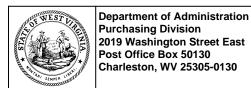


2019 Washington Street, East Charleston, WV 25305 Telephone: 304-558-2306 General Fax: 304-558-6026

Bid Fax: 304-558-3970

The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at *wvOASIS.gov*. As part of the State of West Virginia's procurement process, and to maintain the transparency of the bid-opening process, this documentation submitted online is publicly posted by the West Virginia Purchasing Division at *WVPurchasing.gov* with any other vendor responses to this solicitation submitted to the Purchasing Division in hard copy format.





State of West Virginia Solicitation Response

Proc Folder: 1157978

Solicitation Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Proc Type: Central Master Agreement

 Solicitation Closes
 Solicitation Response
 Version

 2023-02-14 13:30
 SR 0810 ESR0209230000003663
 1

VENDOR

VS0000011255

CREATIVE BUS SALES INC

Solicitation Number: CRFQ 0810 DMT2300000010

Total Bid: 0 Response Date: 2023-02-14 Response Time: 12:54:07

Comments: There are no applicable discounts.

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067 david.h.pauline@wv.gov

VendorSignature XFEIN#DATE

All offers subject to all terms and conditions contained in this solicitation

 Date Printed:
 Feb 14, 2023
 Page: 1
 FORM ID: WV-PRC-SR-001 2020/05

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	138" WB DRW Narrow Body Cutaway	0.00000	EA	0.000000	0.00
	Vehicles				

Comm Code	Manufacturer	Specification	Model #	
25101502				

Commodity Line Comments:

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles. See attached Exhibit A Pricing page

Date Printed: Feb 14, 2023 FORM ID: WV-PRC-SR-001 2020/05



Table of Contents

State of West Virginia CRFQ DMT2300000010, 138" Wheelbase, Dual Rear Wheel, Narrow Body, Cutaway Vehicle:

- 1. Tab 1 Letter of Transmittal
- 2. Tab 2 Experience and Qualifications
- 3. Tab 3 Required Documents
 - a. Bid Form 1 Technical Service and Parts Locations
 - b. Bid Form 2 Air and Water Pollution Certification
 - c. Bid Form 3 Disadvantaged Business Enterprise
 - d. Bid Form 4 Buy America Certification Rolling Stock
 - e. Bid Form 5 Federal Motor Vehicle Safety Standards Certification
 - f. Bid Form 6 U.S. Comptroller's Debarment List Certification
 - g. Bid Form 7 Certification of Primary Participant Regarding Debarment,
 Suspension, and Other Responsibility Matters
 - h. Bid Form 8 Vendor's Certificate of Understanding and Acceptance
 - i. Bid Form 9 Certification of Restrictions on Lobbying
 - j. Bid Form 10 Certification of Compliance with FTA's Bus Testing Requirements
 - k. Required Bid Documentation Checklist
 - I. Documentation to be Submitted with Bid Form
 - m. Training Acknowledgement
 - n. References
 - o. Addenda and Addenda Acknowledgements
 - p. Designated Contact and Certification/Signature Form
 - q. Business Registration Certificate
 - r. Purchasing Affidavit
 - s. Conversion Location and Activities
 - t. Manufacturer Certification Signatures
 - u. Pre-Award Buy America Reports
- 4. Tab 4 Specifications
 - a. Specification Documentation Summary



- b. Floorplans
- c. Weight Calculations
- d. Glaval PrimeTime Standard Build Specifications
- e. Detail of Body Materials
- f. Mechanical Description
- g. PrimeTime Body Construction
- h. Ford E-Series Technical Specifications
- i. Altoona Test
- j. FMVSS Standards/Certification
- 5. Tab 5 Supporting Documents
 - a. Water Test Procedure
 - b. Fast Idle System
 - c. Backup Camera
 - d. Stepwell
 - e. Entry Lift and Rear Door
 - f. Energy Absorbing Bumper
 - g. Wheelchair Lift
 - h. Interlock
 - i. Air Conditioning
 - j. Heater
 - k. Floor Covering
 - I. Seating
 - m. Driver's Seat
 - n. Wheelchair Securement QRT 360
 - o. Destination Sign
 - p. Passenger Signaling System
 - q. Mobile PA System
 - r. Sound-off Strobe Light
 - s. Radio Install Prep
 - t. Dual Purpose Safety Vents
 - u. Rust Proofing and Undercoating
 - v. Security Camera



- w. Exterior Vinyl Colors
- x. Authorized Signatory Letter
- y. Financial Stability Statement
- 6. Tab 6 Warranties
 - a. Warranty Synopsis
 - b. Warranty Provider Locations
 - c. Ford Warranty
 - d. Glaval/Manufacturer Warranty
 - e. Air Conditioning
 - f. Creative Care Owner's and Warranty Guide
- 7. Tab 7 Price Proposal
 - a. Exhibit A Pricing Page

DOCUMENTATION TO BE SUBMITTED WITH BID:

Section	DOCUMENTATION TO BE SUBMITTED WITH BID:
Referenced	
<u>√</u> 3.2	Chassis: include Load leveling System: provide product description, warranty information and product literature.
3.3	Engine shall be 6.8 Liter V-10 gasoline engine: provide product description, warranty information and product literature.
6.10	Radio: AM/FM Stereo with CD: provide product description, warranty information and product literature.
3.8	Transmission: provide product description, warranty information and product literature.
3.5	Radiator and Cooling System: provide product description, warranty information and product literature.
3.6	High Idle System, provide product description, warranty information and product literature.
4.2	Brakes: provide product description, warranty information and product literature.
4.0	Tilt Wheel, Cruise Control and Power Steering: provide details of water testing procedures.
2.16	Wheelbase: provide length of proposed wheelbase.
3.9.4	Rear View Back-Up Camera: provide product description, warranty information and literature.
4.3	Wheels: provide product description, warranty information and product literature.
4.4	Tires: provide product description, warranty information and product literature
4.5.6	Battery: provide product description, warranty information and product literature
4.5.5	Alternator: provide product description, warranty information and product literature
	Front and Rear Heating and Air Conditioning: provide product description, warranty information, product literature.
4.8	Body Specifications: provide a description of how conversion will take place and meet the specification requirements. Provide Actual Interior height and Body length of proposed vehicle.
<u></u> 5.0 ·	Sealant, Rustproofing and Undercoating: provide product description, warranty information and product literature.

REQUEST FOR QUOTATION – CRFQ DMT23*10 138" Wheelbase Dual Rear Wheel (DRW) Narrow Body Cutaway Vehicle

5.1	Passenger Doors and Stepwells: Provide product description, dimensions, description of interlock system of all doors and locks to be provided.
5.8	Flooring: provide a description of product to be used, samples of floor covering, colors to be used and assembly process.
<u>√</u> 6.1	Seats, Grab Handles, Passenger restraints: provide product description, warranty information and product literature.
6.2	Mobility Aid/ Occupant Restraint Systems: provide product description, warranty information and product literature.
_ ✓ 6.13	Training: submit letter of understanding to the terms in this Section.
6.8	Security Cameras System Including Playback: provide product description, warranty information and product literature.
7.12.2	Warranty on Complete Vehicle.
7.12.3	Warranty on Basic Vehicle Structure.
7.12.5	Warranty: warranties to be provide on subsystems and components.
N/ <u>A)</u> ✓ 11.3	Complete two (2) bids in binder form -one (1) marked for DTMF-PT.
<u>√</u> 13.2 A	Complete mechanical description of vehicle, its construction and equipment including manufacturer's model name and / or number.
13.2 B	Proposed interior floor plans, showing detailed dimensions including the location of the wheelchair securement system.
√ _13.2 C	Curb weight (empty weight) and gross vehicle weight rating (GVWR of vehicle.
<u>√.</u> 13.2 D	Exterior Vinyl Colors: provide samples/chart of available colors.
i <u>√√</u> 13.2 H :	Identification of the conversion location of the van and listing of activities to take place at the location.
<u>√</u> 13.2 I	A list of five (5) users names, addresses, emails and telephone numbers who have been provided similar equipment.
<u> </u>	No Debt Affidavit
✓	Addendum Acknowledgement



CRFQ DMT2300000010 138" Wheelbase Dual Rear Wheel (DRW) Narrow Body Cutaway Vehicle

13.2.D Exterior Vinyl Colors

As this is an electronic submittal, we cannot provided vinyl color samples. Rather, we will use whatever vinyl and paint colors provided to us by the individual agencies in order to match new units to their existing fleet.



December 9, 2021

To Whom It May Concern:

Creative Bus Sales, Inc. located at 14740 Ramona Ave Chino, CA 91710, hereby authorizes Nicholas R. Corley, Sales Operations Manager, to act as an authorized signer on behalf of Creative Bus Sales, Inc. for binding contracts with your organization.

If further information is needed, please feel free to contact me.

T.J. Matijevich, Vice President

Creative Bus Sales, Inc.

800-326-2877

TJ@creativebussales.com



Statement of Financial Stability

Creative Bus Sales, Inc has been operating in the bus industry for over 25 years. The Company is the nation's largest bus dealer offering products from over 20 top commercial and school bus manufacturers

Creative Bus Sales, Inc. has a long history of fulfilling similar contracts with other transportation agencies and government procurement offices in other states including California and Florida.

Creative Bus Sales Inc. has been profitable every year since its inception. The Company continues to be financially solvent and practices a conservative expansion plan.

Creative Bus Sales maintains the largest inventory in the nation, and possesses the expertise and necessary equipment to provide adequate support to any bus fleet. The Company has multiple long-term inventory finance resources enabling it to carry sufficient inventory to fulfill the requirements of this contract.

Our financial statements are audited by an external CPA firm, and are available upon request.

If you need any further information, please do not hesitate to contact me.

J.R. Sauder

Sr. Vice President

J.R. Sauder

Exhibit A - CRFQ DMT23*10 138" Wheelbase Dual Rear Wheel (DRW) Narrow Body Cutaway Vehicle

CLASS	ITEM DESCRIPTION	UNIT PRICE PER VEHICLE	ESTIMATED QUANTITY	EXTENDED PRICE
Α	Vehicle Non-Accessible / Paratransit Package	\$107,650.00	5	\$538,250.00
В	Vehicle with One Wheelchair (WC) Positions/ Paratransit Package	\$121,552.00	5	\$607,760.00
С	Vehicle with Two Wheelchair (WC) Position / Paratransit Package	\$123,507.00	5	\$617,535.00
D	Vehicle/Extended Length/ Front Lift / 3 WC Positions, Paratransit Package	\$127,965.00	5	\$639,825.00
E	Vehicle/ One Wheelchair (WC)/ Fixed Route Package	\$129,186.00	5	\$645,930.00
F	Vehicle/Two WC / Fixed Route Package	\$131,230.00	5	\$656,150.00
G	Vehicle/ Extended Length / Front Lift / Three Wheelchair Positions/ Fixed Route Package	\$135,741.00	5	\$678,705.00
н	Vehicle/ One WC Position / Fixed Route Package / Full Bus Paint or 3/4 Bus Body Paint, Expanded Graphics	\$133,286.00	5	\$666,430.00
I	Vehicle / 2 WC Positions / Fixed Route Package / Full Bus Paint or 3/4 Bus Body Paint, Expanded Graphics	\$135,330.00	5	\$676,650.00
J	Vehicle / Extended Length / Fixed Route Package / Front Lift / Three WC Positions/ Full Bus Paint or 3/4 Bus Body Paint, Expanded Graphics,	\$140,441.00	5	\$702,205.00
AA	Option On-Board Automatic Audio-Visual LED Display Voice Announcement System	\$6,600.00	5	\$33,000.00
		TOTAL BI	D FOR EVALUATION	\$6,429,440.00

*Complete form provided.

*Please note these are only estimated quantities and do not reflect any guarantee of purchase.

*The DPT may purchase more or less as needed.

*Please do not alter pricing page.



Letter of Transmittal

Dear Bid Clerk,

Thank you and The State of West Virginia for the opportunity to submit a response to CRFQ 0810 DMT2300000010, 138# Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle.

Our understanding of the scope of work pertaining to this Request for Quote is to provide The State of West Virginia proposals for the manufacture and delivery of products in accordance with the terms and conditions set forth in this solicitation, meeting all specifications and FMVSS laws.

CBS's proposal may include manufacturer's brochures, standard warranty information, and additional technical information within our bid submittal. Information shown in these documents indicates our manufacturer's standard equipment or specifications and does not necessarily reflect the exact equipment to be utilized or included with the bid vehicle(s). Our vehicles are built to meet all bid specifications and amendments unless otherwise noted in our exceptions list: Our submittal makes no exceptions to the solicitation terms and conditions.

The resulting contract will be for up to fifty (50) 138" wheelbase, dual rear wheel, narrow body, cutaway vehicles with related necessary components, and selected options. The contract shall be a one (1) year plus one (1) year extension term. The enclosed offer, specifications and statements are valid for ninety (90) days after bid opening February 14, 2023.

The information contained in our proposal contains our qualifications to perform the required work, detailed specifications, warranties, and descriptions of our facilities and staff. Your expected delivery will be within one hundred fifty (150) days after we receive a purchase order.

Included are all the required documentation and general forms. If you need more information or clarification, please give us a call on 800.326.2877 with any inquiries.

Sincerely,

Nick Čorley | Sales Operations Manager

Creative Bus Sales, Inc.

800-326-2877

ncorley@creativebussales.com



Experience and Qualifications

Responder Information

Creative Bus Sales, Inc. 9365 Counselors Row, Suite 112 Indianapolis, Indiana, 46240 Mike Wilson | Director of Sales

Phone: 800.326.2877

Email: MikeW@CreativeBusSales.com

1. Background and Experience

Operating 23 full-service locations, Creative Bus Sales is the largest bus dealership in the United States representing over 20 major vehicle manufacturers. The Company's team of vehicle sales representatives possess over 560 years of cumulative vehicles sales experience, resulting in 5,000+vehicles sold nationwide every year.

Creative Bus Sales is dedicated to servicing its customers at the highest possible level. Nationwide, the Company has in excess of 270 company operated service bays dedicated to pre-delivery inspections, warranty and service work. Green Alternative Systems (GAS), a division of Creative Bus Sales, has performed over 10,000 alternative fuel conversions (CNG, Propane, and Electric). Additionally, the Company is the only dealership in the nation to possess multiple Ford-certified, Qualified Vehicle Modifier (QVM) dealership locations.

Creative Bus Sales has a dedicated customer service department to handle all pre- and post-sales needs of its customers. The Company has a team of 25+ dedicated outside and inside parts sales representatives responsible for handling all customer parts needs. Creative Bus Sales currently holds multiple State Purchasing Contracts, a partial listing of contracts is shown below.

Nationwide Transit Contract Experience (a partial listing of significant projects)

Orange County Transit (OCTA) Over 950 Paratransit Buses & Vans City of Los Angeles (LADOT) Over 500 Paratransit Buses Caltrans/DGS Over 5.000 Paratransit Buses & Vans RTC Las Vegas Over 400 Paratransit & Transit Buses Access Services Over 1.000 Paratransit Mini Vans Dallas DART Over 400 Paratransit Buses Over 600 Paratransit Buses & Vans Florida (FDOT) **GSA** Over 350 Paratransit Buses Arizona Dept of Trans (ADOT) Over 600 Paratransit Buses & Vans North Carolina (NCDOT) Over 600 Paratransit Buses & Vans Texas (Multiple Contracts) Over 1,200 Paratransit Buses & Vans Washington (WSDOT) Over 650 Paratransit Buses & Vans

Oregon (ODOT)

Oklahoma (Multiple Contracts)

New Mexico (NMDOT)

Over 300 Paratransit Buses & Vans

Over 400 Paratransit Buses & Vans

Over 450 Paratransit Buses & Vans



Creative Bus Sales currently holds transit contracts and/or services customers in the following states: WA, OR, CA, NV, ID, MT, WY, UT, CO, AZ, NM, KS, OK, TX, IL, IN, AR, LA, MS, AL, GA, FL, NC, SC, PA, TN, MD, and MA.

Customer Service Capabilities

Creative Bus Sales' service locations are located within the contract requirements of all recipient locations. The Creative Care and Technical team are available to assist immediately as needed. The Company has the authority to deploy internal and factory personnel from any discipline including engineering, manufacturing, parts, service, and management in response to a customer's needs. No delay in problem resolution due to out-of-state factory personnel availability is experienced. Swift and accurate resolutions to issues and needs are achieved through factory personnel directly reviewing issues, "first hand", as they are presented.

Creative Bus Sales has excellent relations with all major component manufacturers. The Company's Service Technicians and supervisory team are certified by John Deere, Cummins, A/C Carrier, MCC, Trans Air, Thermo King, Freedman Seating, Ricon, and Braun amongst many others. Service Technicians are graduates of the Automotive Technical College and many are Automotive Service Excellence (ASE) Master Technicians.

The Creative Bus Sales' Parts and Service Department is dedicated solely to the service and support of commercial and transit buses and does not service any other type of equipment, school buses or trucks. Such focus ensures an unmatched level of competency in the industry. Technical assistance can be provided immediately during business hours by contacting Creative Bus Sales service technicians. A complete description of warranty policy and procedures can be provided upon award.

With over 5,000 units sold annually, Creative Bus Sales has the largest "fleet" of vehicles in service in the nation. This gives the Company the most vehicle performance data in the industry. The Company is exposed to issues with vehicles across the country in a variety of operating conditions. This data allows the Company to recognize issues well in advance of smaller dealers that do not service the volume of vehicles Creative Bus Sales does. This translates to quicker warranty approvals and repair execution for customers, as many times the Company has already seen the issue prior to receiving the call. Additionally, our technical support team has an information sharing process that communicates common issues and repairs, resulting in reduced troubleshooting times frames and quicker repairs. All of this allows the Company to get customer vehicles back up and running in the quickest manner possible, minimizing downtime for Kanawha Valley customers.

List of Centers

One call to our dedicated Creative Care team will initiate immediate warranty service and technical response. Creative Bus Sales is an authorized repair facility for all products represented. The Company has the authority to make on the spot decisions regarding warranty repairs and approvals. In addition to the Company operated facilities, local warranty repair facilities will be authorized to perform the required repair on an as needed basis. Our intent is to make all warranties and service as



local as possible while providing the customer with the best possible service. Our team of certified technical advisors are available to assist with any necessary troubleshooting efforts. This ensures less downtown and a better overall experience for the KVRTA end users.

Spare Parts and Inventory Levels

A critical part of the project is a quick response time to service assistance and parts supply. Creative Bus Sales operates dedicated parts warehousing operations with over 60,000 square feet of capacity and \$10,000,000 worth of inventory. The Company stocks significant parts supply at all its locations. In addition, the Company operates dedicated parts warehouses in Arizona, California, Florida, Indiana, Georgia, Pennsylvania, and Texas.

One call to our Parts Department will facilitate the end user's needs. With 25+ dedicated employees, Creative Bus Sales' Parts Department has over sixty years of cumulative experience in this field. Most parts can be shipped within twenty-four hours of order. A complete description of the parts policy and procedures can be provided upon award.

Inspection procedures

Due to Creative Bus Sales' proximity to manufacturers' locations, the Company has inspectors on site during vehicle builds. The Company has a team of inspectors located in Elkhart, Indiana that visits manufacturer facilities on an ongoing basis. This allows the Company to catch any potential issues during the building process, prior to customer receipt. Once completed at the manufacturer, vehicles are delivered to a Company location for additional inspection. In many cases these vehicles flow through Creative Bus Sales' Elkhart inspection facility immediately following completion. The Elkhart facility is over 50,000 square feet and processes deliveries of approximately 1,500 vehicles yearly. Any issues identified can be repaired in house or sent back to the manufacturer for repair. Next, vehicles are shipped to one of the Company's local facilities for final PDI (Pre-Delivery Inspection). This additional inspection allows the Company to catch any issues that may have occurred during the initial driving period of the vehicle. Any deficiency noted shall be repaired before delivery. All documents required under the contract shall be provided upon delivery or pickup. The Company inspection processes mentioned above are all in addition to any inspections performed by the manufacturer and/or line inspectors hired by the end user.

Key Personnel and Experience Contract Management Team

- Tony Matijevich | President
- TJ Matijevich | Vice President Sales
- JR Sauder | Senior Vice President
- Mike Wilson | Director of Sales
- Matthew Mashuda | Sales Executive, Project Manager
- Nick Corley | Sales Operations Manager
- Carl Henderson | Senior Director of Service
- Jamie Greenlaw | Fleet Warranty Administrator



3. Fiscal Responsibility

With a 40 year history, 23 locations nationwide, and 350+ employees, Creative Bus Sales has the necessary longevity and financial stability to service any contract of any size. Since 1980, the Company has grown to service customers in nearly every state in the U.S. More than 50% of the Company's facilities are owned facilities, not leased properties, with significant investment in renovations, equipment, and employees.

Creative Bus Sales has long standing relationships with vehicle floorplan providers and banking partners. Floorplan relationships go back 20+ years and the same goes for its banking relationships. The Company has achieved increased revenue, sales, and transaction growth year over year for the past 10+ years.

4. Delivery Performance

Creative Bus Sales prides itself on delivering vehicles on time with all specifications met. The Company has not paid liquidated damages on any transit contract in the past five (5) years.

5. Ownership History and Statement Regarding Judgements and Violations

Originally founded in 1980 as Creative Transportation Systems (CTS), the Company was later renamed Creative Bus Sales in 1990. The current owner, Tony Matijevich, purchased the Company in 1993 and it has been family-owned and operated since. Prior to purchasing Creative Bus Sales, Tony was the President of ElDorado National, the largest manufacturer of small and mid-size buses in the nation at the time. Under the current leadership and vision, Creative Bus Sales has become the largest-volume small, mid and large-size bus and van dealership in the United States. Over the past 40 years, the Company has expanded its scope through a combination of dealer acquisitions and organic growth.

Creative Bus Sales was incorporated in the State of California in 1993 under the current ownership. Creative Bus Sales has had no judgments, litigation, licensing violations or other violations outstanding or resolved against it within the past five (5) years.

6. Additional Information

Creative Bus Sales Nationwide Locations:

- 1. Chino, CA
- 2. Sacramento, CA
- 3. Canby, OR
- 4. Mukilteo, WA
- 5. Phoenix, AZ
- 6. Albuquerque, NM
- 7. Colorado Springs, CO
- 8. Irving, TX
- 9. Lewisville, TX
- 10. Tyler, TX

- 11. Rogers, AR
- 12. Slidell, LA
- 13. Jackson, MS
- 14. Elkhart, IN
- 15. Buffalo, NY
- 16. Canonsburg, PA
- 17. Carlstadt, NJ
- 18. Hudson, NH
- 19. Jacksonville, FL
- 20. Davie, FL



21. Orlando, FL

23. College Park, GA

22. Charlotte, NC

Notices should be sent c/o

Mike Wilson Creative Bus Sales, Inc.

9365 Counselors Row, Ste. 112, Indianapolis, IN, 46242

Phone: 800.326.2877

Fax: 909-465-5529

Email: MikeW@CreativeBusSales.com

Preparer

Nick Corley, Sales Operations Manager for Creative Bus Sales, is the preparer of this proposal.

Flexible Scope

Creative Bus Sales is committed to flexibility in the products and services offered in the contract upon request by the State.

Independent Pricing

Creative Bus Sales certifies that in connection with this Contract the prices proposed have been arrived at without consultation, communication, or agreement for the purpose of restricting competition.

Signer(s)

Each person signing this proposal and/or addenda is the person responsible for or authorized to make decisions as to the prices quoted in the cost proposal and has not participated and will not participate in any action contrary to those stated above.

Consent

If awarded a contract, Creative Bus Sales will not assign any part of its interest to the agreement without prior consent of the State.

Acceptance of Terms

Creative Bus Sales accepts the Contract Terms and Conditions.

Cutoff Dates

Creative Bus Sales agrees to comply with this section. Model year cutoffs are well communicated by the OEM's and chassis dealers alike. We generally receive 60 - 90 day notice and will notify the agency promptly.

Sincerely,

Nick Corley | Sales Operations Manager

Creative Bus Sales, Inc.

CERTIFICATION FOR AIR & WATER POLLUTION MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

The Vendor certifies that the vehicles proposed:
ARE X in compliance with the regulations in 40 CFR Part 85, 40 CFR Part 86, 40 CFR Part 600, Clean Water Act and the air/water pollution criteria established by the Environmental Protection Agency of the United States Government.
ARE NOT in compliance with the regulations in 40 CFR Part 85, 40 CFR Part 86, 40 CFR Part 600, Clean Water Act and the air/water pollution criteria established by the Environmental Protection Agency of the United States Government.
Date Authorized Signature Sales Operations Manager
Title Creative Bus Sales, Inc. Company Name

DISADVANTAGED VEHICLE BUSINESS ENTERPRISE VENDORS/ MANUFACTURERS CERTIFICATION

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

(Check appropriate statement)			
	The Vendor, <u>if a transit vehicle manufacturer</u> , hereby certifies that it has complied with the requirements of 49 CFR Section 26.49 by submitting an annual DBE goal to the Federal Transit Administration (FTA). The goal has either been approved or not disapproved by FTA.		
<u>X</u>	The Vendor, <u>if a non-manufacturing supplier</u> , hereby certifies that the manufacturer of the transit vehicle to be supplied has complied with the above-referenced requirement of 49 CFR Section 26.49.		
	2-3-2023		
Date			
	The		
Autho	rized Signature		
 Title	Nick Corley		
	Creative Bus Sales, Inc.		
Compa	any Name		

BUY AMERICA CERTIFICATION ROLLING STOCK MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

Certificate of Compliance

The bidder or offeror hereby certifies that it will comply with the requirements of section 165(b) (3), of the Surface Transportation Assistance Act of 1982, as amended, and the applicable regulations of 49 CFR 661.11:

2-3-2023	
Date	-
11	
Authorized Signature	-
Creative Bus Sales, Inc.	-
Company Name	
Nick Corley	_
Name	
Sales Operations Manager	
Title	-
Certificate for Non-Compliance	
The bidder or offeror hereby certifies that it cannot of	
165(b) (3) of the Surface Transportation Assistance for an exception to the requirement consistent with s	
Transportation Assistance Act, as amended, and the	
,	
Dete	
Date	
Authorized Signature	-
Company Name	
Company Name	
Name	
Title	
1100	
Revised 10/27/14	

FEDERAL MOTOR VEHICLE SAFETY STANDARDS CERTIFICATION

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

The vendor hereby certifies that it shall submit, as required by Title 49 of the CFR, Part 663 - Subpart D, it's self-certification information stating that the vehicle(s) will comply with the relevant Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 of the Code of Federal Regulations, Part 571.

2-3-2023
Date
7
Authorized Signature
Sales Operations Manager
Title
Creative Bus Sales, Inc.
Company Name

BID FORM #6 U.S. Comptroller's Debarment List Certification

MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

	Creative Bus Sales, Inc.	hereby certifies that it	
I	S or		
	S NOT (specify one) included on the. U.S. GS nformation available at https://www.sam.gov .	A's debarment and suspens	sion
-	2-3-2023		
Date			
	7		
Authoria	zed Signature		
Title	Sales Operations Manager		
Compan	Creative Bus Sales, Inc.		
Compan	ly Ivaille		

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

CERTIFICATION OF PRIMARY PARTICIPANT REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

	Primary Participant (applicant for an FTA granactor for a major third-party contract),	
to the	Creative Bus Sales, Inc. best of its knowledge and belief, that it and it	(COMPANY NAME) certifies
to the	best of its knowledge and benef, that it and it	s principais.
1.	Are not presently debarred, suspended, prop voluntarily excluded from covered transaction	
2.	Have not within a three-year period preceding civil judgment rendered against them for conconnection with obtaining, attempting to obtaining transaction or contract under a public antitrust statutes or commission of embezzled destruction of records, making false statements.	nmission of fraud or a criminal offense in ain, or performing a public (Federal, State or transaction; violation of Federal or State ment, theft, forgery, bribery, falsification or
3.	Are not presently indicted for or otherwise of governmental entity (Federal, State or local) enumerated in paragraph (2) of this certification.	with commission of any of the offenses
4.	Have not within a three-year period preceding public transactions (Federal, State or local) to	
third-p	primary participant (applicant for an FTA gra party contractor) is unable to certify to any of ipant shall attach an explanation to this certific	the statements in this certification, the
AGRE	PRIMARY PARTICIPANT (APPLICANT FO EEMENT, OR POTENTIAL CONTRACTOR FRACT),	
TRUT:	Creative Bus Sales, Inc. THFULNESS AND ACCURACY OF THE COMITTED ON OR WITH THIS CERTIFICATIONS OF 31 U.S.C. SECTIONS 3801 ET S	ON AND UNDERSTANDS THAT THE
71	- Sales Operations Manager	

Signature and Title of Authorized Official

BID FORM #8 MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

VENDOR'S CERTIFICATION OF UNDERSTANDING AND ACCEPTANCE

The Vendor hereby certifies that all Technical Specifications and Contract Terms and Conditions have been carefully reviewed, are fully understood and shall be adhered to in performance and completion of any contract resulting from this bid.

2-3-2023

Date

	1	
Auth	orized Signature	
	Sales Operations Manager	
Title		
	Creative Bus Sales, Inc.	
Com	pany Name	
	SPECIFICATION COMPI	LIANCE
discrepanc	E: Please check if what is offered is in exact cories must be listed as an attachment to the bid as must be provided as a part of the Vendor's	proposal. Exact dimensions and/or
<u> </u>	Bid proposal submitted meets and/or exceeds	all specification requirements.
	Bid proposal submitted contains deviations fro Detailed descriptions of these deviations have	•

BID FORM #9 MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

CERTIFICATION OF RESTRICTIONS ON LOBBYING

The undersigned (Vendor, Contractor) certifies, to the best of his or her knowledge and belief, that:

- 1. No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress regarding the award of a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance, or the extension, continuation, renewal, amendment, or modification of any Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance.
- 2. If any funds other than Federal appropriated funds have been or will be paid to any person to influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or any employee of a Member of Congress in connection with any application for a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance, the undersigned assures that it will complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," Rev. 7-97; and
- 3. The undersigned understands that the language of this certification shall be included in the award documents for all sub awards at all tiers (including subcontracts, sub grants, sub agreements. and contracts under grants, loans (including a line of credit), cooperative agreements, loan guarantees, and loan insurance.

Undersigned understands that this certification is a material representation of fact upon which reliance is placed by the Federal government and that submission of this certification is a prerequisite for providing a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance for a transaction covered by 31 U.S.C. 1352. The undersigned also understands that any person who fails to file a required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The (Vendor, Contractor) Creative Bus Sales, Inc.	, certifies or affirms the truthfulne
and accuracy of each statement of its certification and disclosure, if any.	In addition, the (Vendor, Contracto
understands and agrees that the provisions of 31 U.S.C. §§ 3801, et seq.,	apply to this certification and
disclosure.	
2-3-2023 Date Authorized Signature	
Sales Operations Manager	

Title

CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS

The undersigned (Vendor/Manufacturer) certifies that the vehicle offered in this procurement complies with 49 U.S.C. 5318, as amended by MAP-21, and FTA regulations, "Bus Testing," 49 CFR Part 665.

The undersigned understands that misrepresenting the testing status of a vehicle acquired with Federal financial assistance may subject the undersigned to civil penalties as outlined in the Department of Transportation's regula on Program Fraud Civil Remedies, 49 CFR Part 31. In addition, the undersigned understands that FTA may suspend or debar a manufacturer under the procedures in 49 CFR Part 29.

2-3-2023
Date
2
Authorized Signature
Sales Operations Manager
Title
Creative Bus Sales, Inc.
Company Name



State of West Virginia **Centralized Request for Quote**

Proc Folder:

1157978

Reason for Modification:

Doc Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Addendum No. 1

Proc Type:

Central Master Agreement

Date Issued Solicitation Closes Solicitation No Version

2023-01-18 2023-01-30 13:30 CRFQ 0810 DMT2300000010 2

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

VENDOR

Vendor Customer Code: VS0000011255

Vendor Name: Creative Bus Sales, Inc.

Address: 9365

Street: Counselors Row, Suite 112

City: Indianapolis

State: Indiana

Country: U.S.A.

Zip: 46240

Principal Contact: Matthew Mashuda, Transit Bus Sale

Vendor Contact Phone: 422-922-0184

Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067

david.h.pauline@wv.gov

Vendor

Signature X

FEIN# 33-0388707

DATE

2-3-2023

All offers subject to all terms and conditions contained in this solicitation

Date Printed: Jan 18, 2023

Page: 1

FORM ID: WV-PRC-CRFQ-002 2020/05

ADDITIONAL INFORMATION

Addendum No. 1

To respond to vendor technical questions, see attached.

Bid opening date and time remain January 10, 2023 at 1:30 pm est.

No other changes.

Federal Terms and Conditions Apply

INVOICE TO		SHIP TO		
PUBLIC TRANSIT DIVIS	ON	PUBLIC TRANSIT DIVISION	ON	
BLDG 5 RM 663		KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY		
1900 KANAWHA BLVD E		1550 FOURTH AVE		
CHARLESTON	WV	CHARLESTON	WV	
US		US		

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	138" WB DRW Narrow Body Cutaway Vehicles	0.00000	EA	Please see Exhibi	t A - Pricing Page
İ					***************************************

Comm Code	Manufacturer	Specification	Model #	
25101502	Glaval	Classes A, B, C, D, E, F, G, H, I, J	PrimeTime	·

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

See attached Exhibit A Pricing page

SCHEDU	JLE OF EVENTS		
Line	<u>Event</u>	Event Date	8 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 = 1 =
: . 1	Vendor Technical Questions Due 11:00 am est.	2023-01-16	

	Document Phase	Document Description	Page 3
DMT2300000010		138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle	

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions



State of West Virginia Centralized Request for Quote

Proc Folder:

1157978

Doc Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Reason for Modification:

Addendum No. 2

Proc Type:

Central Master Agreement

Date Issued **Solicitation Closes** Solicitation No Version

2023-01-23 2023-02-06 CRFQ 13:30 0810 3 DMT2300000010

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON WV 25305

US

VENDOR

Vendor Customer Code: VS0000011255

Vendor Name: Creative Bus Sales, Inc.

Address: 9365

Street: Counselors Row, Suite 112

City: Indianapolis

State: Indiana

Country: U.S.A.

Zip: 46240

Principal Contact: Matt Mashuda, Transit Bus Sales

Vendor Contact Phone: 422-922-0184

Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067

david.h.pauline@wv.gov

Vendor

Signature X

FEIN# 33-0388707

DATE 2-3-2023

All offers subject to all terms and conditions contained in this solicitation

Date Printed: Jan 23, 2023

Page: 1

FORM ID: WV-PRC-CRFQ-002 2020/05

ADDITIONAL INFORMATION

Addendum No. 2

To respond to additional vendor technical questions received, see attached.

To move did opening date and time to February 6,, 2023 at 1:30 pm est.

No other changes.

Federal Terms and Conditions Apply

INVOICE TO		SHIP TO	
PUBLIC TRANSIT DIVISION	N	PUBLIC TRANSIT DIVISION OF	
BLDG 5 RM 663		KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY	
1900 KANAWHA BLVD E		1550 FOURTH AVE	
CHARLESTON	WV	CHARLESTON	WV
US		US .	· ·

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	138" WB DRW Narrow Body Cutaway Vehicles	0.00000	EA Ple		A - Pricing Page

Comm Code	Manufacturer	Specification	Model #	1
25101502	Glaval	Classes A, B, C, D, E, F, G, H, I	PrimeTime	
				the state of the s

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

See attached Exhibit A Pricing page

SCHED	ULE OF EVENTS		
<u>Line</u>	<u>Event</u>	Event Date	
. 1.1	Vendor Technical Questions Due 11:00 am est.	2023-01-16	

SOLICITATION NUMBER: CRFQ DMT23*10 Addendum Number: 2

The purpose of this addendum is to modify the solicitation identified as ("CRFQ DMT23*10") to reflect the change(s) identified and described below.

Applicable Addendum Catego

\boxtimes	Modify bid opening date and time	
\boxtimes	Modify specifications of product or service being sought	
\boxtimes	Attachment of vendor questions and responses	
	Attachment of pre-bid sign-in sheet	
	Correction of error	
	Other	
cription	of Modification to Solicitation:	
-	To respond to additional vendor technical questions, see attached. To change specifications, see attached. To move bid opening February 6, 2023 at 1:30 pm est. No other changes.	
		 ✓ Modify specifications of product or service being sought ✓ Attachment of vendor questions and responses ☐ Attachment of pre-bid sign-in sheet ☐ Correction of error

Terms and Conditions:

- 1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
- 2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

ADDENDUM ACKNOWLEDGEMENT FORM SOLICITATION NO.: CRFQ DMT23*10

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received: (Check the box next to each addendum received)							
	\boxtimes	Addendum No. 1		Addendum No. 6			
	\boxtimes	Addendum No. 2		Addendum No. 7			
		Addendum No. 3		Addendum No. 8			
		Addendum No. 4		Addendum No. 9			
		Addendum No. 5		Addendum No. 10			
I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding. Creative Bus Sales, Inc. Company							
				Authorized Signature			
	1-23-2023						

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.



