Event Summary - Armored Rescue Vehicle

Vendor:	Lenco Industries, Inc.	**Type**	Request for Bids
Number	005-RFB-0437-2023	**Stage Title**	-
Organization	DASIowa	**Currency**	US Dollar
Exported on	5/15/2023	**Exported by**	David Kundid
Payment Terms	-	**Sealed Bid**	Yes
Intend to Bid	Yes	**Bid Total**	285,481.80 USD

Event Dates

Time Zone	CDT/CST - Central Standard Time (US/Central)
Released	-
Open	4/14/2023 4:00 PM CDT
Close	5/12/2023 3:00 PM CDT
Submission Date	5/9/2023 3:38 PM CDT
Sealed Bid	5/12/2023 3:00 PM
Question Submission Close	5/3/2023 3:00 PM CDT

Event Users

Contacts

David Kundid
david.kundid@iowa.gov
Phone +1 515-745-2796

Description

The purpose of this Request for Bids (RFB) is to solicit bids from qualified providers to provide the goods and/or services described further in this RFB to the Lead Agency and any Participating Agencies. The Lead Agency intends to award a contract(s) beginning and ending on the dates listed in the solicitation, and the Lead Agency may extend the contract(s) for up to the number of annual extensions identified in the solicitation at the sole discretion of the Lead Agency. Any contract(s) resulting from the RFB shall not be an exclusive contract.

This RFB is designed to provide Bidders with the information necessary for the preparation of competitive Bids. The RFB process is for the Lead Agency's and Participating Agencies' benefit and is intended to provide the Lead Agency with competitive information to assist in the selection process. It is not intended to be comprehensive. Each Bidder is responsible for determining all factors necessary for the submission of a comprehensive Bid.

It is advised to "Save Progress" often and especially after uploading documents.

NOTE: Anytime the Bidder opens their bid after the initial submission, they MUST certify and resubmit. No information will be lost from the initial submission.

NOTE: Bidder must approve and resubmit their bid after an amendment has been posted by the Issuing Officer. If the bid was submitted before the amendment, all information will be saved. The Bidder only needs to read and acknowledge the amendment.

Instructions for Amendments: Answer the newly posted question in the Questions Section, and CERTIFY and SUBMIT your bid again (if previously submitted).

The Iowa Department of Administrative Services on behalf of the Iowa Department of Public Safety is seeking eligible Bidders who can supply new, unused Armored Rescue Vehicles per the bid specifications attached. Federal funding may be used to purchase these vehicles and purchases will be on an as needed basis when funding is available over the duration of the Contract.

Contract Term

The term of the contract will begin September 1, 2023 and end on August 30, 2024.

The Agency shall have the sole option to renew the contract upon the same or more favorable terms and conditions for up to three (3) annual extensions. The resulting contract will be available to all State Agencies.

Stage Description

No description available.

Prerequisites

★ Required to Enter Bid

1 ★ **Instructions To Vendor :**

Bidder shall read and make certifications of the their Bid.

Certification

Bidder certifies that they have read and agree to the terms. ✔

Vendor Must Also Upload a File:

No

Prerequisite Content:

Bidder certifies that the contents of this Bid submitted are true and accurate. Bidder also certifies that Bidder has not knowingly made any false statements in its Bid.

Certification of Independence

I certify that I am a representative of Bidder expressly authorized to make the following certifications on behalf of Bidder. By submitting a Bid in response to the RFB, I certify on behalf of the Bidder the following:

1. The Bid has been developed independently, without consultation, communication or agreement with any employee or consultant to the Agency or with any person serving as a member of the evaluation committee.
2. The Bid has been developed independently, without consultation, communication or agreement with any other Bidder or parties for the purpose of restricting competition.
3. Unless otherwise required by law, the information found in the Bid has not been and will not be knowingly disclosed, directly or indirectly prior to Agency's issuance of the Notice of Intent to Award the contract.
4. No attempt has been made or will be made by Bidder to induce any other Bidder to submit or not to submit a Bid for the purpose of restricting competition.
5. No relationship exists or will exist during the contract period between Bidder and the Agency or any other State agency that interferes with fair competition or constitutes a conflict of interest.

Certification Regarding Debarment

I certify that, to the best of my knowledge, neither Bidder nor any of its principals: (a) are presently or have been debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by a Federal Agency or State Agency; (b) have within a five year period preceding this Bid been convicted of, or had a civil judgment rendered against them for commission of fraud, a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) transaction or contract under a public transaction, violation of antitrust statutes; commission of embezzlement, theft, forgery, falsification or destruction of records, making false statements, or receiving stolen property; (c) are presently indicted for or criminally or civilly charged by a government entity (federal, state, or local) with the commission of any of the offenses enumerated in (b) of this certification; and (d) have not within a three year period preceding this Bid had one or more public transactions (federal, state, or local) terminated for cause.

This certification is a material representation of fact upon which the Agency has relied upon when this transaction was entered into. If it is later determined that Bidder knowingly rendered an erroneous certification, in addition to other remedies available, the Agency may pursue available remedies including suspension, debarment, or termination of the contract.

Certification Regarding Registration, Collection, and Remission of Sales and Use Tax

Pursuant to *Iowa Code sections 423.2(10) and 423.5(8) (2013)* a retailer in Iowa or a retailer maintaining a business in Iowa that enters into a contract with a state agency must register, collect, and remit Iowa sales tax and Iowa use tax levied under *Iowa Code chapter 423* on all sales of tangible personal property and enumerated services. The Act also requires Bidders to certify their compliance with sales tax registration, collection, and remission requirements and provides potential consequences if the certification is false or fraudulent.

By submitting a Bid in response to the (RFB), the Bidder certifies the following:

- Bidder is registered with the Iowa Department of Revenue, collects, and remits Iowa sales and use taxes as required by *Iowa Code chapter 423*; **OR**
- Bidder is not a "retailer" or a "retailer maintaining a place of business in this state" as those terms are defined in *Iowa Code subsections 423.1(47) and (48)*.

Bidder also acknowledges that the Agency may declare the Bidder's Bid or resulting contract void if the above certification is false. The Bidder also understands that fraudulent certification may result in the Agency or its representative filing for damages for breach of contract in additional to other remedies available to Agency.

2 ★ **Instructions To Vendor :**

Bidder shall read and authorize to release information for their Bid.

Certification

Bidder certifies that they have read and agree to the Authorization to Release Information. ✔

Vendor Must Also Upload a File:

No

Prerequisite Content:

Bidder hereby authorizes the Iowa Department of Administrative Services ("Agency") or a member of the Evaluation Committee to obtain information regarding its performance on other contracts, agreements or other business arrangements, its business reputation, and any other matter pertinent to evaluation and the selection of a successful Bidder in response to this Request for Bids (RFB)**.**

The Bidder acknowledges that it may not agree with the information and opinions given by such person or entity in response to a reference request. The Bidder acknowledges that the information and opinions given by such person or entity may hurt its chances to receive contract awards from the State or may otherwise hurt its reputation or operations. The Bidder is willing to take that risk.

The Bidder hereby releases, acquits and forever discharges the State of Iowa, the Agency, their officers, directors, employees and agents from any and all liability whatsoever, including all claims, demands and causes of action of every nature and kind affecting the undersigned that it may have or ever claim to have relating to information, data, opinions, and references obtained by the Agency or the Evaluation Committee in the evaluation and selection of a successful Bidder in response to the RFB.

The Bidder authorizes representatives of the Agency to contact any and all of the persons, entities, and references which are, directly or indirectly, listed, submitted, or referenced in the Respondent's Bid submitted in response to RFB.

The Bidder further authorizes any and all persons, and entities to provide information, data, and opinions with regard to its performance under any contract, agreement, or other business arrangement, its ability to perform, business reputation, and any other matter pertinent to the evaluation of the Bidder’s Bid. The Bidder hereby releases, acquits and forever discharges any such person or entity and their officers, directors, employees and agents from any and all liability whatsoever, including all claims, demands and causes of action of every nature and kind affecting the Bidder that it may have or ever claim to have relating to information, data, opinions, and references supplied to the Agency in the evaluation and selection of a successful Bidder in response to RFB.

Buyer Attachments

Exceptions Form RFB.docx	Exceptions Form RFB.docx	../../Attachments/Exceptions Form RFB.docx
Vehicle Specifications Worksheet 4.17.23.pdf	Vehicle Specifications Worksheet 4.17.23.pdf	../../Attachments/Vehicle Specifications Worksheet 4.17.23.pdf
Vehicle Specifications Terms and Conditions.pdf	Vehicle Specifications Terms and Conditions.pdf	../../Attachments/Vehicle Specifications Terms and Conditions.pdf

Vendor Attachments

Vehicle Specifications Worksheet 4.17.23.pdf	Vehicle Specifications Worksheet 4.17.23.pdf	../../SupplierAttachments/SupplierAttachments/Vehicle Specifications Worksheet 4.17.23.pdf
5 shots 7.62 x 61 AP.pdf	5 shots 7.62 x 61 AP.pdf	../../SupplierAttachments/SupplierAttachments/5 shots 7.62 x 61 AP.pdf
7.62x51 (3) on triangle aka B7.pdf	7.62x51 (3) on triangle aka B7.pdf	../../SupplierAttachments/SupplierAttachments/7.62x51 (3) on triangle aka B7.pdf
10 Shot Photo 50 Cal.JPG	10 Shot Photo 50 Cal.JPG	../../SupplierAttachments/SupplierAttachments/10 Shot Photo 50 Cal.JPG
10 Shots 50 cal on steel.pdf	10 Shots 50 cal on steel.pdf	../../SupplierAttachments/SupplierAttachments/10 Shots 50 cal on steel.pdf
Aberdeen Test Center with Brake Testing.pdf	Aberdeen Test Center with Brake Testing.pdf	../../SupplierAttachments/SupplierAttachments/Aberdeen Test Center with Brake Testing.pdf
Armor Testing - NIJ IV 30-06.pdf	Armor Testing - NIJ IV 30-06.pdf	../../SupplierAttachments/SupplierAttachments/Armor Testing - NIJ IV 30-06.pdf
B7 Test Report - Ballistic Glass 7.62 x 51 mm.pdf	B7 Test Report - Ballistic Glass 7.62 x 51 mm.pdf	../../SupplierAttachments/SupplierAttachments/B7 Test Report - Ballistic Glass 7.62 x 51 mm.pdf
B7 Test Report - Steel Armor.pdf	B7 Test Report - Steel Armor.pdf	../../SupplierAttachments/SupplierAttachments/B7 Test Report - Steel Armor.pdf
BearCat Rear Running Board – Weight Capacity Test Report.pdf	BearCat Rear Running Board – Weight Capacity Test Report.pdf	../../SupplierAttachments/SupplierAttachments/BearCat Rear Running Board – Weight Capacity Test Report.pdf
BearCat Side Running Board – Weight Capacity Test Report.pdf	BearCat Side Running Board – Weight Capacity Test Report.pdf	../../SupplierAttachments/SupplierAttachments/BearCat Side Running Board – Weight Capacity Test Report.pdf
ColorSheet 11_22.pdf	ColorSheet 11_22.pdf	../../SupplierAttachments/SupplierAttachments/ColorSheet 11_22.pdf
G2 4 DR Drawings w Dimensions.pdf	G2 4 DR Drawings w Dimensions.pdf	../../SupplierAttachments/SupplierAttachments/G2 4 DR Drawings w Dimensions.pdf
Glass .50 Cal Ball Proof with Photos.pdf	Glass .50 Cal Ball Proof with Photos.pdf	../../SupplierAttachments/SupplierAttachments/Glass .50 Cal Ball Proof with Photos.pdf
INTERIOR DIMENSIONS.jpg	INTERIOR DIMENSIONS.jpg	../../SupplierAttachments/SupplierAttachments/INTERIOR DIMENSIONS.jpg
Lenco_20mm FSP Artillery_Glass Report.pdf	Lenco_20mm FSP Artillery_Glass Report.pdf	../../SupplierAttachments/SupplierAttachments/Lenco_20mm FSP Artillery_Glass Report.pdf
one piece side wall.jpg	one piece side wall.jpg	../../SupplierAttachments/SupplierAttachments/one piece side wall.jpg
Turning Radius Overhead.pdf	Turning Radius Overhead.pdf	../../SupplierAttachments/SupplierAttachments/Turning Radius Overhead.pdf
Turning Radius Video.doc	Turning Radius Video.doc	../../SupplierAttachments/SupplierAttachments/Turning Radius Video.doc
COI - 8.10.22.pdf	COI - 8.10.22.pdf	../../SupplierAttachments/SupplierAttachments/COI - 8.10.22.pdf

Questions

★ Vendor Response Is Required

Page1

Group 1: Form of Bid

1.1 Enter the Bidder's contact name, telephone number, email address, and shipping address for questions regarding this solicitation. ★

