MI  
TERRE HAUTE, IN

TOLEDO TENT CO.  
TRAILWISE  
TREEHOUSE HAMMOCKS  
TSI CO.  
UNIFORM HOOD LACE CO.  
UTE MOUNTAIN CORP.  
VESELY COMPANY  
VEGA CORP  
WAGNER AWNING & MFG  
WATERLOO TENT & AWNING  
WAUSAU TENT & AWNING  
WENZEL CO.  
WICHITA PONCA CANVAS PROD  
WILDERNESS EXPERIENCE  
S & W TENT & AWNING  
MILLER SKI CO.  
AAA TENT & AWNING CO.  
GREEN MOUNTAIN AWNING CO.  
METZGER BROS.  
HOGSHIRE TENT & AWNING  
NORFOLK TENT CO.  
PORTSMOUTH TENT & AWNING  
L & A TENT & AWNING  
LINDBLAD CORP  
EASTSIDE TENT & AWNING  
JAN SPORT  
LANCS INDUSTRIES INC.  
CAMP LEWIS TENT & AWNING  
CANVAS SUPPLY CO.  
PUGET SOUND TENT & AWNING  
SEATTLE TENT & FABRIC  
BERG, F.O.  
MYHRE'S EXPLORATION PRODUCTS  
SPOKANE TENT & AWNING  
TACOMA TENT & AWNING  
MOUNTAIN PRODUCTS CORP.  
YAKIMA TENT & AWNING  
WHEELING TENT & AWNING  
BARABOO TENT & AWNING  
GALLAGHER, JOHN, CO.  
DOW CANVAS PRODUCTS INC.  
LAACKE & JOYS CO.

TOLEDO, OH  
BERKELY, CA  
ATHENS, GA  
BRIDGEPORT, CT  
CARMEL, IN  
ENGLEWOOD, CA  
LAPEER, MI  
SYRACUSE, IL  
CLEVELAND, OH  
WATERLOO, IA  
WAUSAU, WI  
ST. LOUIS, MO  
WICHITA, KS  
CHATSWORTH, CA  
FORT WORTH, TX  
OREM, UT  
SALT LAKE CITY, UT  
RUTLAND, VT  
RUTLAND, VT  
NORFOLK, VA  
NORFOLK, VA  
PORTSMOUTH, VA  
SPRINGFIELD, VA  
VIRGINIA BEACH, VA  
BELLEVUE, WA  
EVERETT, WA  
KIRKLAND, WA  
SEATTLE, WA  
SEATTLE, WA  
SEATTLE, WA  
SEATTLE, WA  
SPOKANE, WA  
SPOKANE, WA  
SPOKANE, WA  
TACOMA, WA  
WENCATCHEE, WA  
YAKIMA, WA  
WHEELING, WA  
BARABOO, WI  
MADISON, WI  
MANITOWOC, WI  
MILWAUKEE, WI

6. List of Tents That Met Requirements



COMPANY NAME	TENT NAME	FLOOR AREA (square feet)	HEIGHT (inches)	WEIGHT (lbs.)	VESTIBULE O-OPTIONAL S-STANDARD N/A-NOT AVAILABLE	
1	ADVENTURE 16	HALFDOME	54	46	7-20Z	S ORDERED
2	DIAMOND	MTN HUT 2	52.8	47	7-100Z	O ORDERED
3		SR PRIMA PLUS	57	10		O ORDERED
4	DAISY-PELSUE	QP3-300 3-MAN DOME BACKPACKER	55	51	12	O ORDERED
5	EUREKA	EQUINOS 2	47.6	50	8-140Z	O ORDERED
6		GEOM EX-3	51.58	48	9-30Z	O ORDERED
7	FAMOUS TRAILS	EMERALD GEODOME	56	48	8	S ORDERED
8	FLEX BAND	SUMMIT		48	7-80Z	S ORDERED
9		EXODUS		57	12	S ORDERED
10	GREGORY	TAHQUITZ	49	51	10-10Z	S ORDERED
11		TRANQUILITY	46	52	8-60Z	S ORDERED
12	MOSS	BIG DIPPER	56	49	12	S ORDERED
13	NORTHFACE	VE-25	47.7	49	10	S ORDERED
14	OUTBOUND	BLACK TUSK	53	48	9	S ORDERED
15	WILD COUNTRY	SUPER NOVA	52	49	10-90	S ORDERED
16		HYPERSPACE	47	47	10-130Z	S ORDERED