Department of Administration **Purchasing Division** 2019 Washington Street East Post Office Box 50130 Charleston, WV 25305-0130

State of West Virginia **Centralized Request for Quote**

Proc Folder:

1157978

Doc Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Reason for Modification:

Addendum No. 3

Proc Type:

Central Master Agreement

Date Issued Solicitation Closes Solicitation No Version CRFQ 0810 DMT2300000010 2023-01-27 2023-02-06 13:30 4

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

VENDOR

Vendor Customer Code: VS0000011255

Vendor Name: Creative Bus Sales, Inc.

Address: 9365

Street:

Counselors Row, Suite 112

City:

Indianapolis

State: Indiana

Country: U.S.A.

Zip: 46240

Principal Contact: Matthew Mashuda, Transit Bus Sales

Vendor Contact Phone: 422-922-0184

Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067

david.h.pauline@wv.gov

Vendor

Signature X

FEIN# 33-0388707

DATE 2-3-2023

All offers subject to all terms and conditions contained in this solicitation

Date Printed: Jan 27, 2023

Page: 1

FORM ID: WV-PRC-CRFQ-002 2020/05

ADDITIONAL INFORMATION

Addendum No. 3

To attached Exhibit B, C, & D that were inadvertently omitted from the original CRFQ.

Bid opening remains February 6,, 2023 at 1:30 pm est.

No other changes.

Federal Terms and Conditions Apply

INVOICE TO		SHIP TO	
PUBLIC TRANSIT DIVISION	N	PUBLIC TRANSIT DIVISION OF	
BLDG 5 RM 663		KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY	
1900 KANAWHA BLVD E		1550 FOURTH AVE	
CHARLESTON	WV	CHARLESTON	WV
US		US	

L	Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
-	1	138" WB DRW Narrow Body Cutaway Vehicles	0.00000	EA	•••	
1						

Comm Code	Manufacturer	Specification	Model #	
25101502	Glaval	Classes A, B, C, D, E, F, G, H, I, J	PrimeTime	

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

See attached Exhibit A Pricing page

SCHED	ULE OF EVENTS		
<u>Line</u>	<u>Event</u>	Event Date	
1	Vendor Technical Questions Due 11:00 am est.	2023-01-16	

	Document Phase	Document Description	Page 3
DMT2300000010		138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle	

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions

SOLICITATION NUMBER: CRFQ DMT2300000009 Addendum Number: 2

The purpose of this addendum is to modify the solicitation identified as CRFQ DMT2200000009 to reflect the change(s) identified and described below.

Applicable	Addendum	Category:
------------	----------	-----------

\boxtimes	Modify bid opening date and time
\boxtimes	Modify specifications of product or service being sought
\boxtimes	To respond to technical questions
	Attachment of pre-bid sign-in sheet
	Correction of error
	Other

Additional Documentation:

- 1. To move bid opening date and time January 12, 2023, at 1:30 pm est.
- 2. To respond to vendor technical questions, see attached.
- 3. To change specifications, see attached.
- 4. No other changes.

Terms and Conditions:

- 1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
 - 2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

ADDENDUM ACKNOWLEDGEMENT FORM SOLICITATION NO.: CRFQ DMT2300000009

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

H 100 March 1 (100	Addendum Numbers Received: (Check the box next to each addendum received)							
(Circo)	ir une oo	in front to each addendam reco	(100)					
	\boxtimes	Addendum No. 1		Addendum No. 6				
		Addendum No. 2		Addendum No. 7				
	X	Addendum No. 3		Addendum No. 8				
		Addendum No. 4		Addendum No. 9				
		Addendum No. 5		Addendum No. 10				
I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.								
Creative Bus Sales, Inc. Company								
				Authorized Signature				

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

Date



Department of Administration **Purchasing Division** 2019 Washington Street East Post Office Box 50130 Charleston, WV 25305-0130

State of West Virginia Centralized Request for Quote

Proc Folder:

1157978

Reason for Modification:

Doc Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Addendum No. 4

Proc Type:

Central Master Agreement

Date Issued Solicitation Closes **Solicitation No** Version 2023-01-30 2023-02-14 13:30 CRFQ 0810 DMT2300000010 5

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

VENDOR

Vendor Customer Code: VS0000011255 Vendor Name: Creative Bus Sales, Inc.

Address: 9365

Street: Counselors Row, Suite 112

City: Indianapolis

State: Indiana

Country: U.S.A.

Zip: 46240

Principal Contact: Matthew Mashuda, Transit Bus Sales

Vendor Contact Phone: 422-922-0184

Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067

david.h.pauline@wv.gov

Vendor

Signature X

FEIN# 33-0388707

DATE 2-8-2023

All offers subject to all terms and conditions contained in this solicitation

Date Printed: Jan 30, 2023

Page: 1

FORM ID: WV-PRC-CRFQ-002 2020/05

ADDITIONAL INFORMATION

Addendum No. 4

To respond to vendor question and change specfications, see attached

To move bid opening date and time to February 14, 2023 at 1:30 pm est.

No other changes.

Federal Terms and Conditions Apply

INVOICE TO		SHIP TO
PUBLIC TRANSIT DIVISION OF		PUBLIC TRANSIT DIVISION OF
BLDG 5 RM 663		KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY
1900 KANAWHA BLVD I	Ε	1550 FOURTH AVE
CHARLESTON	WV	CHARLESTON WV
US		US note:

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	138" WB DRW Narrow Body Cutaway	Vehicles - 0.00000	EA	Please see Exhib	it A - Pricing Page
					•

Comm Code	Manufacturer	Specification	Model #	
25101502	Glaval	Classes A, B, C, D, E, F, G, H, I, J	PrimeTime	

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

See attached Exhibit A Pricing page

SCHED	OULE OF EVENTS		
<u>Line</u>	<u>Event</u>	Event Date	
.1	Vendor Technical Questions Due 11:00 am est.	2023-01-16	

SOLICITATION NUMBER: CRFQ DMT23*10

Addendum Number: 4

The purpose of this addendum is to modify the solicitation identified as ("CRFQ DMT23*10") to reflect the change(s) identified and described below.

Applicable Addendum	Category:
---------------------	-----------

\boxtimes	Modify bid opening date and time
\boxtimes	Modify specifications of product or service being sought
\boxtimes	Attachment of vendor questions and responses
	Attachment of pre-bid sign-in sheet
	Correction of error
	Other

Description of Modification to Solicitation:

- No respond to vendor technical question, see attached.
 - 2. To change specifications, see attached.
 - 3. To move bid opening date & time to February 14, 2023, at 1:30 pm est.
 - 4. No other changes.

Additional Documentation: Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

Terms and Conditions:

- 1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
- 2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

CRFQ 0810 DMT 23*10

138" Wheelbase, Narrow Body Cutaway Vehicle

Question: For clarification purposes, in addendum #2, it was approved to allow the 4.3L

V6 Engine. The 4.3L Chassis for this vehicle is not available in a Dual Rear Wheel configuration. The Chassis for the 4.3L is a light chassis of 9,900 lbs. GVWR and normally used for school buses. This changes the specifications;

will Public Transit allow this?

Answer: Public Transit is seeking a 138" Wheelbase, narrow body cutaway vehicle with

dual rear wheels. Public Transit will not allow the 4.3L V6 if the Chassis isn't

available to be dual rear wheels from the manufacturer.

ADDENDUM ACKNOWLEDGEMENT FORM SOLICITATION NO.: CRFQ DMT23*10

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

		Numbers Received: ox next to each adde	•	ived)	
	\boxtimes	Addendum No. 1			Addendum No. 6
		Addendum No. 2			Addendum No. 7
		Addendum No. 3			Addendum No. 8
	\boxtimes	Addendum No. 4			Addendum No. 9
		Addendum No. 5			Addendum No. 10
I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.					
					Creative Bus Sales, Inc.
					Company Authorized Signature
				·	2-8-2023
					Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.



Department of Administration Purchasing Division 2019 Washington Street East Post Office Box 50130 Charleston, WV 25305-0130

State of West Virginia Centralized Request for Quote

Proc Folder:

1157978

Doc Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Reason for Modification:

Addendum No. 5

Proc Type:

Central Master Agreement

Date Issued **Solicitation Closes** Solicitation No Version 2023-02-07 2023-02-14 13:30 CRFQ 0810 DMT2300000010 6

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

VENDOR

Vendor Customer Code: VS0000011255 Vendor Name: Creative Bus Sales, Inc.

Address: 9365

Street: Counselors Row, Suite 112

City: Indianapolis

State: Indiana

Country: U.S.A.

Zip: 46240

Principal Contact: Matthew Mashuda, Transit Bus Sales

Vendor Contact Phone: 422-922-0184

Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067

david.h.pauline@wv.gov

Vendor

Signature X

FEIN# 33-0388707 **DATE** 2-8-2023

All offers subject to all terms and conditions contained in this solicitation

Date Printed: Feb 7, 2023

Page: 1

FORM ID: WV-PRC-CRFQ-002 2020/05

ADDITIONAL INFORMATION

Addendum No. 5

To respond to vendor question and change specifications, see attached

Bid opening remains February 14, 2023 at 1:30 pm est.

No other changes.

Federal Terms and Conditions Apply

INVOICE TO		SHIP TO		
PUBLIC TRANSIT DIVIS OF	ON	PUBLIC TRANSIT DIVISION	N	
BLDG 5 RM 663		KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY		
1900 KANAWHA BLVD E		1550 FOURTH AVE		
CHARLESTON	WV	CHARLESTON	WV	
US		US		15 5 4 21 17 3 3 2 21

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price Total Price
1	138" WB DRW Narrow Body Cutaway Vehicles	0.00000	EA	Please see Exhibit A - Pricing Page

Comm Code	Manufacturer	Specification	Model #	". "T "
25101502	Glaval	Classes A, B, C, D, E, F, G, H, I, J	PrimeTime	1

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

See attached Exhibit A Pricing page

SCHED	ULE OF EVENTS		-
<u>Line</u>	<u>Event</u>	Event Date	
. *** 11	Vendôr Technical Questions Due 11:	00 am est. 2023-01-16	
			·

	Document Phase	Document Description	Page 3
DMT2300000010		138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle	

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions



Department of Administration Purchasing Division 2019 Washington Street East Post Office Box 50130 Charleston, WV 25305-0130

State of West Virginia Centralized Request for Quote

Proc Folder:

1157978

Reason for Modification:

Doc Description: 138" Wheelbase, Dual Rear Wheel, Narrow Body Cutaway Vehicle

Addendum #6

Proc Type:

Central Master Agreement

Date Issued **Solicitation Closes** Solicitation No Version

2023-02-07 2023-02-14 13:30 CRFQ 0810 DMT2300000010

BID RECEIVING LOCATION

BID CLERK

DEPARTMENT OF ADMINISTRATION

PURCHASING DIVISION

2019 WASHINGTON ST E

CHARLESTON

WV 25305

US

VENDOR

Vendor Customer Code: VS0000011255 Vendor Name: Creative Bus Sales, Inc.

Address: 9365

Street:

Counselors Row, Suite 112

City:

Indianapolis

State:

Indiana

Country: U.S.A. **Zip**: 46240

Principal Contact: Matthew Mashuda, Transit Bus Sales

Vendor Contact Phone: 422-922-0184

Extension:

FOR INFORMATION CONTACT THE BUYER

David H Pauline 304-558-0067

david.h.pauline@wv.gov

Vendor

Signature X

FEIN# 33-0388707 **DATE** 2-8-2023

All offers subject to all terms and conditions contained in this solicitation

Date Printed: Feb 7, 2023

Page: 1

FORM ID: WV-PRC-CRFQ-002 2020/05

ADDITIONAL INFORMATION

Addendum No. 6

To attach the documents that were not posted with addendum 5, see attached.

To respond to vendor question and change specifications, see attached

Bid opening remains February 14, 2023 at 1:30 pm est.

No other changes.

Federal Terms and Conditions Apply

INVOICE TO	SHIP TO
PUBLIC TRANSIT DIVISION OF	PUBLIC TRANSIT DIVISION OF
BLDG 5 RM 663	KANAWHA VALLEY REGIONAL TRANSPORTATION AUTHORITY
1900 KANAWHA BLVD E	1550 FOURTH AVE
CHARLESTON WV	CHARLESTON WV
US	US

mm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
B" WB DRW Narrow Body Cutaway Vehicles	0.00000	EA	Please see Exhibi	t A -Pricing Page

Comm Code	Manufacturer	Specification	Model #	 213
25101502	Glaval	Classes A, B, C, D, E, F, G, H, I, J	PrimeTime	

Extended Description:

To establish an open ended contract for 138" WB, DRW, Narrow Body Cutaway Vehicles to provide specialized transportation services in an urban and suburban-rural environment including hilly terrain and a severe operating climate suited to stop-start duty cycles.

See attached Exhibit A Pricing page

SCHED	ULE OF EVENTS		
<u>Line</u>	<u>Event</u>	Event Date	
1	Vendor Technical Questions Due 11:00 am est.	2023-01-16	
			and the second s

SOLICITATION NUMBER: CRFQ DMT23*10 Addendum Number: 6

The purpose of this addendum is to modify the solicitation identified as ("CRFQ DMT23*10") to reflect the change(s) identified and described below.

change	(s) idei	nined and described below.	
Applic	able A	ddendum Category:	
		Modify bid opening date and time.	
	\boxtimes	Modify specifications of product or service being sought.	
	\boxtimes	Attachment of vendor questions and responses	
		Attachment of pre-bid sign-in sheet	
		Correction of error	
		Other	
Descrij	ption o	f Modification to Solicitation:	· · · · · · · · · · · · · · · · · · ·
	2.	No respond to vendor technical question, see attached. To change specifications, see attached. To move bid opening date & time to February 14, 2023, at 1:30 pm est. No other changes.	
		ocumentation: Documentation related to this Addendum (if any) has been included and is specifically incorporated herein by reference.	herewith as
1.		onditions: ovisions of the Solicitation and other addenda not modified herein shall remain in fu	ill force and
	Addeno may re	should acknowledge receipt of all addenda issued for this Solicitation by condum Acknowledgment, a copy of which is included herewith. Failure to acknowledge sult in bid disqualification. The addendum acknowledgement should be submitted with education acknowledgement processing.	dge addenda

CRFQ 0810 DMT 23*10

138" Wheelbase, Narrow Body Cutaway Vehicle

Question:

Dual Rear Wheel Ford Transit chassis, as the specifications were originally written around, is offered with two powertrains. The base engine is a naturally aspirated 3.5-liter V-6 that provides 275 horsepower and 262 pound-feet of torque. There's also a turbocharged 3.5-liter V-6 available that generates 310 horsepower and 410 pound-feet of torque. Both engines are paired with a 10-speed automatic transmission. Will Public Transit allow these DRW chassis' to be considered as approved equals?

Answer:

Public Transit will allow these DRW chassis' to be approved equals.

ADDENDUM ACKNOWLEDGEMENT FORM SOLICITATION NO.: CRFQ DMT23*10

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

(Che	ALL DESCRIPTIONS OF THE PARTY O	Numbers Received: ox next to each addendure	n received)	
	\boxtimes	Addendum No. 1	#	Addendum No. 6
		Addendum No. 2		Addendum No. 7
		Addendum No. 3		Addendum No. 8
		Addendum No. 4		Addendum No. 9
		Addendum No. 5		Addendum No. 10
furth discu	er unders	stand that that any verba Id between Vendor's rep	representati resentatives	ddenda may be cause for rejection of this bid. I on made or assumed to be made during any oral and any state personnel is not binding. Only the diffications by an official addendum is binding.
furth discu	er unders	stand that that any verba Id between Vendor's rep	representati resentatives	on made or assumed to be made during any oral and any state personnel is not binding. Only the diffications by an official addendum is binding. Creative Bus Sales, Inc.
furth discu	er unders	stand that that any verba Id between Vendor's rep	representati resentatives	on made or assumed to be made during any oral and any state personnel is not binding. Only the cifications by an official addendum is binding.
furth discu	er unders	stand that that any verba Id between Vendor's rep	representati resentatives	on made or assumed to be made during any oral and any state personnel is not binding. Only the diffications by an official addendum is binding. Creative Bus Sales, Inc. Company
furth discu	er unders	stand that that any verba Id between Vendor's rep	representati resentatives	on made or assumed to be made during any oral and any state personnel is not binding. Only the diffications by an official addendum is binding. Creative Bus Sales, Inc.

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

(Printed Name and Title) <u>Matt Mashuda - Transit Bus Sales</u>
(Address) _9365 Counselors Row, Suite 112, Indianapolis, Indiana, 46420
(Phone Number) / (Fax Number) 412-992-0184 / 909-465-5529
(Email address) _MattM@CreativeBusSales.com

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation/Contract in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation/Contract for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that this bid or offer was made without prior understanding, agreement, or connection with any entity submitting a bid or offer for the same material, supplies, equipment or services; that this bid or offer is in all respects fair and without collusion or fraud; that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; that I am authorized by the Vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on Vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law; and that pursuant to W. Va. Code 5A-3-63, the entity entering into this contract is prohibited from engaging in a boycott against Israel.

Creative Bus Sales, Inc.
(Company)
(Signature of Authorized Representative)
Nick Corley - Sales Operations Manager
(Printed Name and Title of Authorized Representative) (Date)
888-633-838 / 909-465-5529
(Phone Number) (Fax Number)
BidDepartment@CreativeBusSales.com
(Email Address)

STATE OF WEST VIRGINIA Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (*W. Va. Code* §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Creative Bus Sales, Inc.	
Authorized Signature:	Date:2-3-2023
State ofGeorgia	
County of Clayton , to-wit:	
Taken, subscribed, and sworn to before me this <u>3</u> day of <u>February</u>	, 20 <u>23</u> .
My Commission expires <u>September 13</u> , 2023	11/1/
AFFIX SEAL HERE WALTER J M PEDERSEN III Notary Public, Georgia Dekalb County	Purchasing Affidavit (Revised 01/19/2018)

DOCUMENTATON TO BE SUBMITTED WITH BID SUMMARY:

3.2 Chassis :

Description: Ford E350 Gasoline chassis 11,500 GVWR

Warranty: 3 years/36,000 bumper to bumper and 5 years/60,000 powertrain

Literature: See document labeled "Ford E350"

3.3 Engine

Description: 7.3L V8

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

6.10 Radio/AM/FM/USB/MP3:

Description: OEM AM/FM/USB/MP3 *please note CD is not available

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

3.8 Transmission:

Description: OEM Electric 6 Speed Automatic

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

3.5 Radiator and Cooling System:

Description: OEM

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

3.6 High Idle System:

Description: Intermotive Gateway High Idle and Interlock System

Warranty: 2 Years/24,000 miles

Literature: See attachment document labeled "3.6 High Idle System"

4.2 Brakes:

Description: OEM

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

4.0 Tilt Wheel, Cruise Control and Power Steering:

Description: OEM

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

4.0 Water Test: Please find attachment provided labeled "4.0 Water Test Procedure"

2.16 Wheelbase: Per the bid specs for Classes A, B, C, E, F, H, I the wheelbase will be 138" and for Classes D, G, J will be 158"

3.9.4 Rear View Back-Up Camera:

Description: Rosco STSK4750B

Warranty: 2 Years/24,000 miles

Literature: See the document labeled "3.9.4 Back up Camera"

4.3 Wheels:

Description: 16" Steel Wheel painted white on both sides

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

4.4 Tires:

Description: Tires will be LT 225/75R16 E All Weather tires

Warranty: Tire warranty varies depending on the brand supplied from the factory. See document

labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

4.5.6 Battery:

Description: Ford Provided

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

4.5.5 Alternator:

Description: 225-amp alternator

Warranty: See document labeled "7.12.2 Ford Warranty"

Literature: See document labeled "Ford E350"

5.5 Front and Rear Heating and Air Conditioning:

Description: Trans Air TA712 Super Air Conditioning

ProAir 435 35,000 BTU 3 speed Floor Heater

Warranty: Three years unlimited miles A/C ---- 3 Year Heater with lifelong motor coverage

Literature: Please see multiple attachments labeled "5.5 Air Conditioning and 5.5 Heater"

4.8 Body Specifications: Please see the attachment titled "4.8 Body Construction" and "4.8 Glaval Primetime Construction Specs"

Proposed Length Class A, B, C, E, F, H, and I: 21-22 Feet

Proposed Length Class D, G, and J: 23 Feet

Proposed Actual interior Height for all Classes: 77"

5.0 Rustproofing and Undercoating: See attached documents labeled "Rustproofing and Undercoating"

5.1 Passenger Doors and Stepwell:

Description: A+M Door Systems-Dual leaf entry door, single panel rear door, dual leaf lift doors

Stepwell Description: Stainless Steel Entry Step Assembly-included sides and header

Dimensions: Rear door 38 ½" X 59"- Entry Door 31" Clear opening X 76"-Extra wide dual lift

Doors due to platform width chosen in the specifications.

Interlock Connectivity: Industry standard interlocking to be used except when call out in this bid

Door Locks type: Standard key lock with ¼ turn handles

5.8 Flooring:

Description: Gerflor Sirius NT #6801

Sample: Due to it being an electronic bid, a sample of the flooring can be mailed upon request

Color to be used: Gerflor #6801 Graphite is a black color

Assembly process: Please see provided document labeled "5.8 Flooring + Flooring installation"

6.1 Passengers Seats and Restraints:

Description: Freedman Feather weight Mid-Hi fixed seat and High Backs

Freedman Double Fold Way seats, Freedman USR under seat retractable belts

Description: Freedman Anti-Vandal Grab Handles

Warranty: 2 year/24,000 miles

Literature: See multiple documents labeled "6.1 Seating"

6.2 Mobility Aid/Occupant Restraint Systems:

Description: Q'Straint 360 Tie Downs and Quick Straps

Warranty: One year

Literature: See document provided labeled "6.2 QRT 360"

6.13 Training: Please see the attachment labeled "6.13 Training Acknowledgement"

6.8 Security Camera System Including Playback:

Description:

Angel Trax Vulcan 12 System with 6 cameras. 1TB Hardrive. SD card back up. Secured box with 2 keys. Location is open

VULCANV12 - Vulcan Series 12-Channel HD/IP Mobile Digital Video Recorder • 12 Channels with 8 Channels D1, WD1, 720P, or up to 1080P + 4 Channels IP up to 1080P

SSD500G-UPGRADE - 500GB Solid-State Hard Drive

MSD512GB - 512GB microSD Solid-State Memory Card

VULPBH - Vulcan Series Panic Button Housing PC color

DMB100-V12 - L-Shaped Vertical Mounting Bracket for Vulcan V12 MDVR

HD1700V - Vulcan Series 170-Degree HD 1080P Low Profile Cameraoverhang, facing towards the rear, Above the drivers left shoulder facing the door, Above the driver, to see the drivers operations

HD2500V - Vulcan Series 2500 HD Low Profile Camera- facing the wheelchair lift • 2.5mm Lens with Fully Articulating Lens Casing, Adjustable Vertically and Horizontally at Installation

HD2500WS - Vulcan Series 2500 HD Windshield Camera- Out the Windshield • 2.5mm Lens with Fully Articulating Lens Casing, Adjustable Vertically and Horizontally at Installation

HD3600V - Vulcan Series 3600 HD Low Profile Camera- rear of the bus
• 3.6mm Lens with Fully Articulating Lens Casing, Adjustable Vertically and
Horizontally at Installation

HD4CBL - 13.12 ft. HD Camera Cable

HD9CBL - 29.53 ft. HD Camera Cable

ADJBRWS - Adjustable Mounting Bracket for Vulcan Series HD-WS Starlight Camera Capturing Windshield View

WC4G - Vulcan Series Wi-Fi Cellular GPS Tri-Mode Antenna

V12SECKEY - Security Key USB 3.0 for Vulcan V12 MDVR

Warranty: 2 year/24,000 mile

Literature: See provided document labeled "6.8 Security Camera System"

7.12.2 Warranty on Complete Vehicle:

Literature: See attachment labeled "7.12.2, 7.12.3, 7.12.5 Glaval Limited Warranty"

7.12.3 Warranty of Basic Vehicle Structure:

Literature: See attachment labeled "7.12.2, 7.12.3, 7.12.5 Glaval Limited Warranty"

7.12.5 Warranty: warranties to be provided on subsystems and components:

Literature: See attachment labeled "7.12.2, 7.12.3, 7.12.5 Glaval Limited Warranty" and "7.12.5 Air Conditioning Warranty"

11.3 Complete two (2) bids in binder form:

As this is an electronic submission, this is not applicable

13.2 A Complete mechanical description of vehicle, its construction, and equipment including manufacturer's model name: **GLAVAL PRIMETIME**

Please find the provided document labeled:

"13.2 A Complete Mechanical Description"

"13.2 A Glaval Universal Construction Specs"

"13.2 A Detail on Body Materials"

13.2 B Proposed Floor Plans: Please see attachments labeled:

"13.2 B Class A Floor Plan"

"13.2 B Class B E H Floor Plan"

"13.2 B Class C F I Floor Plan"

"13.2 B Class D G J Floor Plan"

13.2 C Curb weight: Please see attachments labeled:

"13.2 B Class A Weight Calc"

"13.2 B Class B E H Weight Calc"

"13.2 B Class C F I Weight Calc"

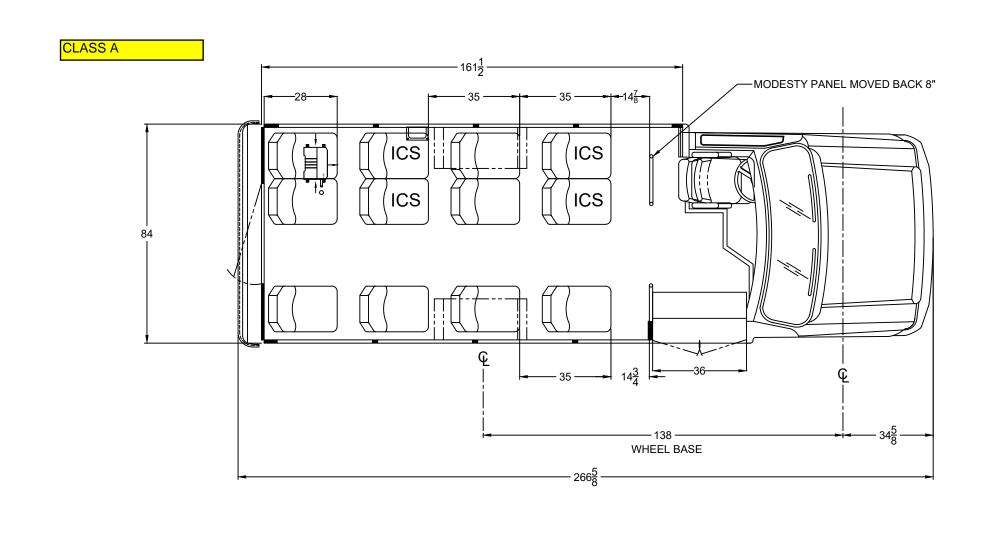
"13.2 B Class D G J Weight Calc"

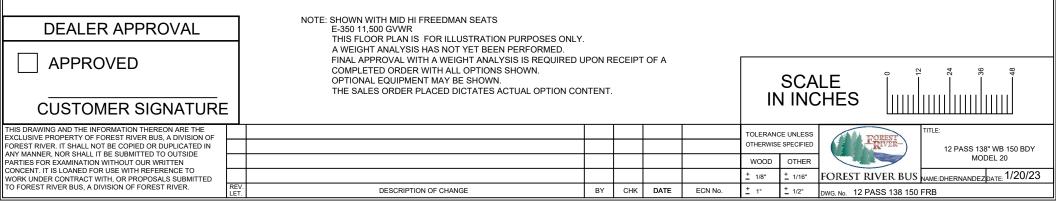
*We have provided the weight calculation sheets in lieu of the empty weight, as they calculate using the GVWR of each chassis, using the FTA approved passenger weight per seat, and they check the vehicle for 4 corner weight compliance if all seats were being used.

13.2 D Exterior Vinyl Colors: See attached documents labeled "13.2 D Vinyl Paint Colors"

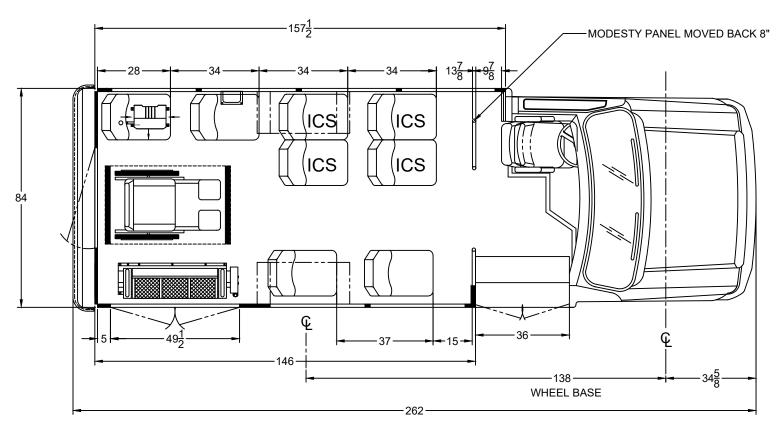
13.2 H Identification Conversion Location and Activities: See attached documents labeled "13.2 H Conversion Location and Activities"

13.2 | References: See attached document labeled "13.2 | References"





CLASS B/E/H





APPROVED

CUSTOMER SIGNATURE

NOTE: SHOWN WITH MID HI FREEDMAN SEATS E-350 11,500 GVWR

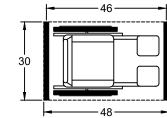
THIS FLOOR PLAN IS FOR ILLUSTRATION PURPOSES ONLY.

A WEIGHT ANALYSIS HAS NOT YET BEEN PERFORMED. FINAL APPROVAL WITH A WEIGHT ANALYSIS IS REQUIRED UPON RECEIPT OF A

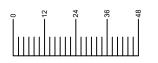
COMPLETED ORDER WITH ALL OPTIONS SHOWN.

OPTIONAL EQUIPMENT MAY BE SHOWN.

THE SALES ORDER PLACED DICTATES ACTUAL OPTION CONTENT.



5	SCALE
IN	INCHES



THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF FOREST RIVER BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITEN CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO FOREST RIVER BUS, A DIVISION OF FOREST RIVER.

						TOLERANC	E UNLESS	ſ
						OTHERWISE	SPECIFIED	
						WOOD	OTHER	
						<u>+</u> 1/8"	± 1/16"	1
E\ ET	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.	<u>+</u> 1°	± 1/2°	[

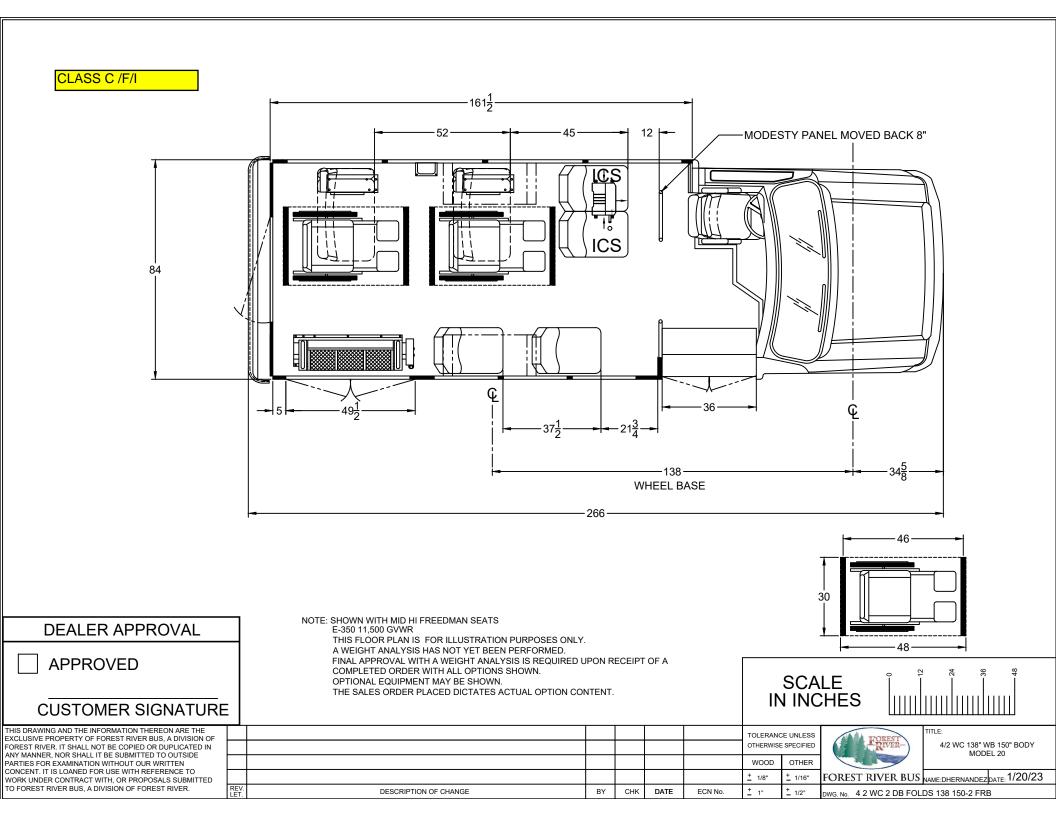




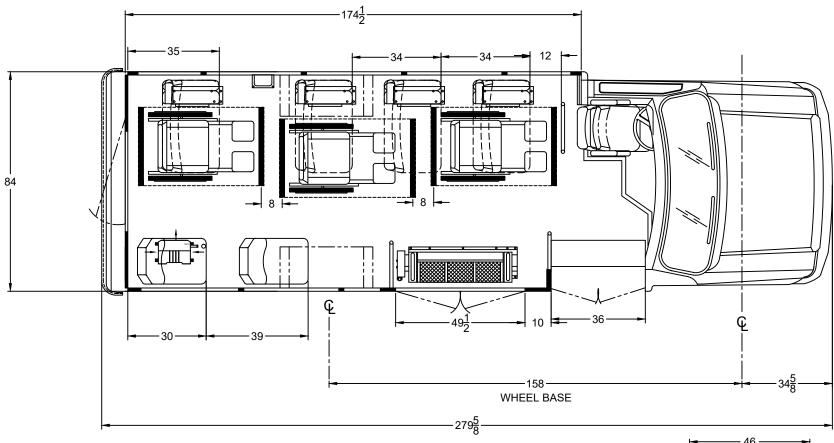
DATE: 1/23/23

FOREST RIVER BUS NAME: CRANS

DWG. No. 8 1 WC 138 146-6 FRB



CLASS D/G/J





APPROVED

CUSTOMER SIGNATURE

NOTE: SHOWN WITH MID HI FREEDMAN SEATS

E-350 11,500 GVWR

THIS FLOOR PLAN IS FOR ILLUSTRATION PURPOSES ONLY.

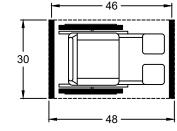
A WEIGHT ANALYSIS HAS NOT YET BEEN PERFORMED.

FINAL APPROVAL WITH A WEIGHT ANALYSIS IS REQUIRED UPON RECEIPT OF A

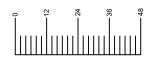
COMPLETED ORDER WITH ALL OPTIONS SHOWN.

OPTIONAL EQUIPMENT MAY BE SHOWN.

THE SALES ORDER PLACED DICTATES ACTUAL OPTION CONTENT.







THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF FOREST RIVER BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO FOREST RIVER.