Text (Multi-Line)

Rob Weisberger (413) 443-7359 rweisberger@lencoarmor.com 10 Betnr Industrial Dr. Pittsfield, MA 01201

1.2 Enter the Bidder's State or Foreign Country of Residence. ★

Text (Single Line)

Massachusetts

1.3 Bidder shall enter the Resident Preference given by the State or Foreign Country of the Bidder's residence. Enter the resident preference in the text box or indicate "no preference". ★

Text (Single Line)

no preference

1.4 Enter the number of years the Bidder has been in business in the text box. ★

Numeric Text Box

42.00

1.5 Enter the number of years of experience the Bidder has with providing the types of goods and/or services sought by the solicitation. ★

Text (Single Line)

22

1.6 The Bidder shall provide references from three (3) previous customers or clients knowledgeable of the Bidder's performance in providing goods and/or services similar to the goods and/or services described in this solicitation. Enter a contact person, telephone number and email address for each reference. Fill out the text box. If the Bidder wants to upload reference letters to the Vendor Attachments Section, enter "see attached" in the text box. ★

Text (Multi-Line)

Lieutenant Francis Rego, Miami-Dade Police Department SRT (786) 205-5595 fprego@mdpd.com; Detective Cesar Hernandez, Orlando Police Department (407) 246-2942 cesar.hernandez@orlando.gov; Deputy Shane Leeth, Hancock County Sheriff's Office (Ohio) (419) 348-7341 smleeth@co.hancock.oh.us

1.7 Bidder shall read, fill-out and upload the Terminations, Litigation and Debarment document. ★

File Upload

Terminations.pdf - ./SupplierAttachments/QuestionAttachments/Terminations.pdf

Terminations, Litigation and Debarment Document -

1.8 Is the Bidder requesting confidential treatment of specific information? ★

Yes/No

No

1.9 A Bidder requesting confidential treatment of specific information shall fully complete the form attached. In the Items Section, mark each good or service upon which the Bidder believes confidential information appears. ★

File Upload

No response.

Form 22 - ../../Attachments/QuestionAttachments/Form 22 -11.22.pdf

1.10 The State of Iowa requires shipping to be FOB Destination, Freight Prepaid. Does the Bidder agree to the terms? ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT accept the Terms
Bidder agrees but will submit exceptions

Bidder agrees

Group 2: Terms and Conditions

2.1 Bidder shall read the RFB Definitions and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT agree to the Definitions
Bidder agrees but will submit exceptions

Bidder agrees

Definitions - ../../Attachments/QuestionAttachments/Definitions 11.22.pdf

2.2 Bidder shall read the Administrative Terms and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT accept the Terms & Conditions
Bidder agrees and will submit exceptions

Bidder agrees

Administrative Terms - ../../Attachments/QuestionAttachments/Administrative Terms 11.22.pdf

2.3 Bidder shall read the Contract Terms & Conditions and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT accept the Terms & Conditions
Bidder agrees and will submit exceptions

Bidder agrees

Contract Terms & Conditions - ../../Attachments/QuestionAttachments/Contract Terms and Conditions

2.4 Bidder shall read the Specification Terms and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder agrees but will submit exceptions
Bidder does NOT accept the Terms

Bidder agrees

Specifications - ../../Attachments/QuestionAttachments/Specifications 11.22.pdf

2.5 Bidder shall read the Terms and Conditions for GOODS and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder agrees but will submit exceptions
Bidder does NOT accept the Terms

Bidder agrees but will submit exceptions

Terms and Conditions for GOODS - ../../Attachments/QuestionAttachments/GOODS Terms and

2.6 Bidder shall read the Federal Terms and Conditions and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder agrees but will submit exceptions
Bidder does NOT accept the Terms & Conditions

Bidder agrees

Federal Terms and Conditions - ../../Attachments/QuestionAttachments/FEDERAL Terms and

2.7 Bidder shall read the Insurance Requirements and enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder agrees but will submit exceptions
Bidder does NOT accept the Insurance requirements

Bidder agrees but will submit exceptions

Insurance Requirements - ../../Attachments/QuestionAttachments/Insurance Requirements RFB.pdf

2.8 The Bidder hereby explicitly authorizes the Agency to conduct criminal history and/or other background investigation(s) of the Bidder, its officers, directors, shareholders, or partners and managerial and supervisory personnel retained by the Bidder for the performance of the resulting Contract. Bidder shall enter a response. ★

Dropdown List (Pick One)

Bidder agrees
The Bidder does NOT except the Terms
Bidder agrees but will submit exceptions

Bidder agrees

2.9 Public Entities (Political Subdivisions) - The resulting Contract will be made available to Political Entities, i.e. cities, counties, and schools. Bidder shall enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT accept the Terms & Conditions
Bidder agrees but will submit exceptions

Bidder agrees

2.10 Nonprofit Entities - The resulting Contract will be made available to nonprofit entities that qualify under I.R.S. § 501 (c) provisions. Bidder shall enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT accept the Terms & Conditions
Bidder agrees but will submit exceptions

Bidder agrees but will submit exceptions

2.11 Quarterly Sales Report - The Bidder shall provide a detailed quarterly report in Microsoft Excel on ALL sales made under the resulting Contract via e-mail to the Iowa Department of Administrative Services. Bidder shall enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT except the Terms
Bidder agrees but will submit exceptions

Bidder agrees

2.12 Administrative Fee - In addition to the approved discounts or prices specified in the solicitation herein, the Bidder shall pay to the Agency a $300 Administrative Fee per completed vehicle made against this resulting Contract. The fee shall be paid quarterly to the Iowa Department of Administrative Services. Bidder shall enter a response. ★

Dropdown List (Pick One)

Bidder agrees
Bidder agrees but will submit exceptions
Bidder does NOT accept the Terms

Bidder agrees

Group 3: Payment Terms

3.1 Payment Terms - Per Iowa Code § 8A.514 the State of Iowa is allowed sixty (60) days to pay an invoice submitted by a Bidder. Does the Bidder agree to the terms? ★

Dropdown List (Pick One)

Bidder agrees
Bidder does NOT except the Terms
Bidder agrees but will submit exceptions

Bidder agrees

3.2 What discount will the Bidder give for payment in 15 days? Enter the discount in the text box. If none, enter zero. ★

Numeric Text Box

0.00

3.3 What discount will the Bidder give for payment in 30 days? Enter the discount in the text box. If none, enter zero. ★

Numeric Text Box

0.00

Group 4: Specifications

4.1 The Respondent shall provide a schematic and/or a diagram which shall include, but not limited to show the proposed exterior of the Armored Rescue Vehicle. ★

Yes/No

Yes

4.2 Respondent shall meet the specifications listed in the attached Vehicle Specifications Worksheet. Respondent shall fill out the attachment, complete Vehicle Specifications Worksheet, and upload it with their bid response ★

Yes/No

Yes

4.3 Vehicle shall be fully functional upon delivery to DAS Fleet Services located at 109 S.E. 13th Street, Des Moines, IA 50319. Respondent shall submit an invoice after vehicle inspection and acceptance. ★

Yes/No

Yes

4.4 This specialized vehicle must be warranted to be free from defects in material or workmanship under normal use and service. The warranty period must begin on the day of acceptance. All warranty documentation must be delivered with the vehicle. This includes warranty information for the chassis and body up-fit accessories and parts as applicable. Standard vehicle warranty parts must be a minimum of three (3) or 36,000 miles. ★

Yes/No

Yes

4.5 Respondent shall submit pricing for optional equipment, accessories, and services in their Bid. Optional equipment and accessory pricing shall not be considered a part of the award price. However, the resulting Contract will be available to other governmental agencies and political subdivisions who may require custom options beyond what is provided in the Armored Rescue Vehicle specifications of this RFB. The State of Iowa is seeking to provide maximum flexibility to serve the needs of all purchasing entities. ★

Yes/No

Yes

Product Line Items

★ Required Product Line Items

Group P1: Bid Specifications. Bidder must satisfy all the specifications to be deemed a Responsible Bidder

#	Item Name, Commodity Code, Description	Allow Alternates	Qty.	UOM	Requested Delivery	Unit Price (USD)	Total Unit Price (USD)	Total Price (USD)	Estimated Delivery
P1.1	Armored Rescue Vehicle ★ - **Comment**		1	EA - Each	-	279,777.00	279,777.00	279,777.00	5/10/2024
	Percentage Off: -								
P1.2	Delivery to DAS Fleet Services located at 109 S.E. 13th Street, Des Moines, IA 50319 ★ - **Comment**		1	EA - Each	-	5,700.00	5,700.00	5,700.00	5/10/2024
	Percentage Off: -								
P1.3	Per mile charge for delivery anywhere within the State of Iowa ★ - **Comment**		1	MILE - Mile	-	4.80	4.80	4.80	5/10/2024
	Percentage Off: -								
					Total Price (USD)		285,481.80		

Q&A Board

Subject = Question from International Armored Group		Public Thread
Q: The specification calls for a two-piece front windshield but would a single piece windshield be acceptable? The single piece windshield is a superior design due to not having a blind spot that is caused by the center metal brace that is part of the two-piece windshield design. The single piece windshield offers more visibility than the two-piece windshield.	Question added by: David Kundid	4/21/2023 9:48 AM CDT
A: The current requirements are sufficient for the ballistic protection and window configuration.	Answered by: David Kundid	4/21/2023 9:48 AM CDT

Subject = Question from International Armored Group		Public Thread
Q: The specification states that the “Chassis” Armoring Level is threat level 4. Capable of stopping up to 7.62cal and lower. I assume that this is referring to level NIJ IV. Is this correct? Later in the specification in the “Armor” section it states that the “Armor level must meet or exceed NIJ IV + .50 caliber”. This is different than what is asked for in the “Chassis” section so please clarify. Also in the “Windows” Section , it states “All windows must meet or exceed NIJ IV/ .50 caliber armor piercing.” Please clarify as this is also very different than the armoring requested above. Below is the chart for NIJ IV armoring for reference. As you will see it, does not account for .50 caliber as there is no NIJ IV + on the official NIJ scale. The National Institute of Justice (NIJ) provides scientific research and development for the United States Department of Justice (DOJ). This government agency sets the voluntary national standard for ballistically certified materials. If .50 caliber protection is preferred it would not fall under the NIJ Standard.	Question added by: David Kundid	4/21/2023 9:48 AM CDT
A: The current requirements are sufficient for the ballistic protection and window configuration.	Answered by: David Kundid	4/21/2023 9:48 AM CDT

H.P. White Laboratory, Inc.

BALLISTIC RESISTANCE TEST

Client : LENCO INDUSTRIES

Job No. : 9770-03 Test Date : 10/3/05

TEST PANEL

Manufacturer : LENCO INDUSTRIES
Size : 18 x 18 in.
Thicknesses : 0.483, 0.485, 0.480, 0.482 in.
Avg. Thick. : 0.482 in.
Description : 1/2" HIGH HARD STEEL

Sample No. : TS06
Weight : 43.70 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 09-23-05
Via : YELLOW
Returned : Federal Express

SET-UP

Shot Spacing : 4 ON 8" SQUARE - 1 IN CENTER
Witness Panel : 0.020", 2024-T3 ALUMINUM
Obliquity : 0 deg.
Backing Material : NA
Conditioning : AMBIENT

Primary Vel. Screens : 6.5 ft., 9.5 ft.
Primary Vel. Location : 8.0 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 50.0 ft.
Target to Wit. : 6.0 in.

Range No. : 5
Temp. : 66 F
BP : 30.12 in. Hg
RH : 52%
Barrel No./Gun : TEST BARREL
Gunner : UNGER
Recorder : POOLE

AMMUNITION

(1) : 7.62mm AP, M61, 150 gr. Lot No. : FN70-72
(2) : Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0108.01 (MODIFIED)
(2) : SPECIAL REQUEST
(3) : REQUIRED VELOCITY : 2750-2850 fps.

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	1069	2806	1076	2788	2797	None	
2	1	1056	2841	1063	2822	2832	None	
3	1	1063	2822	1070	2804	2813	None	
4	1	1070	2804	1073	2796	2800	None	
5	1	1064	2820	1071	2801	2810	None	

REMARKS :

FOOTNOTES :

Filename : 9770-03 (TS06) LENCO INDUSTRIES.Pen

28 April 2017

Lenco Armored Vehicles
10 Betnr Industrial Drive
Pittsfield, MA 01201

Attention: Mr. Lenny Light

Subject: Lenco Armored Vehicles, Armor Protection Ballistic Resistance Test: Job No. 2427-034-B, Tested 13 April 2017, Purchase Order No. 60984

Dear Mr. Light:

Please find enclosed a report documenting the subject test series conducted by NTS-Chesapeake Testing on 13 April 2017. This report includes a detailed shot record for each armor sample tested.