APPENDIX D

1. Marine Corps Extreme Cold Weather Shelter  
(ECWS) Purchase Description
2. Marine Corps ECWS Commerce Business Daily  
Synopsis

1. Marine Corps Extreme Weather Shelter  
(ECWS) Purchase Description

PURCHASE DESCRIPTION  
FOR THE  
EXTREME COLD WEATHER TENT

1. Scope. This purchase description establishes the requirements for the components and materials used in the development of the Extreme Cold Weather Tent. The tent will provide shelter for missions in areas of extreme cold weather and with large quantities of snowfall. It will be used as a supplement to, but not a replacement for, the bulkier and heavier 5-man and 10-man arctic tents which are too large and heavy for rapid mobility.

2. General Description. The Extreme Cold Weather Tent (ECWT) will require no special tools for erection and striking and shall have a self-supporting design. It will be capable of shedding snow in all configurations to a degree sufficient to ensure the structural integrity of the shelter. It will be constructed of material which is waterproof (fly sheets), vapor-permeable (tent body), flame resistant, and will not emit toxic fumes if exposed to flame. It will be designed to be stable in high winds and will be extremely durable in poor environmental conditions. To match surrounding territory, it will have a choice of two fly sheets, white or olive drab green. It will have a vestibule entrance area with enough space for two men shedding their packs and cold weather clothing before entering the tent body. The vestibule will also act as an area for meal preparation with enough room for four men to sit and eat. The tent will have a hole in the floor, allowing debris to be swept out of the tent without opening the zippered door. Figure 1. depicts the tent body's general description.

3. Applicable Documents. The following documents form a part of this purchase description as specified herein.

3.1 Military Specifications

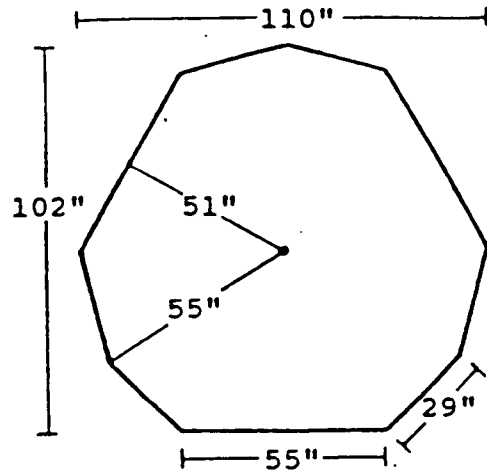
DDD-L-20 - Label; for Clothing, Equipage, and Tentage

MIL-C-44103B - Cloth, Duck, Polyester, Fire, Water, Weather Resistant

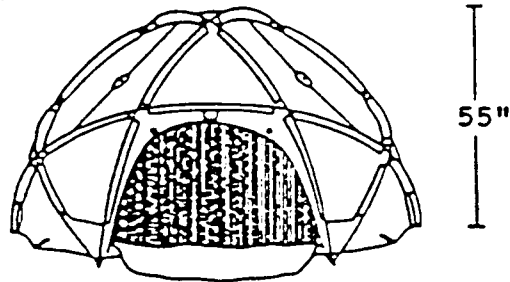
3.2 Military Standards

FED-STD-5 - Standard Guides for Preparation of Item Descriptions by Government Suppliers

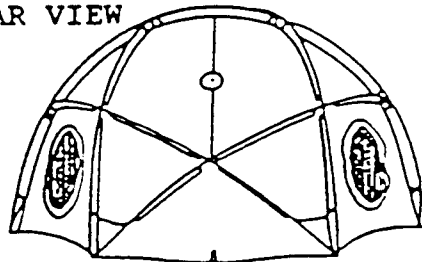
TOP VIEW



FRONT VIEW



REAR VIEW



SIDE VIEW

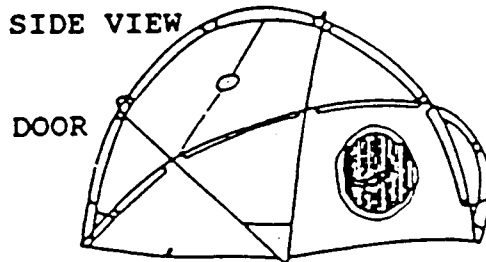


Figure 1. Tent Body

Enclosure (4)