								_
						TOLERANO	E UNLESS	
						OTHERWISE	SPECIFIED	l
						WOOD	OTHER	l
						<u>+</u> 1/8"	<u>+</u> 1/16"	I
REV LET	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.	+ 1°	± 1/2°	С

TA AL	TITLE:
FOREST	l
RIVER-	l
	l
	l
	l

2 3 WC 158" WB 163 BDY MODEL 22

DATE: 1/23/23

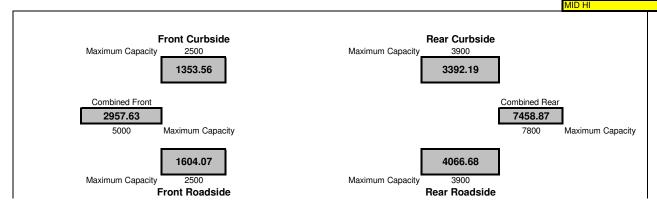
FOREST RIVER BUS NAME:CRANS

DWG. No. 2 3 WC 4 DB FOLDS 158 163 FRB

WEIGHT ANALYSIS

4/26/2017 12 PASS 3PT SEATS 138 146 USA

			4/20	<u>5/2017 12 P.</u>	<u>ASS 3PT SEA</u>	1TS 138 146 US.					
	INPUT AREAS=						FUEL LOAD ADJ.				
	VEHICLE DESCR		CHASSIS	UNIT#	MODEL:	FUEL TYPE:	FUEL CAP.	FUEL WGT PEF	GAL.		
	12 PASS 138 146	SUSA	E-350		STARLITE	GAS	40	6.1			
	WHEELBASE	PER IN. VALUE CALC.			WEIGHTS		FUEL AMT.	WGT OF FUEL	FUEL A	DJ. AMT.	
	138	0.72			RIGHT FRONT		0.13	244		0.50	
	(LE CAPACITIES		3071	1623	1448		FUEL TANK CENTER		DEA	ALER	
FRONT	REAR	TOTAL		LEFT REAR	RIGHT REAR		165				
5000	7800	11500	4882	2391	2491						
		LEFT (ROADSIDE	i)				F	RIGHT (CURBS	SIDE)		
	DISTANCE (IN.)	WEIGHT (LBS.)	% REAR AXLE	FRONT	REAR	DISTANCE (IN.)	WEIGHT (LBS.)	% REAR AXLE	FRONT	REAR	
DRIVER	48	150	34.78%	97.83	52.17	100	-32	72.46%	-8.81	-23.19	MID SNGL
MID HI DBL	97	-55	70.29%	-16.34	-38.66	135	-32	97.83%	-0.70	-31.30	MID SNGL
MID HI DBL	133	-55	96.38%	-1.99	-53.01	170	-32	123.19%	7.42	-39.42	MID SNGL
MID HI DBL	169	-55	122.46%	12.36	-67.36	205	-32	148.55%	15.54	-47.54	MID SNGL
MID HI DBL	207	-55	150.00%	27.50	-82.50	200	02	0.00%	0.00	0.00	IVIID GIVAL
WILD THE DOL	201	33	0.00%	0.00	0.00			0.00%	0.00	0.00	
MID HI DBL	94	405	68.12%	129.13	275.87	103	207	74.64%	52.50	154.50	MID SNGL
MID HI DBL	130	405	94.20%	23.48	381.52	136	207	98.55%	3.00	204.00	MID SNGL
MID HI DBL	166	405	120.29%	-82.17	487.17	169	207	122.46%	-46.50	253.50	MID SNGL
MID HI DBL	202	405	146.38%	-187.83	592.83	202	207	146.38%	-96.00	303.00	MID SNGL
WIID TII DDL	202	403	0.00%	0.00	0.00	202	201	0.00%	0.00	0.00	WIID SNGL
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
				0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
	TOTAL PASSEN	CERLOAR	0.00%	1.96	1548.04			0.00%	-73.55	773.55	2050.00
	AXLE WEIGHTS			1.96	1548.04 2391.00				-/3.55 1448.00	2491.00	2250.00 7953.00
	AALE WEIGHIS			1023.00	2391.00				1440.00	2491.00	7953.00
				EDONT	DEAD	LEST BLOUT TOO				 	
			LEET	FRONT	REAR	LEFT/RIGHT TOTALS	LEFT/RIGHT %'S			-	
			LEFT	1604.07	4066.68	5670.75	0.544			-	
			RIGHT	1353.56	3392.19	4745.75	0.456				
		FRT	REAR TOTALS	2957.63	7458.87	10416.50					
		AX	LE CAPACITIES	5000	7800	11500					
			LE CAPACITIES	2042.37	341.13	1083.50					
	1	1						'	AS BUILT	46425B	
									MID HI		



WEIGHT ANALYSIS 4/26/2017 12 PASS 3PT SEATS 138 146 USA

WEIGHT ANALYSIS 4/26/2017 8 1 WC 138 146-8 USA

	INPUT AREAS=						FUEL LOAD ADJ.				
	VEHICLE DESCR		CHASSIS	UNIT #	MODEL:	FUEL TYPE:	FUEL CAP.	FUEL WGT PER	R GAL.		
8	8 1 WC 138 146-8	B EST USA	E-350			GAS	40	6.1			
	WHEELBASE	PER IN. VALUE CALC.		AXLE \	WEIGHTS		FUEL AMT.	WGT OF FUEL	FUEL A	DJ. AMT.	
	138	0.72		LEFT FRONT	RIGHT FRONT		0.13	244	-31	1.72	
AXLE	CAPACITIES		2770	1414	1356		FUEL TANK CENTER		DE/	ALER	
FRONT	REAR	TOTAL		LEFT REAR	RIGHT REAR		165				
4600	7800	11500	5371	2441	2930						
	l	LEFT (ROADSIDE						RIGHT (CUR	BSIDE)	1	
	DISTANCE (IN.)		% REAR AXLE	FRONT	REAR	DISTANCE (IN.)	WEIGHT (LBS.)	% REAR AXLE		REAR	
DRIVER	48	150	34.78%	97.83	52.17	102	-32	73.91%	-8.35	-23.65	SINGLE
MID DBL	90	-55	65.22%	-19.13	-35.87	144	-32	104.35%	1.39	-33.39	SINGLE
MID DBL	122	-55	88.41%	-6.38	-48.62		- 02	0.00%	0.00	0.00	0022
MID DBL	154	-55	111.59%	6.38	-61.38			0.00%	0.00	0.00	
	10-1		0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
MID DBL	97	405	70.29%	120.33	284.67	99	207	71.74%	58.50	148.50	SGL
MID DBL	132	405	95.65%	17.61	387.39	134	207	97.10%	6.00	201.00	SGL
MID SNGL	167	207	121.01%	-43.50	250.50	138	-62.5	100.00%	0.00	-62.50	MORRYD
MID SNGL	202	207	121.01%	-43.50 -96.00	303.00	191		138.41%	-115.22	415.22	W/C
MID SNGL	202	207				191	300				W/C
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
MORRYDE	138	-62.5	100.00%	0.00	-62.50			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
-	TOTAL PASSEN	GER LOAD		77.13	1069.37				-57.67	645.17	1734.00
	AXLE WEIGHTS			1414.00	2441.00				1356.00	2930.00	8141.00
1			1	FRONT	REAR	LEFT/RIGHT TOTALS	LEFT/RIGHT %'S	1			
			LEFT	1470.36	3637.28	5107.64	0.506				
					1						
			RIGHT	1277.56	3702.08	4979.64	0.494	1			
		FRT	/ REAR TOTALS	2747.92	7339.36	10087.28		1			
			LE CAPACITIES	4600 1852.08	7800 460.64	11500 1412.72					

MORRYDE MID HI SEATS Rear Curbside Front Curbside Maximum Capacity 2300 Maximum Capacity 3900 1277.56 3702.08 Combined Front Combined Rear 2747.92 7339.36 4600 Maximum Capacity 7800 Maximum Capacity 1470.36 3637.28 Maximum Capacity 2300 Maximum Capacity 3900 Front Roadside Rear Roadside

WEIGHT ANALYSIS

4/26/2017 4 2 WC 2 DB FOLDS 138 146 USA

			4/	26/2017 4 2	WC 2 DB FO	LDS 138 146 US					
	INPUT AREAS=						FUEL LOAD ADJ.				
	VEHICLE DESCR	RIPTION:	CHASSIS	UNIT #	MODEL:	FUEL TYPE:	FUEL CAP.	FUEL WGT PEF	R GAL.		
	4 2 WC 2 DB FO	LDS 138 146 USA	E-350	34401B	STARLITE	GAS	40	6.1			
	WHEELBASE	PER IN. VALUE CALC.		AXLE V	VEIGHTS		FUEL AMT.	WGT OF FUEL	FUEL A	OJ. AMT.	
	138	0.72		LEFT FRONT	RIGHT FRONT		0.13	244	-31	.72	
AXL	E CAPACITIES		2825	1529	1296		FUEL TANK CENTER		DEA	LER	
FRONT	REAR	TOTAL		LEFT REAR	RIGHT REAR		165				
4600	7800	11500	5378	2449	2929						
		LEFT (ROADSIDE	<u>:</u>)					RIGHT (CURE	SSIDE)		
	DISTANCE (IN.)	WEIGHT (LBS.)	% REAR AXLE	FRONT	REAR	DISTANCE (IN.)	WEIGHT (LBS.)	% REAR AXLE	FRONT	REAR	
DRIVER	40	150	28.99%	106.52	43.48	100	-32	72.46%	-8.81	-23.19	SINGLE
MID DBL	86	-55	62.32%	-20.72	-34.28	142	-32	102.90%	0.93	-32.93	SINGLE
DB FOLD	119	-85	86.23%	-11.70	-73.30			0.00%	0.00	0.00	
DB FOLD	150	-85	108.70%	7.39	-92.39			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00	105	207	76.09%	49.50	157.50	SINGLE
MID DBL	98	405	71.01%	117.39	287.61	137	207	99.28%	1.50	205.50	SINGLE
DB FOLD	139	435	100.72%	-3.15	438.15			0.00%	0.00	0.00	
DB FOLD	183	435	132.61%	-141.85	576.85			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
	TOTAL PASSEN	GER LOAD		53.88	1146.12				43.12	306.88	1550.00
	AXLE WEIGHTS			1529.00	2449.00				1296.00	2929.00	8203.00
				FRONT	REAR	LEFT/RIGHT TOTALS	LEFT/RIGHT %'S				
			LEFT	1562.11	3722.03	5284.14	0.530				
			RIGHT				0.470				
		EDT	/ REAR TOTALS	1318.35 2880.46	3362.79 7084.82	4681.14 9965.28	0.470				
			LE CAPACITIES		7800	11500					
	+		BLE CAPACITIES		715.18			t	l		
		Δ\/ΔΙΙΛΩ		1/14/5/4	/15 18	1534.72					

MID HI SEATS Front Curbside Rear Curbside Maximum Capacity 2300 Maximum Capacity 3900 1318.35 3362.79 Combined Front Combined Rear 2880.46 7084.82 4600 Maximum Capacity 7800 Maximum Capacity 1562.11 3722.03 2300 3900 Maximum Capacity Maximum Capacity Front Roadside Rear Roadside

WEIGHT ANALYSIS 4/26/2017 2 3 WC 4 DBL FOLDS 158 163 USA

1	INPUT AREAS=		I	1	I		ELIEL LOAD AD L	DATA (E.L.A.)		1	
	VEHICLE DESCRIPTION: 7 2 WC 158 163-1 USA		CHASSIS	UNIT #	MODEL:	FUEL TYPE:	FUEL LOAD ADJ. DATA (F.L.A.) FUEL CAP. FUEL WGT PE		CVI		
			E-350	UNII #	ALLSTAR	GAS	40	6.1	GAL.		
	7 2 WC 136 163-1	I USA	E-330		ALLSTAN	GAS	40	0.1			
	WHEELBASE	PER IN. VALUE CALC.		VAI E /	VEIGHTS		FUEL AMT.	WGT OF FUEL	FUEL AI) I AMT	
	158	0.63			RIGHT FRONT		0.13	244).50	
AXLE CAPACITIES		3446	1776	1670		FUEL TANK CENTER	244	DEALER			
FRONT	REAR	TOTAL	3440	LEFT REAR			185		DLA	LLI1	
5000	8500	12500	5335	2492	2843		100			ı	
0000		LEFT (ROADSIDE		LHOL	2040		-	RIGHT (CURBS	SIDE)	l	
1	DISTANCE (IN.)		% REAR AXLE	FRONT REAR		DISTANCE (IN.)		% REAR AXLE FRONT REAR			
DRIVER	48	150	30.38%	104.43	45.57	104	-40	65.82%	-13.67	-26.33	3PT MID SNG
DB FOLD	90	-107	56.96%	-46.05	-60.95	134	-40	84.81%	-6.08	-33.92	3PT MID SNG
3PT MID DBL	120	-83	75.95%	-19.96	-63.04			0.00%	0.00	0.00	
3PT MID DBL	188	-83	118.99%	15.76	-98.76			0.00%	0.00	0.00	
	.00		0.00%	0.00	0.00	179	207	113.29%	-27.51	234.51	MID SNGL
DB FOLD	91	435	57.59%	184.46	250.54	218	207	137.97%	-78.61	285.61	MID SNGL
DB FOLD	125	435	79.11%	90.85	344.15			0.00%	0.00	0.00	
DB FOLD	159	435	100.63%	-2.75	437.75			0.00%	0.00	0.00	
DB FOLD	210	435	132.91%	-143.16	578.16			0.00%	0.00	0.00	
MORRYDE	158	-62.5	100.00%	0.00	-62.50	158	-62.5	100.00%	0.00	-62.50	MORRYDE
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
			0.00%	0.00	0.00			0.00%	0.00	0.00	
	TOTAL PASSEN	GER LOAD		183.58	1370.92			ļ	-125.87	397.37	1826.00
	AXLE WEIGHTS			1776.00	2492.00				1670.00	2843.00	8781.00
				FRONT	DEAD						
			LECT	FRONT	REAR	LEFT/RIGHT TOTALS	LEFT/RIGHT %'S	ļ			
			LEFT	1941.33	3987.92	5929.25	0.548	ļ			
			RIGHT	1525.89	3365.36	4891.25	0.452				
		FRT / REAR TOTALS		3467.22	7353.28	10820.50					
							ı	i			
			LE CAPACITIES		8500 1146.72	12500 1679.50					

Front Curbside Rear Curbside Maximum Capacity 2500 Maximum Capacity 4250 1525.89 3365.36 Combined Front Combined Rear 3467.22 7353.28 5000 Maximum Capacity 8500 Maximum Capacity 3987.92 1941.33 Maximum Capacity Maximum Capacity 2500 4250 Front Roadside Rear Roadside



The following information is submitted for all Glaval Bus products proposed on this bid as supporting documentation of the structural soundness and impact resistance of the bodies manufactured. All vehicles are built using virtually the same materials with some minor differences in the height and width of cross members due to entry floor heights and/or body width variations.

A representative set of construction prints provided by engineering supplements this verbal accounting of our materials and assembly specifications.

If, in the reviewing of these written technical specifications and engineering frame prints submitted any questions arise, please contact us immediately for any clarification or help in interpretation and understanding.

3.0 Body Construction – General Frame Construction

Manufactured from all aluminized steel products, the floor, roof, side walls, rear wall, driver halo assembly and entry door assembly are all wire welded (MIG) together to form an integral steel frame that is mounted with specified hardware to the rubber body mount points (pucks) supplied by the chassis manufacturer. Once joined to the chassis, the bus finishing process begins.

3.0.1 Floor frame construction and assembly –

- 3.0.1.1 Cross Members -- The floor cross members form the base structural support for the rest of the frame components. Our cross members are constructed of 14 gauge aluminzed steel, formed to a capital "C" shape. Cross members over the fuel tank are made to provide the clearance needed to conform with FMVSS301, and include formed internal reinforcements welded in place for additional strength. All additional longitudinal and latitudinal structure is flush welded in place to form a one piece floor upon completion.
- 3.0.1.2 Aluminized steel "Hat Posts" 1"x1"x4" run the length of the floor between cross members and are welded into place. This extremely strong form is used to weld our HSLA steel seat track in place.
- 3.0.1.3 Aluminized steel C Channel 1"x1.5" C channel is welded in between cross members the full length of the floor in 5 places. Coupled with the Hat Posts this provides a one-piece strong "ladder" type frame for the flooring.
- 3.0.1.4 Seat Track 12 gauge roll formed high strength/low alloy steel is wire welded in place for seat mounting down each side of the bus, with lengths predicated on the floor plan chosen. This is yet another stiffener in our extensive construction process.



- 3.0.1.5 Wheel Wells -- Constructed of 14 gauge ALUMINIZED steel, wheel wells are also welded in during the floor construction process. All seams in the wheel well are welded to create a one piece water resistant wheel housing structure. The wheel wells also provide additional strength to the body assembly, when welded in place.
- 3.0.1.6 Structural Aluminized steel Angle 1/8" thick 1.5" x 2.5" structural aluminized steel angle is used the full perimeter length of each floor assembly, welded to the ends of all floor cross members. This provides not only a flat plane for joining the sidewall assembly, but also ties all cross members together and provides additional side impact resistance.
- 3.0.1.7 Additional structure When adding vertical stanchions, wheel chair lifts and/or tie down options, additional structure is welded into the floor at locations specified by our engineering department on CAD drawings.

3.0.2 Sidewall Construction –

- 3.0.2.1 Sidewall vertical member The heart of our sidewall is the vertical structure, a roll formed 18 gauge aluminized steel 1.5" x 2" tube that provides strength and rigidity. The vertical member is installed in full lengths and in shorter sections below window frames. Additional vertical structure is used at both ends of the sidewall enabling the structure to withstand the forces applied by the vehicle when in motion.
- 3.0.2.2 Aluminized steel Tubing 1.5"x1" lower and 1.5"x3" upper 16 gauge aluminized steel tubing is welded in horizontally between vertical members to frame in window openings. This adds front to rear reinforcement as well.
 - 3.0.2.3 Seat Track 12 gauge high strength/low alloy roll formed ALUMINIZED steel welded down each sidewall belowt the kvisndow frame. While serving as a seat attaching device, it adds excellent structure to the sidewall and also adds excellent side impact resistance.
- 3.0.2.4 Wheelchair Options Add another layer of metal. Depending on track locations, another structure of 11 gauge thick aluminized steel is welded in place between each vertical member for attaching a shoulder belt mount. Also, additional structure is added to accommodate wheelchair door frames either 1.5"x1" or 1.5"x2" 16 gauge wall aluinized steel tubing..
- 3.0.2.5 Full length glavanized steel tubing 1.5"x1" 16 gauge aluinized steel tubing is stitch welded to the sidewall bottom and top at each vertical member for attaching to the floor and roof sections, respectively.

3.0.3 Rear Wall Construction –

3.0.3.1 Rear wall vertical member – The vertical sidewall 1.5"x 2" aluminized steel tube is also used in the rear wall assembly. Full length structure is used at varying places,



- depending on choice of rear window, or rear door. Shorter cut pieces are used above windows and doors. Additional side windows used with the rear door also change the configuration.
- 3.0.3.2 Aluinized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded horizontally between vertical members to provide a window frame in the standard product, and used as an upper door frame in the optional rear assembly.
 - 3.0.3.3 Full length aluminized steel tubing -1.5"x1" 16 gauge aluminized steel tubing stitch welded to the rear wall top and bottom as in the sidewall

assembly. 3.0.4 Roof Construction –

- 3.0.4.1 Roof Bows Radius formed one-piece 16 gauge aluminized steel roof bows formed as a modified hat post design with eight bends for exceptional strength and located on 16" centers (the closest in the industry), including 4 bends in the web that allows for the roof structure to be capable of taking severe loads. They are then capped with top flat pieces from flange to flange to provide abundant surface area for securing the exterior roof material.
- 3.0.4.2 aluminized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded in horizontally to frame all lower window openings and 1.5" x 3" 16 gauge aluminized steel tubing to all upper window openings as required. A full perimeter is also welded on to mate the roof to the sidewall and rear wall, with short vertical pieces providing support on the front and rear ends. The 3" wide aluminized steel tube supplies a structural mounting surface for shoulder belt attachment and has been pull tested to federal standards.

3.0.5 Driver Compartment Overhead Halo -

- 3.0.5.1 aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is cut and jig welded into an integrated one piece structure spanning from the front roof bow of the body to the newly cut roof line of the cab. Also created during the structure manufacture is the housing for mounting the electronic circuit board.
- 3.0.5.2 11 Gauge aluminized steel formed to make brackets used to mount to the chassis roof.

3.0.6 False Floor (Cab to body transition) –

- 3.0.6.1 aluminized steel Tubing 2" x 2" 16 gauge aluminized steel tubing is welded together forming a flat body floor transition from the step area back to the actual body area. An overhang on the curbside provides a secure attach point frontally for the entry door frame added later.
- 3.0.6.2 Structural aluminized steel angle 11 gauge 1.5"x1.5" structural angle is added in
 - short lengths five places to provide attachment points to the chassis floor.



3.0.7 Interior Vertical Transition Frames –

3.0.7.1 aluminized steel Tubing – 1"x1" 16 gauge aluminized steel tubing is used vertically and a ladder type assembly is made welding the 1x 1 tube to .75"x.75" 11 gauge aluminized steel tube that is used horizontally in the assemblies. These pieces transition from the body fronts on each side to the driver halo side assembly and the entry door frame assembly on the curbside.

3.0.8 Entry Door & Step Assembly Frame –

3.0.8.1 aluminized steel Tubing – 1"x1" 16 gauge and .75"x.75" 11 gauge aluminized steel tube is cut to length and welded together in a ladder type construction forming a rigid frame for attaching the entry door/step assembly.

3.0.9 Entry Door/Step Assembly –

3.0.9.1 11 Gauge aluminized steel – The step riser/tread piece is manufactured from one-piece 11 gauge aluminized steel and uses 90° bends at all risers and treads. The bottom tread also adds an additional 90° bend for additional strength and safety. Upper and lower side pieces are then attached and an 11 gauge flat plate with holes is used to bridge the lower and upper side pieces, then is stitch welded and plug welded to form a strong one piece assembly prior to inserting and welding to the entry step framing.

APPLICATION OF EXTERIOR SIDEWALL MATERIAL

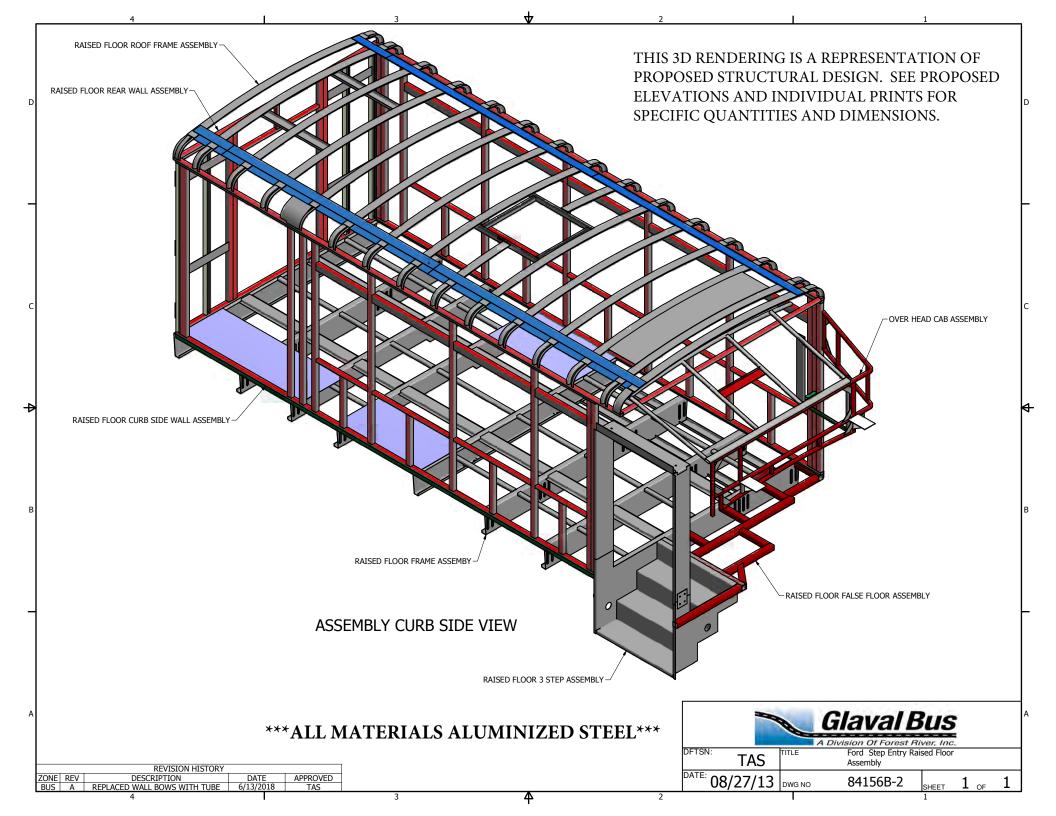
GALVAIZED STEEL SIDEWALLS OR OPTIONAL FIBERGLASS/FRP/COMPOSITE SIDEWALLS

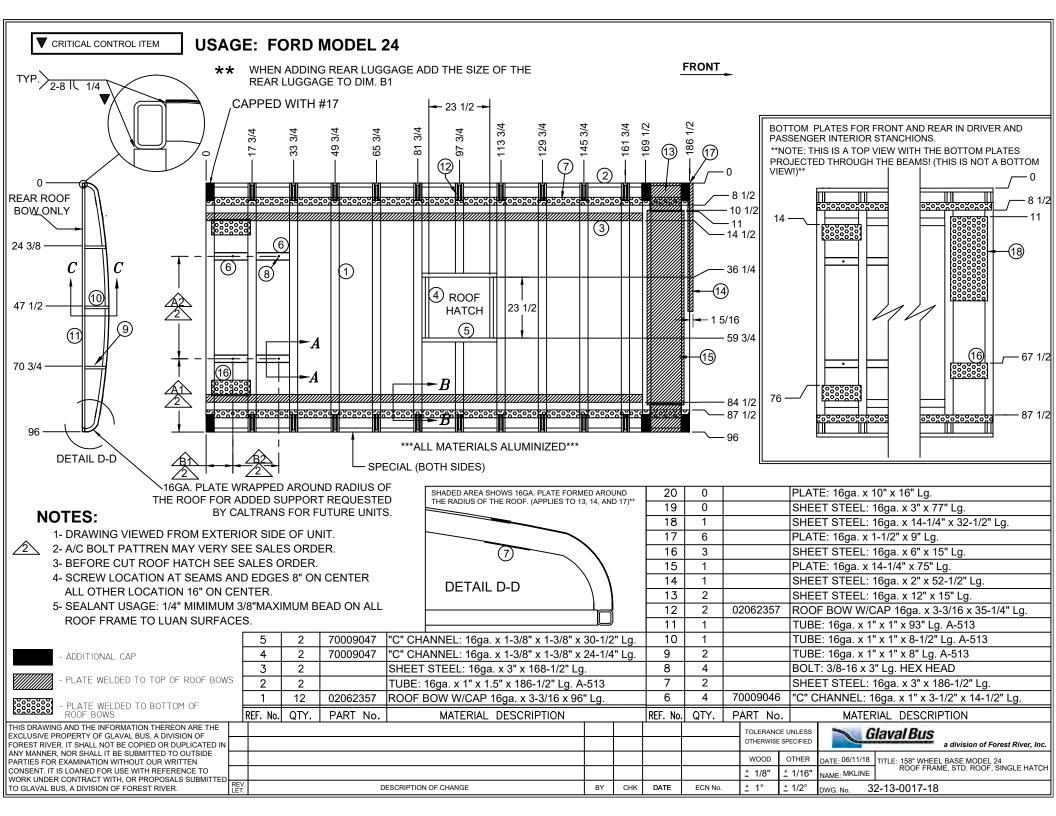
The exterior is .024" galvanized steel pre-painted white with an underlayment of 5/32" luan. The interior is 5/32" luan covered with a light gray FRP or padded vinyl.

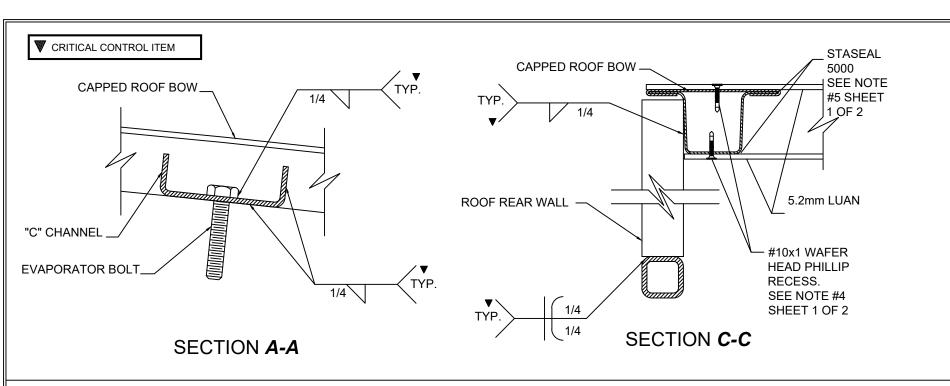
The foam filled aluminized steel cage is placed in the center and all layers are adhered using a cross linked polyurethane hot melt adhesive. The entire assembly is then laminated to assure adhesion.

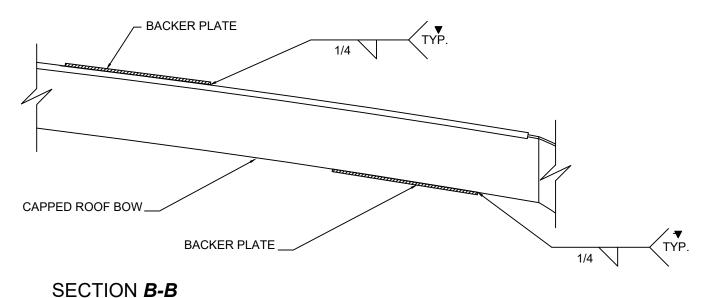
Composite FRP exterior sidewall panels are installed using the same method.

Should any further questions arise, please contact your Glaval Bus representative.









DESCRIPTION OF CHANGE

THIS DRAWING AND THE INFORMATION THEREON ARE THE

FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN

WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED

ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE

EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF

PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO

TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

Т	/A-71 NEW STYLE	33-5/8	30	10	12-1/4
	ACC 23022 SERIES	38	20	10	14-3/4
	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4
	T/A-77	18-1/4	59-1/2	10	10-3/8
	T/A-73	28-1/4	39-1/2	10	9-1/2
T	/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4
	T/A-70	36-3/4	22-1/2	10	11-5/8
	T/A-30	31	34	10	9-1/2
	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2
	EM-6 & RE-10	36	24	10	9-1/2
	EM-3 & RE-30	28-1/4	39-1/2	10	16
	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2
	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2
	EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2
	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2
	EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2
	EVAPORATOR MODEL	A-1	A-2	B-1	B-2
	TOLERANCE UNLESS	Glava	Bus		•

Glaval Bus

32-13-0017-18

NAME: MKLINE

a division of Forest River, Inc.

158" WHEEL BASE MODEL 24

ROOF FRAME, DETAILS SINGLE HATCH

OTHERWISE SPECIFIED

± 1/16"

± 1/2°

WOOD

± 1/8"

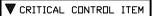
± 1°

BY

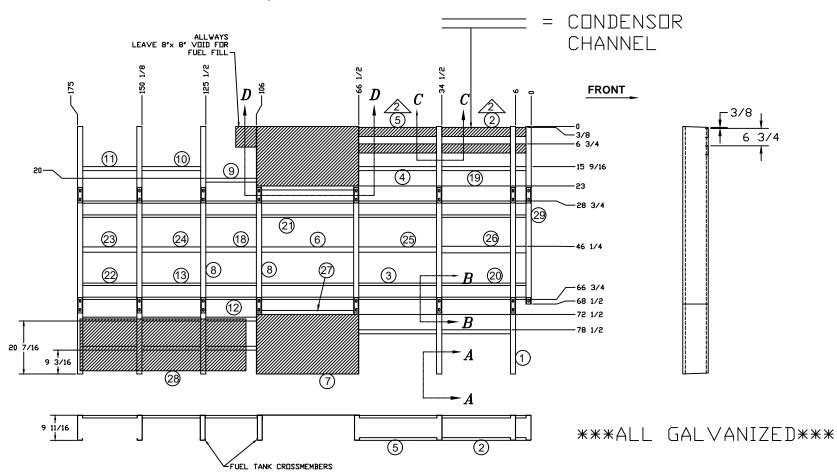
CHK

DATE

ECN No.



USAGE: FORD 158" WHEEL BASE, MODEL 24



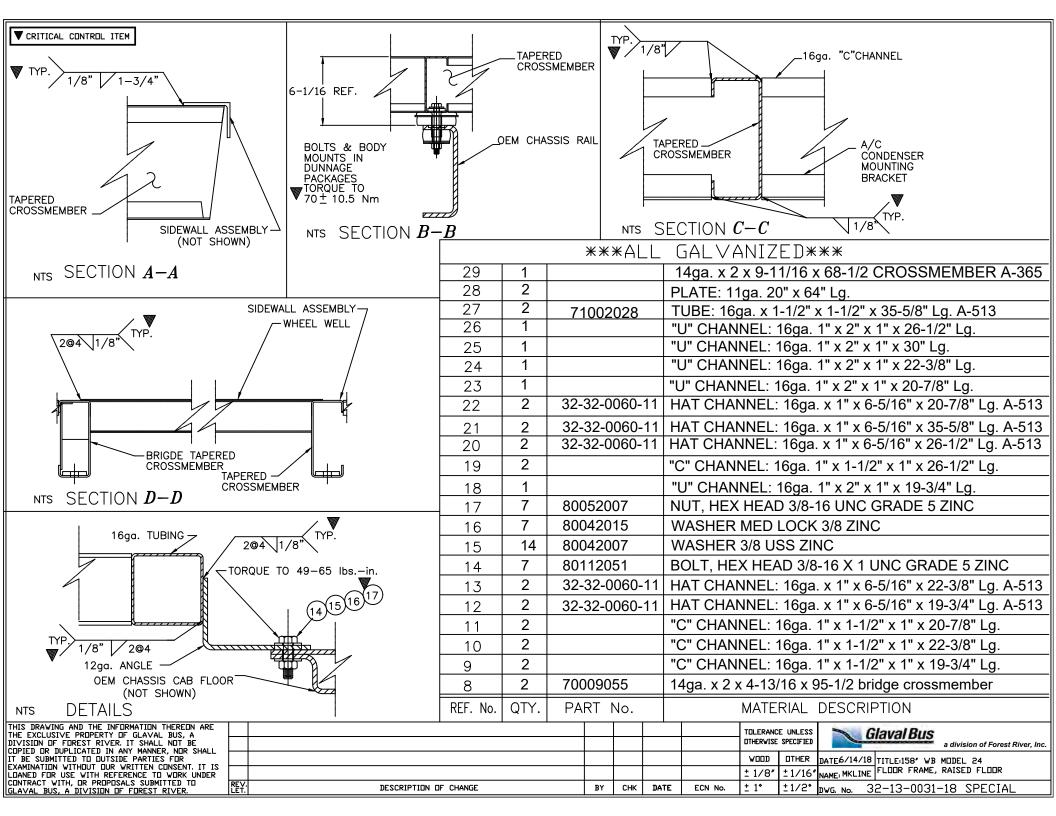
NOTES:

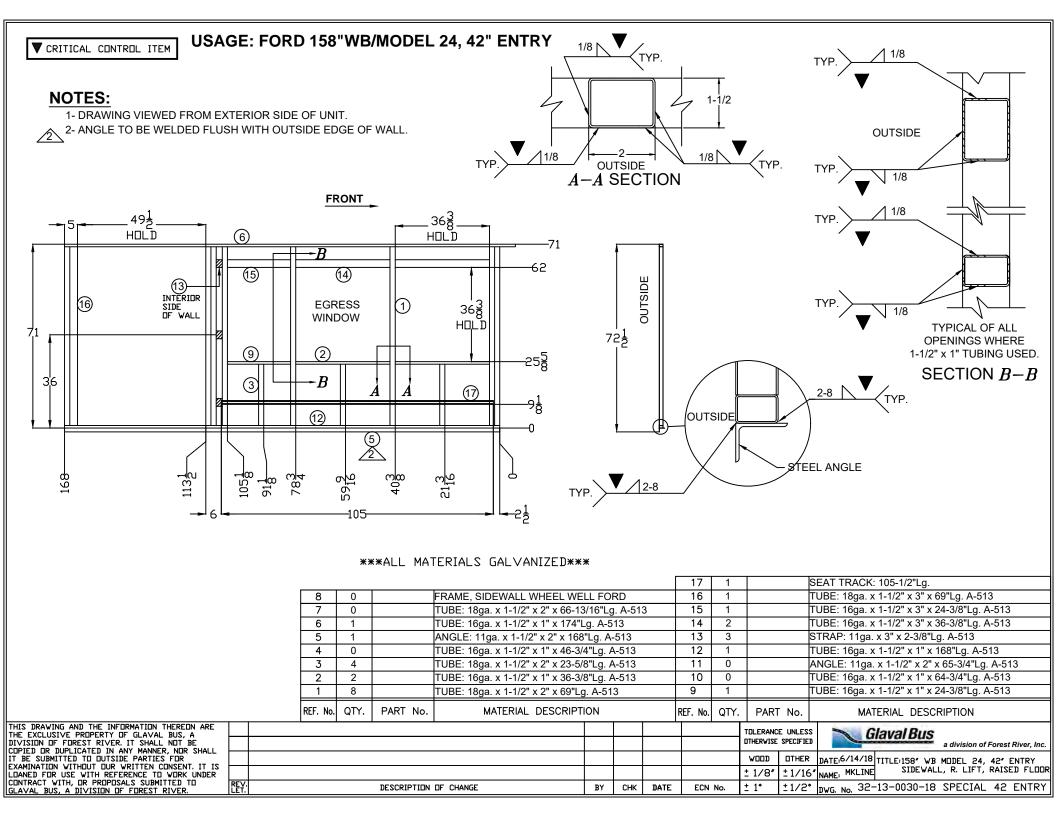
- 1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.
- 2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSIDE EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.
 - 3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

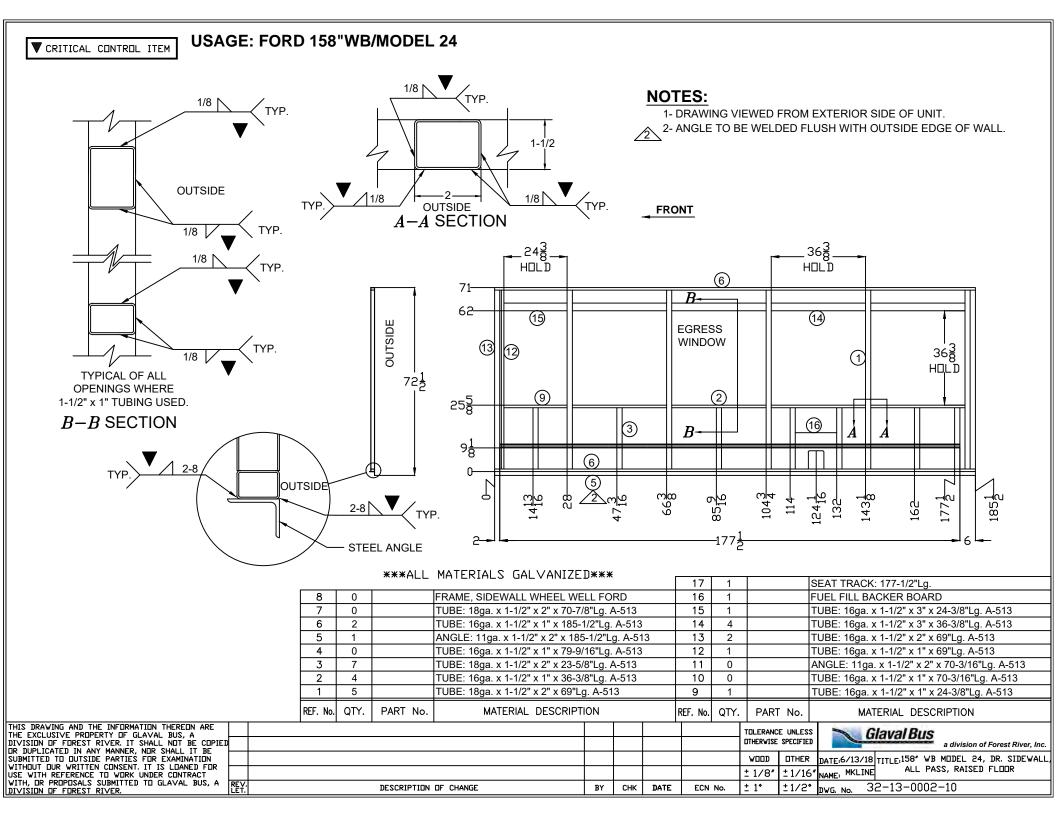
	7	2	71002066	SHEET STEEL: 11ga. x 24" x 39-1/4" Lg. HRS
	6	1		"U" CHANNEL: 16ga. 1" x 2" x 1" x 35-5/8" Lg.
	5	2	70009046	"C" CHANNEL: 12ga. x 1" x 3-1/2" x 30" Lg.
Е	4	2		"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.
	3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513
	2	2		"C" CHANNEL: 12ga. x 1" x 3-1/2" x 26-1/2" Lg.
	1	5	71009018	14ga. x 2 x 9-11/16 x 95-1/2 CROSSMEMBER A-365
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION
				A

THIS DRAWING AND THE INFORMATION THEREON ARE
THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A
DIVISION OF FOREST RIVER, IT SHALL NOT BE
COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL
IT BE SUBMITTED TO DUTSIDE PARTIES FOR
EXAMINATION WITHOUT OUR WRITTEN CONSENT, IT IS
LOANED FOR USE WITH REFERENCE TO WORK UNDER
CONTRACT WITH, OR PROPOSALS SUBMITTED TO
GLAVAL BUS, A DIVISION OF FOREST RIVER.