If you have any questions related to this test, please call Mr. Craig Thomas at 410 297 8154 or contact him via e-mail at craig.thomas@nts.com.

Sincerely,

Chris Schueler
General Manager, NTS-Chesapeake Testing

lmd

Enc. a/s

POC: Mr. Lenny Light
Purchase Order No.: 60984
Test Date: 13 April 2017
Job No.: 2427-034-B

Lenco Armored Vehicles,
Armor Protection Ballistic Resistance Test

Prepared by:

Craig A. Thomas
Laura M. Deptol

NTS-Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

14 April 2017

Further dissemination only as directed by
Lenco Armored Vehicles, April 2017.

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

Client: Lenco Armored Vehicles
Job No.: 2427-034-1
Test Date: 4/13/2017

Test Panel

Description: 1/2" 46100, E6D055-303, 6655670, P.O. 59604-A

Manufacturer: Lenco Armored Vehicles

Sample No.: 4

Size: 18.00 x 18.00 in	Weight: 45.72 lbs	Date Received: 4/3/2017
Avg. Thick: 0.527 in	Plies/Laminates: NA	Via: FedEx Freight
Thickness: 0.530 in; 0.529 in; 0.526 in; 0.521 in		Returned: FedEx

Setup

Shot Spacing: 3 shots on a 120 mm triangle	Primary Vel. Screens (ft): 20.000, 20.333, 29.667, 30.000	Range No.: 6
Witness Panel: .001 in Aluminum foil with splinter box	Primary Vel. Location (ft): 25.000	Temp: 65.3 °F
Backing Material: NA	Range to Target (ft): 32.800	BP: 29.7 inHg
Condition: Ambient	Target to Witness (in): 19.680	RH: 54.0%
		Barrel/Gun: CT-6027
		Gunner: Jacob Arisman
		Recorder: J. Thomas

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 150-grain M61 AP	Military	N133

Applicable Standards or Procedures

(1) EN 1063 BR7, dated 15 July 2000
(2) Customer request

Shot No.	Ammo	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	150.1	3695	2706	3451	2705	2705	2700	None	0.0	
2	1	151.2	3675	2721	3431	2720	2721	2715	None	0.0	
3	1	150.6	3710	2695	3465	2694	2695	2689	None	0.0	

Remarks:
Required velocity: 2690 ±32 ft/s

Footnotes:


.501
.501
1
1
2
2
5
5
4
4
3
3
2
498
45.33

H.P. White Laboratory, Inc.

BALLISTIC RESISTANCE TEST

Client : LENCO INC.

Job No. : 10441-01 Test Date : 2/20/07

TEST PANEL

Manufacturer : UNK.
Size : 18 x 18 in.
Thicknesses : 0.498, 0.501, 0.501, 0.501 in.
Avg. Thick. : 0.500 in.
Description : 1/2" STEEL PANEL

Sample No. : HPW-4 (M-2)
Weight : 45.33 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 02/15/07
Via : UPS
Returned : N/A

SET-UP

Shot Spacing : 4 ON 8" SQUARE - 1 IN CENTER
Witness Panel : 0.020", 2024-T3 ALUMINUM
Obliquity : 0 deg.
Backing Material : NA
Conditioning : AMBIENT

Primary Vel. Screens : 15.0 ft., 35.0 ft.
Primary Vel. Location : 25.0 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 45.0 ft.
Target to Wit. : 6.0 in.

Range No. : 3
Temp. : 75 F
BP : 29.47 in. Hg
RH : 23%
Barrel No./Gun : TEST BARREL
Gunner : BONSALL
Recorder : BLACK

AMMUNITION

(1) : CAL. .50, M2, BALL, 695 gr. Lot No. :
(2) : CAL. .50, M33, BALL, 643 gr. Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

(1) : REQUIRED VELOCITY : 2800-2900 fps.
(2) :
(3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	7079	2825	7081	2824	2825	None	
2	1	7002	2856	7003	2856	2856	None	
3	1	6994	2860	6995	2859	2859	None	
4	1	6975	2867	6976	2867	2867	None	
5	1	7025	2847	7026	2847	2847	None	
6	2	6940	2882	6945	2880	2881	None	
7	2	6992	2860	6993	2860	2860	None	
8	2	7045	2839	7046	2838	2839	None	
9	2	7000	2857	7001	2857	2857	None	
10	2	6962	2873	6963	2872	2873	None	

REMARKS :

FOOTNOTES :

Filename : 10441-01 (HPW-4 (M-2)) LENCO INC..Pen

U.S. ARMY ABERDEEN TEST CENTER
ABERDEEN PROVING GROUND, MARYLAND 21005-5059
TEST RECORD

21 MAY 2007

ATEC Project No.: 2007-DT-ATC-AFSPT-D2979
Test Type and Title: Armored Vehicle Roll-Over Test

Dates of Test: 13 November 2006 through 1 March 2007

Authority: ATEC Decision Support System 14 September 2006

Test Record No.: AD-V-25-07

TEST ITEM

One Ballistic Engineered Armored Response Counter Attack Truck (BearCat), vehicle identification number (VIN) 1FDA57P76EC11173, was provided by Lenco Industries of Pittsfield, Massachusetts, for testing at the U.S. Army Aberdeen Test Center (ATC), Aberdeen Proving Ground (APG), Maryland.

The Lenco BearCat is an armored personnel carrier constructed on a commercially available Ford Motor Company F-550 Chassis with modifications by Lenco Industries providing seating capacity for ten passengers. Modifications include a shortened wheelbase, a one-piece armor hull constructed of 1.27 centimeter (cm) (0.5 inches (in.)) thick high-hard certified ballistic steel, ballistic glass, nine gunports and a myriad of other available options. The U.S. Air Force Space Command, Directorate of Security Forces, intends to utilize the BearCat as a standardized security vehicle at Peterson Air Force Base, Colorado, in replacement of their current High Mobility Multi-purpose Wheeled Vehicle (HMMWV) fleet.

SUPPORTING FACILITIES AND INSTRUMENTATION

a. Facilities

(1) ATC Engineering Test Facility (Building 436)

(2) ATC Tilt Table

(3) ATC Munson Test Area (MTA)

(4) ATC Perryman Test Area (PTA)

(5) ATC Churchville Test Area (CTA)

(6) Philips Army Airfield (PAAF)

The use of trade names in this document does not constitute and official endorsement or approval of the use of such commercial hardware or software. This document may not be cited for purposes of advertisement.

b. Instrumentation

(1) Advanced Distributed Modular Acquisition System (ADMAS)

(2) Advanced On-Board Computer System (ADOCS)

DETAILS OF TEST

Objective. ATC was tasked with performing vehicle performance testing to determine the dynamic vehicle characteristics of the BearCat at Gross Combat Weight (GCW). Characteristic photographs of the BearCat at GCW are shown in Figures 1, 2 and 3.

Figure 1. Left front three-quarter view of the BearCat.

Figure 2. Front view of the BearCat.

Figure 3. Right side view of the BearCat.

SUMMARY OF RESULTS

a. Physical Dimensions. Test Operating Procedure (TOP) 2-2-500, Vehicle Characteristics, and Society of Automotive Engineers (SAE) J1100, Motor Vehicle Dimensions, were used as general guides during this test. The dimensions of the BearCat were measured at the Vehicle Curb Weight (VCW) and GCW. The physical characteristics of the BearCat at VCW and GCW are presented in Table 1.

TABLE 1. OVERALL DIMENSIONS OF THE BEARCAT

Parameter	Location	Measurement	
		cm	in.
Overall length	Front tow eyes to rear step	565.3	222.6
Overall width	Left rear tire bulge to right rear tire bulge	243.0	95.7
Overall height	Top of the gun cupola shield - VCW	267.8	105.4
	Top of the gun cupola shield - GCW	267.0	105.1
Axle spacing	Front to rear axle – left side	317.8	125.1
	Front to rear axle – right side	317.5	125.0
	Front overhang	95.4	37.6
	Rear overhang	152.1	59.9
Tread	Axle no. 1 left side to right side tire centerline	176.0	69.3
	Axle no. 2 left side to right side tire centerline	188.0	74.0
Minimum width between traction elements	Axle no. 1 - VCW	171.2	67.4
	Axle no. 2 -VCW	133.1	52.4
	Axle no. 1 - GCW	171.2	67.4
	Axle no. 2 -GCW	133.1	52.4
Angle of approach	Front bumper - VCW	39.7°	
	Front bumper - GCW	39.3°	
Angle of departure	Rear step - VCW	21.8°	
	Rear step - GCW	21.3°	
Breakover angle	Catalytic converter- VCW	40.7°	
	Catalytic converter- GCW	40.6°	

b. Weight Distribution. TOP 2-2-801, Load Distribution and Ground Pressure, was used as a general guide during this test. The weight distribution and total weight of the BearCat was determined by sequential weighing on a calibrated platform scale (accuracy $\pm$0.5 percent of reading). Weight distribution and total weight of the BearCat were measured at VCW and GCW and are presented in Table 2.

TABLE 2. WEIGHT DISTRIBUTION OF THE BEARCAT

Axle Location	Weight								
	Left			Right			Total		
	kg	lb	%	kg	lb	%	kg	lb	%
Lenco BearCat at VCW									
Front axle	1,570	3,460	19.7	1,540	3,400	19.3	3,110	6,860	39.0
Rear axle	2,410	5,310	30.2	2,465	5,430	30.9	4,875	10,740	61.0
Total	3,980	8,770	49.8	4,005	8,830	50.2	7,985	17,600	100.0
Lenco BearCat at GCW									
Front axle	1,590	3,510	18.0	1,640	3,620	18.6	3,230	7,130	36.6
Rear axle	2,840	6,260	32.2	2,755	6,070	31.2	5,595	12,330	63.4
Total	4,430	9,770	50.2	4,395	9,690	49.8	8,825	19,460	100.0

c. Ground Clearance. A bottom profile of the BearCat was created in accordance with the North Atlantic Treaty Organization (NATO) Reference Mobility Model (NRMM). Each ground clearance measurement location of the vehicle was given a sequential “J Number” starting from the front of the vehicle. The list of “J Numbers”, their physical description and associated values are presented in Table 3.

TABLE 3. GROUND CLEARANCE OF THE BEARCAT

Location	J Number	X-Coordinate[a]		Lenco BearCat at VCW		Lenco BearCat at GCW	
				Y-Coordinate[b]		Y-Coordinate[b]	
		cm	in.	cm	in.	cm	in.
Rear step	J14	0.0	0.0	58.4	23.0	55.2	21.7
Rear edge fuel tank armor	J13	46.2	18.2	59.2	23.3	55.6	21.9
Middle fuel tank armor	J12	80.8	31.8	48.2	19.0	44.9	17.7
Forward edge fuel tank armor	J11	131.1	51.6	46.3	18.2	43.7	17.2
Axle no. 2 differential	J10	151.5	59.6	27.1	10.7	25.9	10.2
Exhaust	J9	213.1	83.9	33.1	13.0	33.2	13.1
Catalytic converter	J8	280.9	110.6	39.8	15.7	39.7	15.6
Transfer case	J7	324.1	127.6	44.0	17.3	44.6	17.6
Front axle support arm, rear pivot	J6	371.1	146.1	36.6	14.4	36.9	14.5
Front axle support arm, front pivot	J5	453.6	178.6	27.7	10.9	27.3	10.7
Axle no. 1 differential	J4	476.2	187.5	27.9	11.0	27.9	11.0
Front tie rod	J3	494.2	194.6	32.3	12.7	31.4	12.4
Front bumper, bottom	J2	543.6	214.0	47.2	18.6	46.6	18.3
Front tow eyes	J1	565.3	222.6	69.9	27.5	69.0	27.2

[a] Referenced longitudinally from the BearCat rear step.
[b] Referenced vertically from ground.

d. Center of Gravity. The Center of Gravity (CG) of the test item was determined in three orthogonal planes. The lateral and longitudinal CG components of the test item were determined using the weight distribution, axle spacing and tread measurements of the vehicle. The vertical component was determined utilizing the reaction method outlined in TOP 2-2-800, CG. All measurements were determined with the vehicle's tire pressures set to the recommended highway road tire pressures. The CG locations of the BearCat at VCW and GCW are presented in Table 4.

TABLE 4. CG LOCATIONS OF THE BEARCAT

Plane	Reference Location	Measurement			
		VCW		GCW	
		cm	in.	cm	in.
Vertical	Above ground level	113.0	44.5	117.4	46.2
Longitudinal	Forward of rear axle centerline	122.6	48.3	115.2	45.4
Lateral	Right of longitudinal centerline	0.3	0.1	0.4	0.2

e. Ground Pressure. The ground pressure of the BearCat was measured at GCW using tire prints of all four wheels to measure the contact area between each wheel and a hard surface. The tire prints for each respective wheel were then scanned by a computer and processed in order to determine the specific contact area between the tire and ground. The nominal area was then measured as the outline of the contact patch to determine the amount of tread in contact with the ground on a soft soil surface. Both the specific and nominal ground pressures were calculated using the respective weight of each wheel location. The specific and nominal contact areas and ground pressures are presented in Table 5.