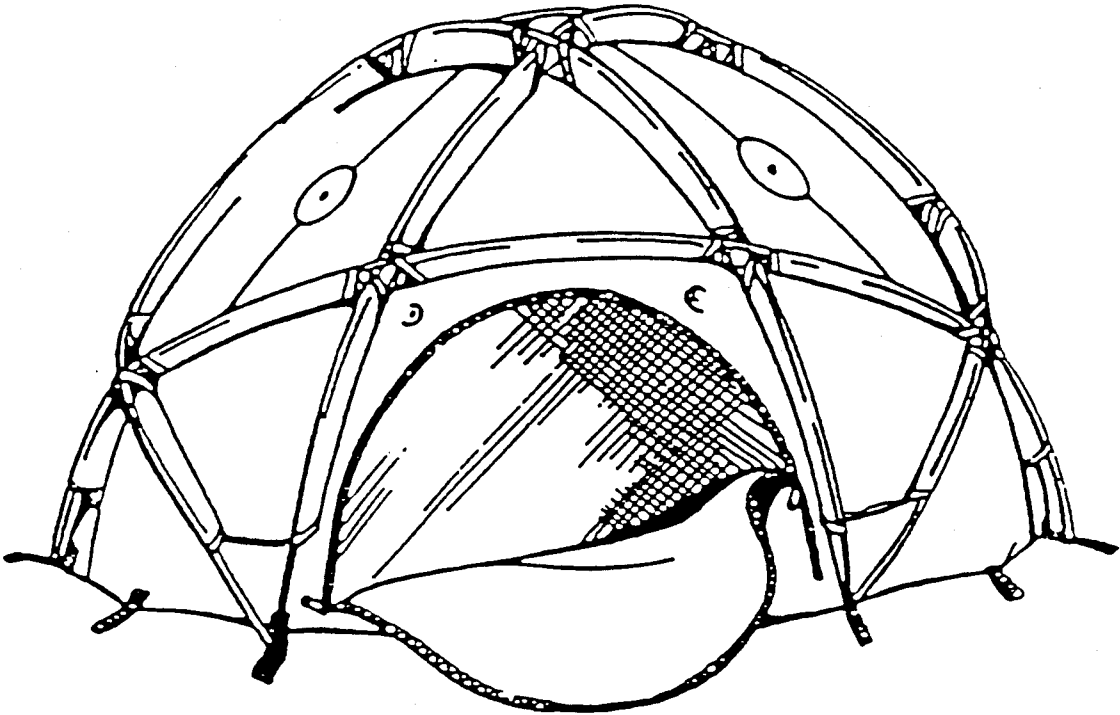


Figure 2. Stress Distribution

Enclosure (4)