		1121. 1101 2111 17111					, , , , , , , , ,	,	20011111111
							TOLERANC	E UNLESS	Glaval Bus
							OTHERWISE	SPECIFIED	a division of Forest River, Inc.
							WOOD	DTHER	DATE 6/14/18 TITLE: 158' WB MODEL 24
3							± 1/8"	±1/16"	NAME: MKLINE FLOOR FRAME, RAISED FLOOR
	REY.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	± 1°	±1/2°	DWG. No. 32-13-0031-18 SPECIAL







▼ CRITICAL CONTROL ITEM

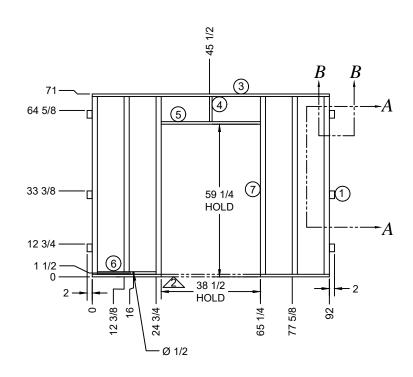
NOTES:

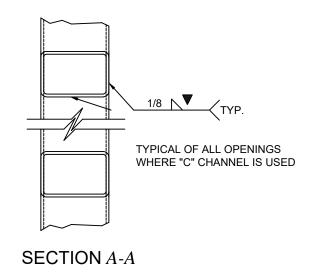
1- DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.

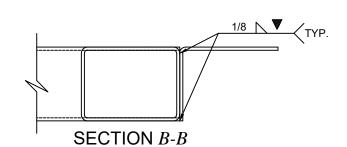
BUT BEFORE INSTALLING DOOR JAM ASSEMBLY.

2- REMOVE STEEL TUBE IN DOOR AREA AFTER WALL MOUNT TO FLOOR

USAGE: Raised Floor w/ Rear Door, SPECIAL 1-1/2" THICK WALL







ALL MATERIALS aluminized

7	6		TUBE: 16ga. x 1-1/2" x 2" x 69"Lg. A-513
6	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 10-3/8"Lg. A-513
5	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 38-1/2"Lg. A-513
4	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 9-3/4"Lg. A-513
3	2	02071055	TUBE: 16ga. x 1-1/2" x 1" x 92"Lg. A-513
2	0		
1	6		ANGLE: 16ga. x 1" x 2" x 6"Lg. A-513
REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

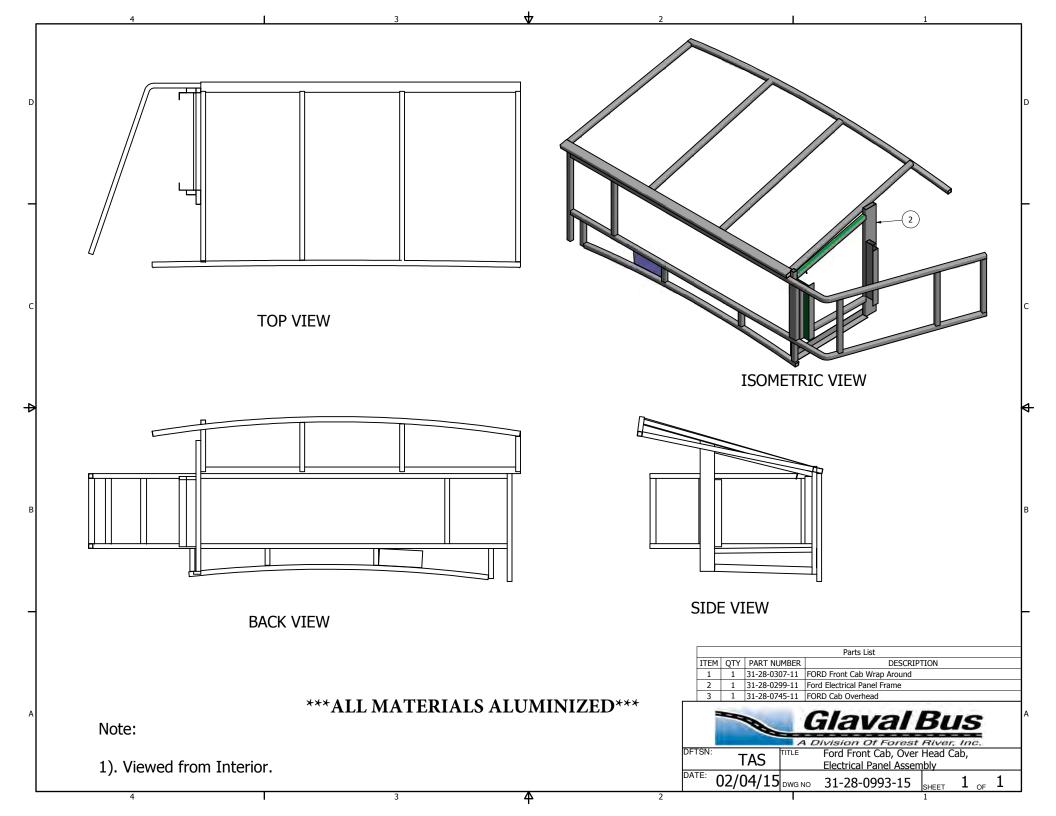


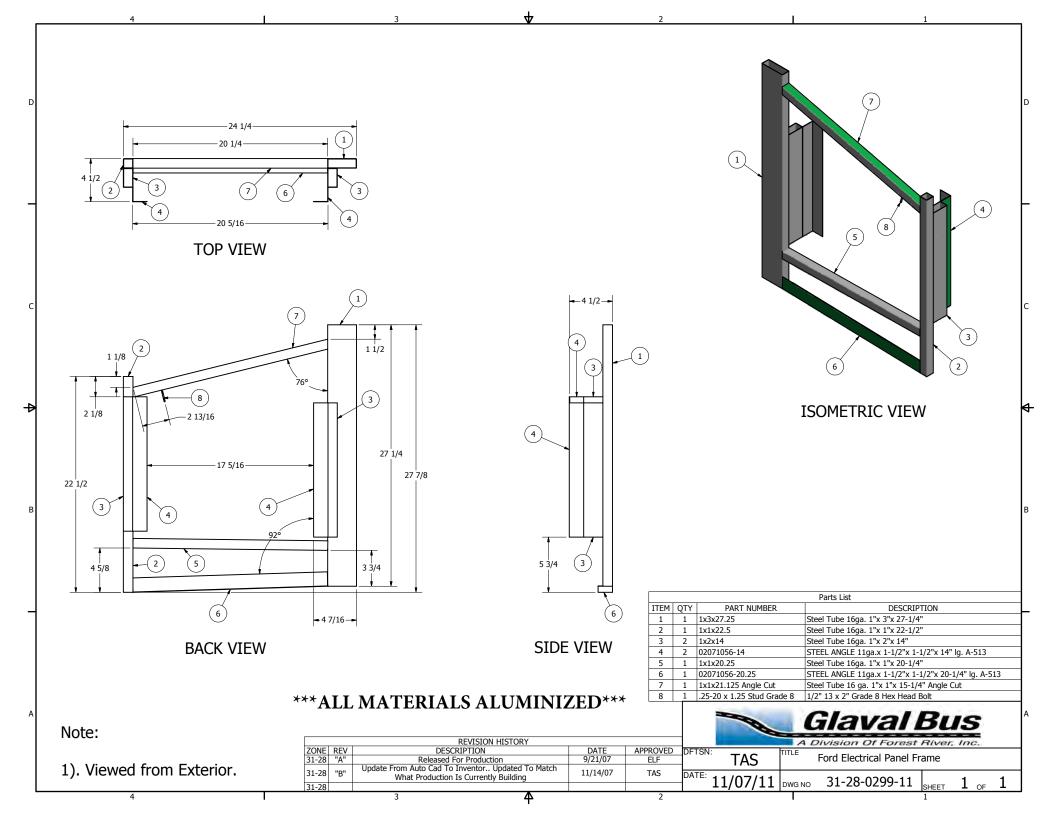
DISK No.

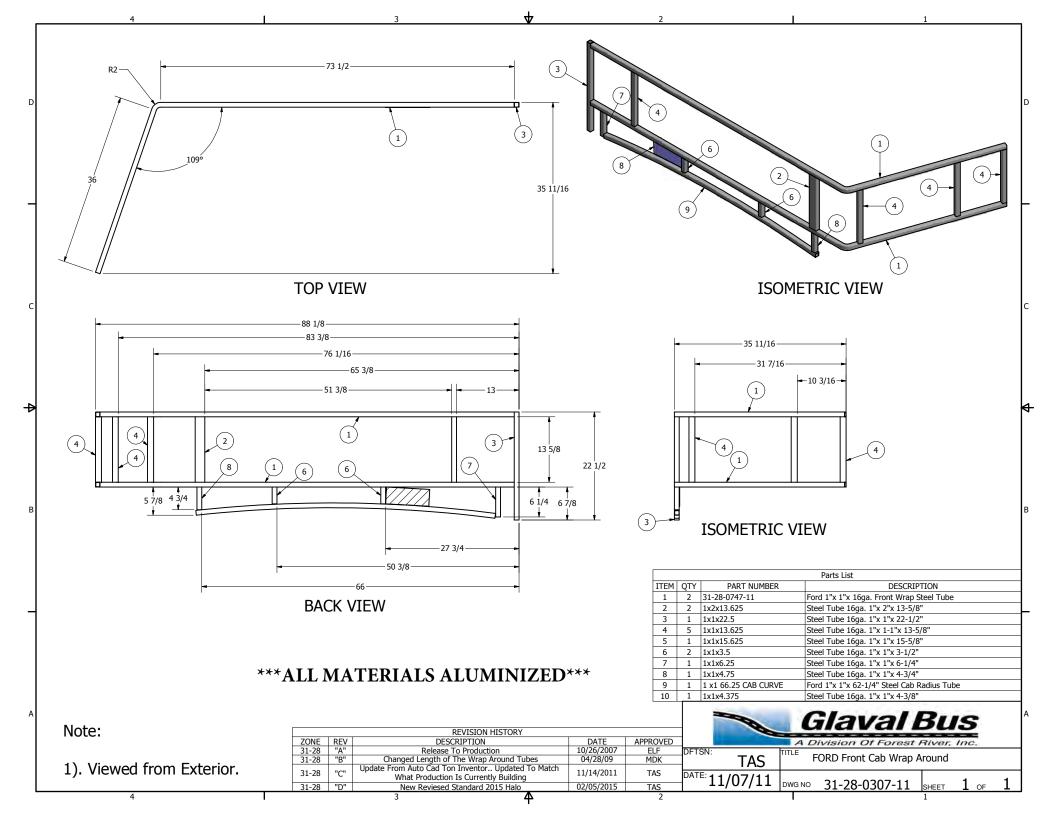
a division of Forest River, Inc.

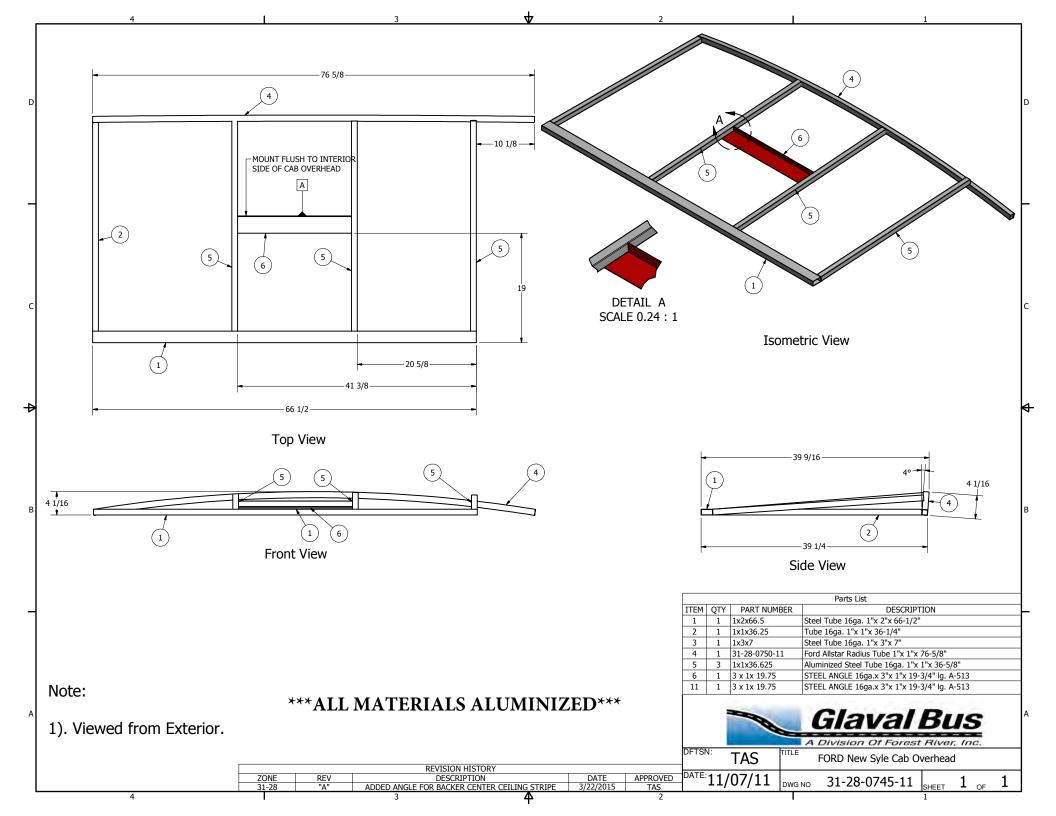
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF						
GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY						
MANNER, NOR SHALL IT BE SUBMITTED TO DUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS						
LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS						
SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV. LET.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.

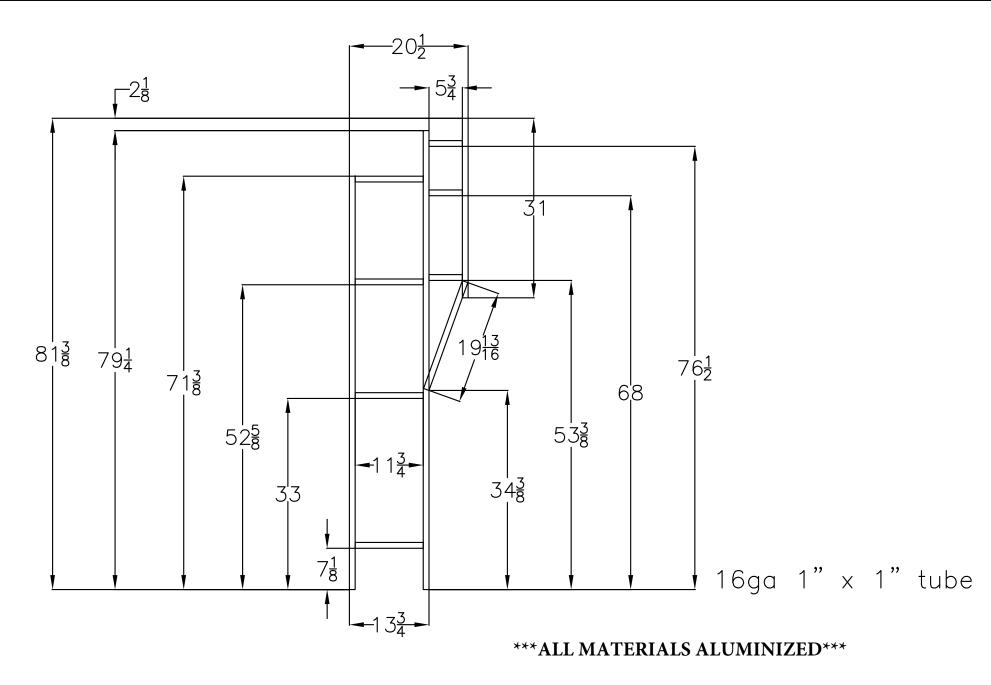
Frame, Rear Wall Raised Floor With Door DATE: 06/14/18 DFTSN: MKLINE TOLERANCE UNLESS THERWISE SPECIFIED CHKR: ± .00 ± .030 31-28-0010-18 SPECIAL APRVD: SCALE ± .000 ± .015 ± .0000 ± .005 SHEET 1 OF 1



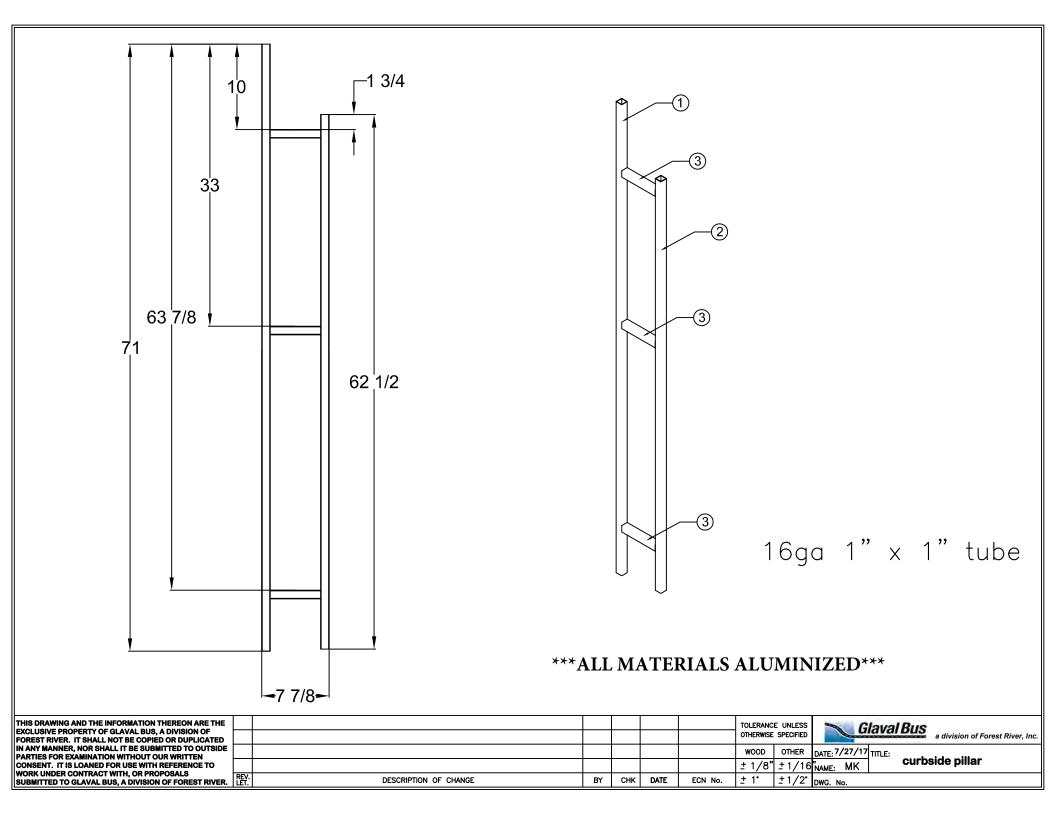


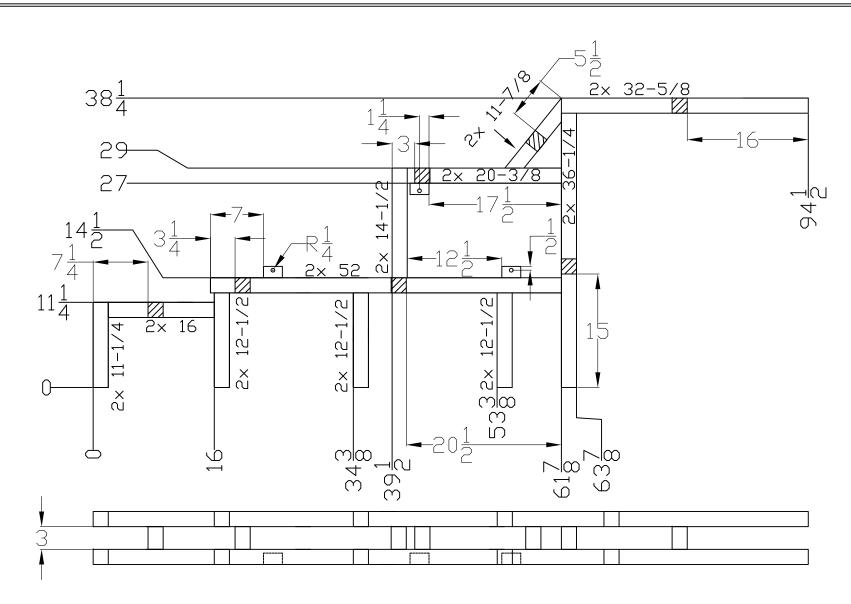






THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED							TOLERANC OTHERWISE		0	a division of Forest River, Inc.
IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN							WOOD	OTHER	DATE: 7/27/17	TITLE:
CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO							± 1/8"	±1/16	NAME: MK	streetside pillar
WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	<u>+</u> 1°	±1/2°	DWG. No. 31	-28-0955-14



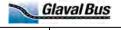


 $MAT'L=2" \times 2" \times 16GA.$

ALL MATERIALS ALUMINIZED

THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

					TOLERANCE	E UNLESS	
					OTHERWISE	SPECIFIED	
					WOOD	OTHER	DA
					± 1/8"	±1/16"	NΑ
Y	DESCRIPTION OF CHANGE	BY	DATE	ECN No.	± 1°	±1/2°	n۱



a division of Forest River, Inc.

DATE: 06/30/17 TITLE: RAISED FLOOR-3
STEP FALSE FLOOR ASSEMBLY

ECN No. | ± 1° | ± 1/2° | DWG. No.



The following information is submitted for all Glaval Bus products proposed on this bid as supporting documentation of the structural soundness and impact resistance of the bodies manufactured. All vehicles are built using virtually the same materials with some minor differences in the height and width of cross members due to entry floor heights and/or body width variations.

A representative set of construction prints provided by engineering supplements this verbal accounting of our materials and assembly specifications.

If, in the reviewing of these written technical specifications and engineering frame prints submitted any questions arise, please contact us immediately for any clarification or help in interpretation and understanding.

3.0 Body Construction – General Frame Construction

Manufactured from all aluminized steel products, the floor, roof, side walls, rear wall, driver halo assembly and entry door assembly are all wire welded (MIG) together to form an integral steel frame that is mounted with specified hardware to the rubber body mount points (pucks) supplied by the chassis manufacturer. Once joined to the chassis, the bus finishing process begins.

3.0.1 Floor frame construction and assembly –

- 3.0.1.1 Cross Members -- The floor cross members form the base structural support for the rest of the frame components. Our cross members are constructed of 14 gauge aluminzed steel, formed to a capital "C" shape. Cross members over the fuel tank are made to provide the clearance needed to conform with FMVSS301, and include formed internal reinforcements welded in place for additional strength. All additional longitudinal and latitudinal structure is flush welded in place to form a one piece floor upon completion.
- 3.0.1.2 Aluminized steel "Hat Posts" 1"x1"x4" run the length of the floor between cross members and are welded into place. This extremely strong form is used to weld our HSLA steel seat track in place.
- 3.0.1.3 Aluminized steel C Channel 1"x1.5" C channel is welded in between cross members the full length of the floor in 5 places. Coupled with the Hat Posts this provides a one-piece strong "ladder" type frame for the flooring.
- 3.0.1.4 Seat Track 12 gauge roll formed high strength/low alloy steel is wire welded in place for seat mounting down each side of the bus, with lengths predicated on the floor plan chosen. This is yet another stiffener in our extensive construction process.



- 3.0.1.5 Wheel Wells -- Constructed of 14 gauge ALUMINIZED steel, wheel wells are also welded in during the floor construction process. All seams in the wheel well are welded to create a one piece water resistant wheel housing structure. The wheel wells also provide additional strength to the body assembly, when welded in place.
- 3.0.1.6 Structural Aluminized steel Angle 1/8" thick 1.5" x 2.5" structural aluminized steel angle is used the full perimeter length of each floor assembly, welded to the ends of all floor cross members. This provides not only a flat plane for joining the sidewall assembly, but also ties all cross members together and provides additional side impact resistance.
- 3.0.1.7 Additional structure When adding vertical stanchions, wheel chair lifts and/or tie down options, additional structure is welded into the floor at locations specified by our engineering department on CAD drawings.

3.0.2 Sidewall Construction –

- 3.0.2.1 Sidewall vertical member The heart of our sidewall is the vertical structure, a roll formed 18 gauge aluminized steel 1.5" x 2" tube that provides strength and rigidity. The vertical member is installed in full lengths and in shorter sections below window frames. Additional vertical structure is used at both ends of the sidewall enabling the structure to withstand the forces applied by the vehicle when in motion.
- 3.0.2.2 Aluminized steel Tubing 1.5"x1" lower and 1.5"x3" upper 16 gauge aluminized steel tubing is welded in horizontally between vertical members to frame in window openings. This adds front to rear reinforcement as well.
 - 3.0.2.3 Seat Track 12 gauge high strength/low alloy roll formed ALUMINIZED steel welded down each sidewall belowt the window frame. While serving as a seat attaching device, it adds excellent structure to the sidewall and also adds excellent side impact resistance.
- 3.0.2.4 Wheelchair Options Add another layer of metal. Depending on track locations, another structure of 11 gauge thick aluminized steel is welded in place between each vertical member for attaching a shoulder belt mount. Also, additional structure is added to accommodate wheelchair door frames either 1.5"x1" or 1.5"x2" 16 gauge wall aluinized steel tubing..
- 3.0.2.5 Full length glavanized steel tubing 1.5"x1" 16 gauge aluinized steel tubing is stitch welded to the sidewall bottom and top at each vertical member for attaching to the floor and roof sections, respectively.

3.0.3 Rear Wall Construction –

3.0.3.1 Rear wall vertical member – The vertical sidewall 1.5"x 2" aluminized steel tube is also used in the rear wall assembly. Full length structure is used at varying places,



- depending on choice of rear window, or rear door. Shorter cut pieces are used above windows and doors. Additional side windows used with the rear door also change the configuration.
- 3.0.3.2 Aluinized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded horizontally between vertical members to provide a window frame in the standard product, and used as an upper door frame in the optional rear assembly.
 - 3.0.3.3 Full length aluminized steel tubing -1.5"x1" 16 gauge aluminized steel tubing stitch welded to the rear wall top and bottom as in the sidewall

assembly. 3.0.4 Roof Construction –

- 3.0.4.1 Roof Bows Radius formed one-piece 16 gauge aluminized steel roof bows formed as a modified hat post design with eight bends for exceptional strength and located on 16" centers (the closest in the industry), including 4 bends in the web that allows for the roof structure to be capable of taking severe loads. They are then capped with top flat pieces from flange to flange to provide abundant surface area for securing the exterior roof material.
- 3.0.4.2 aluminized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded in horizontally to frame all lower window openings and 1.5" x 3" 16 gauge aluminized steel tubing to all upper window openings as required. A full perimeter is also welded on to mate the roof to the sidewall and rear wall, with short vertical pieces providing support on the front and rear ends. The 3" wide aluminized steel tube supplies a structural mounting surface for shoulder belt attachment and has been pull tested to federal standards.

3.0.5 Driver Compartment Overhead Halo -

- 3.0.5.1 aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is cut and jig welded into an integrated one piece structure spanning from the front roof bow of the body to the newly cut roof line of the cab. Also created during the structure manufacture is the housing for mounting the electronic circuit board.
- 3.0.5.2 11 Gauge aluminized steel formed to make brackets used to mount to the chassis roof.

3.0.6 False Floor (Cab to body transition) –

- 3.0.6.1 aluminized steel Tubing 2" x 2" 16 gauge aluminized steel tubing is welded together forming a flat body floor transition from the step area back to the actual body area. An overhang on the curbside provides a secure attach point frontally for the entry door frame added later.
- 3.0.6.2 Structural aluminized steel angle 11 gauge 1.5"x1.5" structural angle is added in
 - short lengths five places to provide attachment points to the chassis floor.



3.0.7 Interior Vertical Transition Frames –

3.0.7.1 aluminized steel Tubing – 1"x1" 16 gauge aluminized steel tubing is used vertically and a ladder type assembly is made welding the 1x 1 tube to .75"x.75" 11 gauge aluminized steel tube that is used horizontally in the assemblies. These pieces transition from the body fronts on each side to the driver halo side assembly and the entry door frame assembly on the curbside.

3.0.8 Entry Door & Step Assembly Frame –

3.0.8.1 aluminized steel Tubing – 1"x1" 16 gauge and .75"x.75" 11 gauge aluminized steel tube is cut to length and welded together in a ladder type construction forming a rigid frame for attaching the entry door/step assembly.

3.0.9 Entry Door/Step Assembly –

3.0.9.1 11 Gauge aluminized steel – The step riser/tread piece is manufactured from one-piece 11 gauge aluminized steel and uses 90° bends at all risers and treads. The bottom tread also adds an additional 90° bend for additional strength and safety. Upper and lower side pieces are then attached and an 11 gauge flat plate with holes is used to bridge the lower and upper side pieces, then is stitch welded and plug welded to form a strong one piece assembly prior to inserting and welding to the entry step framing.

APPLICATION OF EXTERIOR SIDEWALL MATERIAL

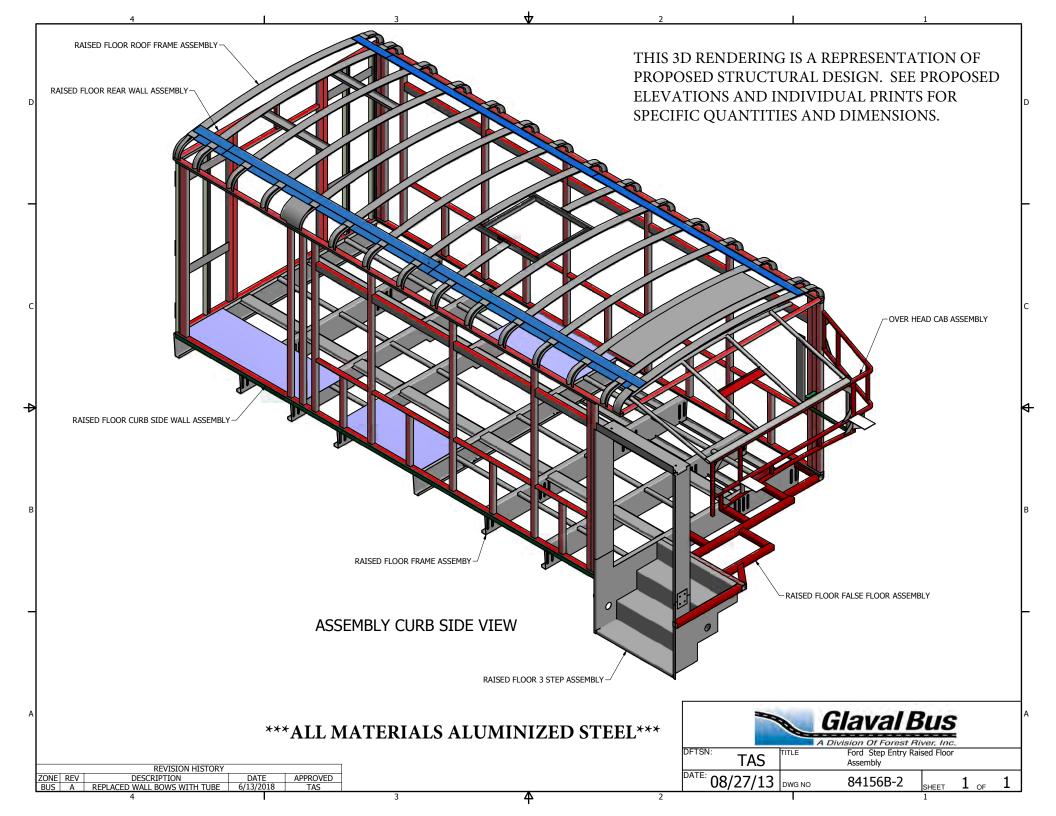
GALVAIZED STEEL SIDEWALLS OR OPTIONAL FIBERGLASS/FRP/COMPOSITE SIDEWALLS

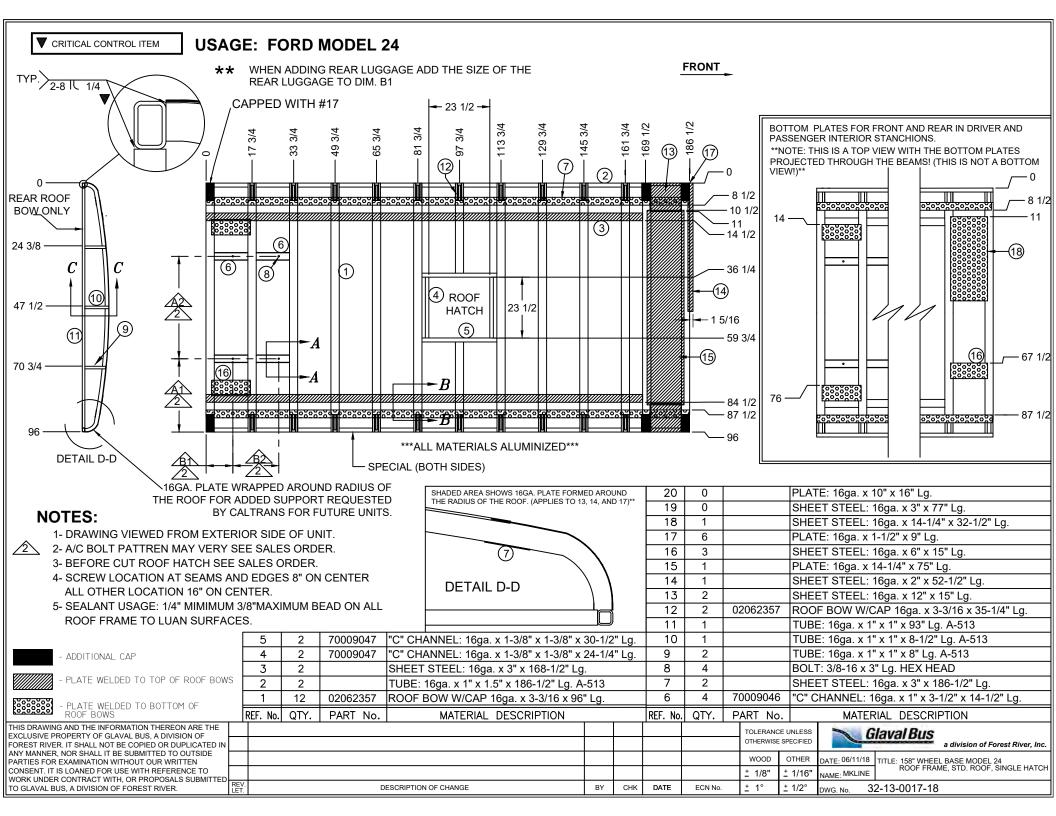
The exterior is .024" galvanized steel pre-painted white with an underlayment of 5/32" luan. The interior is 5/32" luan covered with a light gray FRP or padded vinyl.