TABLE 5. GROUND PRESSURE MEASUREMENTS OF THE BEARCAT AT GCW

Tire Location	Contact Area				Ground Pressure			
	Specific		Nominal		Specific		Nominal	
	cm^2	$in.^2$	cm^2	$in.^2$	kPa	psi	kPa	psi
Left front	178.1	27.6	348.4	54.0	877.1	127.2	448.3	65.0
Right front	166.5	25.8	324.5	50.3	967.7	140.3	496.3	72.0
Left rear	289.7	44.9	549.0	85.1	961.5	139.4	507.3	73.6
Right rear	286.5	44.4	549.0	85.1	942.8	136.7	491.9	71.3

f. Gradeability. TOP 2-2-610, Gradeability and Side Slope Performance, was used as a general guide for all longitudinal grade and side-slope operations. The BearCat was subjected to Gradeability Testing on the longitudinal grades at MTA. An overall summary of the longitudinal grade performance results of the BearCat at GCW are presented in Table 6. The parking brake of the BearCat was not capable of holding the vehicle stationary on grades in excess of 20 percent. Photographs of the BearCat at GCW on the 60 percent longitudinal grade in the ascending and descending attitudes are presented in Figures 4 and 5, respectively.

TABLE 6. LONGITUDINAL GRADE PERFORMANCE ON THE BEARCAT AT GCW

Orientation	Climbing Ability		Brake Holding Ability	
	Initial	After Restart	Service	Parking
20-percent Longitudinal Grade				
Ascending	Satisfactory	Satisfactory	Satisfactory	Unsatisfactory
Descending	Satisfactory	Satisfactory	Satisfactory	Unsatisfactory
30-percent Longitudinal Grade				
Ascending	Satisfactory	Satisfactory	Satisfactory	-
Descending	Satisfactory	Satisfactory	Satisfactory	-
40-percent Longitudinal Grade				
Ascending	Satisfactory	Satisfactory	Satisfactory	-
Descending	Satisfactory	Satisfactory	Satisfactory	-
50-percent Longitudinal Grade				
Ascending	Satisfactory	Satisfactory	Satisfactory	-
Descending	Satisfactory	Satisfactory	Satisfactory	-
60-percent Longitudinal Grade				
Ascending	Satisfactory	Satisfactory	Satisfactory	-
Descending	Satisfactory	Satisfactory	Satisfactory	-

Figure 4. The BearCat ascending the 60-percent longitudinal grade.

Figure 5. The BearCat descending the 60-percent longitudinal grade.

g. Tilt Table. The static rollover threshold of the BearCat at GCW was measured using the ATC Tilt Table. Maximum side slope angle (accuracy ±0.2 degree of reading) and simulated lateral acceleration (accuracy ±0.01 degree of reading) were determined with both the left and right side of the vehicle positioned upslope. Static rollover results are presented in Table 7. A photograph of the BearCat on the Tilt Table is shown in Figure 6.

TABLE 7. STATIC ROLLOVER THRESHOLD RESULTS OF THE BEARCAT

Vehicle Side Upslope	Wheel Location	Rollover Measurement			
		VCW		GCW	
		Side Slope, degree	Simulated Lateral Acceleration, *g*	Side Slope, degree	Simulated Lateral Acceleration, *g*
Driver side	Axle 2 outside	37.0	0.75	36.4	0.74
	Axle 2 inside	37.7	0.77	36.8	0.75
	Axle 1	37.9	0.78	36.8	0.75
Curb side	Axle 2 outside	36.8	0.75	36.4	0.74
	Axle 2 inside	37.7	0.77	37.6	0.77
	Axle 1	38.2	0.79	37.6	0.77

Figure 6. BearCat on the Tilt Table at rollover threshold.

h. Side Slope Operation. The ability of the BearCat to traverse the 20 percent, 30 percent and 40 percent side slope was tested at MTA. The BearCat successfully negotiated the 20 percent, 30 percent and 40 percent side slopes with each side upslope while performing a sinusoidal steering pattern the length of the course at a speed of approximately 8 kilometers per hour (kph) (5 miles per hour (mph)). A photograph of the BearCat traversing the 40 percent side slope is presented in Figure 7.

Figure 7. The BearCat negotiating the 40-percent side slope.

i. Standard Obstacles. TOP 2-2-611, Standard Obstacles, was used as a general guide for conducting this test.

(1) Vertical Wall. The ability of the vehicle to negotiate a 45.7 cm (18 in.) vertical wall in the forward and reverse direction in both the ascending and descending directions was assessed with the vehicle at GCW. The BearCat was unable to successfully negotiate the 45.7 cm (18 in.) vertical wall in the forward direction when approaching the obstacle at a perpendicular attitude. The vehicle was able to negotiate the wall only after the rear axle was positioned at an oblique angle, allowing each read wheel to climb independently. No problems were noted while performing this task in the descending direction. A photograph of the BearCat climbing the 45.7 cm (18 in.) vertical wall in this manner is shown in Figure 8. The vehicle was not able to climb the vertical wall in the reverse direction due to interference between the fuel tank armor and the top of the wall. As a result, the vehicle was not able to navigate the wall in the descending direction due to the same interference. A photograph of the interference between the fuel tank armor of the BearCat and the top of the vertical wall is shown in Figure 9.

Figure 8. The BearCat negotiating the 45.7 cm (18 in.) vertical wall in the forward direction with the rear axle approaching at an oblique angle.

Figure 9. The interference between the fuel tank armor of the BearCat and the top of the 45.7 cm (18 in.) vertical wall.

(2) Trench Crossing. Trench crossing tests were conducted to evaluate the operational angles of approach and departure. The trench profile on the MTA test course consisted of a symmetrical concrete ditch 7.8 meters (m) (308 in.) in length and 4.9 m (192 in.) wide. The ditch was 1.4 m (56 in.) deep at its center point creating equal ingress and egress angles. The vehicle attempted to cross in the forward direction only, approaching the profile at 90 degrees. While the BearCat was attempting to descend into the trench, there was interference between the front bumper of the vehicle and opposite wall of the trench. The vehicle was unable to continue negotiating the trench without damaging the bumper. A photograph of the BearCat attempting to negotiate the trench crossing obstacle and a photograph of the interference experience is presented in Figures 10 and 11, respectively.

Figure 10. The BearCat negotiating the trench crossing obstacle.

Figure 11. Interference between the front bumper of the BearCat and the wall of the trench crossing obstacle.

(3) Loading Ramp. The simulated C-130 loading ramp was negotiated by the BearCat. The vehicle successfully climbed the 15 degree and 20 degree simulated loading ramps with no interference in either the forward or reverse directions. The vehicle also successfully descended both loading ramps in the forward and reverse directions. A photograph of the BearCat negotiating the 15 degree C-130 loading ramp is presented in Figure 12.

Figure 12. The BearCat negotiating the 15 degree simulated C-130 loading ramp.

j. Speed and Acceleration. The acceleration and speed characteristics were determined on the 3-Mile Straightaway Course at PTA. The test course was a level, hard-surfaced roadway and was dry at the time of testing. The maximum sustained speed of the BearCat was determined to be 144.8 kph (90.0 mph). The results from the acceleration testing of the BearCat are presented in Table 8.

TABLE 8. ACCELERATION CHARACTERISTICS OF THE BEARCAT AT GCW

Road Speed		Average Time to Speed, sec
kph	mph	
8	5	1.4
16	10	2.5
24	15	3.4
32	20	4.4
40	25	5.7
48	30	7.2
56	35	9.2
64	40	11.3
72	45	13.7
80	50	17.0
88	55	20.5
97	60	25.0
105	65	29.9
113	70	35.4
121	75	41.8
129	80	52.4
137	85	69.9
145	90	92.7

k. Braking. Applicable portions of TOPs 2-2-608, Braking, Wheeled Vehicles, and 2-2-627, Braking; SAEs J46, Wheel Slip Brake Control System Road Test Code, J786, Brake System Road Test Code – Truck, Bus and Combination of Vehicles, and J702, Brake and Electrical Connection Locations - Truck-Tractor and Truck-Trailer; and Federal Motor Vehicle Safety Standard (FMVSS) 105, Hydraulic and Electric Brake Systems, were used as general guides to conduct the braking subtest. All brake testing was conducted with the vehicle configured at GCW.

(1) Paved Surface. Brake testing was performed on a paved, level, dry road surface at the main runway (4/22) at PAAF. The braking capabilities of the BearCat were determined by measuring the distance required to stop from road speeds of 32 kph (20 mph) to a maximum speed of 113 kph (70 mph) using maximum pedal effort to apply the service brakes. Testing of the BearCat was conducted with the vehicle “as received” with new brake components and no formal burnish procedure conducted. The results of the paved surface brake testing are presented in Table 9.

TABLE 9. AVERAGE MAXIMUM EFFORT BRAKE STOP RESULTS OF THE BEARCAT AT GCW, PAVED SURFACE

Speed at Brake Apply		Normalized Measurement			
		Stopping Distance		Deceleration	
kph	mph	m	ft	m/sec^2	ft/sec^2
32	20	8.2	27.1	4.9	16.0
48	30	15.5	50.7	5.8	19.1
64	40	29.6	97.1	5.4	17.7
80	50	43.7	143.3	5.7	18.8
97	60	70.1	229.9	5.2	17.0
113	70	102.0	334.8	4.8	15.8

(2) Secondary Road. Additional brake testing was conducted at PTA "A" course, an improved secondary road, in order to assess the braking ability and vehicle stability while operating on secondary roads. The braking capabilities of the BearCat were determined by measuring the distance required to stop from road speeds of 32 kph (20 mph) to a maximum speed of 56 kph (35 mph) using maximum pedal effort to apply the service brakes. The results of the secondary road brake testing are presented in Table 10.

TABLE 10. AVERAGE MAXIMUM EFFORT BRAKE STOP RESULTS OF THE BEARCAT AT GCW, SECONDARY ROAD

Speed at Brake Apply		Normalized Measurement			
		Stopping Distance		Deceleration	
kph	mph	m	ft	m/sec^2	ft/sec^2
32	20	8.2	27.1	4.9	16.0
48	30	15.5	50.7	5.8	19.1
56	35	25.2	82.7	4.9	15.9

l. Steering and Handling. TOP 2-2-609, Steering, was used as a general guide for determining the steering and handling characteristics of the BearCat.

(1) Steady-State Circular (Skidpad) Testing. The steady-state cornering characteristics of the BearCat at GCW were determined using SAE J2181, Steady-State Circular Test Procedure for Trucks and Buses. For testing, the vehicle was operated at a constant road speed around a bituminous concrete circular test course having a diameter of 60 m (197 ft). Testing was performed in both the left and right steer directions, at road speeds ranging from 8 kph (5 mph) up to the maximum attainable speed, which may be limited by either the available power of the vehicle or by instability in the roll or yaw axis. This testing was used to develop a handling diagram for the vehicle through which to evaluate the understeer/oversteer characteristics of the vehicle. A handling diagram shows the relationship of vehicle steering angle to its lateral acceleration. The ratio of the degrees of steering input at the steering wheel to a degree of rotation of the wheels on the steering axle was 18.4, which was a value used to define the handling diagram. By examining the local slope of the curve on the handling diagram, it can be determined whether the vehicle understeers, oversteers, or exhibits neutral steer characteristics at a given level of lateral acceleration, as shown on a handling diagram are presented in Figure 11. A negative slope indicates that the vehicle is in an understeering condition, whereas a positive slope indicates that the vehicle is in an oversteering condition. An infinite, or vertical, slope indicates that the vehicle is in a neutral steering condition and may also determine the point at which the vehicle is in transition from one steering condition to the other. An examination of the handling diagram of the BearCat, presented in Table 12, establishes the understeer steering characteristic for the vehicle in both steer directions. The vehicle was capable of sustaining a lateral acceleration of 0.48 *g* in the right steer direction and 0.45 *g* in the left steer direction before experiencing a loss of traction that ended testing.