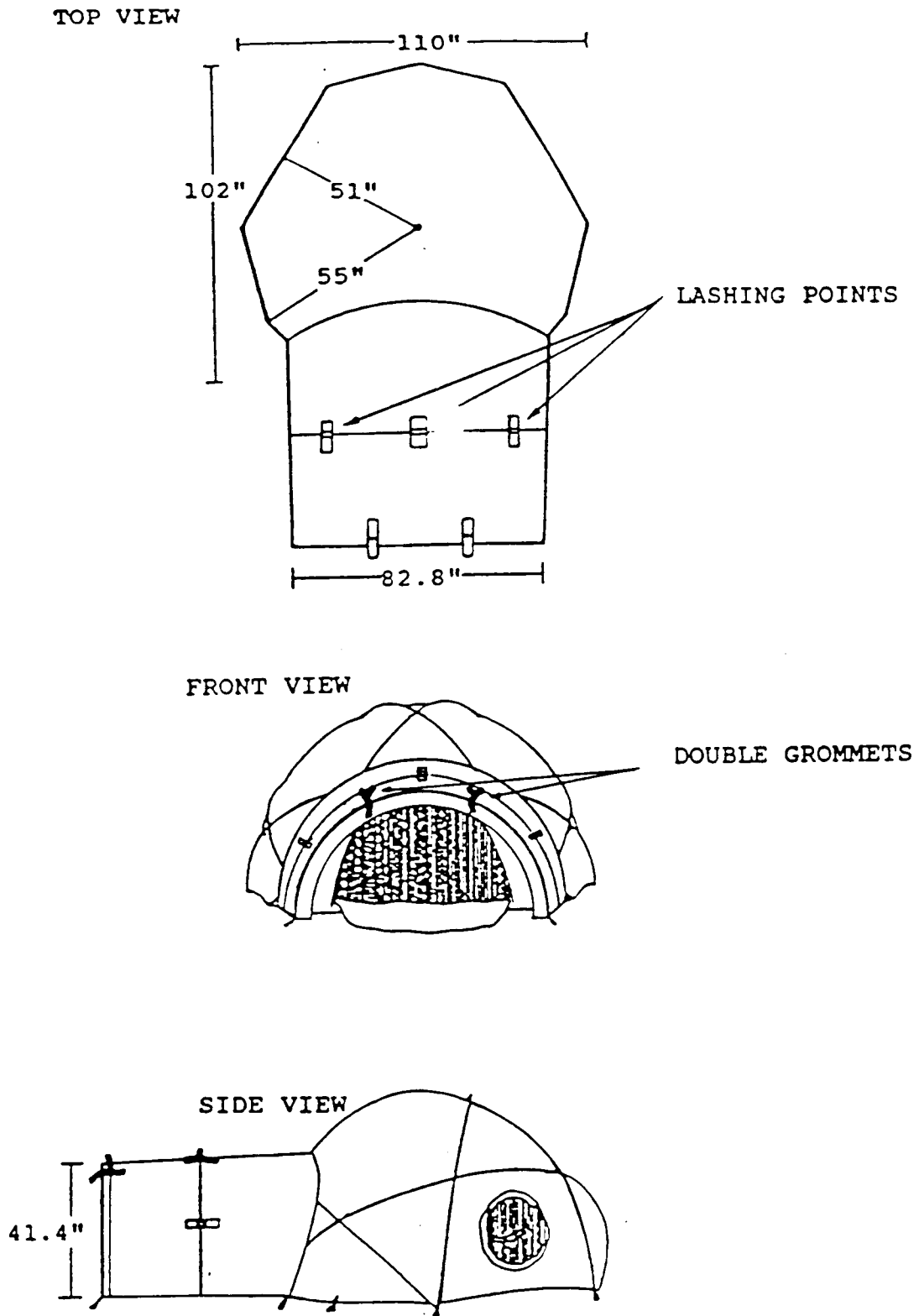
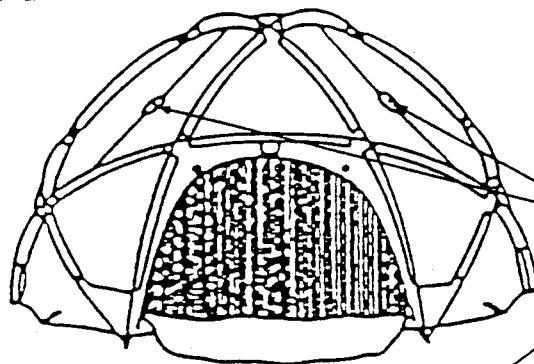


Figure 3. ECWT Vestibule

Enclosure (4)