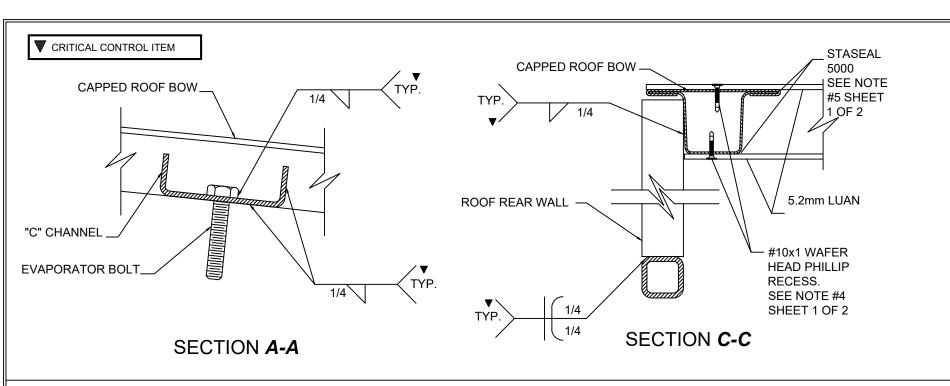
The foam filled aluminized steel cage is placed in the center and all layers are adhered using a cross linked polyurethane hot melt adhesive. The entire assembly is then laminated to assure adhesion.

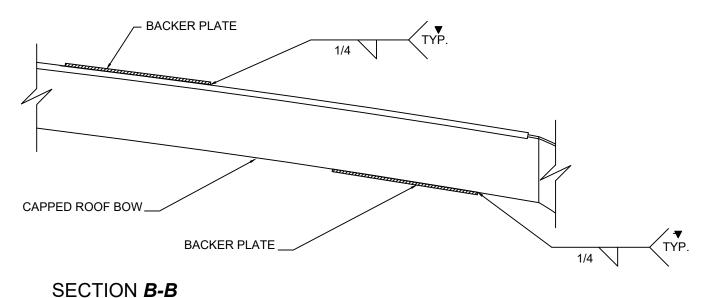
Composite FRP exterior sidewall panels are installed using the same method.

Should any further questions arise, please contact your Glaval Bus representative.









DESCRIPTION OF CHANGE

THIS DRAWING AND THE INFORMATION THEREON ARE THE

FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN

WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED

ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE

EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF

PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO

TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

Т	/A-71 NEW STYLE	33-5/8	30	10	12-1/4
	ACC 23022 SERIES	38	20	10	14-3/4
	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4
	T/A-77	18-1/4	59-1/2	10	10-3/8
	T/A-73	28-1/4	39-1/2	10	9-1/2
T	/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4
	T/A-70	36-3/4	22-1/2	10	11-5/8
	T/A-30	31	34	10	9-1/2
	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2
	EM-6 & RE-10	36	24	10	9-1/2
	EM-3 & RE-30	28-1/4	39-1/2	10	16
	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2
	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2
	EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2
	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2
	EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2
	EVAPORATOR MODEL	A-1	A-2	B-1	B-2
	TOLERANCE UNLESS	Glava	Bus		•

Glaval Bus

32-13-0017-18

NAME: MKLINE

a division of Forest River, Inc.

158" WHEEL BASE MODEL 24

ROOF FRAME, DETAILS SINGLE HATCH

OTHERWISE SPECIFIED

± 1/16"

± 1/2°

WOOD

± 1/8"

± 1°

BY

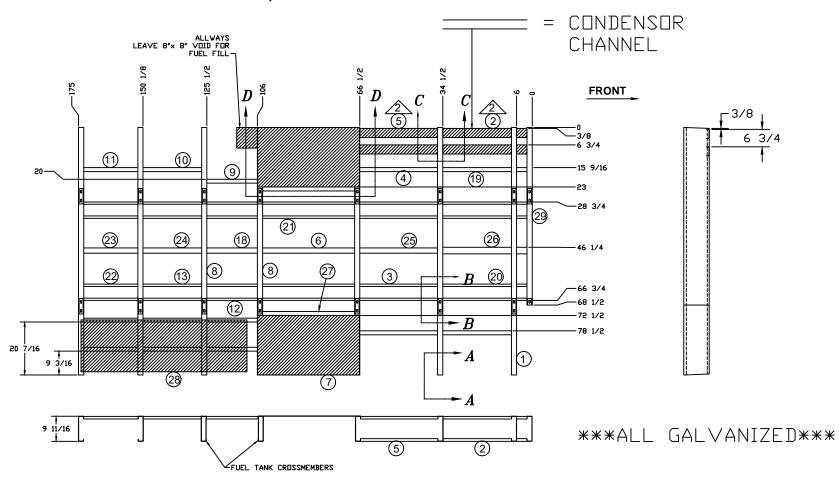
CHK

DATE

ECN No.



USAGE: FORD 158" WHEEL BASE, MODEL 24



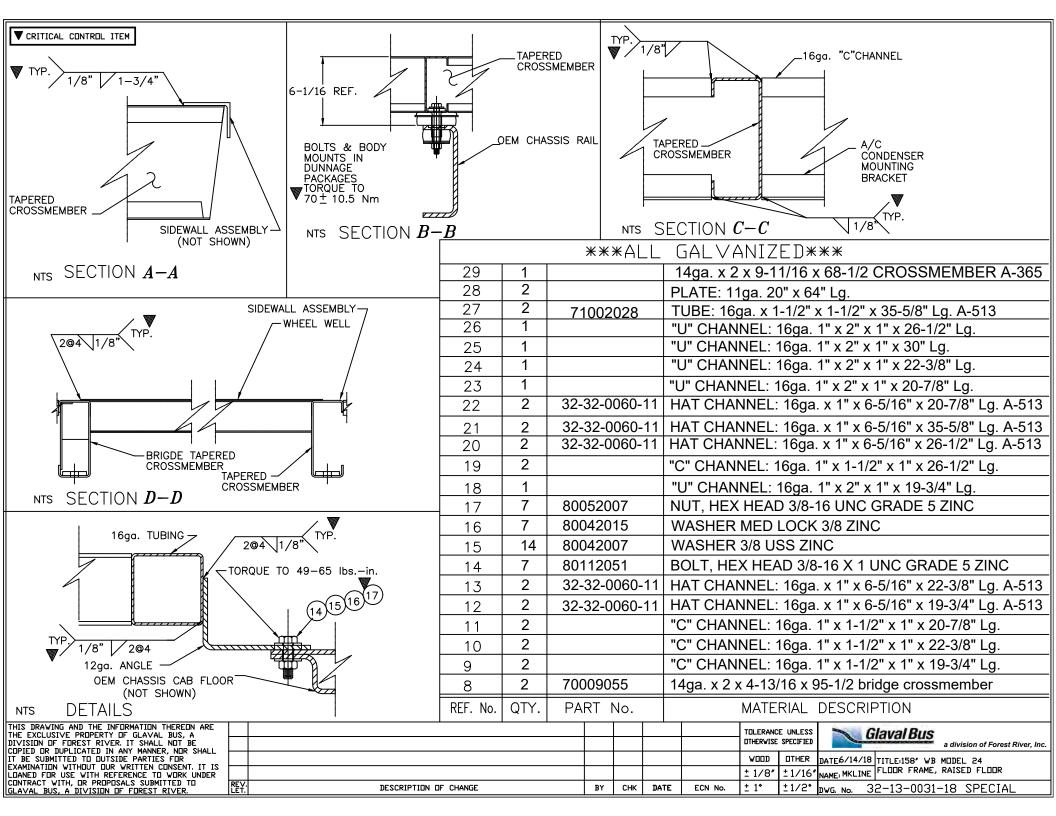
NOTES:

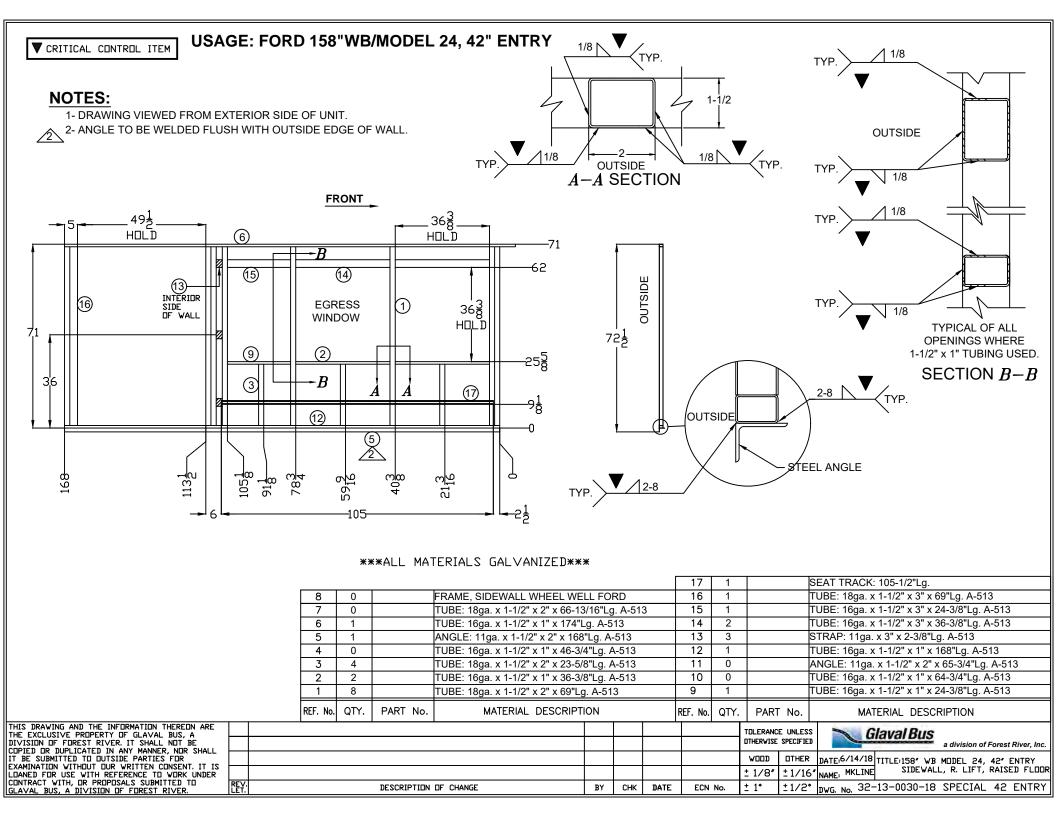
- 1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.
- 2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSIDE EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.
 - 3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

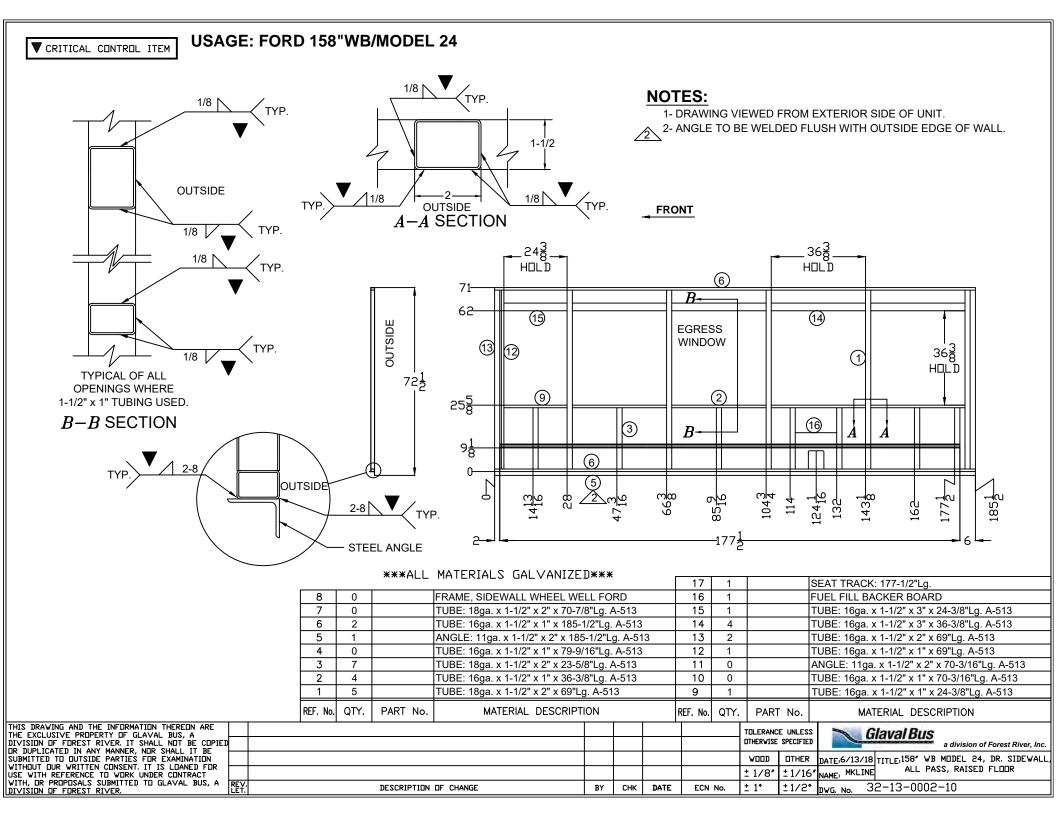
	7	2	71002066	SHEET STEEL: 11ga. x 24" x 39-1/4" Lg. HRS
	6	1		"U" CHANNEL: 16ga. 1" x 2" x 1" x 35-5/8" Lg.
	5	2	70009046	"C" CHANNEL: 12ga. x 1" x 3-1/2" x 30" Lg.
	4	2		"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.
	3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513
	2	2		"C" CHANNEL: 12ga. x 1" x 3-1/2" x 26-1/2" Lg.
	1	5	71009018	14ga. x 2 x 9-11/16 x 95-1/2 CROSSMEMBER A-365
İ	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

THIS DRAWING AND THE INFORMATION THEREON ARE
THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A
DIVISION OF FOREST RIVER, IT SHALL NOT BE
COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL
IT BE SUBMITTED TO DUTSIDE PARTIES FOR
EXAMINATION WITHOUT OUR WRITTEN CONSENT, IT IS
LOANED FOR USE WITH REFERENCE TO WORK UNDER
CONTRACT WITH, OR PROPOSALS SUBMITTED TO
GLAVAL BUS. A DIVISION OF FOREST RIVER.

			NO.			IVI	AILIN	IAL D	LOCKII HON
							TOLERANC	E UNLESS	Glaval Bus
							OTHERWISE	SPECIFIED	a division of Forest River, Inc.
							WOOD	OTHER	DATE6/14/18 TITLE:158' WB MODEL 24
2							± 1/8"	±1/16"	NAME: MKLINE FLOOR FRAME, RAISED FLOOR
	REV.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.	± 1°	±1/2°	DWG. No. 32-13-0031-18 SPECIAL







▼ CRITICAL CONTROL ITEM

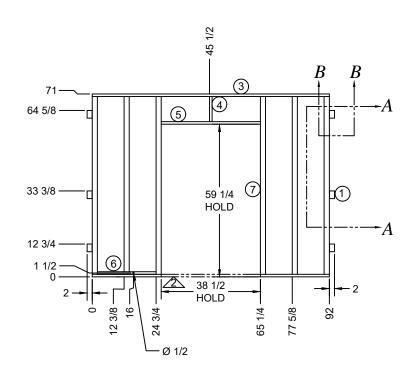
NOTES:

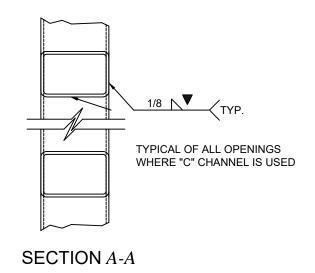
1- DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.

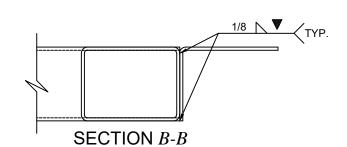
BUT BEFORE INSTALLING DOOR JAM ASSEMBLY.

2- REMOVE STEEL TUBE IN DOOR AREA AFTER WALL MOUNT TO FLOOR

USAGE: Raised Floor w/ Rear Door, SPECIAL 1-1/2" THICK WALL







ALL MATERIALS aluminized

7	6		TUBE: 16ga. x 1-1/2" x 2" x 69"Lg. A-513
6	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 10-3/8"Lg. A-513
5	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 38-1/2"Lg. A-513
4	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 9-3/4"Lg. A-513
3	2	02071055	TUBE: 16ga. x 1-1/2" x 1" x 92"Lg. A-513
2	0		
1	6		ANGLE: 16ga. x 1" x 2" x 6"Lg. A-513
REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

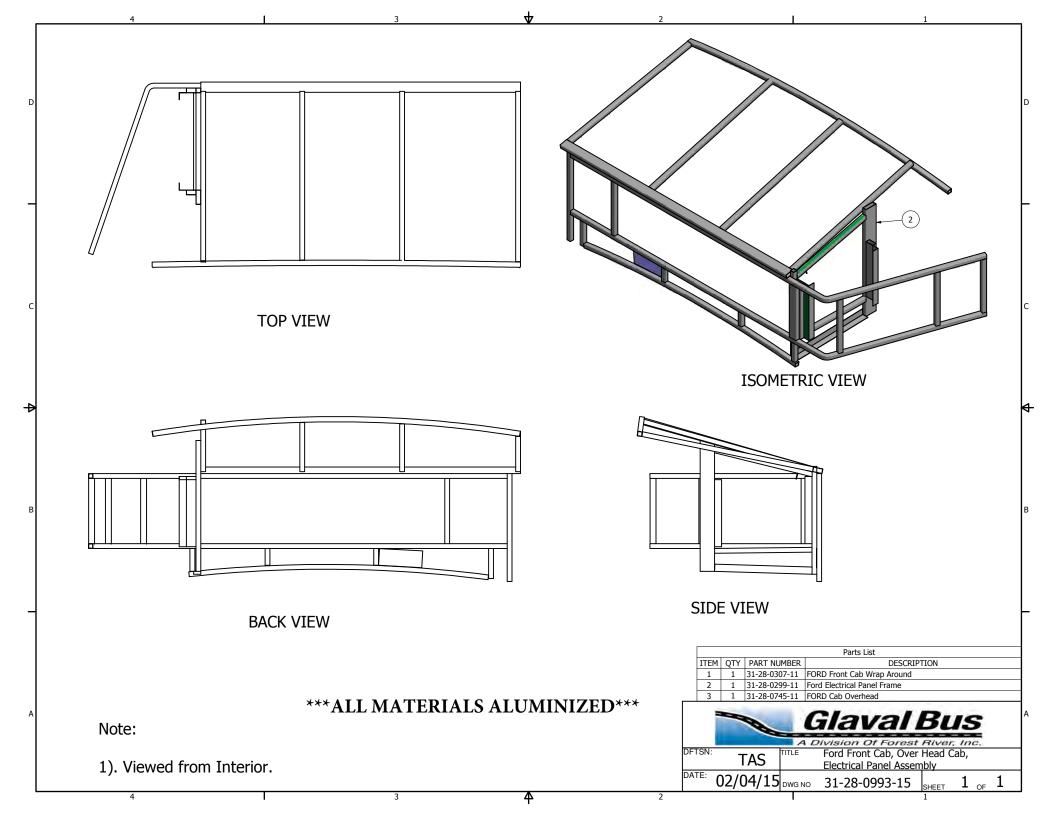


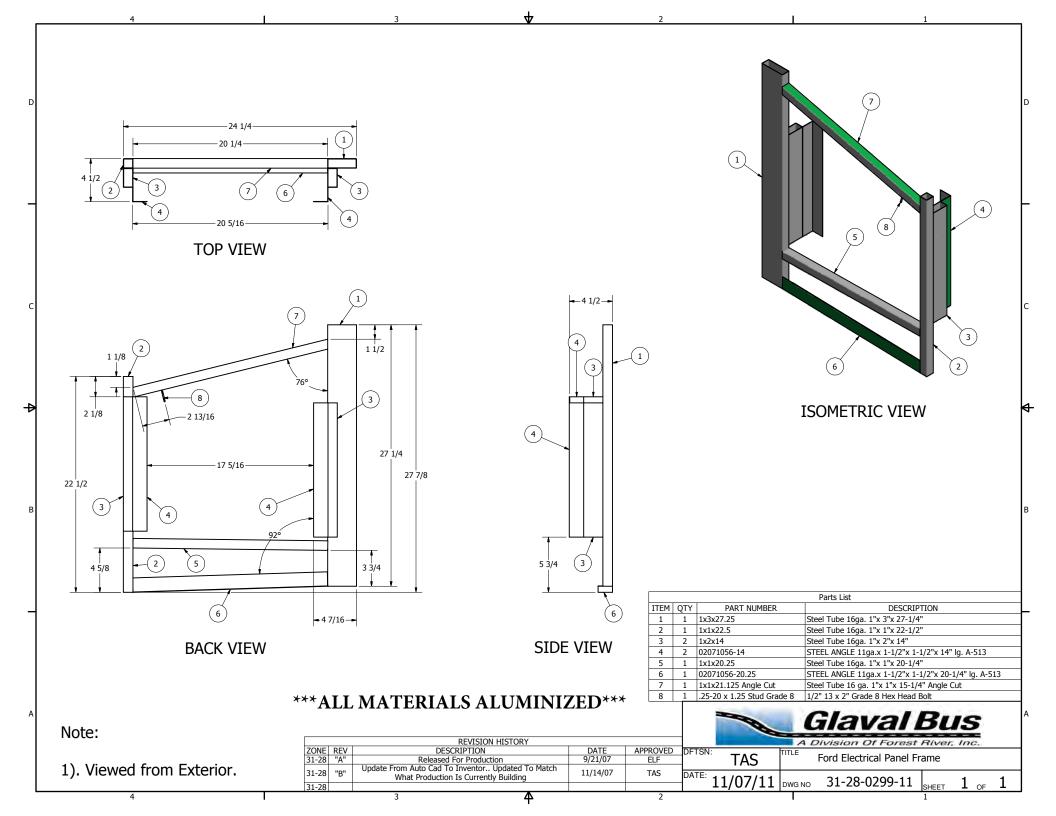
DISK No.

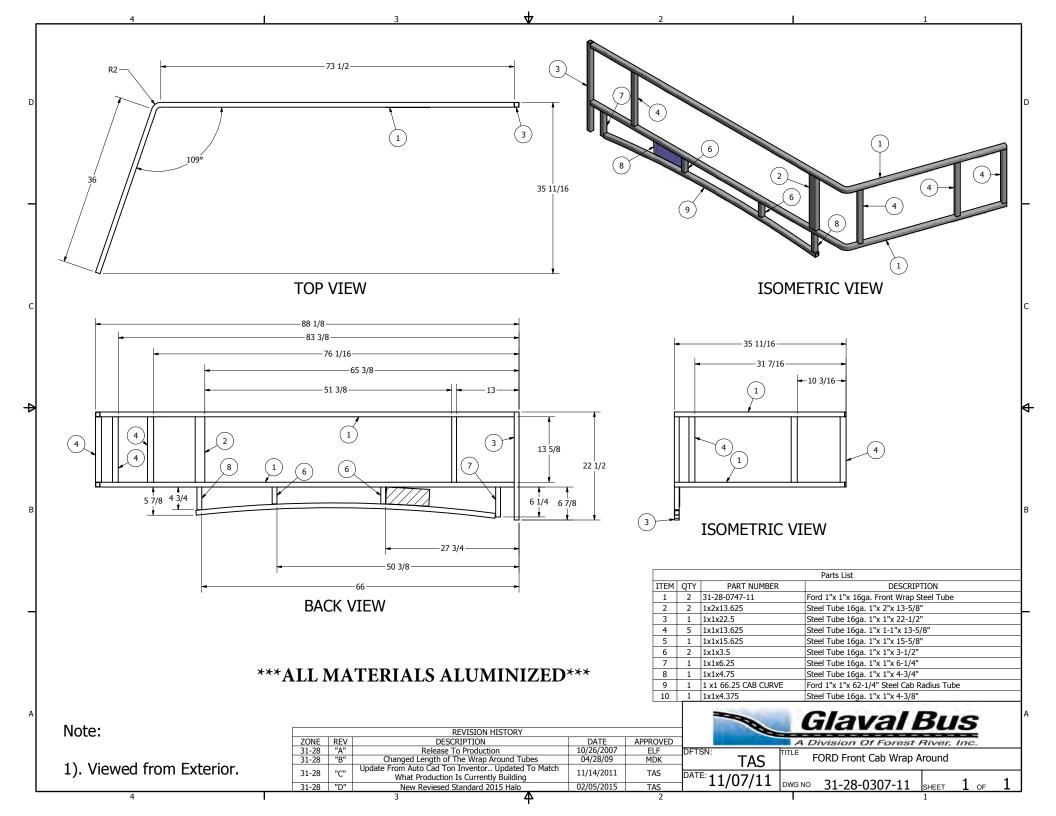
a division of Forest River, Inc.

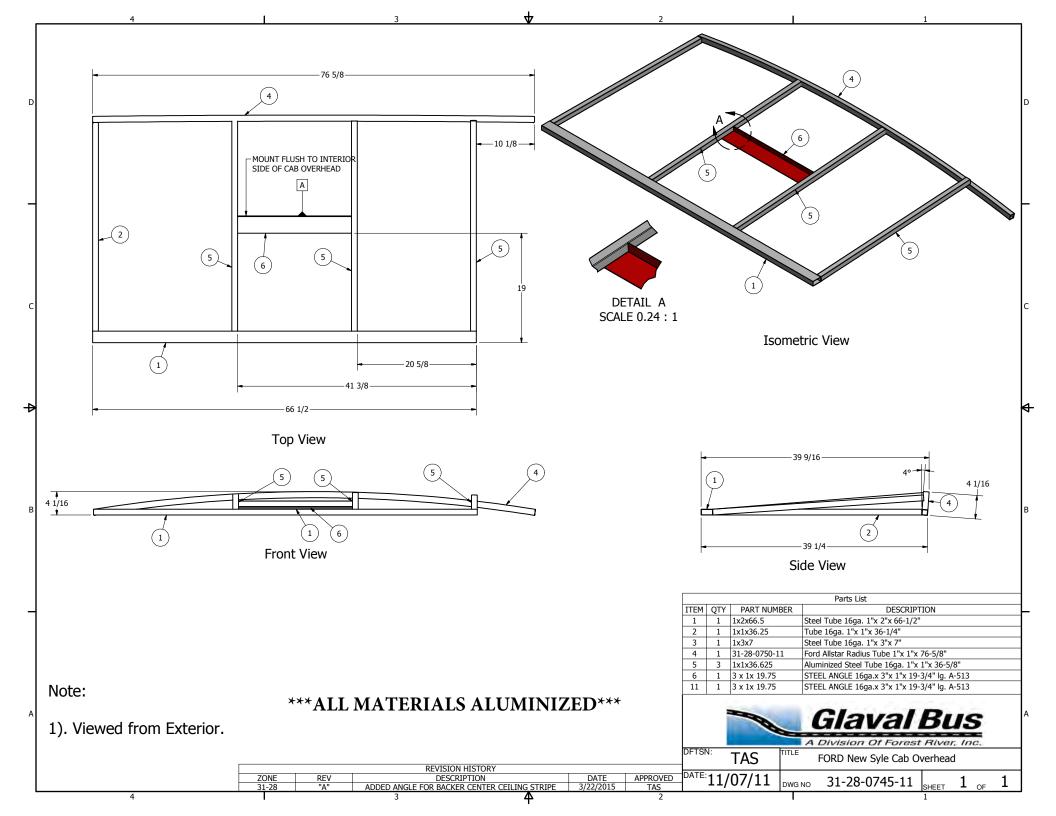
I'HIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF SLAVAL BUS, A DIVISION OF FOREST RIVER, IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO DUTSIBLE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.						
	REV. LET.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.

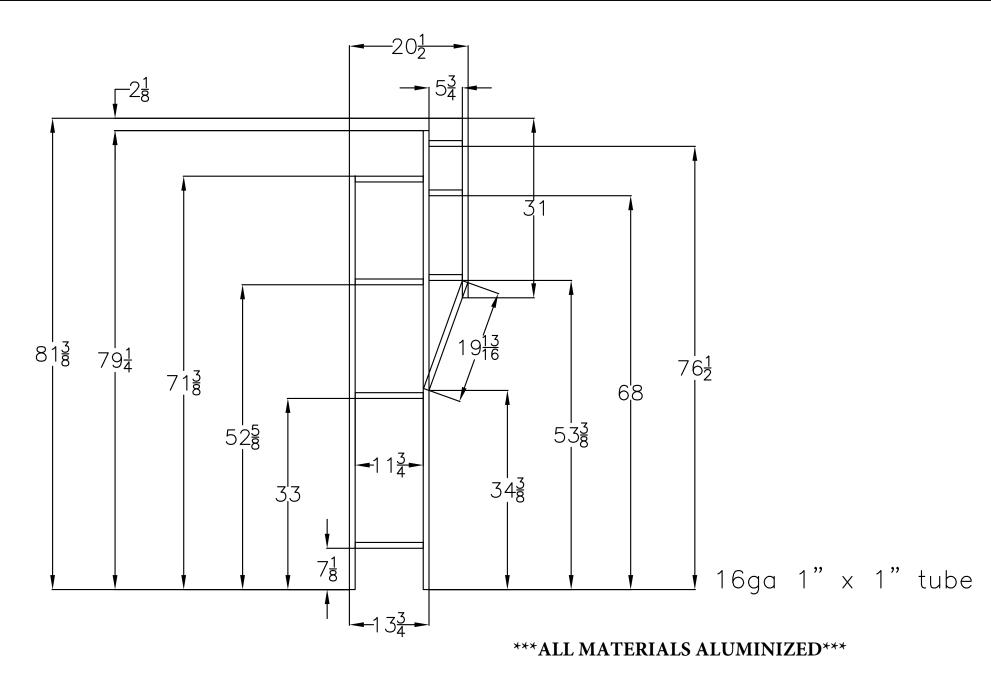
Frame, Rear Wall Raised Floor With Door DATE: 06/14/18 DFTSN: MKLINE TOLERANCE UNLESS THERWISE SPECIFIED CHKR: ± .00 ± .030 31-28-0010-18 SPECIAL APRVD: SCALE ± .000 ± .015 ± .0000 ± .005 SHEET 1 OF 1



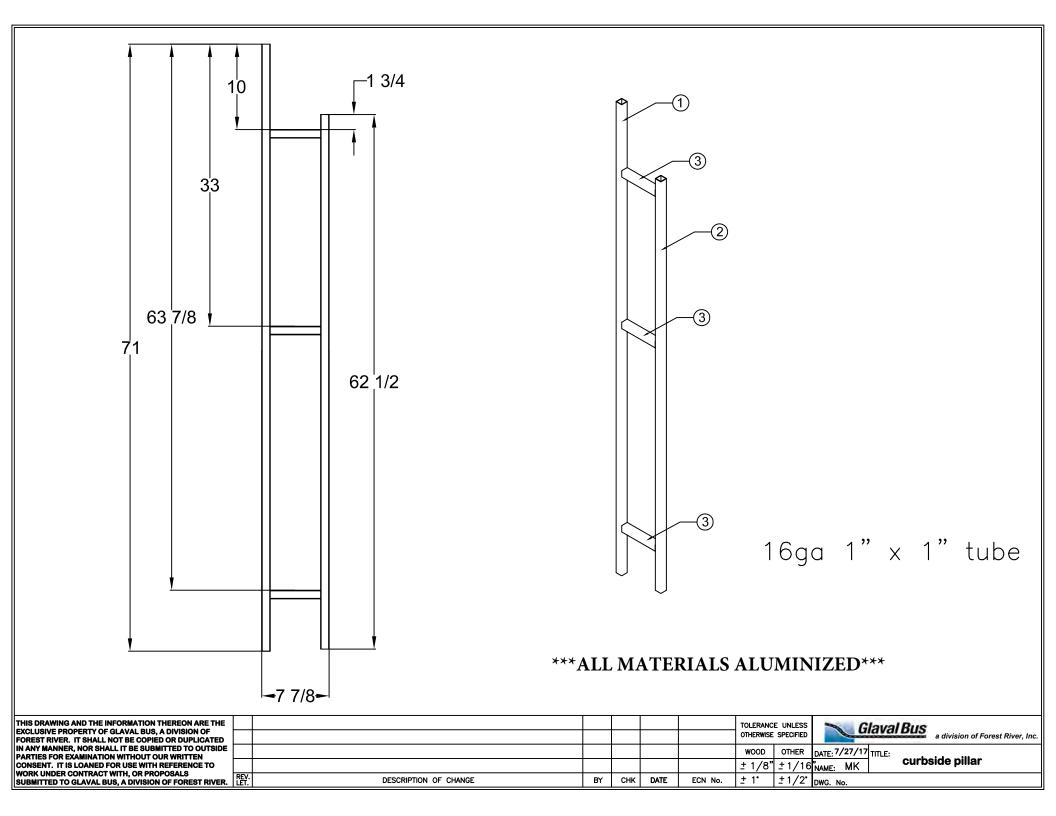


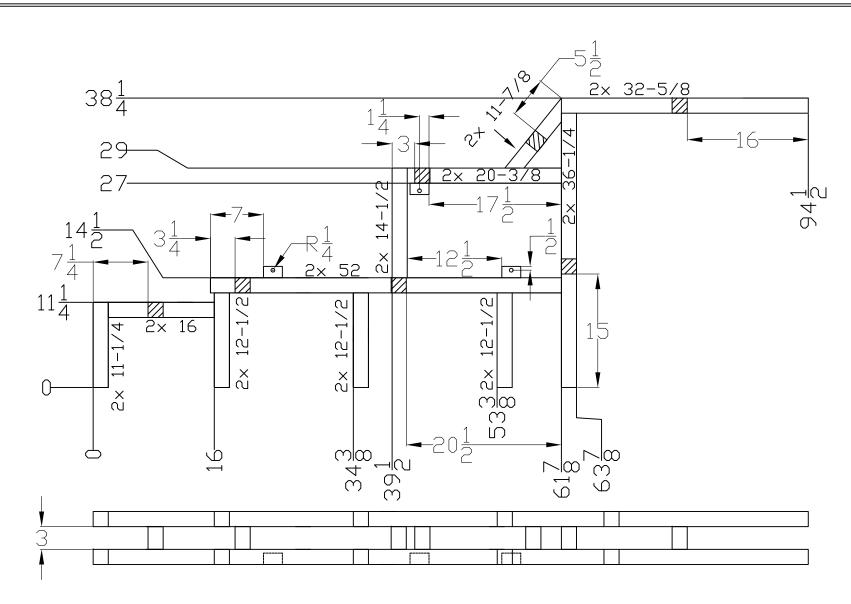






THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED							TOLERANC OTHERWISE		0	a division of Forest River, Inc.
IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN							WOOD	OTHER	DATE: 7/27/17	TITLE:
CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO							± 1/8"	±1/16	NAME: MK	streetside pillar
WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	<u>+</u> 1°	±1/2°	DWG. No. 31	-28-0955-14



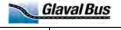


 $MAT'L=2" \times 2" \times 16GA.$

ALL MATERIALS ALUMINIZED

THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

					TOLERANCE UNLESS				
					OTHERWISE SPECIFIED				
					WOOD	OTHER	DA		
					± 1/8"	±1/16"	NA		
Y	DESCRIPTION OF CHANGE	BY	DATE	ECN No.	± 1°	±1/2°	n۱		



a division of Forest River, Inc.