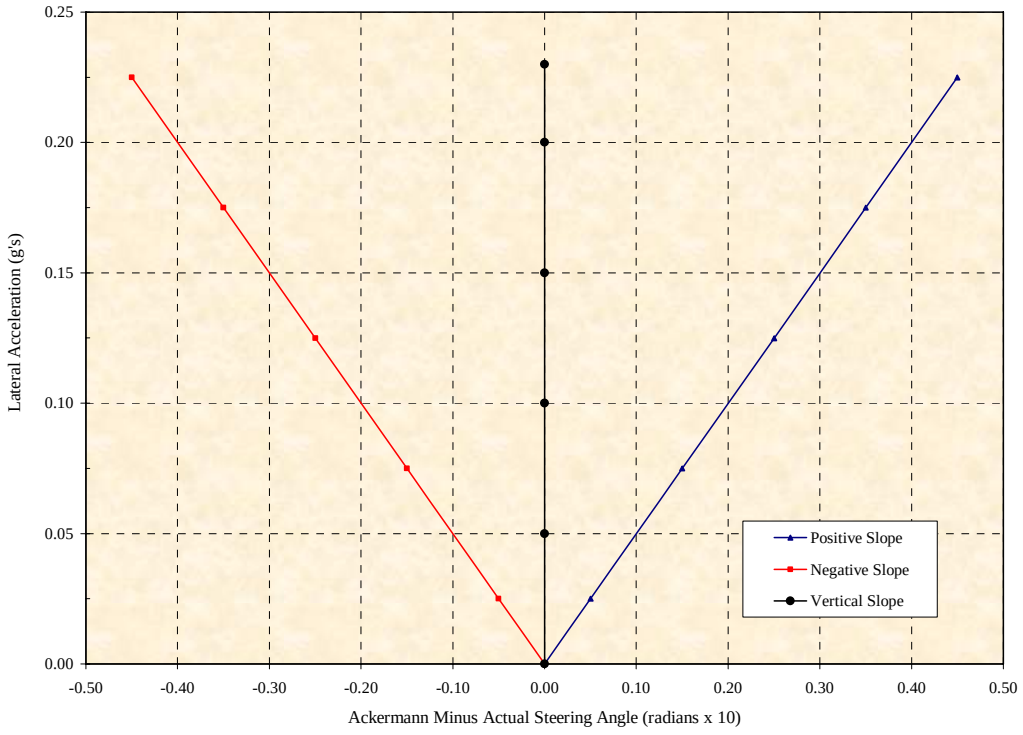

Figure 11. Various steering characteristics and corresponding trend lines as observed on a handling diagram.

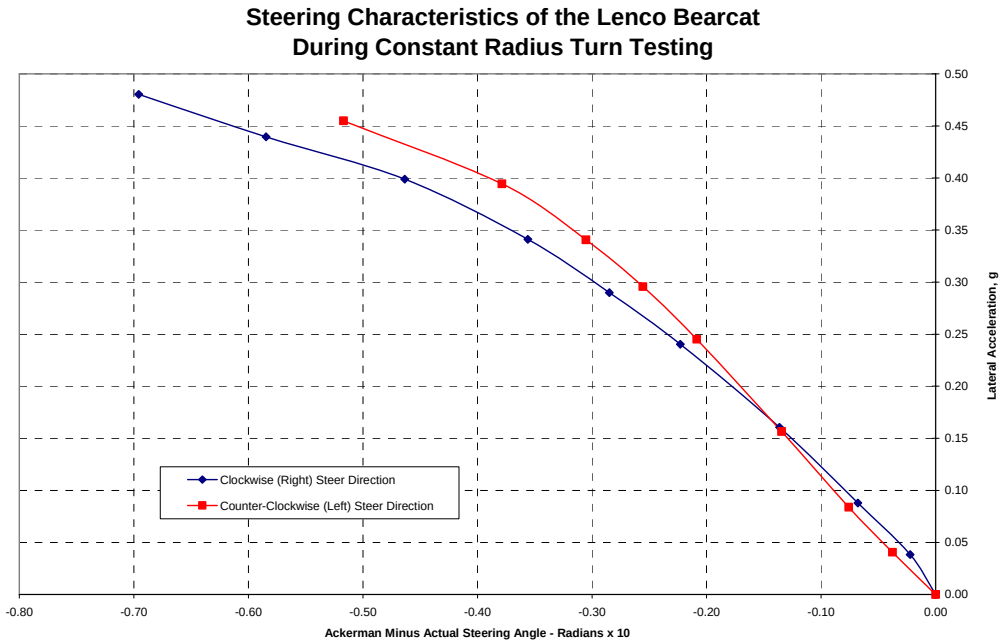

Figure 12. Handling diagram of the BearCat at GCW, 61 m (200 ft) constant turn diameter.

(2) Emergency Lane Change. Emergency handling characteristics of the BearCat at GCW were determined by driving the vehicle through two separate lane change courses. The dimensions of these courses were set in accordance with NATO Allied Vehicle Testing Publication (AVTP) 03-160W, Dynamic Stability, Steady-State Circular Test Procedure for Trucks and Buses, and TOP 2-2-609, Steering. A turning circle diameter of 11.6 m (37.9 ft), an effective length of 3.8 m (12.5 ft), and an effective width of 2.4 m (8.0 ft) for the BearCat were used to establish the boundaries of both lane change courses. The layout of the NATO and TOP courses is graphically presented in Figures 13 and 14, respectively. Course limits were defined using conventional traffic pylons. Throughout each lane change maneuver, the driver attempted to maintain constant road speed while applying the minimum steering inputs necessary to successfully negotiate the course. Testing was initially performed at 32 km/hr (20 mph) on each course, with speeds for subsequent runs increased in small increments until the vehicle achieved its maximum road speed or could no longer successfully negotiate the course. Testing was conducted on a paved, level bituminous concrete surface and repeated on PTA “A” course. The BearCat safely negotiated the NATO lane change course at 68.4 kph (42.5 mph) and 56.7 kph (35.2 mph) on a primary and secondary road surface, respectively. Testing was suspended with the vehicle negotiating the NATO course on a secondary road surface when the vehicle reached the course maximum road speed of 56.3 kph (35 mph). The BearCat safely negotiated the TOP lane change course at 48.7 kph (30.3 mph) and 40.2 kph (25.0 mph) on a primary and secondary road surface, respectively. Testing was terminated when the vehicle required violent course corrections accompanied by high lateral acceleration measurements in order to negotiate the course. The maximum safe speed and peak lateral acceleration achieved by the BearCat at GCW on the NATO and TOP emergency lane change courses on both road surfaces are presented in Table 11.

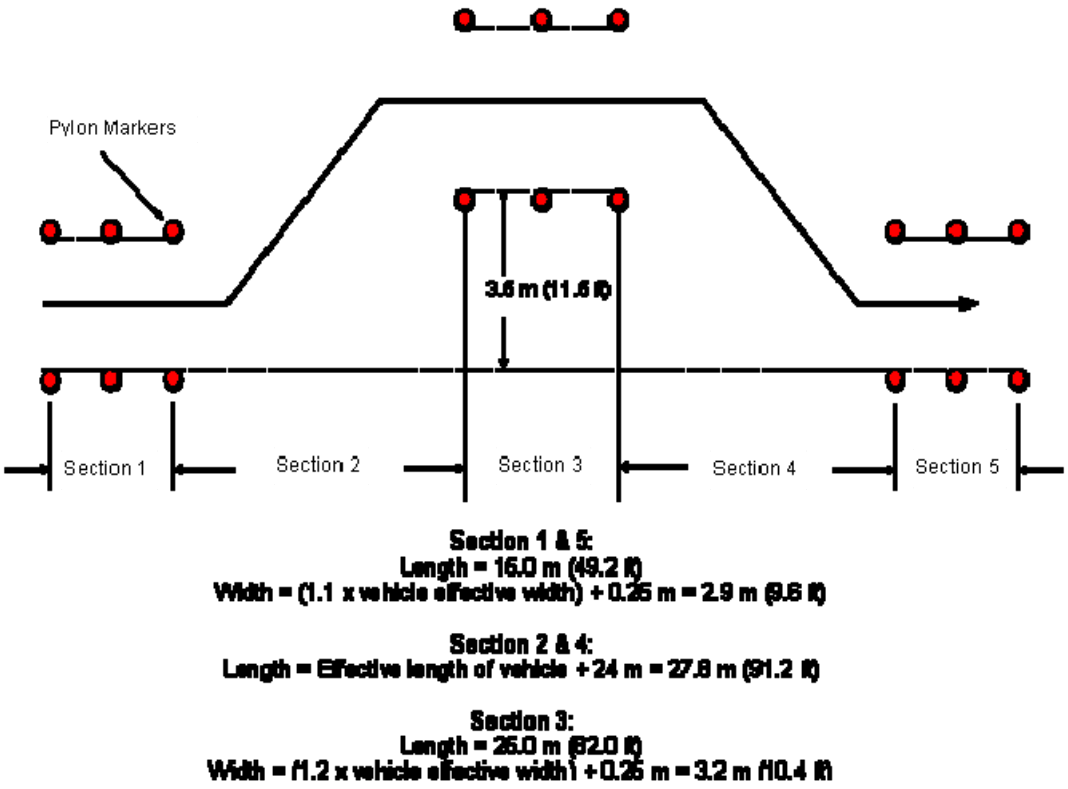

Figure 13. The NATO emergency lane change course layout for the BearCat.

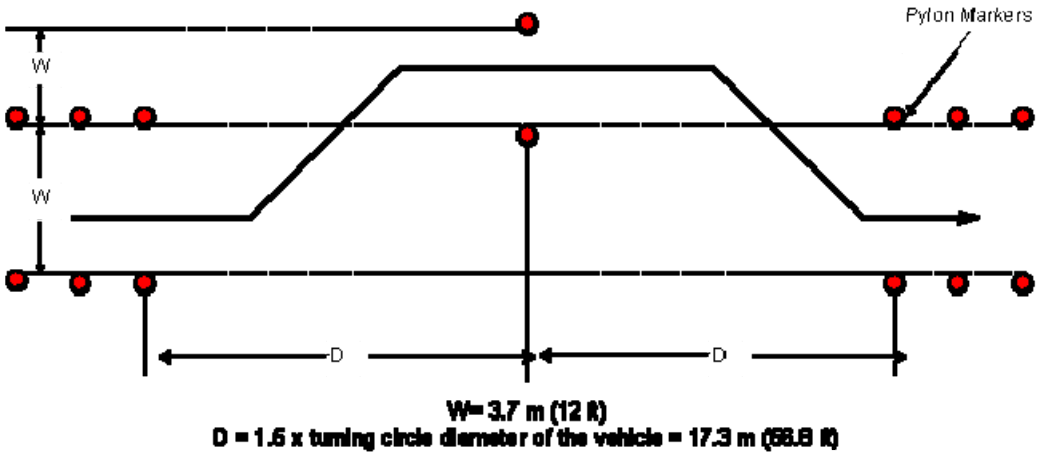

Figure 14. The TOP emergency lane change course layout for the BearCat.

TABLE 11. EMERGENCY LANE CHANGE RESULTS OF THE BEARCAT AT GCW

Test Course	Maximum Average Road Speed				Peak Lateral Acceleration, *g*	
	Primary Road Surface		Secondary Road Surface		Primary Road Surface	Secondary Road Surface
	kph	mph	kph	mph		
NATO	68.4	42.5	56.7	35.2	0.7	1.6
TOP	48.7	30.3	40.2	25.0	1.1	1.5

m. Endurance Operations. The BearCat was subjected to 805 km (500 mi) of endurance mileage following an 11 percent paved, 46 percent secondary roads and 43 percent trails mission profile terrain. Endurance operations were completed at MTA, PTA and CTA. The mission breakdown, by test course, is shown in Table 12. A photograph of the BearCat operating on PTA "A" course is shown in Figure 15.

TABLE 12. ENDURANCE TEST OPERATIONS PROFILE

Test Course	Kilometers	Miles
Paved (11%)	88	55
Secondary Roads (46%)		
BB&G[a]	105	65
PTA-1	161	100
PTA-A	105	65
Trails/Cross-Country (43%)		
PTA-2&3	105	65
CTA-B	241	150
Total	805	500

[a]Belgian Block and Gravel: 40-percent Belgian Block and 60-percent Gravel.

Figure 15. The BearCat operating on PTA “A” course.

(1) While operating on the Belgian Block and Gravel (BB&G) course at MTA, a post-operational inspection revealed that the front, right tire had lost air pressure. The distance driven on the runflat was not known because no loss of vehicle control was noted by the operator. During maintenance it was noted that the bead of the tire had slipped from the wheel causing the loss of air pressure. The air pressure was restored and operations were continued.

OBSERVATIONS AND REMARKS

a. The parking brake system of the BearCat will not hold the vehicle stationary on grades in excess of 15 percent.

b. The vehicle is capable of safely operating on a longitudinal grade of 60 percent and a side slope of 40 percent.

c. The BearCat is not able to climb a 45.7 cm (18 in.) vertical wall in the reverse direction due to interference with the underbelly armor. Tall obstacles should be approached with caution using a ground guide to observe interference issues with the undercarriage.

d. The brake system BearCat is capable of stopping the vehicle within safe distances as mandated by FMVSS standards.

e. The BearCat produces an understeering trait throughout the range of dynamic stability.

f. The vehicle is capable of operating on secondary roads and cross country trails without vehicle preparations.