FRONT VIEW



POLYETHYLENE  
DISCS

REAR VIEW

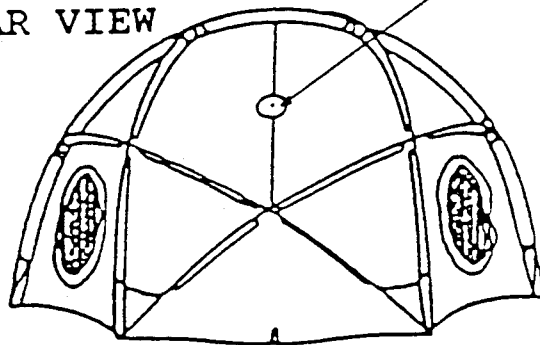
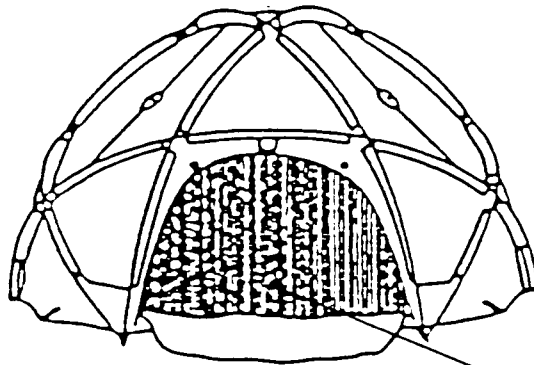


Figure 4. Polyethylene Discs

Enclosure (4)

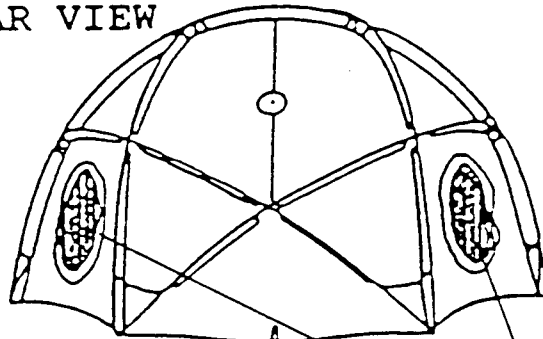


FRONT VIEW



LARGE DOOR

REAR VIEW



VENT/DOORS

SIDE VIEW

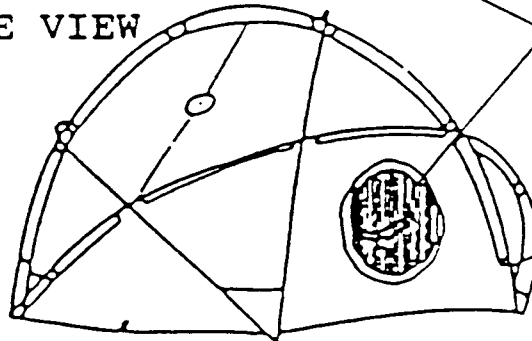


Figure 5. Doors

Enclosure (4)