DATE: 06/30/17 TITLE: RAISED FLOOR-3
STEP FALSE FLOOR ASSEMBLY

ECN No. | ± 1° | ± 1/2° | DWG. No.



The following information is submitted for all Glaval Bus products proposed on this bid as supporting documentation of the structural soundness and impact resistance of the bodies manufactured. All vehicles are built using virtually the same materials with some minor differences in the height and width of cross members due to entry floor heights and/or body width variations.

A representative set of construction prints provided by engineering supplements this verbal accounting of our materials and assembly specifications.

If, in the reviewing of these written technical specifications and engineering frame prints submitted any questions arise, please contact us immediately for any clarification or help in interpretation and understanding.

3.0 Body Construction – General Frame Construction

Manufactured from all aluminized steel products, the floor, roof, side walls, rear wall, driver halo assembly and entry door assembly are all wire welded (MIG) together to form an integral steel frame that is mounted with specified hardware to the rubber body mount points (pucks) supplied by the chassis manufacturer. Once joined to the chassis, the bus finishing process begins.

3.0.1 Floor frame construction and assembly –

- 3.0.1.1 Cross Members -- The floor cross members form the base structural support for the rest of the frame components. Our cross members are constructed of 14 gauge aluminzed steel, formed to a capital "C" shape. Cross members over the fuel tank are made to provide the clearance needed to conform with FMVSS301, and include formed internal reinforcements welded in place for additional strength. All additional longitudinal and latitudinal structure is flush welded in place to form a one piece floor upon completion.
- 3.0.1.2 Aluminized steel "Hat Posts" 1"x1"x4" run the length of the floor between cross members and are welded into place. This extremely strong form is used to weld our HSLA steel seat track in place.
- 3.0.1.3 Aluminized steel C Channel 1"x1.5" C channel is welded in between cross members the full length of the floor in 5 places. Coupled with the Hat Posts this provides a one-piece strong "ladder" type frame for the flooring.
- 3.0.1.4 Seat Track 12 gauge roll formed high strength/low alloy steel is wire welded in place for seat mounting down each side of the bus, with lengths predicated on the floor plan chosen. This is yet another stiffener in our extensive construction process.



- 3.0.1.5 Wheel Wells -- Constructed of 14 gauge ALUMINIZED steel, wheel wells are also welded in during the floor construction process. All seams in the wheel well are welded to create a one piece water resistant wheel housing structure. The wheel wells also provide additional strength to the body assembly, when welded in place.
- 3.0.1.6 Structural Aluminized steel Angle 1/8" thick 1.5" x 2.5" structural aluminized steel angle is used the full perimeter length of each floor assembly, welded to the ends of all floor cross members. This provides not only a flat plane for joining the sidewall assembly, but also ties all cross members together and provides additional side impact resistance.
- 3.0.1.7 Additional structure When adding vertical stanchions, wheel chair lifts and/or tie down options, additional structure is welded into the floor at locations specified by our engineering department on CAD drawings.

3.0.2 Sidewall Construction –

- 3.0.2.1 Sidewall vertical member The heart of our sidewall is the vertical structure, a roll formed 18 gauge aluminized steel 1.5" x 2" tube that provides strength and rigidity. The vertical member is installed in full lengths and in shorter sections below window frames. Additional vertical structure is used at both ends of the sidewall enabling the structure to withstand the forces applied by the vehicle when in motion.
- 3.0.2.2 Aluminized steel Tubing 1.5"x1" lower and 1.5"x3" upper 16 gauge aluminized steel tubing is welded in horizontally between vertical members to frame in window openings. This adds front to rear reinforcement as well.
 - 3.0.2.3 Seat Track 12 gauge high strength/low alloy roll formed ALUMINIZED steel welded down each sidewall belowt the window frame. While serving as a seat attaching device, it adds excellent structure to the sidewall and also adds excellent side impact resistance.
- 3.0.2.4 Wheelchair Options Add another layer of metal. Depending on track locations, another structure of 11 gauge thick aluminized steel is welded in place between each vertical member for attaching a shoulder belt mount. Also, additional structure is added to accommodate wheelchair door frames either 1.5"x1" or 1.5"x2" 16 gauge wall aluinized steel tubing..
- 3.0.2.5 Full length glavanized steel tubing 1.5"x1" 16 gauge aluinized steel tubing is stitch welded to the sidewall bottom and top at each vertical member for attaching to the floor and roof sections, respectively.

3.0.3 Rear Wall Construction –

3.0.3.1 Rear wall vertical member – The vertical sidewall 1.5"x 2" aluminized steel tube is also used in the rear wall assembly. Full length structure is used at varying places,



- depending on choice of rear window, or rear door. Shorter cut pieces are used above windows and doors. Additional side windows used with the rear door also change the configuration.
- 3.0.3.2 Aluinized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded horizontally between vertical members to provide a window frame in the standard product, and used as an upper door frame in the optional rear assembly.
 - 3.0.3.3 Full length aluminized steel tubing 1.5"x1" 16 gauge aluminized steel tubing stitch welded to the rear wall top and bottom as in the sidewall

assembly. 3.0.4 Roof Construction –

- 3.0.4.1 Roof Bows Radius formed one-piece 16 gauge aluminized steel roof bows formed as a modified hat post design with eight bends for exceptional strength and located on 16" centers (the closest in the industry), including 4 bends in the web that allows for the roof structure to be capable of taking severe loads. They are then capped with top flat pieces from flange to flange to provide abundant surface area for securing the exterior roof material.
- 3.0.4.2 aluminized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded in horizontally to frame all lower window openings and 1.5" x 3" 16 gauge aluminized steel tubing to all upper window openings as required. A full perimeter is also welded on to mate the roof to the sidewall and rear wall, with short vertical pieces providing support on the front and rear ends. The 3" wide aluminized steel tube supplies a structural mounting surface for shoulder belt attachment and has been pull tested to federal standards.

3.0.5 Driver Compartment Overhead Halo -

- 3.0.5.1 aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is cut and jig welded into an integrated one piece structure spanning from the front roof bow of the body to the newly cut roof line of the cab. Also created during the structure manufacture is the housing for mounting the electronic circuit board.
- 3.0.5.2 11 Gauge aluminized steel formed to make brackets used to mount to the chassis roof.

3.0.6 False Floor (Cab to body transition) –

- 3.0.6.1 aluminized steel Tubing 2" x 2" 16 gauge aluminized steel tubing is welded together forming a flat body floor transition from the step area back to the actual body area. An overhang on the curbside provides a secure attach point frontally for the entry door frame added later.
- 3.0.6.2 Structural aluminized steel angle 11 gauge 1.5"x1.5" structural angle is added in
 - short lengths five places to provide attachment points to the chassis floor.



3.0.7 Interior Vertical Transition Frames –

3.0.7.1 aluminized steel Tubing – 1"x1" 16 gauge aluminized steel tubing is used vertically and a ladder type assembly is made welding the 1x 1 tube to .75"x.75" 11 gauge aluminized steel tube that is used horizontally in the assemblies. These pieces transition from the body fronts on each side to the driver halo side assembly and the entry door frame assembly on the curbside.

3.0.8 Entry Door & Step Assembly Frame –

3.0.8.1 aluminized steel Tubing – 1"x1" 16 gauge and .75"x.75" 11 gauge aluminized steel tube is cut to length and welded together in a ladder type construction forming a rigid frame for attaching the entry door/step assembly.

3.0.9 Entry Door/Step Assembly –

3.0.9.1 11 Gauge aluminized steel – The step riser/tread piece is manufactured from one-piece 11 gauge aluminized steel and uses 90° bends at all risers and treads. The bottom tread also adds an additional 90° bend for additional strength and safety. Upper and lower side pieces are then attached and an 11 gauge flat plate with holes is used to bridge the lower and upper side pieces, then is stitch welded and plug welded to form a strong one piece assembly prior to inserting and welding to the entry step framing.

APPLICATION OF EXTERIOR SIDEWALL MATERIAL

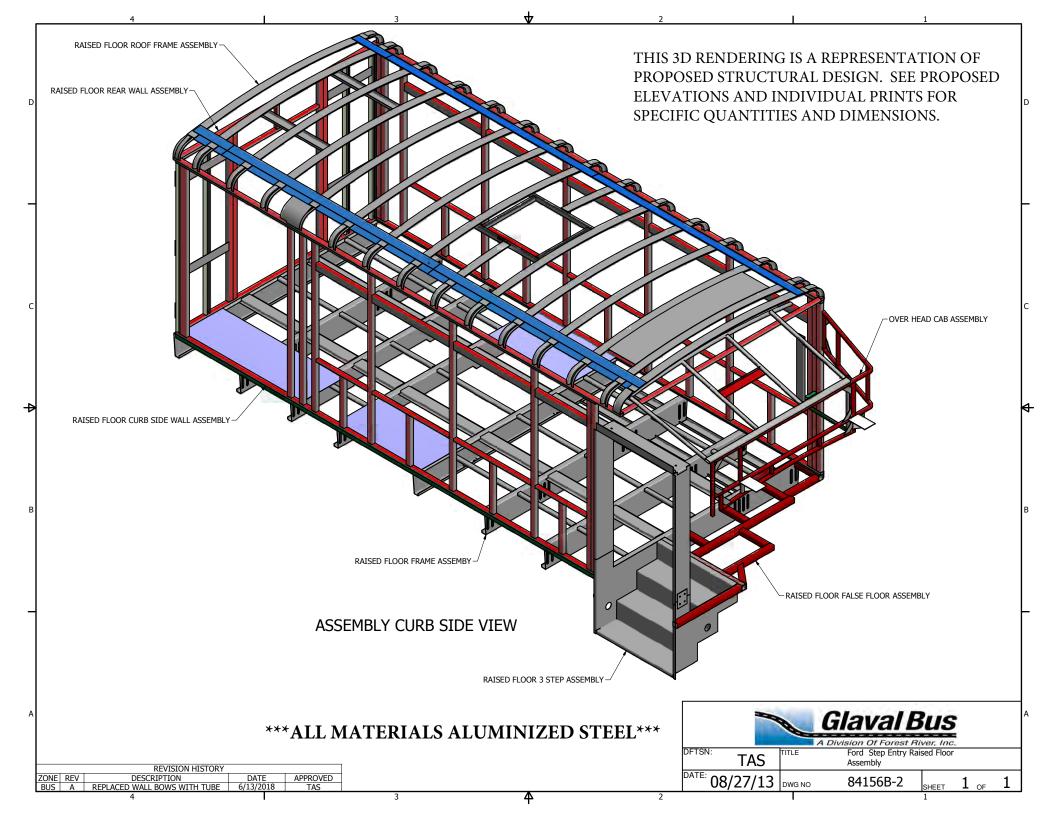
GALVAIZED STEEL SIDEWALLS OR OPTIONAL FIBERGLASS/FRP/COMPOSITE SIDEWALLS

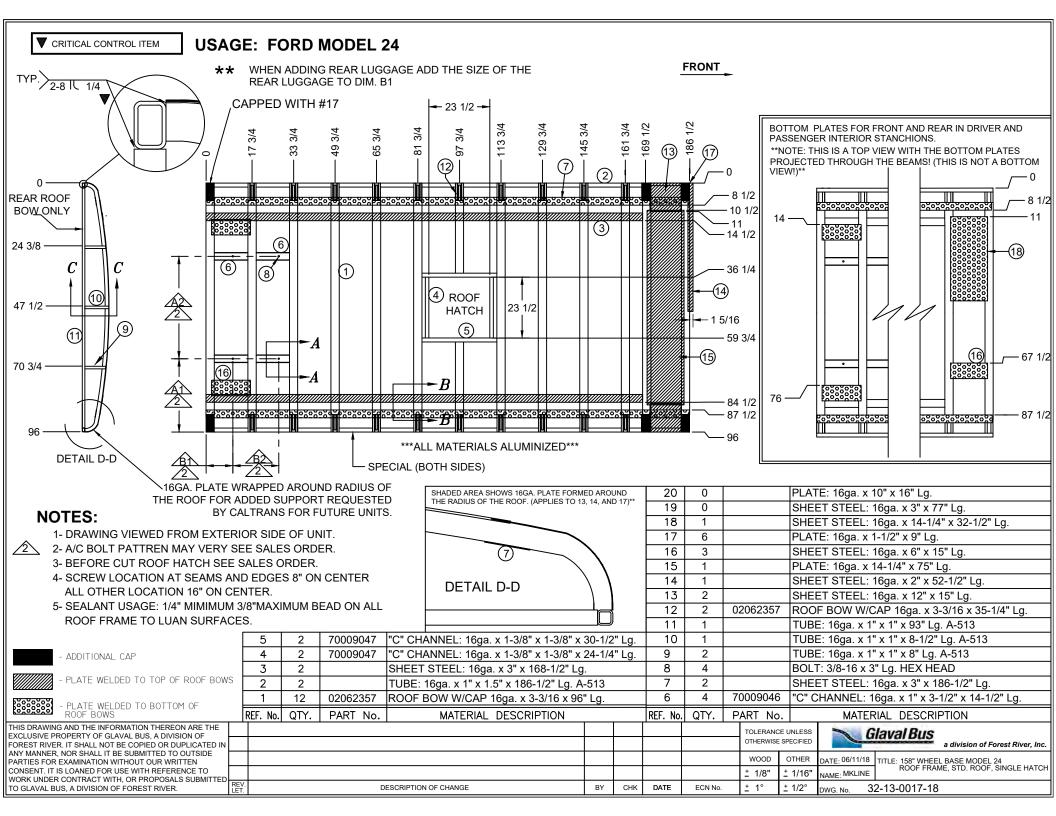
The exterior is .024" galvanized steel pre-painted white with an underlayment of 5/32" luan. The interior is 5/32" luan covered with a light gray FRP or padded vinyl.

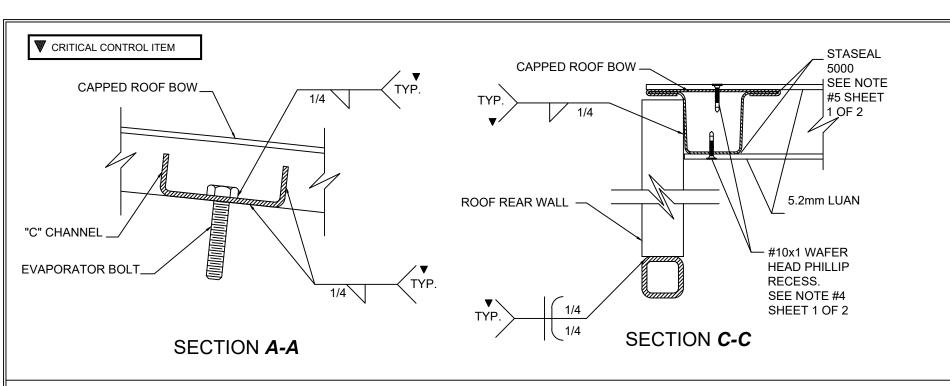
The foam filled aluminized steel cage is placed in the center and all layers are adhered using a cross linked polyurethane hot melt adhesive. The entire assembly is then laminated to assure adhesion.

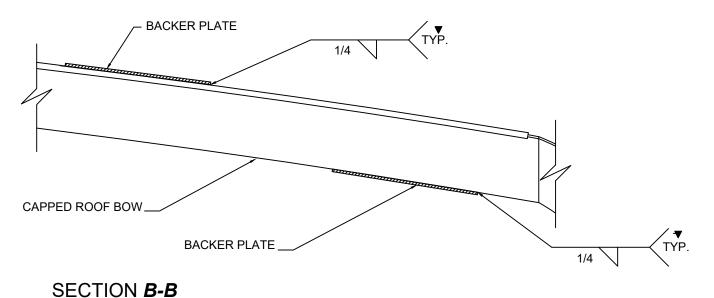
Composite FRP exterior sidewall panels are installed using the same method.

Should any further questions arise, please contact your Glaval Bus representative.









DESCRIPTION OF CHANGE

THIS DRAWING AND THE INFORMATION THEREON ARE THE

FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN

WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED

ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE

EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF

PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO

TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

Т	/A-71 NEW STYLE	33-5/8	30	10	12-1/4
	ACC 23022 SERIES	38	20	10	14-3/4
	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4
	T/A-77	18-1/4	59-1/2	10	10-3/8
	T/A-73	28-1/4	39-1/2	10	9-1/2
T	/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4
	T/A-70	36-3/4	22-1/2	10	11-5/8
	T/A-30	31	34	10	9-1/2
	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2
	EM-6 & RE-10	36	24	10	9-1/2
	EM-3 & RE-30	28-1/4	39-1/2	10	16
	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2
	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2
	EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2
	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2
	EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2
	EVAPORATOR MODEL	A-1	A-2	B-1	B-2
	TOLERANCE UNLESS	Glava	Bus		•

Glaval Bus

32-13-0017-18

NAME: MKLINE

a division of Forest River, Inc.

158" WHEEL BASE MODEL 24

ROOF FRAME, DETAILS SINGLE HATCH

OTHERWISE SPECIFIED

± 1/16"

± 1/2°

WOOD

± 1/8"

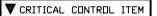
± 1°

BY

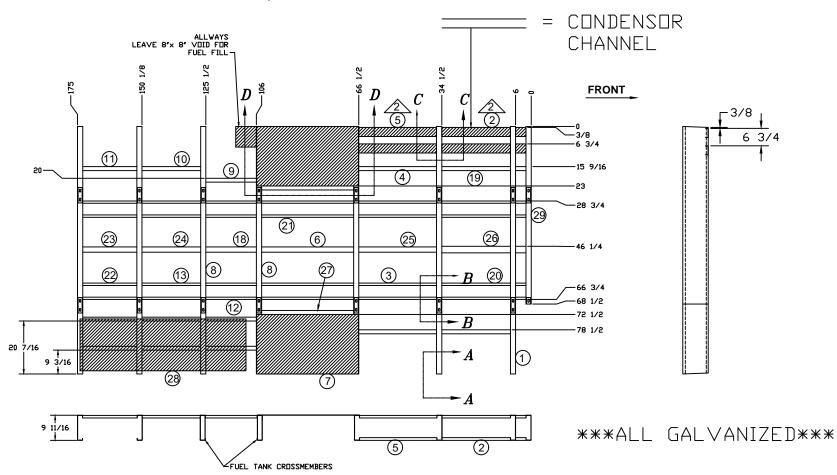
CHK

DATE

ECN No.



USAGE: FORD 158" WHEEL BASE, MODEL 24



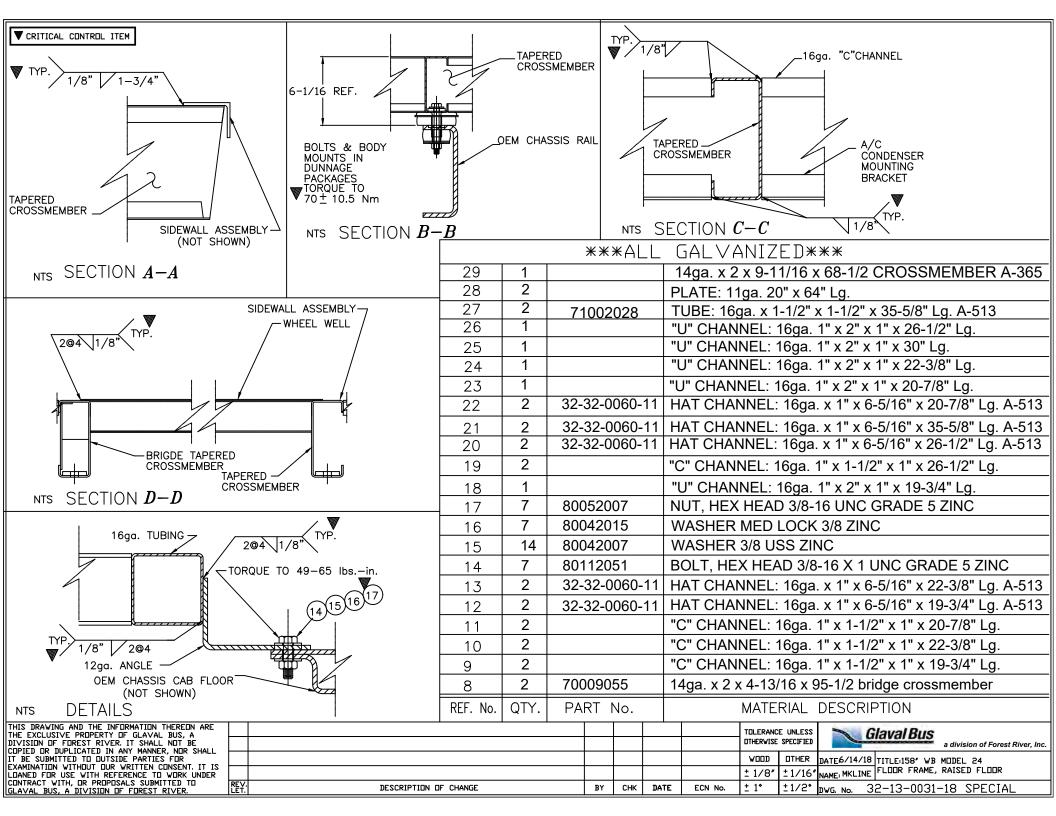
NOTES:

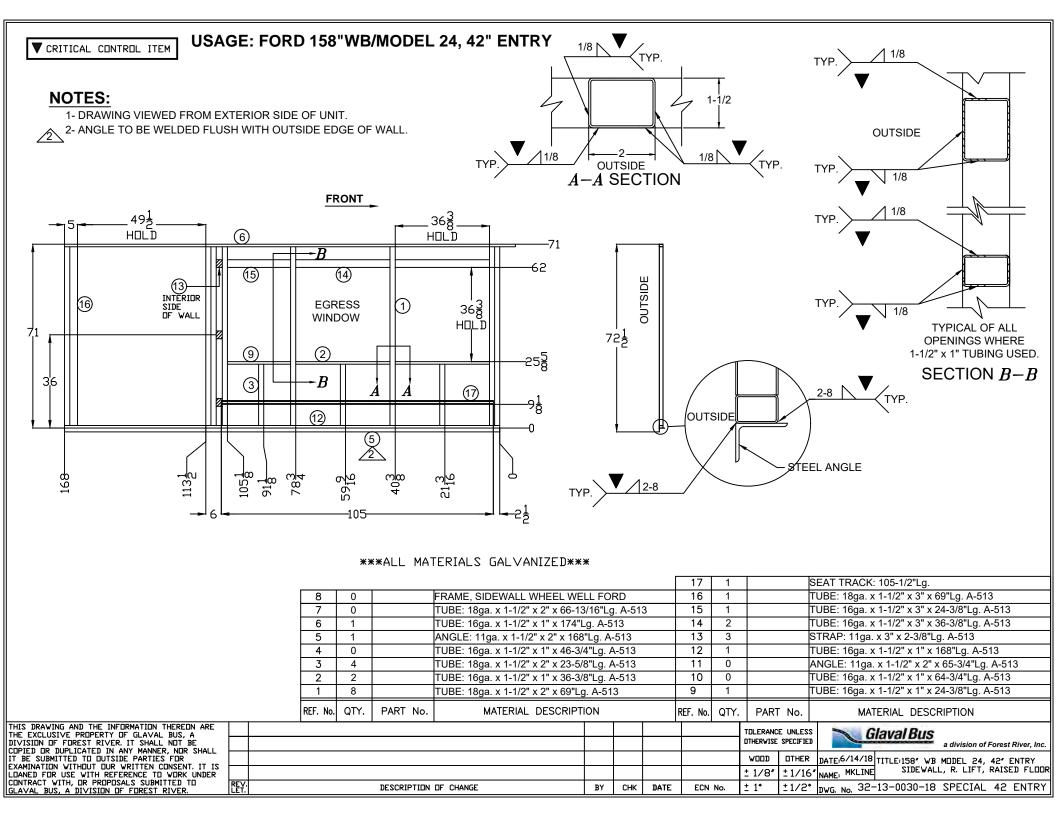
- 1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.
- 2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSIDE EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.
 - 3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

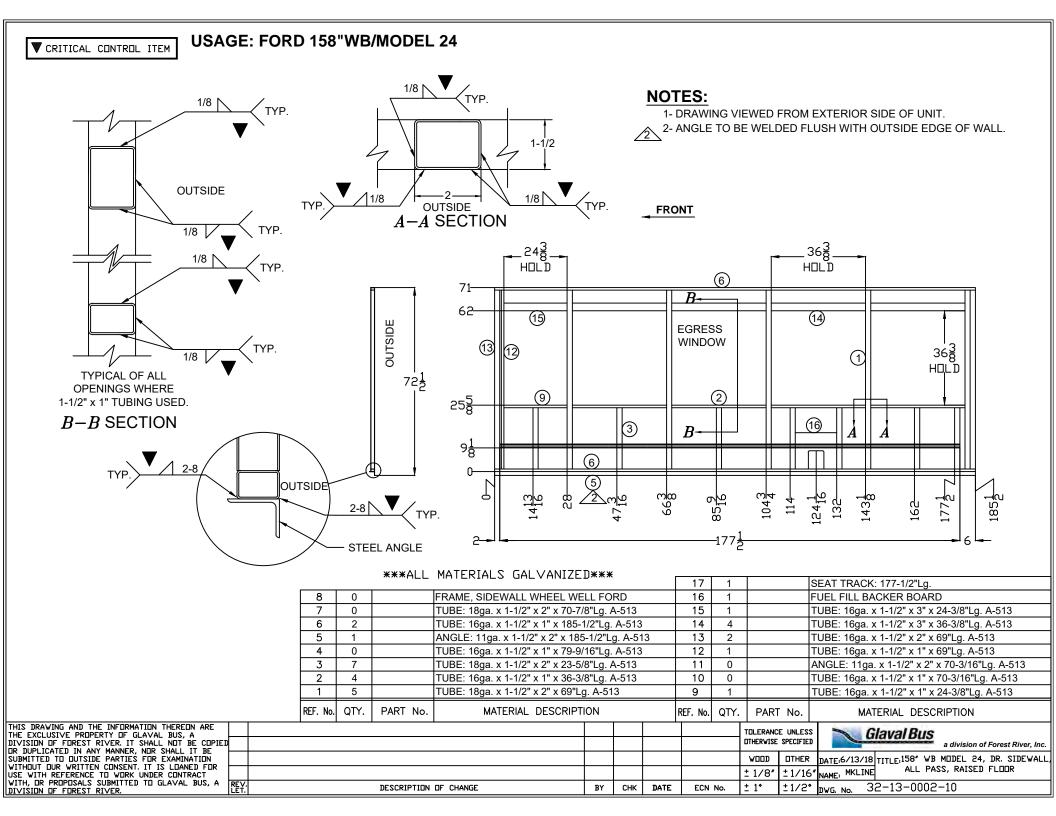
	7	2	71002066	SHEET STEEL: 11ga. x 24" x 39-1/4" Lg. HRS
	6	1		"U" CHANNEL: 16ga. 1" x 2" x 1" x 35-5/8" Lg.
	5	2	70009046	"C" CHANNEL: 12ga. x 1" x 3-1/2" x 30" Lg.
Е	4	2		"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.
	3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513
	2	2		"C" CHANNEL: 12ga. x 1" x 3-1/2" x 26-1/2" Lg.
	1	5	71009018	14ga. x 2 x 9-11/16 x 95-1/2 CROSSMEMBER A-365
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION
				A

THIS DRAWING AND THE INFORMATION THEREON ARE
THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A
DIVISION OF FOREST RIVER, IT SHALL NOT BE
COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL
IT BE SUBMITTED TO DUTSIDE PARTIES FOR
EXAMINATION WITHOUT OUR WRITTEN CONSENT, IT IS
LOANED FOR USE WITH REFERENCE TO WORK UNDER
CONTRACT WITH, OR PROPOSALS SUBMITTED TO
GLAVAL BUS, A DIVISION OF FOREST RIVER.

		1121. 1101 2111 17111					, 	,	20011111111
							TOLERANC	E UNLESS	Glaval Bus
							OTHERWISE	SPECIFIED	a division of Forest River, Inc.
							WOOD	DTHER	DATE 6/14/18 TITLE: 158' WB MODEL 24
3							± 1/8"	±1/16"	NAME: MKLINE FLOOR FRAME, RAISED FLOOR
	REY.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	± 1°	±1/2°	DWG. No. 32-13-0031-18 SPECIAL







▼ CRITICAL CONTROL ITEM

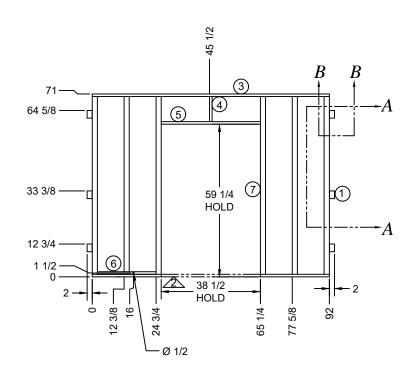
NOTES:

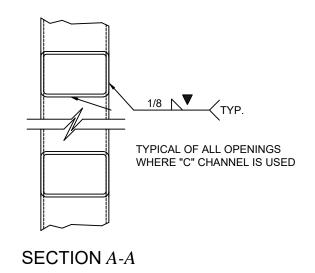
1- DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.

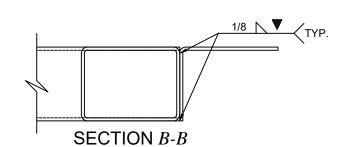
BUT BEFORE INSTALLING DOOR JAM ASSEMBLY.

2- REMOVE STEEL TUBE IN DOOR AREA AFTER WALL MOUNT TO FLOOR

USAGE: Raised Floor w/ Rear Door, SPECIAL 1-1/2" THICK WALL







ALL MATERIALS aluminized

7	6		TUBE: 16ga. x 1-1/2" x 2" x 69"Lg. A-513
6	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 10-3/8"Lg. A-513
5	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 38-1/2"Lg. A-513
4	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 9-3/4"Lg. A-513
3	2	02071055	TUBE: 16ga. x 1-1/2" x 1" x 92"Lg. A-513
2	0		
1	6		ANGLE: 16ga. x 1" x 2" x 6"Lg. A-513
REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

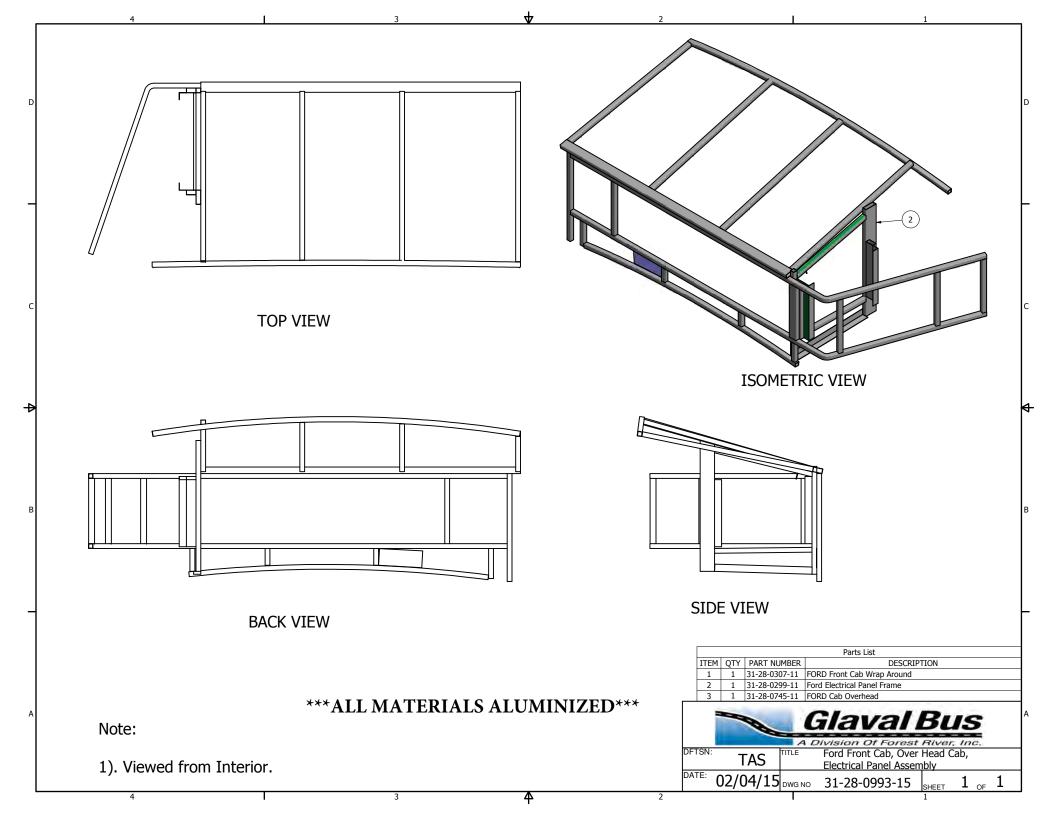


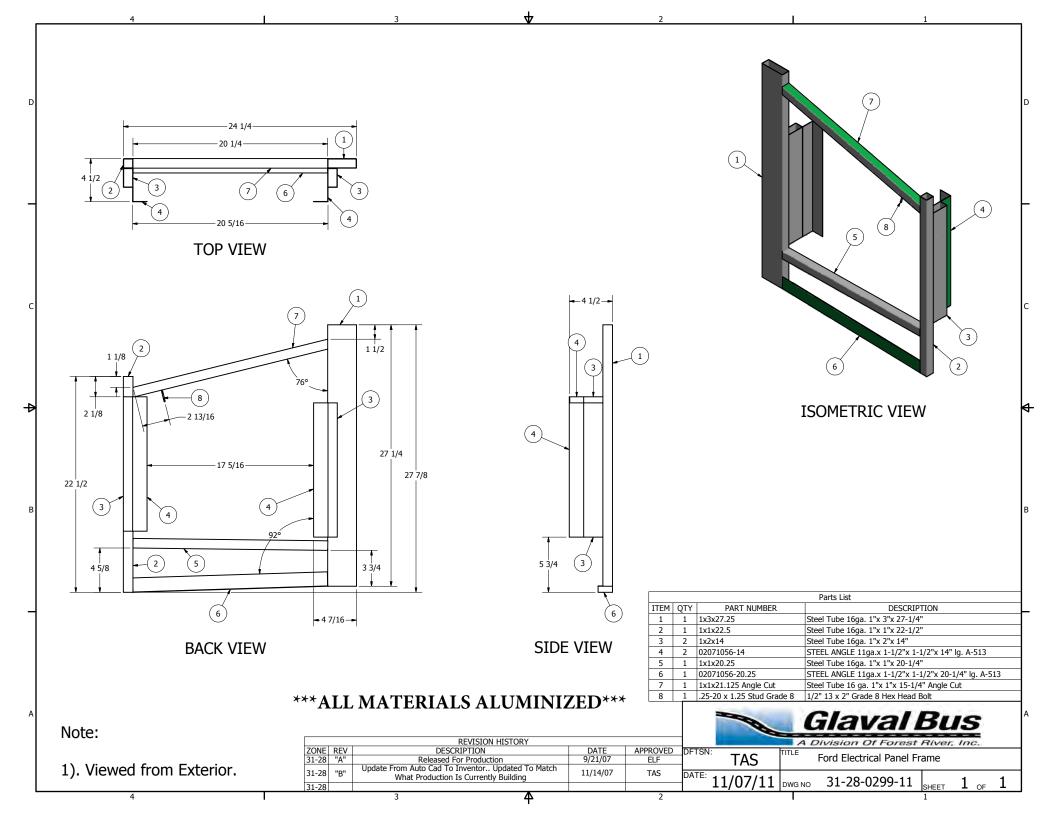
DISK No.