FUTURE RELATED WORK

Not determined.

REVIEWED BY:

BILL MULLIS
Test Director

SUBMITTED BY:

KYLE W. KRYSTON
Assistant Test Director

REVIEWED BY:

WILLIAM A. BAETZ
Chief, Vehicles Division

FOR THE COMMANDER:

WILLIAM W. NEWTON
Director, Automotive Directorate

2 Encls
1. References
2. Distribution List

REFERENCES

1. FMVSS 105, Hydraulic and Electric Brake Systems, 1 Oct 06.

2. TOP 2-2-801, Load Distribution and Ground Pressure, 26 Sep 06.

3. TOP 2-2-800, Center of Gravity, 26 Sep 06.

4. SAE J702, Brake and Electrical Connection Locations - Truck-Tractor and Truck-Trailer, 1 Aug 03.

5. SAE J1100, Motor Vehicle Dimensions, Jul 02.

6. SAE J46, Wheel Slip Brake Control System Road Test Code, Oct 93.

7. SAE J2181, Steady-State Circular Test Procedure for Trucks and Buses, 1 Jun 93.

8. NATO AVTP 03-160W, Dynamic Stability, Sep 91.

9. International TOP 2-2-627, Braking, 21 May 87.

10. TOP 2-2-608, Braking, Wheeled Vehicles, 24 Jun 83.

11. TOP 2-2-500, Vehicle Characteristics, 3 Dec 81.

12. TOP 2-2-610, Gradeability and Side Slope Performance, 18 Jul 80.

13. TOP 2-2-609, Steering, 18 Jul 80.

14. TOP 2-2-611, Standard Obstacles, 18 Jul 80.

15. SAE J786, Brake System Road Test Code – Truck, Bus and Combination of Vehicles.

Test Record No. AD-V-25-07

DISTRIBUTION LIST

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H.P. WHITE LABORATORY, INC.
3114 Scarboro Road
Street, Maryland 21154-1822
Telephone: (410) 838-6550
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Email: info@hpwhite.com
www.hpwhite.com

12 December 2003
(HPWLI 8970-04D)

Lenco Industries, Inc.
61 Downing Industrial Park
Pittsfield, Massachusetts 01201

Attention: James J. Massery

Gentlemen:

In accordance with your instructions, H.P. White Laboratory, Inc. conducted ballistic resistance testing of one steel panel received 26 November 2003 via United Parcel Service.

Testing was conducted in accordance with the provisions of NIJ-STD-0108.01, Level IV, using caliber .30-06 Springfield, 166 grain, AP, M2 ammunition. The test sample was mounted on an indoor range 50.0 feet from the muzzle of a test barrel to produce zero degree obliquity impacts. Photoelectric lumiline screens were positioned at 6.5 and 9.5 feet which, in conjunction with elapsed time counters (chronographs), were used to compute projectile velocities 8.0 feet from the muzzle. Penetrations were determined by visual examination of a 0.020-inch thick alloy 2024T3 aluminum witness panel positioned 6.0 inches behind, and parallel to, the test sample. Table I is a summary of the attached data record.

TABLE I. SUMMARY OF RESULTS

Test Sample		Ballistic Threat					Results
Sample Number	Weight (lbs.)	Obliquity (degrees)	Caliber	Shots	Velocity (fps)		Penetrations
					Max.	Min.	
HPW-2 (NIJ-IV)	45.88	0	.30AP, M2	1	2812		0

Based on the data presented in Table I, the test sample submitted for testing SATISFIED the ballistic resistance requirements of NIJ-STD-0108.01, Level IV. This conclusion is based on data obtained from having tested only the sample submitted, and should NOT be interpreted as an endorsement by H.P. White Laboratory, Inc. of the continuing quality, or performance, of any other items of the same, or similar, design.

In accordance with your instructions, the test sample is being discarded. Should you have any questions regarding this matter, or if we may be of any further service, please do not hesitate to contact us.

Very truly yours,

H.P. White Laboratory, Inc.

Craig B. Dunn

CBD/tc
Enclosure

H.P. White Laboratory, Inc.

BALLISTIC RESISTANCE TEST

Client : LENCO INC.

Job No. : 8970-04 Test Date : 12/8/03

TEST PANEL

Manufacturer : UNK.
Size : 18 x 18 in.
Thicknesses : 0.503, 0.504, 0.506, 0.507 in.
Avg. Thick. : 0.505 in.
Description : 1/2" STEEL PANEL

Sample No. : HPW-2 (NIJ-IV)
Weight : 45.88 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 11/26/03
Via : UPS
Returned : N/A

SET-UP

Shot Spacing : 1 SHOT IN CENTER
Witness Panel : 0.020", 2024-T3 ALUMINUM
Obliquity : 0 deg.
Backing Material : NA
Conditioning : AMBIENT

Primary Vel. Screens : 6.5 ft., 9.5 ft.
Primary Vel. Location : 8.0 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 50.0 ft.
Target to Wit. : 6.0 in.

Range No. : 3
Temp. : 66 F
BP : 30.17 in. Hg
RH : 50%
Barrel No./Gun : TEST BARREL
Gunner : POOLE
Recorder : POOLE

AMMUNITION

(1) : CAL. .30 AP, M2, 166 gr. Lot No. : LCL-104452
(2) : Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

(1) : NIJ-STD-0108.01
(2) : THREAT LEVEL : IV
(3) : REQUIRED VELOCITY : 2800-2900 fps.

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	1066	2814	1068	2809	2812	None	

REMARKS :

FOOTNOTES :

Filename : 8970-04 (HPW-2 (NIJ-IV)) LENCO INC..Pen

BALLISTIC RESISTANCE TEST

Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

Client: Lenco Armored Vehicles
Job No.: 2427-024-2
Test Date: 2/24/2016

Test Panel

Description: 18”x18” of 76mm No Spall Ballistic Glass

Manufacturer: Lenco Armored Vehicles

Sample No.: Transparent No. 2

Size: 18.00 x 18.00 in	Weight: 84.15 lbs	Date Received: 2/23/2016
Avg. Thick: 3.140 in	Plies/Laminates: NA	Via: FedEx Freight
Thickness: 3.136 in; 3.140 in; 3.138 in; 3.145 in		Returned: FedEx

Setup

Shot Spacing: 3 shots on a 120 mm triangle	Primary Vel. Screens (ft): 20.000, 20.333, 29.667, 30.000	Range No.: 1
Witness Panel: .001 in Aluminum foil with splinter box	Primary Vel. Location (ft): 25.000	Temp: 67.4 °F
Backing Material: NA	Range to Target (ft): 32.800	BP: 29.6 inHg
Condition: Ambient	Target to Witness (in): 19.680	RH: 38.4%
		Barrel/Gun: CT-4060
		Gunner: Brad Shaffer
		Recorder: Fritz Boniface

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 150-grain M61 AP	Military	N133

Applicable Standards or Procedures

(1) BS EN 1063 BR7, dated 15 July 2000
(2) Customer request

Shot No.	Ammo	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	150.2	3711	2695	3466	2693	2694	2688	None	0.0	
2	1	150.3	3688	2711	3446	2708	2710	2704	None	0.0	
3	1	149.9	3682	2716	3441	2712	2714	2708	None	0.0	

Remarks:
Required velocity: 2690 ±32 ft/s

Footnotes:

BALLISTIC RESISTANCE TEST

Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

Client: Lenco Armored Vehicles
Job No.: CD01-2014-R04BRT-88419
Test Date: 10/16/2014

Test Panel

Description: Proprietary.

Manufacturer: Lenco Armored Vehicles

Sample No.: Black Smooth

Size:	12.00 x 12.00 in	Heat No.:	NA	Date Received:	10/14/2014
Thickness:	0.511 in; 0.515 in; 0.512 in; 0.516 in	Weight:	20.33 lbs	Via:	UPS
		Hardness:	NA	Returned:	UPS
Avg. Thick:	0.514 in	Plies/Laminates:	NA		

Setup

Shot Spacing:	3 shots on a 120 mm triangle	Primary Vel. Screens (ft):	20.000, 20.333, 29.666, 30.000	Range No.:	4
Witness Panel:	.002 in Aluminum foil with splinter box	Primary Vel. Location (ft):	25.000	Temp:	66.9 °F
Obliquity:	0.0°	Range to Target (ft):	32.800	BP:	29.6 inHg
Backing Material:	NA	Target to Witness (in):	19.680	RH:	43.6%
Condition:	Ambient			Barrel/Gun:	CT-4064
				Gunner:	M. Contreras
				Recorder:	S. McDowell

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 150-grain M61 AP	Military	N133

Applicable Standards or Procedures

(1) BS EN 1063 Level BR7
(2) Per customer request

Shot No.	Ammo	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Penetration	Deformation (mm)	Footnotes
1	1	3685	2714	3440	2713	2713	2708	None		
2	1	3728	2682	3481	2681	2682	2676	None		
3	1	3732	2680	3484	2679	2679	2673	None		

Remarks:
Required Velocity: 2690 +/- 32 ft/s

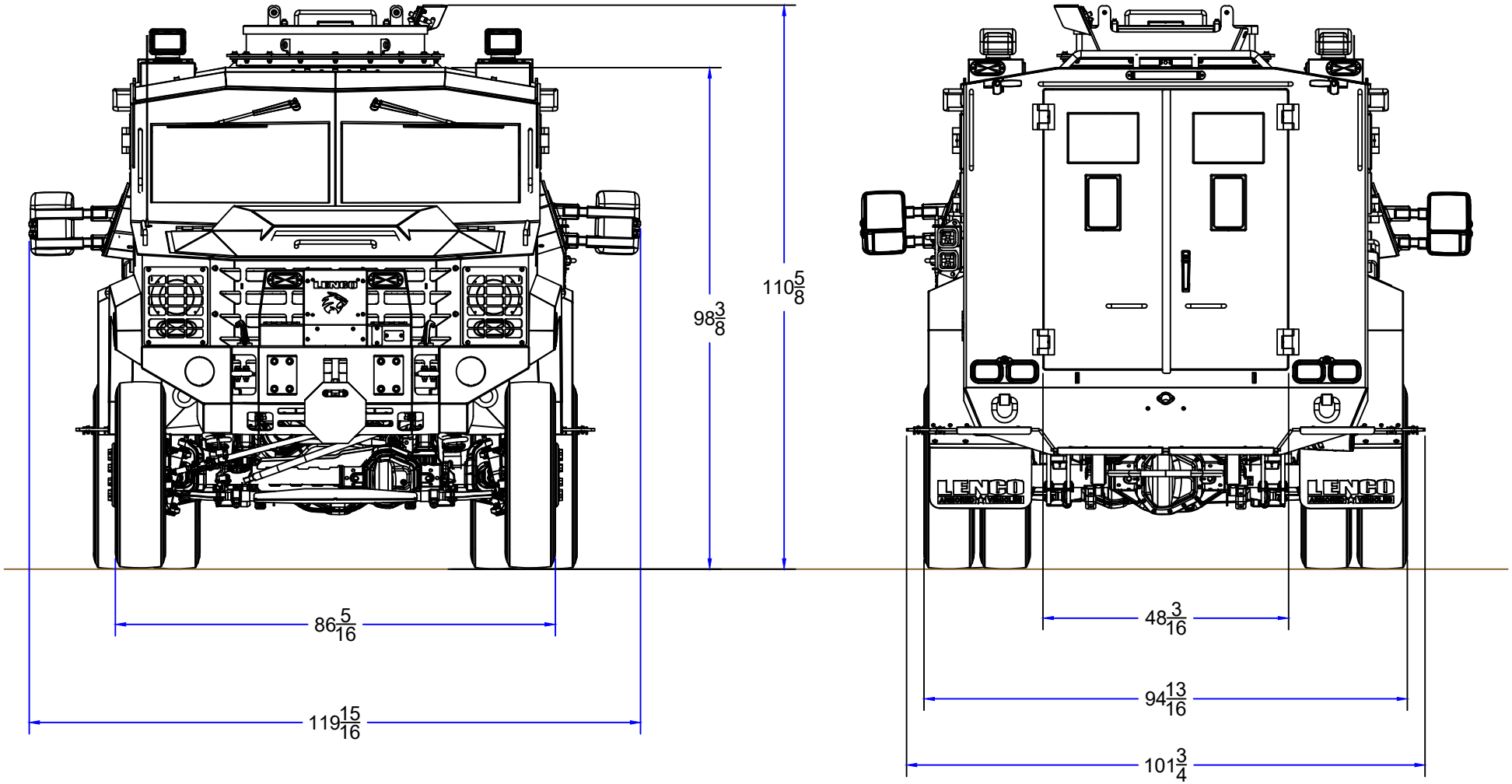
Footnotes:

LENCO ARMORED VEHICLES

COLOR SHEET

CARC, High Gloss & Bedrock available.