10

70

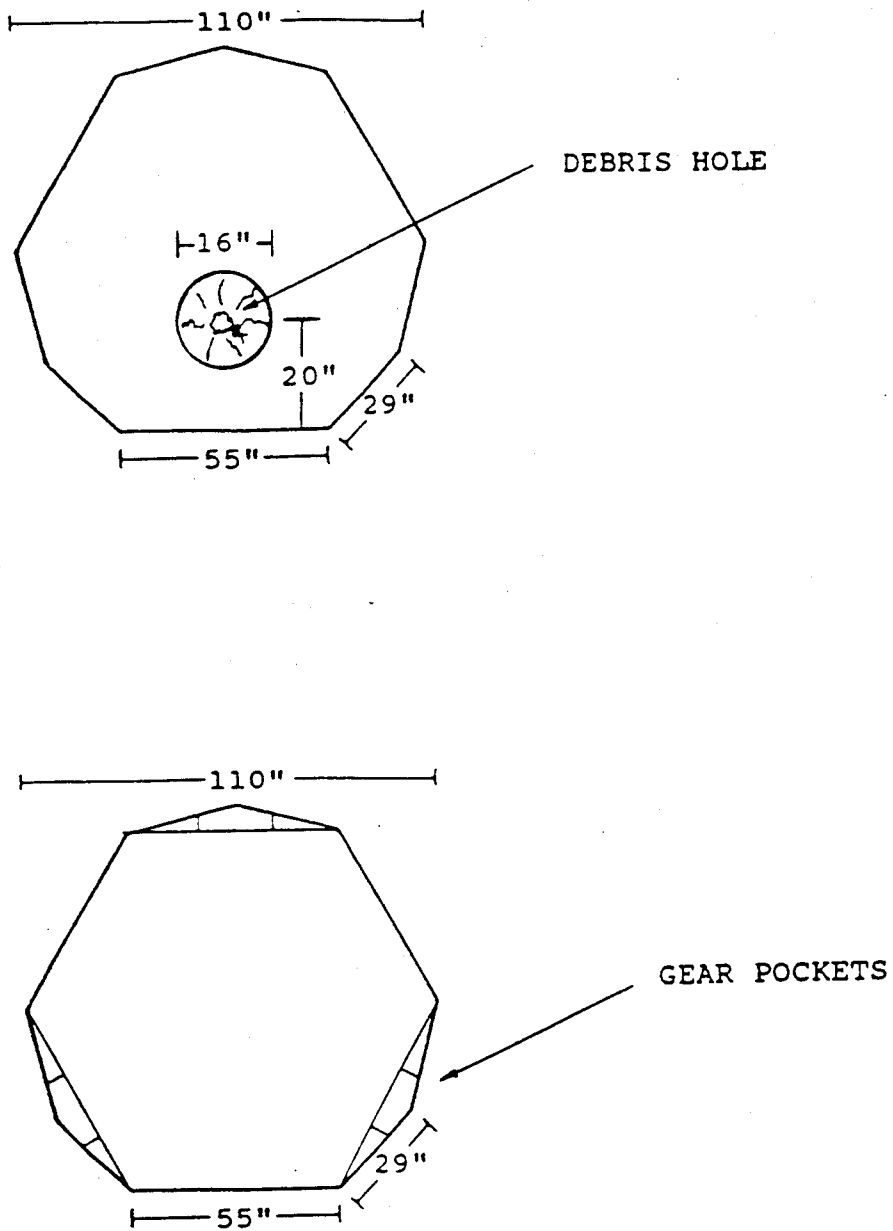


Figure 6. Gear Pockets and Debris Hole

Enclosure (4)

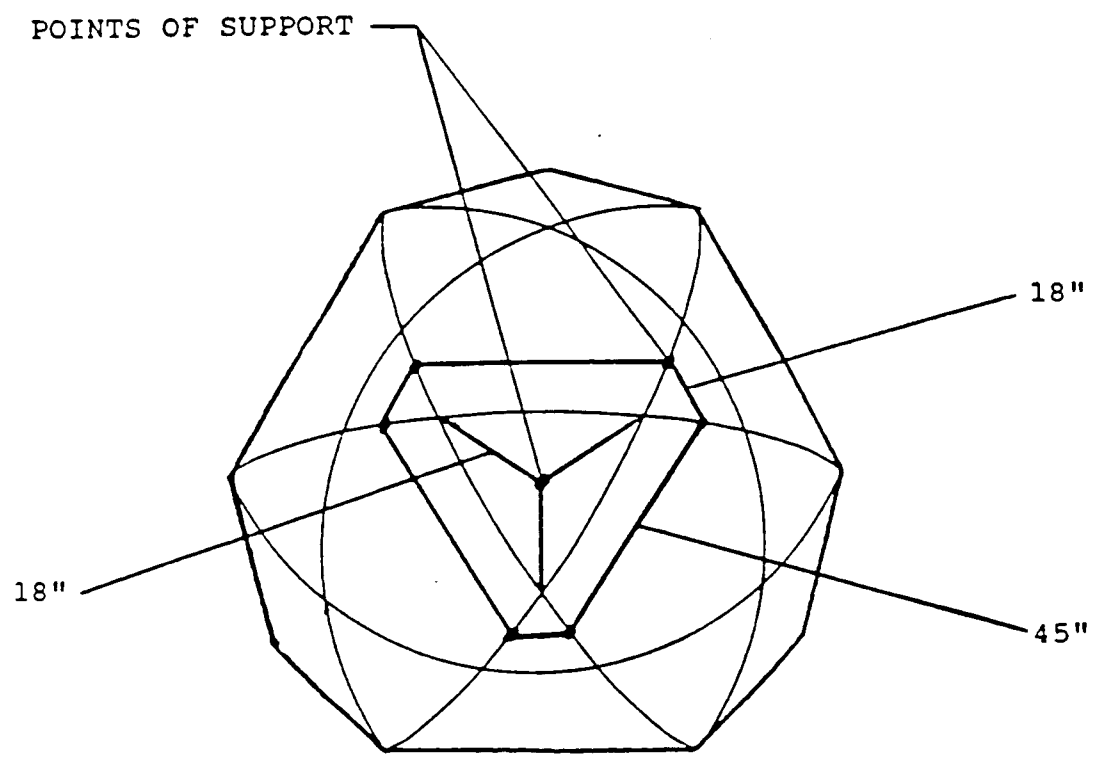


Figure 7. Attic Netting

Enclosure (4)