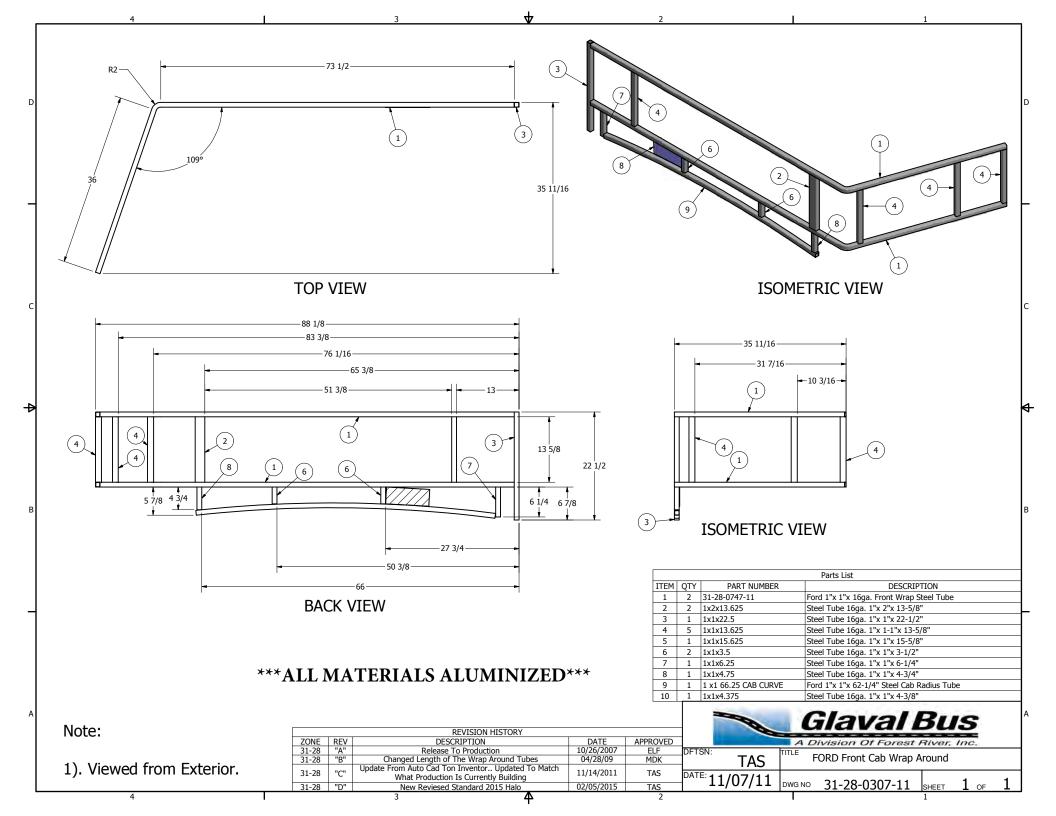
a division of Forest River, Inc.

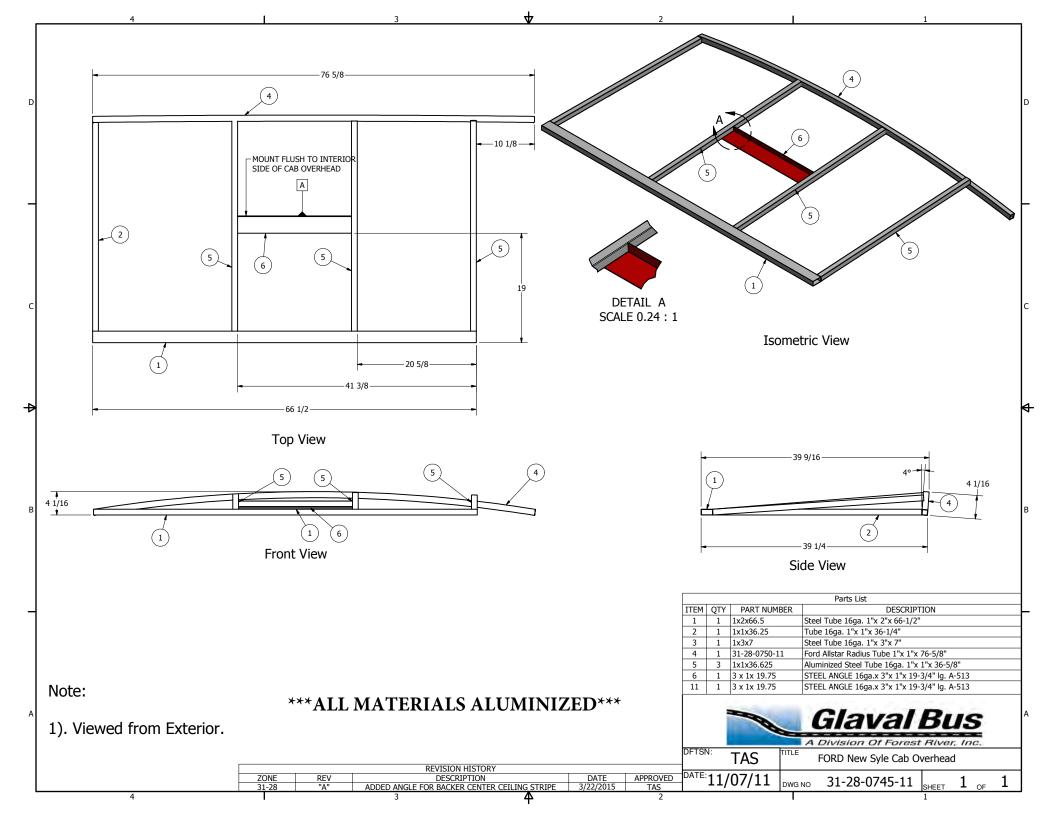
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF						
GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY						
MANNER, NOR SHALL IT BE SUBMITTED TO DUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS						
LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS						
SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV. LET.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.

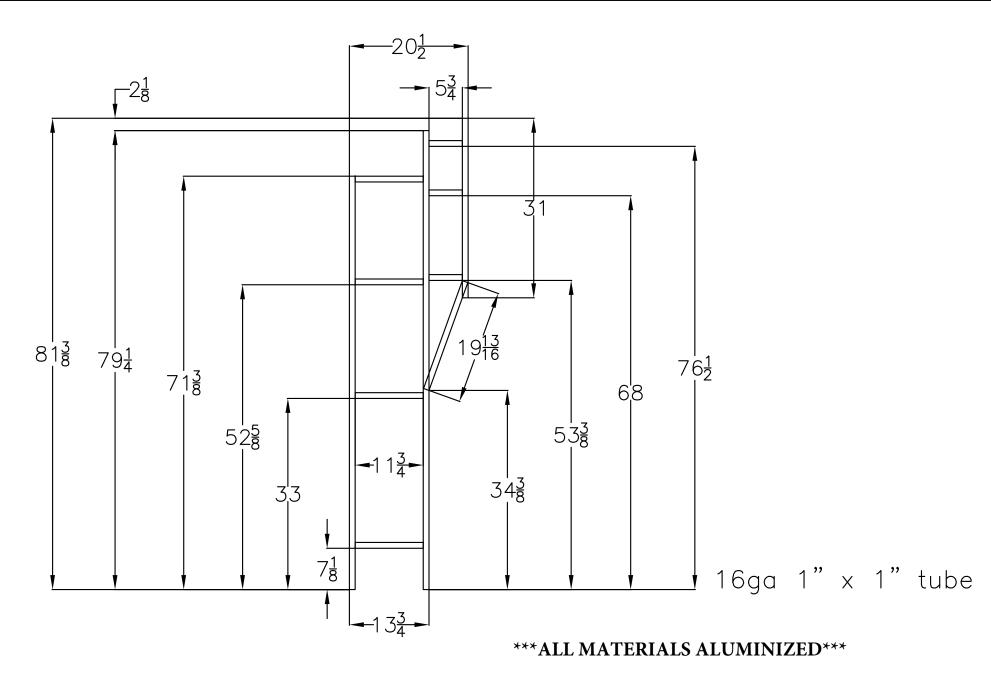
Frame, Rear Wall Raised Floor With Door DATE: 06/14/18 DFTSN: MKLINE TOLERANCE UNLESS THERWISE SPECIFIED CHKR: ± .00 ± .030 31-28-0010-18 SPECIAL APRVD: SCALE ± .000 ± .015 ± .0000 ± .005 SHEET 1 OF 1



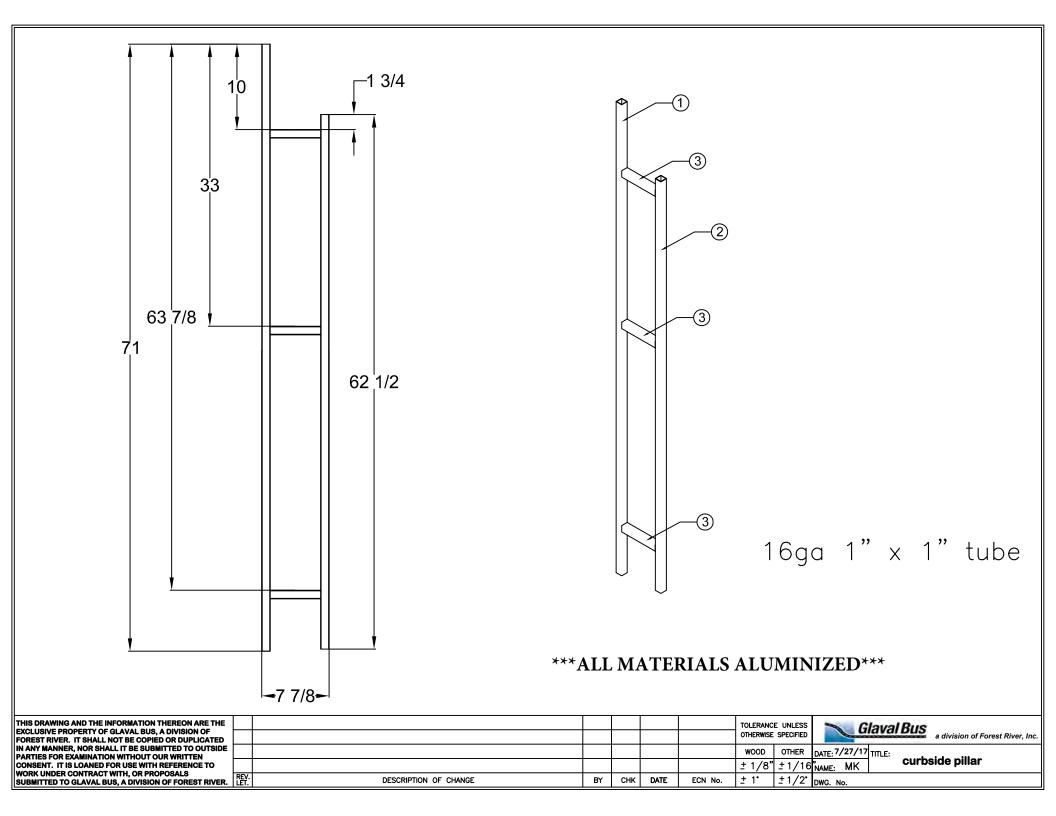


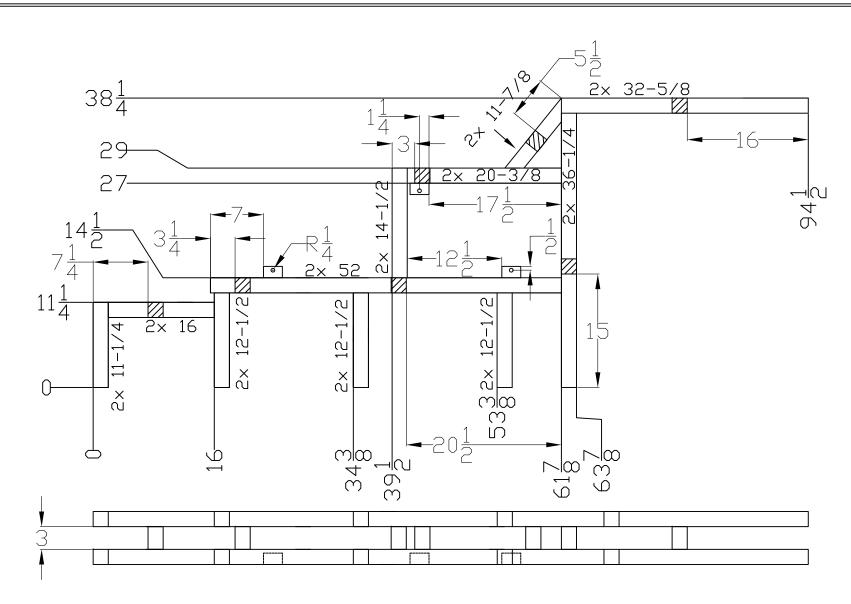






THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED							TOLERANC OTHERWISE		0	a division of Forest River, Inc.
IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN							WOOD	OTHER	DATE: 7/27/17	TITLE:
CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO							± 1/8"	±1/16	NAME: MK	streetside pillar
WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	<u>+</u> 1°	±1/2°	DWG. No. 31	-28-0955-14



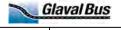


 $MAT'L=2" \times 2" \times 16GA.$

ALL MATERIALS ALUMINIZED

THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

					TOLERANCE	E UNLESS	
					OTHERWISE	SPECIFIED	
					WOOD	OTHER	DA
					± 1/8"	±1/16"	NΑ
Y	DESCRIPTION OF CHANGE	BY	DATE	ECN No.	± 1°	±1/2°	n۱



a division of Forest River, Inc.

DATE: 06/30/17 TITLE: RAISED FLOOR-3
STEP FALSE FLOOR ASSEMBLY

ECN No. | ± 1° | ± 1/2° | DWG. No.



UNIVERSAL BODY FRAME CONSTRUCTION

The following information is submitted for all Glaval Bus products proposed on

_________as supporting documentation of the structural soundness and impact resistance of the bodies manufactured. All vehicles are built using virtually the same materials with some minor differences in the height and width of cross members due to entry floor heights and/or body width variations.

A representative set of construction prints provided by engineering supplements this verbal accounting of our materials and assembly specifications.

If, in the reviewing of these written technical specifications and engineering frame prints submitted any questions arise, please contact us immediately for any clarification or help in interpretation and understanding.

3.0 Body Construction – General Frame Construction

Manufactured from all aluminized steel products, the floor, roof, side walls, rear wall, driver halo assembly and entry door assembly are all wire welded (MIG) together to form an integral aluminized steel frame that is thoroughly coated in our primer paint shop, then mounted with specified hardware to the rubber body mount points (pucks) supplied by the chassis manufacturer. Once joined to the chassis, the bus finishing process begins.

3.0.1 Floor frame construction and assembly –

- 3.0.1.1 Cross Members -- The floor cross members form the base structural support for the rest of the frame components. Our cross members are constructed of 11 gauge aluminized steel, formed to a capital "C" shape. Cross members over the fuel tank are made to provide the clearance needed to conform with FMVSS301, and include formed internal reinforcements welded in place for additional strength. All additional longitudinal and latitudinal structure is flush welded in place to form a one piece floor upon completion.
- 3.0.1.2 Aluminized steel "Hat Posts" 1"x1"x4" run the length of the floor between cross members and are welded into place. This extremely strong form is used to weld our HSLA steel seat track in place.
- 3.0.1.3 Aluminized steel C Channel 1"x1.5" C channel is welded in between cross members the full length of the floor in 5 places. Coupled with the Hat Posts this provides a one-piece strong "ladder" type frame for the flooring.
- 3.0.1.4 Seat Track 12 gauge roll formed high strength/low alloy steel is wire welded in place for seat mounting down each side of the bus, with lengths predicated on the floor plan chosen. This is yet another stiffener in our extensive construction process.



- 3.0.1.5 Wheel Wells -- Constructed of 14 gauge aluminized steel, wheel wells are also welded in during the floor construction process. All seams in the wheel well are welded to create a one piece water resistant wheel housing structure. The wheel wells also provide additional strength to the body assembly, when welded in place.
- 3.0.1.6 Structural Aluminized steel Angle 1/8" thick 1.5" x 2.5" structural aluminized steel angle is used the full perimeter length of each floor assembly, welded to the ends of all floor cross members. This provides not only a flat plane for joining the sidewall assembly, but also ties all cross members together and provides additional side impact resistance.
- 3.0.1.7 Additional structure When adding vertical stanchions, wheel chair lifts and/or tie down options, additional structure is welded into the floor at locations specified by our engineering department on CAD drawings.

3.0.2 Sidewall Construction –

- 3.0.2.1 Sidewall vertical member The heart of our sidewall is the vertical structure, a roll formed 18 gauge aluminized steel capital "C" channel with 8 bends that create extreme strength and rigidity. The vertical member is installed in full lengths and in shorter sections below window frames. Additional vertical structure is used at both ends of the sidewall enabling the structure to withstand the forces applied by the vehicle when in motion. Using the open C member also enables a thorough primer application.
- 3.0.2.2 Aluminized steel Tubing 1"x1" lower and 1"x3" upper 16 gauge aluminized steel tubing is welded in horizontally between vertical members to frame in window openings. This adds front to rear reinforcement as well.
- 3.0.2.3 Seat Track 11 gauge high strength low alloy roll formed aluminized steel track is welded down each sidewall below the window frame. While serving as a seat attaching device, it adds excellent structure to the sidewall and also adds excellent side impact resistance.
- 3.0.2.4 Wheelchair Options Add another layer of metal. Depending on track locations, another structure of 11 gauge thick aluminized steel is welded in place between each vertical member for attaching a shoulder belt mount. Also, additional structure is added to accommodate wheelchair door frames either 1"x1" or 1"x2" 16 gauge wall aluminized steel tubing..
- 3.0.2.5 Full length aluminized steel tubing 1"x1" 16 gauge aluminized steel tubing is stitch welded to the sidewall bottom and top at each vertical member for attaching to the floor and roof sections, respectively.

3.0.3 Rear Wall Construction –

3.0.3.1 Rear wall vertical member – The vertical sidewall capital "C" channel with 8 bends is also used in the rear wall assembly. Full length structure is used at varying places, depending on choice of rear window, or rear door. Shorter cut pieces are used above windows and doors. Additional side windows used with the rear door also change the configuration.



- 3.0.3.2 Aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is welded horizontally between vertical members to provide a window frame in the standard product, and used as an upper door frame in the optional rear assembly.
- 3.0.3.3 Full length aluminized steel tubing 1"x1" 16 gauge aluminized steel tubing is stitch welded to the rear wall top and bottom as in the sidewall assembly.

3.0.4 Roof Construction -

- 3.0.4.1 Roof Bows Radius formed one-piece 16 gauge aluminized steel roof bows formed as a modified hat post design with eight bends for exceptional strength and located on 16" centers (the closest in the industry), including 4 bends in the web similar to our vertical sidewall aluminized steel provide a roof structure capable of taking severe loads. They are then capped with top flat pieces from flange to flange to provide abundant surface area for securing the exterior roof material.
- 3.0.4.2 Aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is welded in horizontally to frame all lower window openings and 1" x 3" 16 gauge aluminized steel tubing to all upper window openings as required. A full perimeter is also welded on to mate the roof to the sidewall and rear wall, with short vertical pieces providing support on the front and rear ends. The 3" wide aluminized steel tube supplies a structural mounting surface for shoulder belt attachment and has been pull tested to federal standards.

3.0.5 Driver Compartment Overhead Halo –

- 3.0.5.1 Aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is cut and jig welded into an integrated one piece structure spanning from the front roof bow of the body to the newly cut roof line of the cab. Also created during the structure manufacture is the housing for mounting the electronic circuit board.
- 3.0.5.2 11 Gauge Aluminized steel formed to make brackets used to mount to the chassis roof.

3.0.6 False Floor (Cab to body transition) –

- 3.0.6.1 Aluminized steel Tubing 2" x2" (taller when needed) 16 gauge aluminized steel tubing is welded together forming a flat body floor transition from the step area back to the actual body area. An overhang on the curbside provides a secure attach point frontally for the entry door frame added later.
- 3.0.6.2 Structural aluminized steel angle 11 gauge 1.5"x1.5" structural angle is added in short lengths five places to provide attachment points to the chassis floor.

3.0.7 Interior Vertical Transition Frames –

3.0.7.1 Aluminized steel Tubing – 1"x1" 16 gauge aluminized steel tubing is used vertically and a ladder type assembly is made welding the 1x 1 tube to .75"x.75" 11 gauge aluminized steel tube that is used horizontally in the assemblies. These pieces



transition from the body fronts on each side to the driver halo side assembly and the entry door frame assembly on the curbside.

3.0.8 Entry Door & Step Assembly Frame –

3.0.8.1 Aluminized steel Tubing – 1"x1" 16 gauge and .75"x.75" 11 gauge aluminized steel tube is cut to length and welded together in a ladder type construction forming a rigid frame for attaching the entry door/step assembly.

3.0.9 Entry Door/Step Assembly –

3.0.9.1 11 Gauge Aluminized steel – The step riser/tread piece is manufactured from one-piece 11 gauge aluminized steel and uses 90° bends at all risers and treads. The bottom tread also adds an additional 90° bend for additional strength and safety. Upper and lower side pieces are then attached and an 11 gauge flat plate with holes is used to bridge the lower and upper side pieces, then is stitch welded and plug welded to form a strong one piece assembly prior to inserting and welding to the entry step framing.

APPLICATION OF EXTERIOR SIDEWALL MATERIAL

GALVANIZED STEEL SIDEWALLS OR OPTIONAL FIBERGLASS/FRP/COMPOSITE SIDEWALLS

The exterior is .024" galvanized steel pre-painted white with an underlayment of 5/32" luan.

The interior is 5/32" luan covered with a light gray FRP or padded vinyl.

The foam filled aluminized steel cage is placed in the center and all layers are adhered using polyurethane hot melt adhesive. The entire assembly is the sent through a pressure application roller system to assure adhesion.

Composite FRP exterior sidewall panels are installed using the same method.

Should any further questions arise, please contact your Glaval Bus representative.



The following information is submitted for all Glaval Bus products proposed on this bid as supporting documentation of the structural soundness and impact resistance of the bodies manufactured. All vehicles are built using virtually the same materials with some minor differences in the height and width of cross members due to entry floor heights and/or body width variations.

A representative set of construction prints provided by engineering supplements this verbal accounting of our materials and assembly specifications.

If, in the reviewing of these written technical specifications and engineering frame prints submitted any questions arise, please contact us immediately for any clarification or help in interpretation and understanding.

3.0 Body Construction – General Frame Construction

Manufactured from all aluminized steel products, the floor, roof, side walls, rear wall, driver halo assembly and entry door assembly are all wire welded (MIG) together to form an integral steel frame that is mounted with specified hardware to the rubber body mount points (pucks) supplied by the chassis manufacturer. Once joined to the chassis, the bus finishing process begins.

3.0.1 Floor frame construction and assembly –

- 3.0.1.1 Cross Members -- The floor cross members form the base structural support for the rest of the frame components. Our cross members are constructed of 14 gauge aluminzed steel, formed to a capital "C" shape. Cross members over the fuel tank are made to provide the clearance needed to conform with FMVSS301, and include formed internal reinforcements welded in place for additional strength. All additional longitudinal and latitudinal structure is flush welded in place to form a one piece floor upon completion.
- 3.0.1.2 Aluminized steel "Hat Posts" 1"x1"x4" run the length of the floor between cross members and are welded into place. This extremely strong form is used to weld our HSLA steel seat track in place.
- 3.0.1.3 Aluminized steel C Channel 1"x1.5" C channel is welded in between cross members the full length of the floor in 5 places. Coupled with the Hat Posts this provides a one-piece strong "ladder" type frame for the flooring.
- 3.0.1.4 Seat Track 12 gauge roll formed high strength/low alloy steel is wire welded in place for seat mounting down each side of the bus, with lengths predicated on the floor plan chosen. This is yet another stiffener in our extensive construction process.



- 3.0.1.5 Wheel Wells -- Constructed of 14 gauge ALUMINIZED steel, wheel wells are also welded in during the floor construction process. All seams in the wheel well are welded to create a one piece water resistant wheel housing structure. The wheel wells also provide additional strength to the body assembly, when welded in place.
- 3.0.1.6 Structural Aluminized steel Angle 1/8" thick 1.5" x 2.5" structural aluminized steel angle is used the full perimeter length of each floor assembly, welded to the ends of all floor cross members. This provides not only a flat plane for joining the sidewall assembly, but also ties all cross members together and provides additional side impact resistance.
- 3.0.1.7 Additional structure When adding vertical stanchions, wheel chair lifts and/or tie down options, additional structure is welded into the floor at locations specified by our engineering department on CAD drawings.

3.0.2 Sidewall Construction –

- 3.0.2.1 Sidewall vertical member The heart of our sidewall is the vertical structure, a roll formed 18 gauge aluminized steel 1.5" x 2" tube that provides strength and rigidity. The vertical member is installed in full lengths and in shorter sections below window frames. Additional vertical structure is used at both ends of the sidewall enabling the structure to withstand the forces applied by the vehicle when in motion.
- 3.0.2.2 Aluminized steel Tubing 1.5"x1" lower and 1.5"x3" upper 16 gauge aluminized steel tubing is welded in horizontally between vertical members to frame in window openings. This adds front to rear reinforcement as well.
 - 3.0.2.3 Seat Track 12 gauge high strength/low alloy roll formed ALUMINIZED steel welded down each sidewall belowt the window frame. While serving as a seat attaching device, it adds excellent structure to the sidewall and also adds excellent side impact resistance.
- 3.0.2.4 Wheelchair Options Add another layer of metal. Depending on track locations, another structure of 11 gauge thick aluminized steel is welded in place between each vertical member for attaching a shoulder belt mount. Also, additional structure is added to accommodate wheelchair door frames either 1.5"x1" or 1.5"x2" 16 gauge wall aluinized steel tubing..
- 3.0.2.5 Full length glavanized steel tubing 1.5"x1" 16 gauge aluinized steel tubing is stitch welded to the sidewall bottom and top at each vertical member for attaching to the floor and roof sections, respectively.

3.0.3 Rear Wall Construction –

3.0.3.1 Rear wall vertical member – The vertical sidewall 1.5"x 2" aluminized steel tube is also used in the rear wall assembly. Full length structure is used at varying places,



- depending on choice of rear window, or rear door. Shorter cut pieces are used above windows and doors. Additional side windows used with the rear door also change the configuration.
- 3.0.3.2 Aluinized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded horizontally between vertical members to provide a window frame in the standard product, and used as an upper door frame in the optional rear assembly.
 - 3.0.3.3 Full length aluminized steel tubing 1.5"x1" 16 gauge aluminized steel tubing stitch welded to the rear wall top and bottom as in the sidewall

assembly. 3.0.4 Roof Construction –

- 3.0.4.1 Roof Bows Radius formed one-piece 16 gauge aluminized steel roof bows formed as a modified hat post design with eight bends for exceptional strength and located on 16" centers (the closest in the industry), including 4 bends in the web that allows for the roof structure to be capable of taking severe loads. They are then capped with top flat pieces from flange to flange to provide abundant surface area for securing the exterior roof material.
- 3.0.4.2 aluminized steel Tubing 1.5"x1" 16 gauge aluminized steel tubing is welded in horizontally to frame all lower window openings and 1.5" x 3" 16 gauge aluminized steel tubing to all upper window openings as required. A full perimeter is also welded on to mate the roof to the sidewall and rear wall, with short vertical pieces providing support on the front and rear ends. The 3" wide aluminized steel tube supplies a structural mounting surface for shoulder belt attachment and has been pull tested to federal standards.

3.0.5 Driver Compartment Overhead Halo -

- 3.0.5.1 aluminized steel Tubing 1"x1" 16 gauge aluminized steel tubing is cut and jig welded into an integrated one piece structure spanning from the front roof bow of the body to the newly cut roof line of the cab. Also created during the structure manufacture is the housing for mounting the electronic circuit board.
- 3.0.5.2 11 Gauge aluminized steel formed to make brackets used to mount to the chassis roof.

3.0.6 False Floor (Cab to body transition) –

- 3.0.6.1 aluminized steel Tubing 2" x 2" 16 gauge aluminized steel tubing is welded together forming a flat body floor transition from the step area back to the actual body area. An overhang on the curbside provides a secure attach point frontally for the entry door frame added later.
- 3.0.6.2 Structural aluminized steel angle 11 gauge 1.5"x1.5" structural angle is added in
 - short lengths five places to provide attachment points to the chassis floor.



3.0.7 Interior Vertical Transition Frames –

3.0.7.1 aluminized steel Tubing – 1"x1" 16 gauge aluminized steel tubing is used vertically and a ladder type assembly is made welding the 1x 1 tube to .75"x.75" 11 gauge aluminized steel tube that is used horizontally in the assemblies. These pieces transition from the body fronts on each side to the driver halo side assembly and the entry door frame assembly on the curbside.

3.0.8 Entry Door & Step Assembly Frame –

3.0.8.1 aluminized steel Tubing – 1"x1" 16 gauge and .75"x.75" 11 gauge aluminized steel tube is cut to length and welded together in a ladder type construction forming a rigid frame for attaching the entry door/step assembly.

3.0.9 Entry Door/Step Assembly –

3.0.9.1 11 Gauge aluminized steel – The step riser/tread piece is manufactured from one-piece 11 gauge aluminized steel and uses 90° bends at all risers and treads. The bottom tread also adds an additional 90° bend for additional strength and safety. Upper and lower side pieces are then attached and an 11 gauge flat plate with holes is used to bridge the lower and upper side pieces, then is stitch welded and plug welded to form a strong one piece assembly prior to inserting and welding to the entry step framing.

APPLICATION OF EXTERIOR SIDEWALL MATERIAL

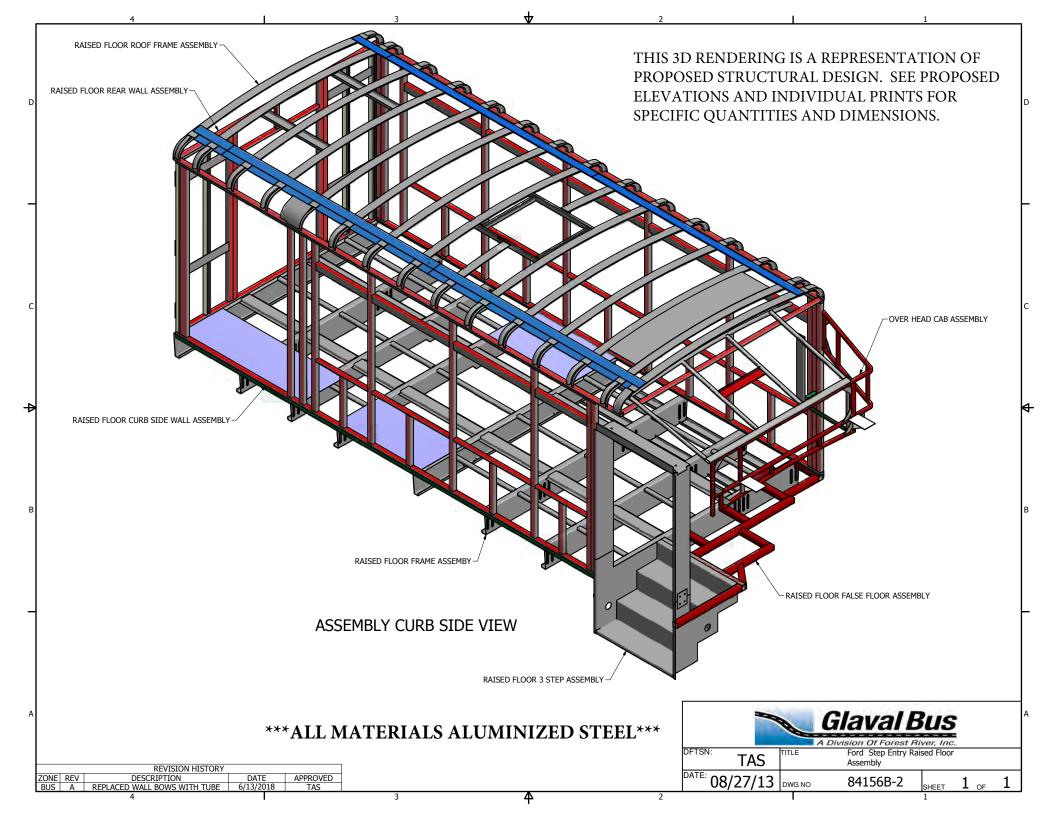
GALVAIZED STEEL SIDEWALLS OR OPTIONAL FIBERGLASS/FRP/COMPOSITE SIDEWALLS

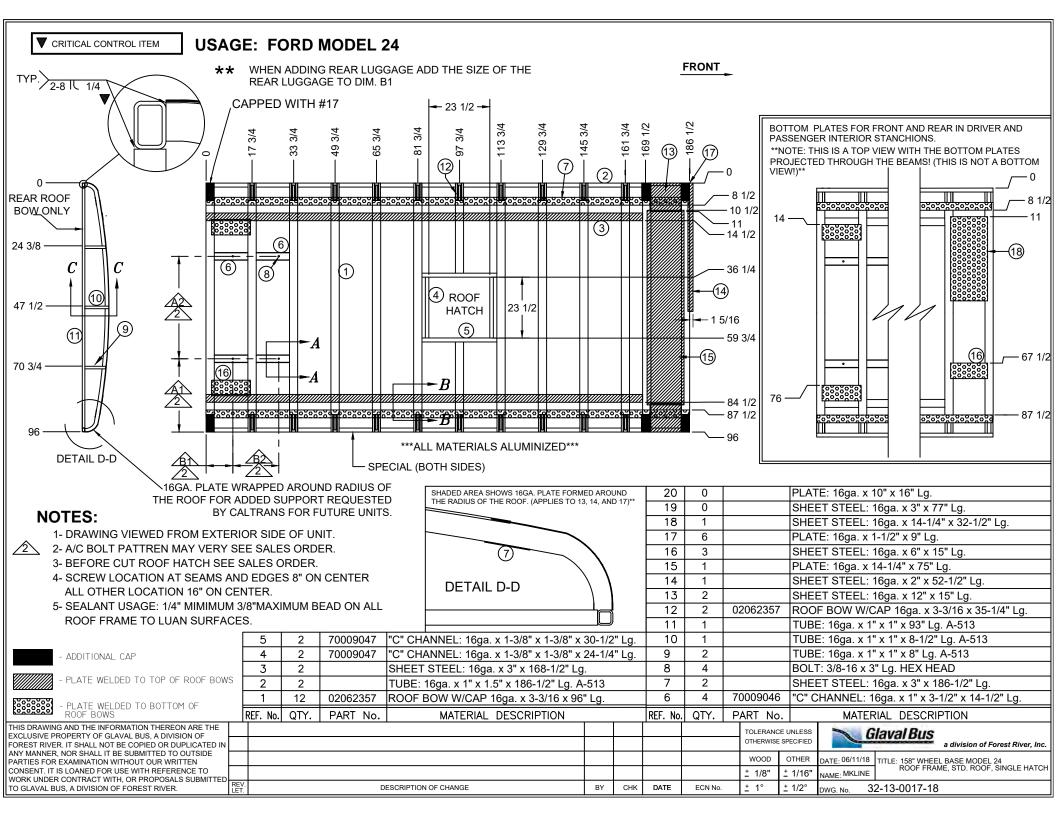
The exterior is .024" galvanized steel pre-painted white with an underlayment of 5/32" luan. The interior is 5/32" luan covered with a light gray FRP or padded vinyl.

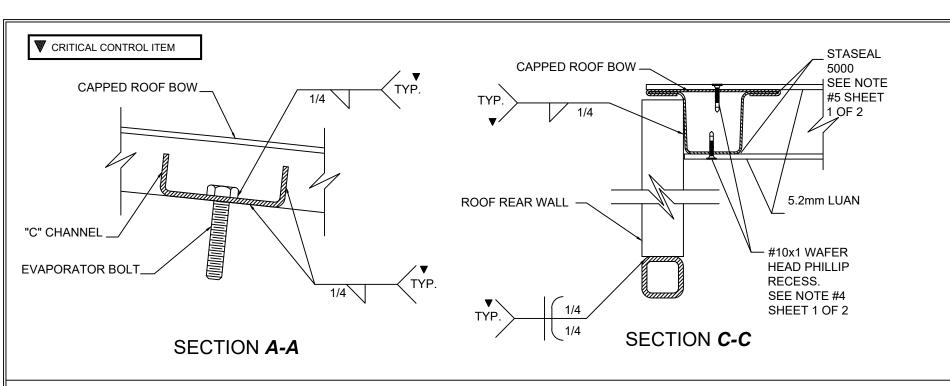
The foam filled aluminized steel cage is placed in the center and all layers are adhered using a cross linked polyurethane hot melt adhesive. The entire assembly is then laminated to assure adhesion.