NAME:	COLOR CODE:	
Lusterless Black	18-342	
Charcoal Gray	101991	
Lusterless Army Green	103753	
Lusterless Urban Green	103733	
Lusterless Desert Tan	100559	
Lusterless Navy Blue	18-F93XXL7508	
Lusterless Gray	101062	
Flat White	18-TRE0006	
Engine Red	18-1027	



REV:	REV DATE:	REV DESCRIPTION:	REV BY:
-01			

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE INCHES

STANDARD TOLERANCES

FRACTIONAL	ANGULAR
±1/16	±2°

PROJECTION:

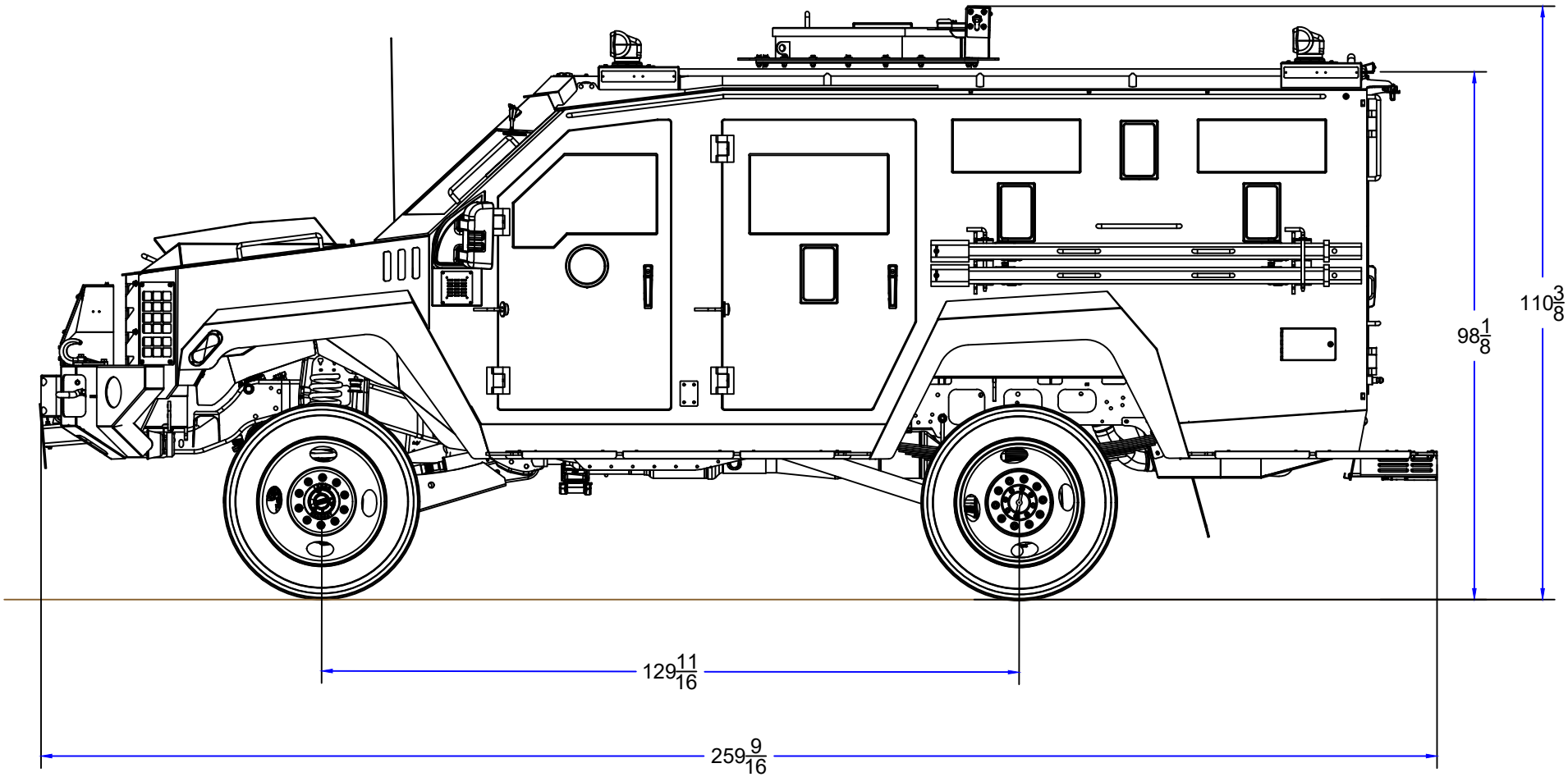
dxfC380.BMP

10 BETNR INDUSTRIAL DRIVE
PITTSFIELD, MA 01201
TEL (413) 443-7359
FAX (413) 445-7865
LencoArmor.com

TITLE:
4-DOOR BEARCAT FRONT & REAR VIEWS
G2 22.5" WHEELS & TIRES

DWG NO:	ITAR/EAR NO:	REV:
BC1800-114		

MATERIAL:	DRAWN:	DATE:	SHEET:
			1 OF 4



REV:	REV DATE:	REV DESCRIPTION:	REV BY:
-01			

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE INCHES

STANDARD TOLERANCES

FRACTIONAL	ANGULAR
±1/16	±2°

PROJECTION:

dxfC380.BMP

10 BETNR INDUSTRIAL DRIVE
PITTSFIELD, MA 01201
TEL (413) 443-7359
FAX (413) 445-7865
LencoArmor.com

TITLE:
4-DOOR BEARCAT SIDE VIEW
G2 22.5" WHEELS & TIRES

DWG NO: **BC1800-114**

ITAR/EAR NO:

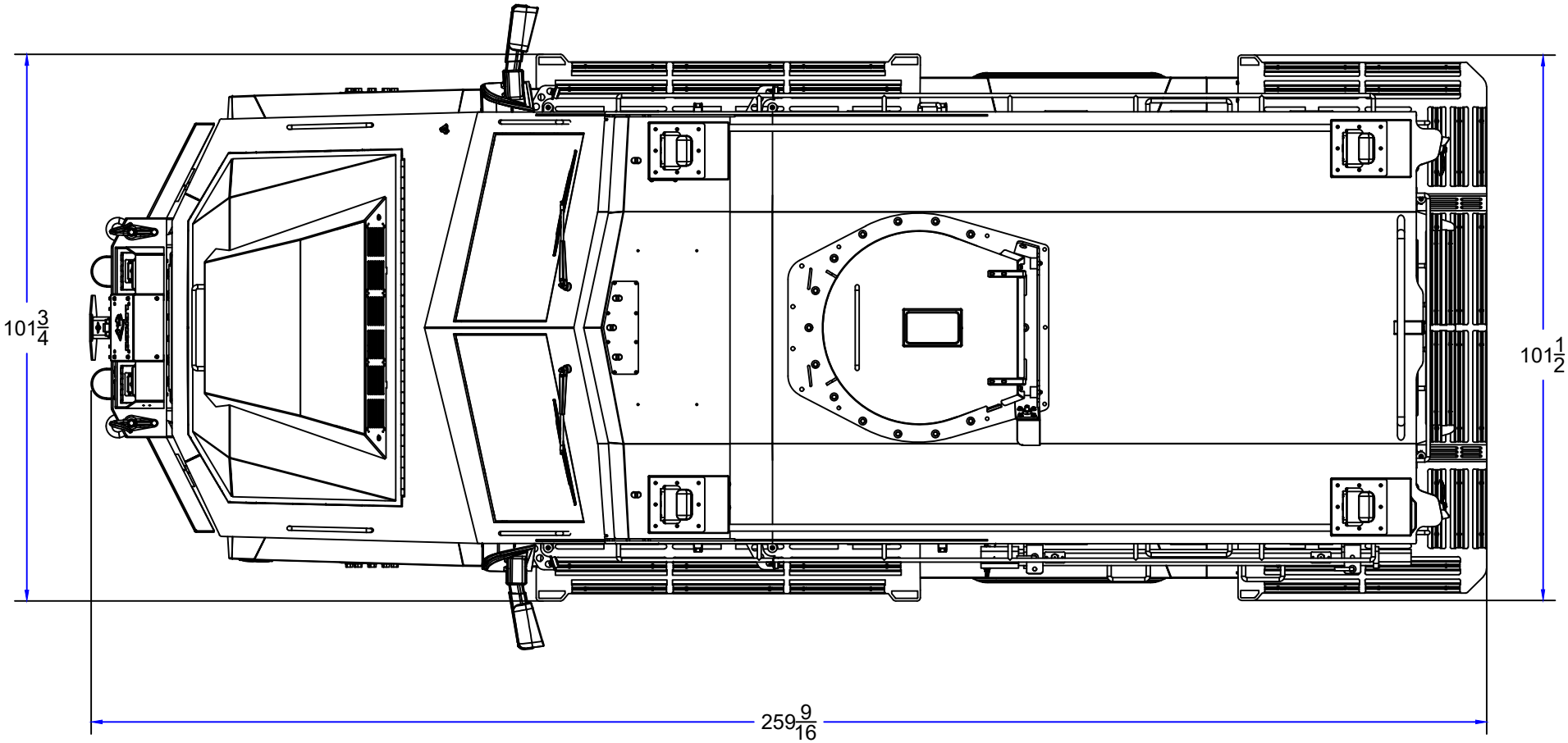
REV:

MATERIAL:

DRAWN:

DATE:

SHEET: 2 OF 4



REV:	REV DATE:	REV DESCRIPTION:	REV BY:
-01			

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE INCHES

STANDARD TOLERANCES

FRACTIONAL	ANGULAR
±1/16	±2°

PROJECTION:

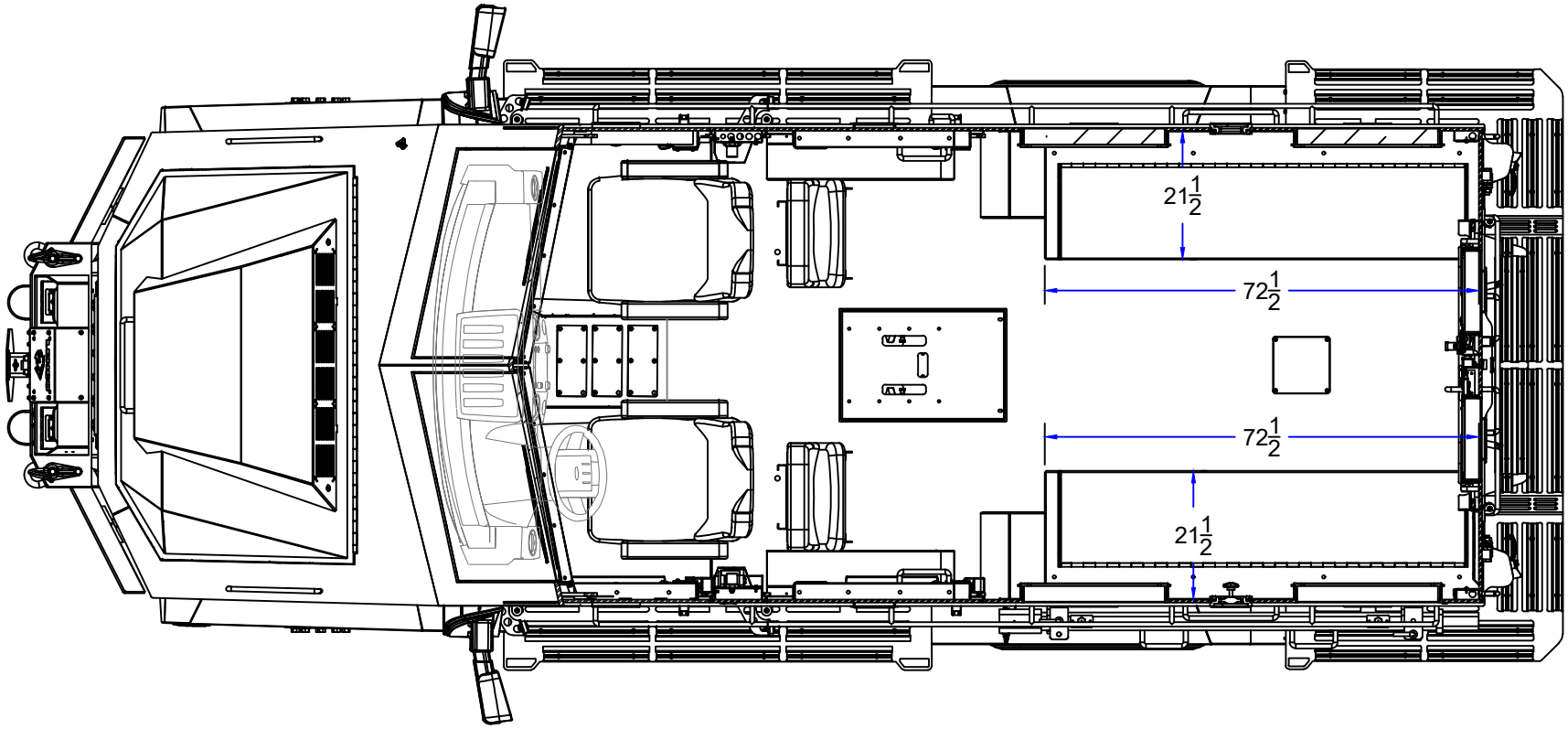
dxfA9D6.BMP

10 BETNR INDUSTRIAL DRIVE
PITTSFIELD, MA 01201
TEL (413) 443-7359
FAX (413) 445-7865
LencoArmor.com

TITLE:
4-DOOR BEARCAT TOP VIEW
G2 22.5" WHEELS & TIRES

DWG NO:	ITAR/EAR NO:	REV:
BC1800-114		

MATERIAL:	DRAWN:	DATE:	SHEET:
			3 OF 4



REV:	REV DATE:	REV DESCRIPTION:	REV BY:
-01			

UNLESS OTHERWISE NOTED
ALL DIMENSIONS ARE INCHES

STANDARD TOLERANCES

FRACTIONAL	ANGULAR
±1/16	±2°

PROJECTION:

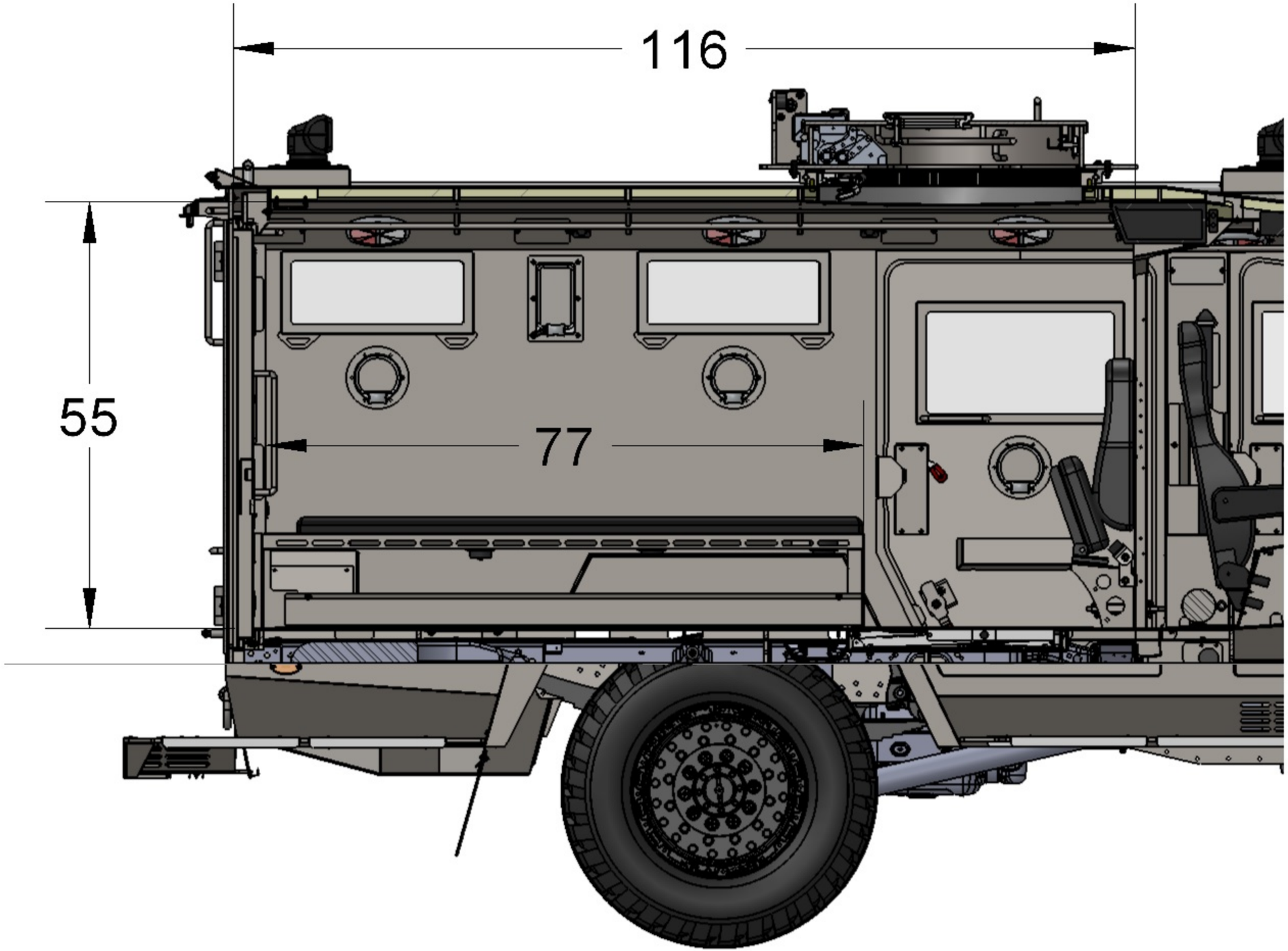
dxfA9D6.BMP

10 BETNR INDUSTRIAL DRIVE
PITTSFIELD, MA 01201
TEL (413) 443-7359
FAX (413) 445-7865
LencoArmor.com

TITLE:
4-DOOR BEARCAT INSIDE VIEW
G2 22.5" WHEELS & TIRES

DWG NO:	ITAR/EAR NO:	REV:
BC1800-114		

MATERIAL:	DRAWN:	DATE:	SHEET:
			4 OF 4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OREGON BALLISTIC LABORATORIES

BALLISTIC RESISTANCE TEST - V_0

Customer:	LENCO INDUSTRIES
OBL ID#:	8383
Test Date:	5/6/2014
Purchase Order:	51097-A

TEST SAMPLE

Sample No.:	20mm FSP	**Size (in.):**	16 x 16			
Heat No.:	N/A	**Weight (lb.):**	54.0			
Lot No.:	N/A	**Thickness:**	2.605	2.591	2.594	2.600
Plies:	N/A	**Avg. Thk. (in):**	2.598			
Description:	Transparent armor					

RANGE SET-UP

Range to Target:	50 ft.	**Range #:**	1	**Pre Test:**	
Screen Dist. Vel. 1 (ft.):	5	**Temperature:**	68.0 °F	**Clay Drops (mm):**	
Screen Dist. Vel. 2 (ft.):	5	**Bar. Pressure:**	30.09 in. Hg	**Drop Avg (mm):**	
Screen 4 to target (ft):	N/A	**Rel. Humidity:**	47.0 %	**Clay Temp °F:**	
Primary Vel. Location:	8.25 ft. from target	**Sample Temp.**	Amb. °F	**Clay Box #:**	
Striking Velocity:	No	**Recorder:**	Brandon Bertsch	**Post Test:**	
Target to Witness:	6 in.	**Gunner:**	Scott Buell	**Clay Drops (mm):**	
Witness Panel:	0.020" 2024-T3 Alum.			**Drop Avg (mm):**	
Backing Material:	N/A			**Clay Temp °F:**	
Obliquity:	0 Degrees				
Barrel:	20mm				

AMMUNITION

Projectile:	20mm 830gr. FSP	**Powder:**	WC872

STANDARDS / PROCEDURES

STANAG 4569 Level 2 (abbrev)	**Required Velocity:** 2066 fps ± 66 fps

SHOT NO.	PROJECTILE WT. (gr.)	POWDER WT. (gr.)	TIME 1 µs (10^{-6})	TIME 2 µs (10^{-6})	VELOCITY 1 ft/s	VELOCITY 2 ft/s	AVERAGE VELOCITY	PENET. P/C	OBLIQUITY	BFD	NOTES
1	830.1	405.0	2393	2395	2089	2088	2089	P	0°		

REMARKS:

P=Partial Penetration
C=Complete Penetration
UH=Unfair Hit

TEST RESULTS:

Test sample satisfied the ballistic requirements given.

FOOTNOTES:

NVLAP LAB CODE 200826-0 NIJ CERTIFIED LABORATORY

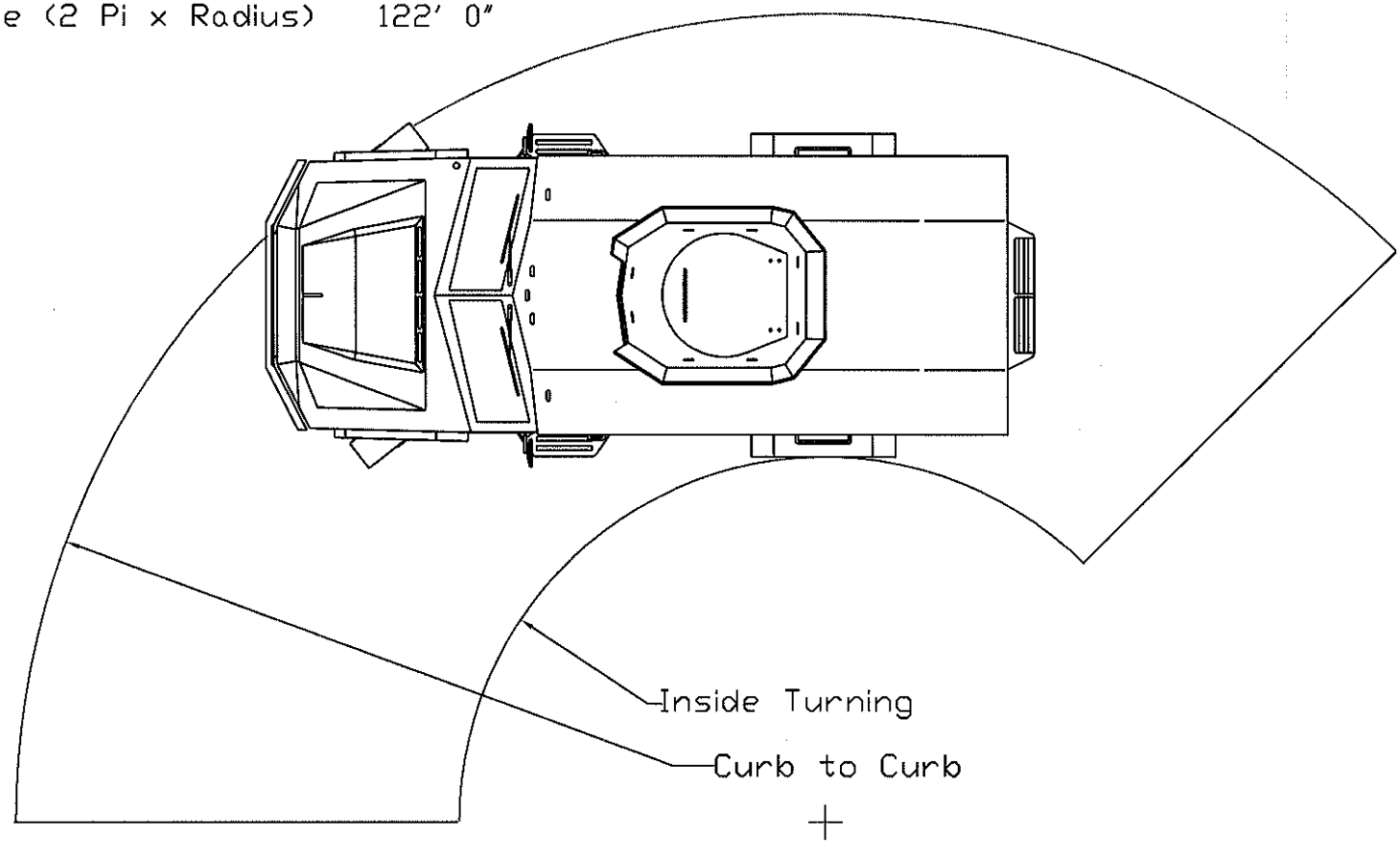
This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Inside Turning

Radius	8′ 10″
Diameter (2 x Radius)	17′ 8″
Circumference (2 Pi x Radius)	55′ 6″

Curb to Curb

Radius	19′ 5′
Diameter (2 x Radius)	38′ 10″
Circumference (2 Pi x Radius)	122′ 0″



MATERIAL:	LENCO ARMORED VEHICLES				
APPLICATION:	TITLE: BearCat Turning Performance Specs.				
FILE:					
DRAWN BY: KMD	SIM TO:	DWG NO.	REV: –	DATE	
DATE: 4/17/06	SCALE	CHECKED BY:	SHEET 1 OF 1		