2. Marine Corps ECWS Commerce Business Daily  
Synopsis

Transmission via CBD Express V. 4.3/S  
Marine Corps Research, Development & Acquisition Cmd

1. R!!
2. 0427!!
3. 90!!
4. 1727!!
5. 20380-0001!!
6. 83!!
7. Commanding General, Marine Corps Research, Development and Acquisition Command, Code CTL, Washington, DC 20380-0001!!
8. 83 -- EXTREME COLD WEATHER TENT!!
9. M67854-90-B-0067!!
10. N/A!!
11. Fran Wilkinson, 202/696-0920, Contracting Officer, Joan Burke, 202/696-0919!!
12. N/A!!
13. N/A!!
14. N/A!!
15. N/A!!
16. N/A!!
17. Correction: The information publicized in the original synopsis 3/7/90 is corrected as follows: The requirement for Extreme Cold Weather Tents (EWCT) shall be Brand Name or Equal to Northface's VE25 tent model with modifications. These modifications will include but not be limited to: (1) The tent dimensions will be larger than the brand name model. (2) A vestibule will be required. The ECWT will not have a hole in the floor. The anticipated delivery is extended from DEC 90 to MAY 91. Minimum salient characteristics are Height- Minimum 55 inches; Area- approximately 58 square feet; Weight 18 pounds or less; Tent Body Pole Sleeves- 1.9 ounces; Floor (urethane taffeta)- 2.2 to 3.0 ounces; Flysheet-2.2 to 3.0 ounces; Repair Kit (Ripstop Tape)-1.9 ounces; Stuffed Size- approximately 8 X 26 inches. Solicitation will be issued under Two Step Sealed Bidding; Step one to be issued on or about 15 June 90. Pre-Bidders Conference is scheduled to be held approximately 3 weeks after issuance of step one. All other information is correct. To telephonic requests will be accepted.\*\*\*\*\*

## 83 Textiles, Leather, Furs, Apparel and Shoe Findings, Tents and Flags

Commanding General, Marine Corps Research, Development and Acquisition Command, Code CTL, Washington, DC 20380-0001

83 -- EXTREME COLD WEATHER TENT SOL M6754-90-B-0067 POC Fran Wilkinson, 202: 696-0920, Contracting Officer, Joan Burke, 202: 696 0949. The Marine Corps has a requirement for Extreme Cold eather Tents (EWCT). The EWCT shall be Brand Name or Equal to Northface's North Star Model, 999 Harrison Street, Burkley CA 94710. The ECWT shall be modified to have a vestibule entrance area with enough space for two men shedding their packs and cold weather clothing before entering the tent body. The vestibule will also act as an area for meal preparation with enough room for four men to sit and eat. The tent will have a hole in the floor allowing debris to be swept out of the tent without opening the zippered door. The tent will be constructed of material which is waterproof (fly sheets), vapor-permeable (tent body), flam resistant, and will not emit toxic fumes if exposed to flame. It will be designed to be stable in high winds and will be extremely durable in poor environment conditions. To match surrounding territory, it will have a choice of two fly sheets, white or olive drab green. The complete tent assembly will fit inside one stuff sack. Base quantity of 3,220 to be delivered December 1990. Delivery is FOB Destination to Camp Lejune, NC. Option quantity 16,000 for FY91, 4,125 for FY92, 4,125 for FY93. Invitation for Bid is estimated to be issue on or about 15 April 1990 with closing date on or about 15 May 1990. Interested offerors will be required to submit a bid sample with bid. Request for solicitation package must be in writing. No telephonic requests will be accepted.