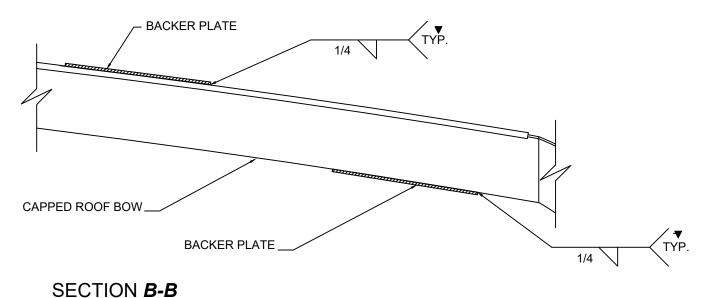
Composite FRP exterior sidewall panels are installed using the same method.

Should any further questions arise, please contact your Glaval Bus representative.









DESCRIPTION OF CHANGE

THIS DRAWING AND THE INFORMATION THEREON ARE THE

FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN

WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED

ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE

EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF

PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO

TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

Т	/A-71 NEW STYLE	33-5/8	30	10	12-1/4
	ACC 23022 SERIES	38	20	10	14-3/4
	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4
	T/A-77	18-1/4	59-1/2	10	10-3/8
	T/A-73	28-1/4	39-1/2	10	9-1/2
T	/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4
	T/A-70	36-3/4	22-1/2	10	11-5/8
	T/A-30	31	34	10	9-1/2
	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2
	EM-6 & RE-10	36	24	10	9-1/2
	EM-3 & RE-30	28-1/4	39-1/2	10	16
	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2
	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2
	EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2
	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2
	EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2
	EVAPORATOR MODEL	A-1	A-2	B-1	B-2
	TOLERANCE UNLESS	Glava	Bus		•

Glaval Bus

32-13-0017-18

NAME: MKLINE

a division of Forest River, Inc.

158" WHEEL BASE MODEL 24

ROOF FRAME, DETAILS SINGLE HATCH

OTHERWISE SPECIFIED

± 1/16"

± 1/2°

WOOD

± 1/8"

± 1°

BY

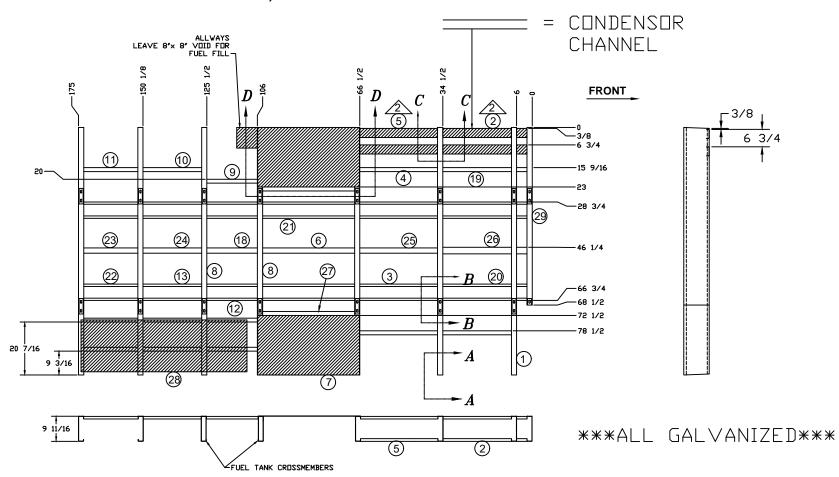
CHK

DATE

ECN No.



USAGE: FORD 158" WHEEL BASE, MODEL 24



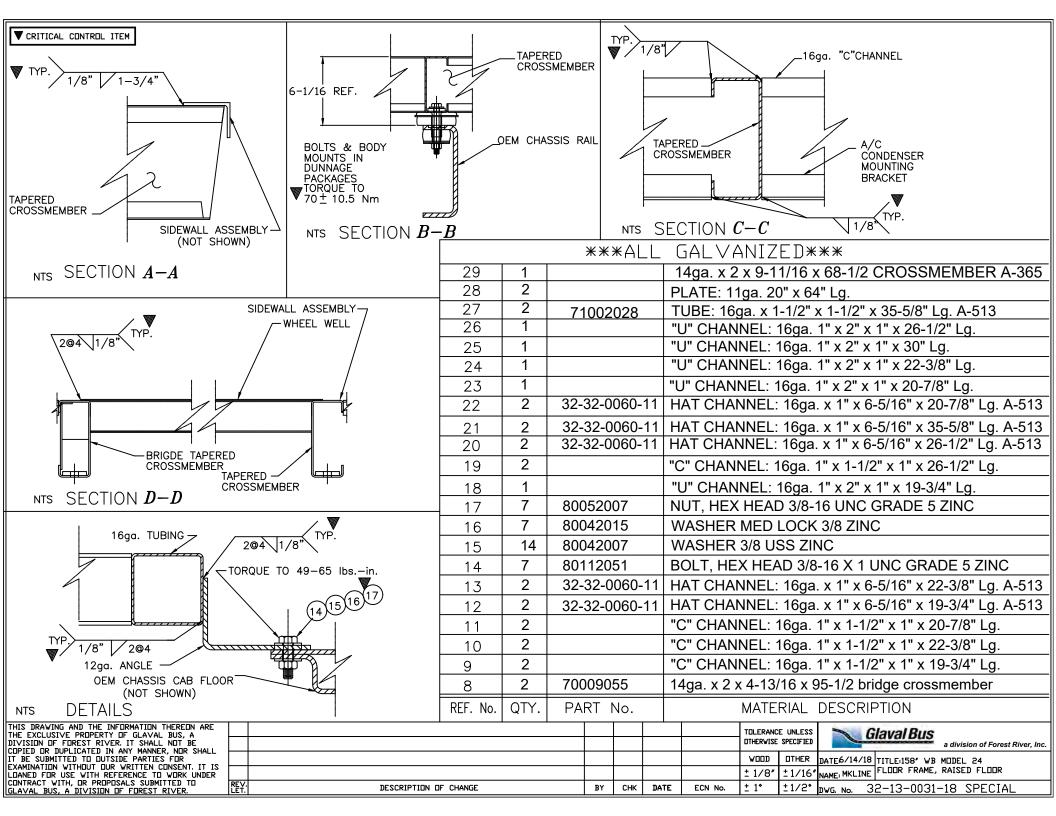
NOTES:

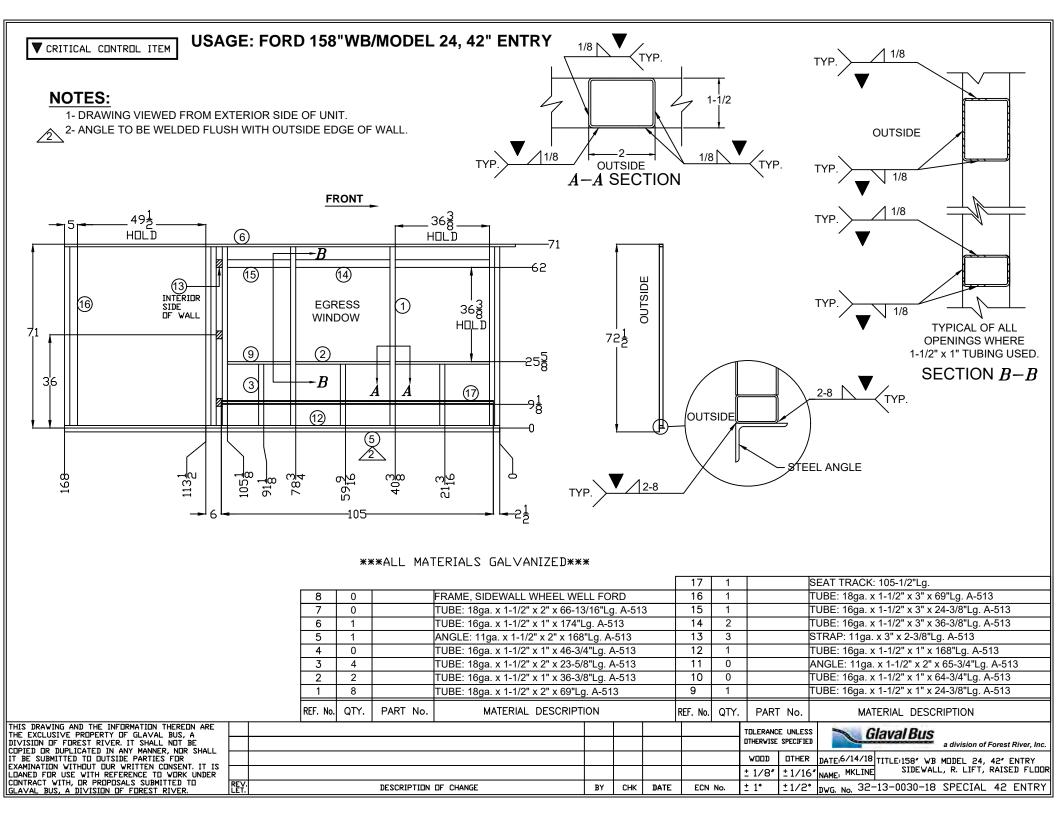
- 1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.
- 2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSIDE EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.
 - 3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

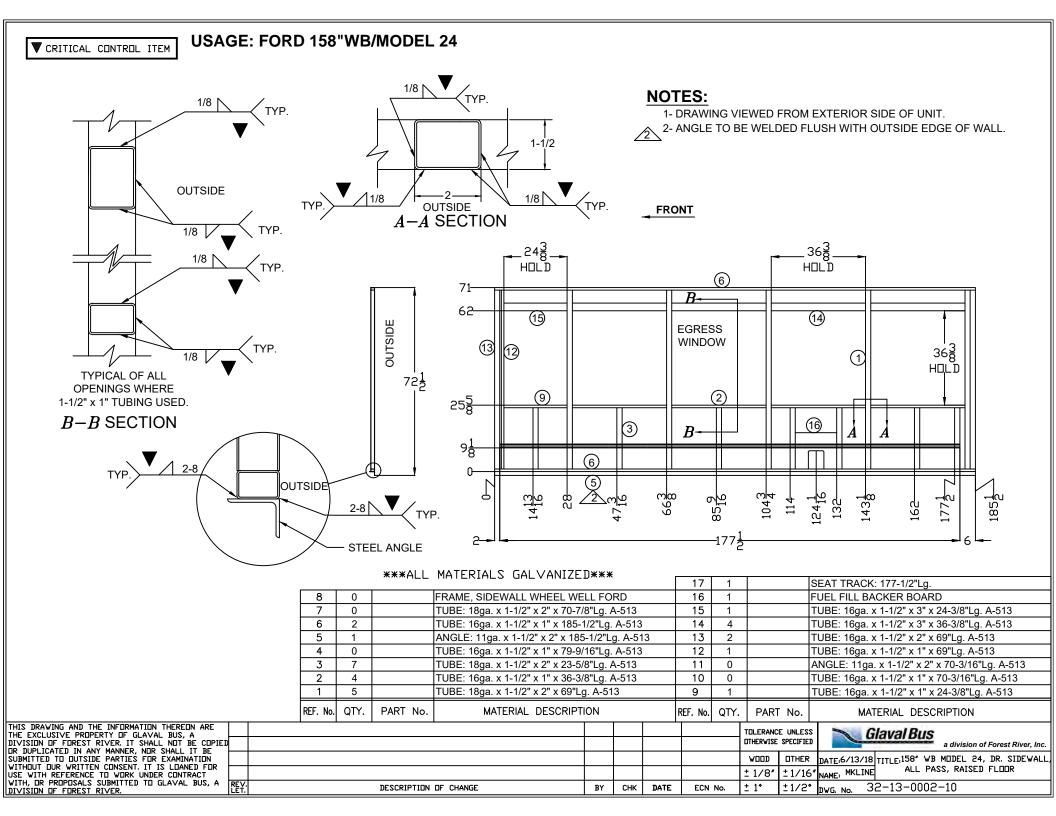
	7	2	71002066	SHEET STEEL: 11ga. x 24" x 39-1/4" Lg. HRS
	6	1		"U" CHANNEL: 16ga. 1" x 2" x 1" x 35-5/8" Lg.
	5	2	70009046	"C" CHANNEL: 12ga. x 1" x 3-1/2" x 30" Lg.
	4	2		"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.
	3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513
	2	2		"C" CHANNEL: 12ga. x 1" x 3-1/2" x 26-1/2" Lg.
	1	5	71009018	14ga. x 2 x 9-11/16 x 95-1/2 CROSSMEMBER A-365
İ	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

THIS DRAWING AND THE INFORMATION THEREON ARE
THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A
DIVISION OF FOREST RIVER, IT SHALL NOT BE
COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL
IT BE SUBMITTED TO DUTSIDE PARTIES FOR
EXAMINATION WITHOUT OUR WRITTEN CONSENT, IT IS
LOANED FOR USE WITH REFERENCE TO WORK UNDER
CONTRACT WITH, OR PROPOSALS SUBMITTED TO
GLAVAL BUS. A DIVISION OF FOREST RIVER.

			NO.			IVI	AILIN	IAL D	LOCKII HON
							TOLERANC	E UNLESS	Glaval Bus
							OTHERWISE	SPECIFIED	a division of Forest River, Inc.
							WOOD	OTHER	DATE6/14/18 TITLE:158' WB MODEL 24
2							± 1/8"	±1/16"	NAME: MKLINE FLOOR FRAME, RAISED FLOOR
	REV.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.	± 1°	±1/2°	DWG. No. 32-13-0031-18 SPECIAL







▼ CRITICAL CONTROL ITEM

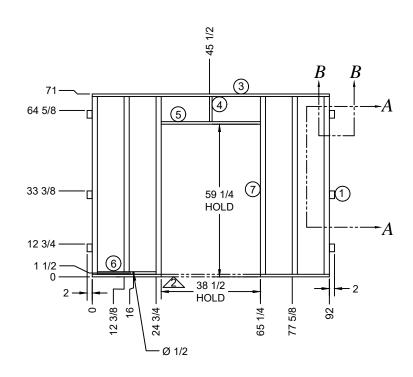
NOTES:

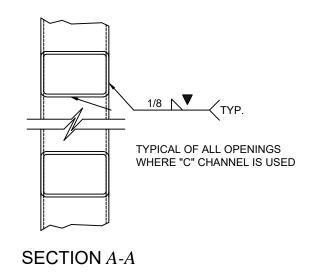
1- DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.

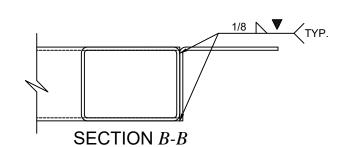
BUT BEFORE INSTALLING DOOR JAM ASSEMBLY.

2- REMOVE STEEL TUBE IN DOOR AREA AFTER WALL MOUNT TO FLOOR

USAGE: Raised Floor w/ Rear Door, SPECIAL 1-1/2" THICK WALL







ALL MATERIALS aluminized

7	6		TUBE: 16ga. x 1-1/2" x 2" x 69"Lg. A-513
6	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 10-3/8"Lg. A-513
5	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 38-1/2"Lg. A-513
4	1	02071055	TUBE: 16ga. x 1-1/2" x 1" x 9-3/4"Lg. A-513
3	2	02071055	TUBE: 16ga. x 1-1/2" x 1" x 92"Lg. A-513
2	0		
1	6		ANGLE: 16ga. x 1" x 2" x 6"Lg. A-513
REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

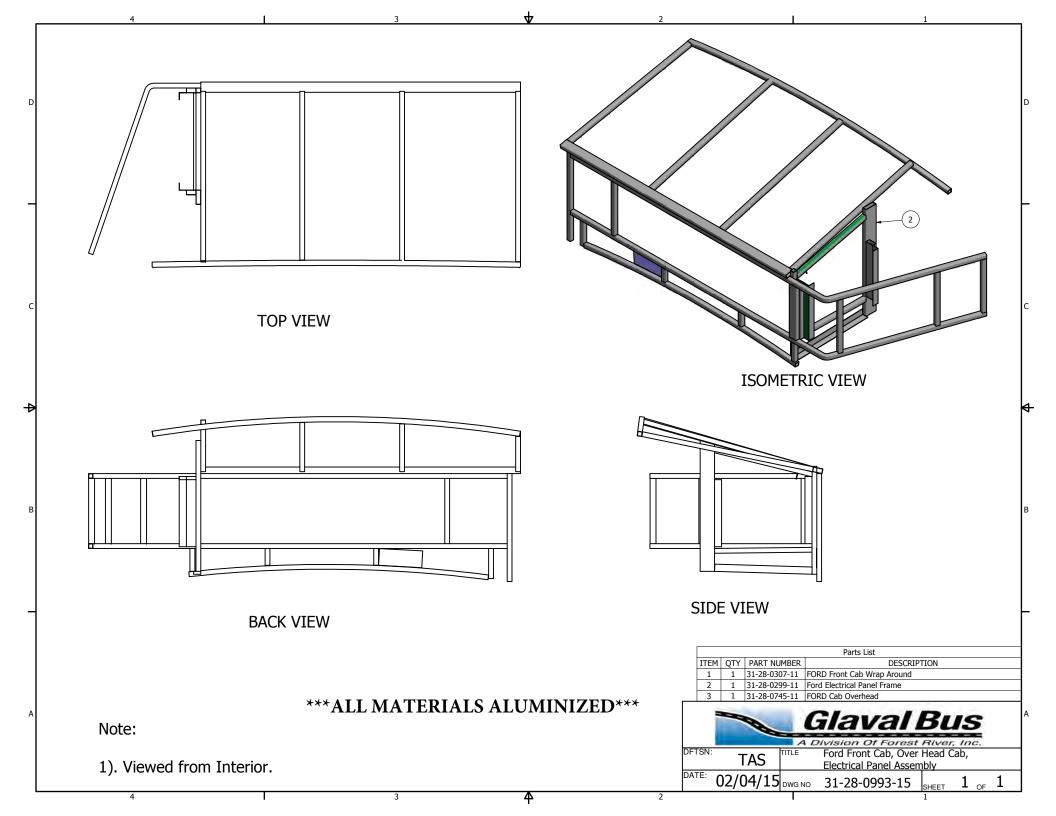


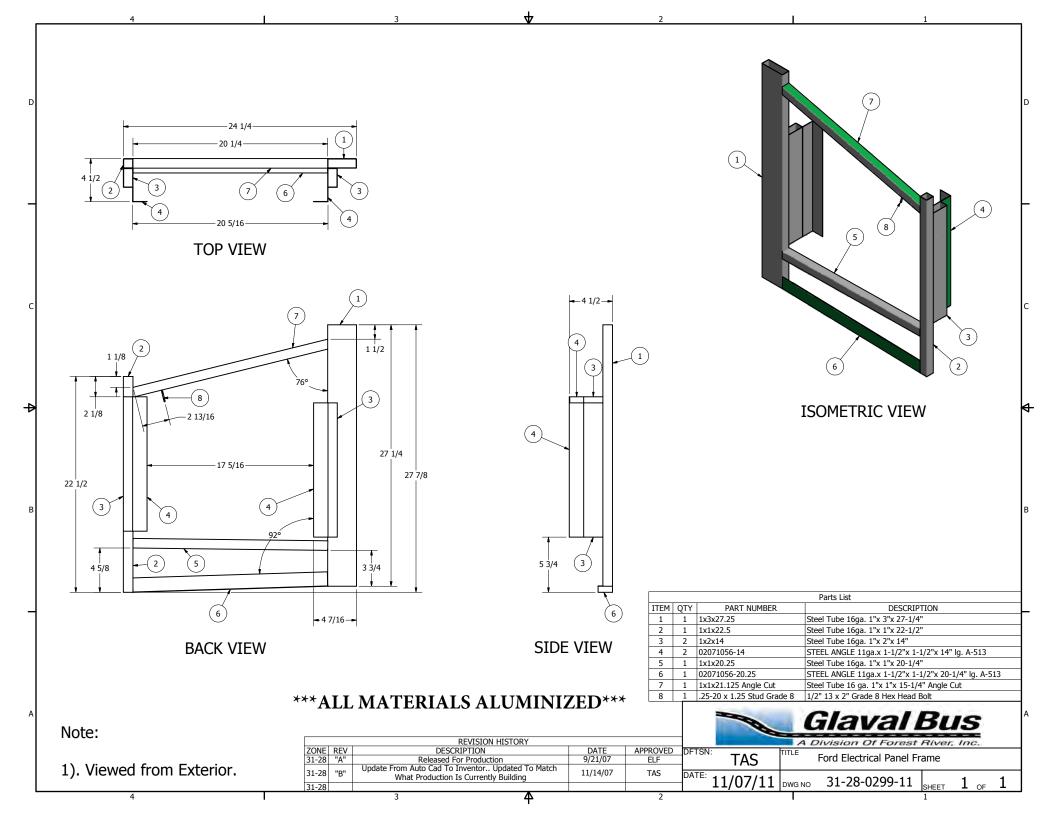
DISK No.

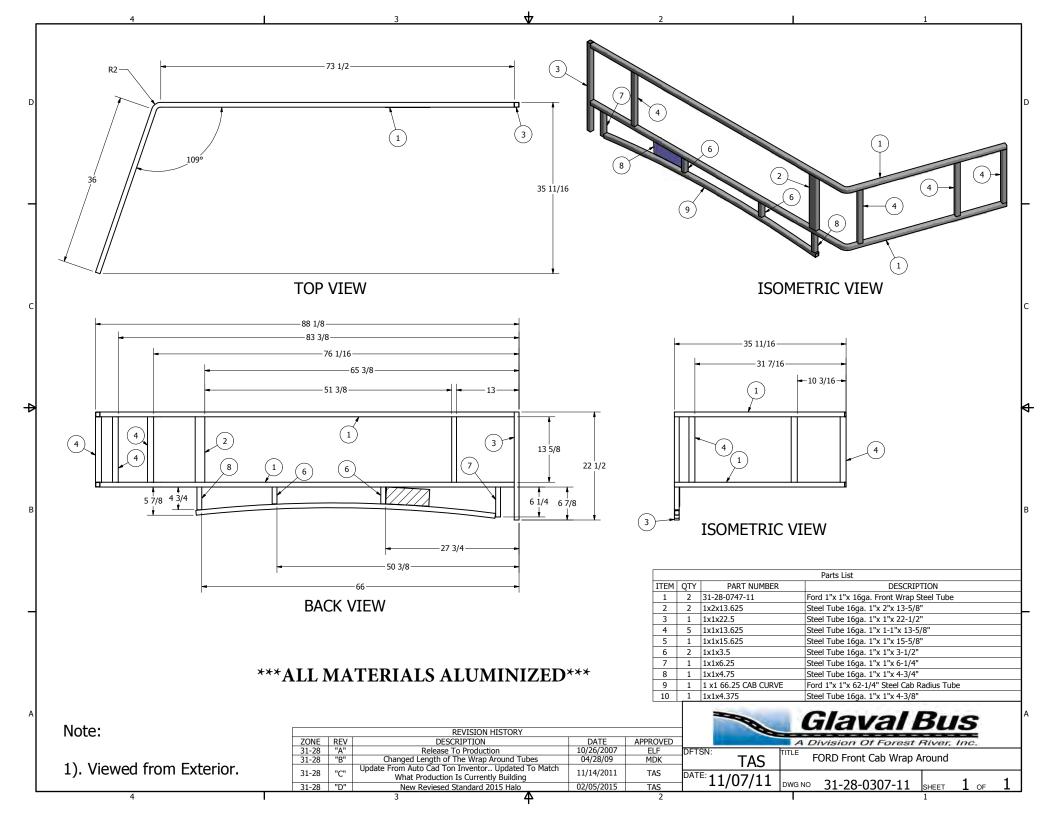
a division of Forest River, Inc.

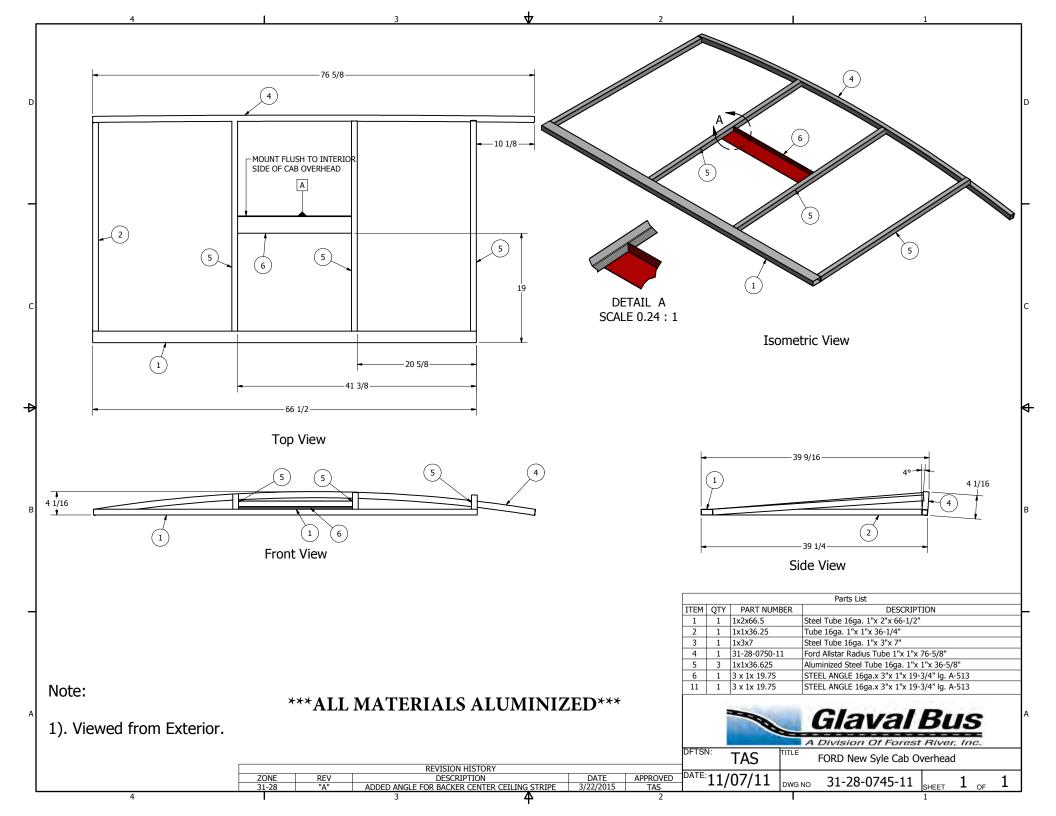
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF						
GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY						
MANNER, NOR SHALL IT BE SUBMITTED TO DUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS						
LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS						
SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV. LET.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.

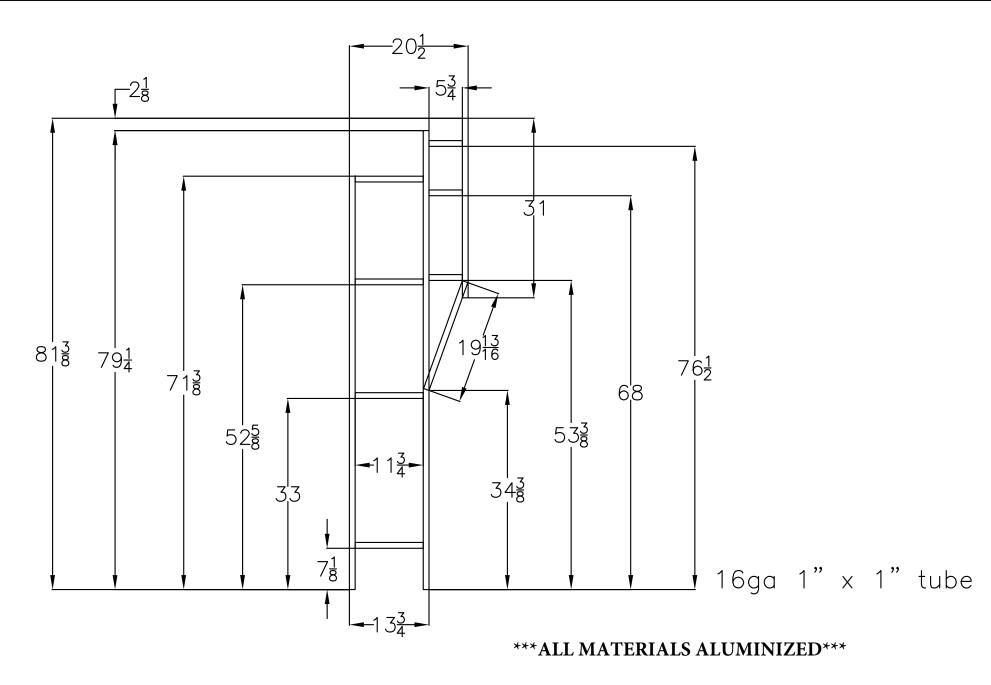
Frame, Rear Wall Raised Floor With Door DATE: 06/14/18 DFTSN: MKLINE TOLERANCE UNLESS THERWISE SPECIFIED CHKR: ± .00 ± .030 31-28-0010-18 SPECIAL APRVD: SCALE ± .000 ± .015 ± .0000 ± .005 SHEET 1 OF 1



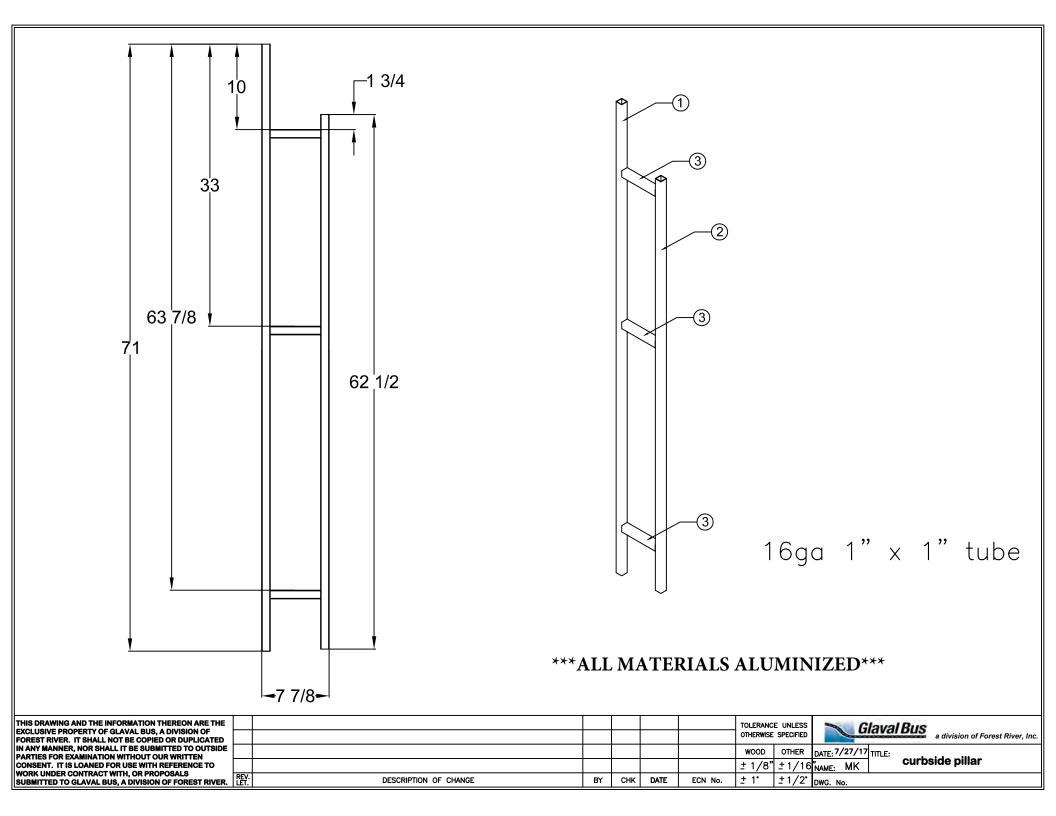


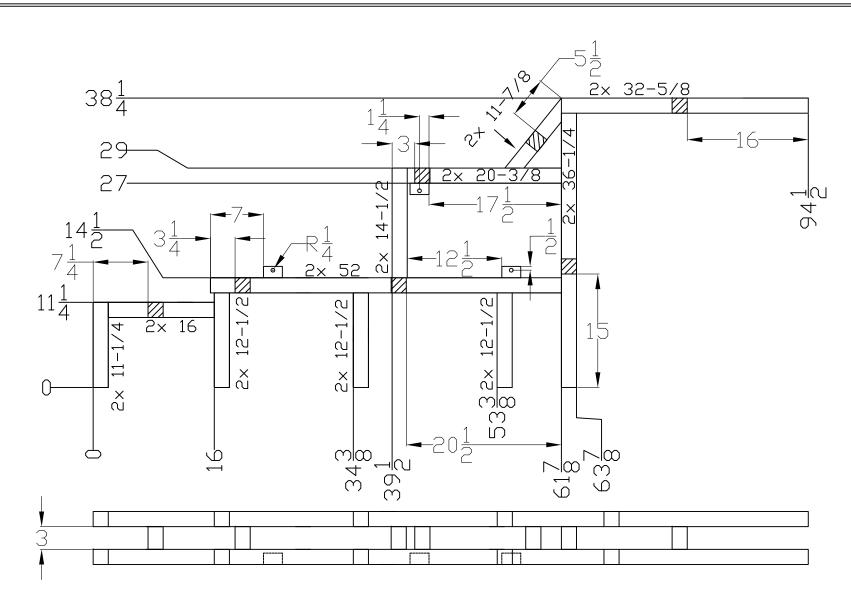






THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED							TOLERANC OTHERWISE		0	a division of Forest River, Inc.
IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN							WOOD	OTHER	DATE: 7/27/17	TITLE:
CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO							± 1/8"	±1/16	NAME: MK	streetside pillar
WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.	REV.	DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	<u>+</u> 1°	±1/2°	DWG. No. 31	-28-0955-14



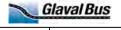


 $MAT'L=2" \times 2" \times 16GA.$

ALL MATERIALS ALUMINIZED

THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONSENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS, A DIVISION OF FOREST RIVER.

					TOLERANCE	E UNLESS	
					OTHERWISE	SPECIFIED	
					WOOD	OTHER	DA
					± 1/8"	±1/16"	NΑ
Y	DESCRIPTION OF CHANGE	BY	DATE	ECN No.	± 1°	±1/2°	n۱



a division of Forest River, Inc.

DATE: 06/30/17 TITLE: RAISED FLOOR-3
STEP FALSE FLOOR ASSEMBLY

ECN No. | ± 1° | ± 1/2° | DWG. No.



2024 E-Series

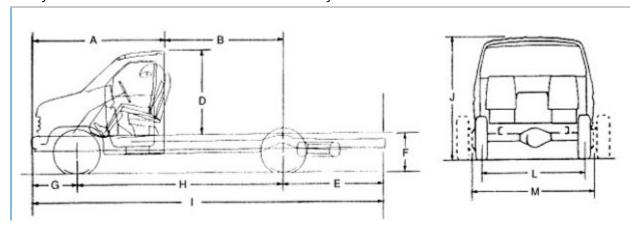
Specs

Key product specifications include vehicle dimensions and capacities, detailed powertrain information, transmission gear ratios and more.



2024 E-Series > **Specs** > Dimensions/Weights/Capacities

Body Dimensions — E-350/E-450 Cutaway



Series			E-350		E-4	¥50
Model			Cutaway		Cuta	away
wodet		SRW/DRW	SRW/DRW	DRW	DRW	DRW
Code	Description					
А	Cab Length	92.5	92.5	92.5	92.5	92.5
В	Cab Rear to Rear Axle	80.0	100.0	118.0	100.0	118.0
D	Top of Frame to Top of Cab	58.4	58.4	58.4	58.4	58.4
Е	Rear Overhang	68.5	68.5	68.5	68.5	68.5
F	Load Height (Loaded)	25.9/26.2	25.9/26.2	26.2	26.0	26.0
G	Front Overhang	34.6	34.6	34.6	34.6	34.6
Н	Wheelbase	138.0	158.0	176.0	158.0	176.0
I	Overall Length	241.1	261.1	261.1	261.1	261.1

J	Cab Height (Curb)	80.3/80.3	80.3/80.4	80.0	80.5	80.4
L	Front Track	69.4	69.4	69.4	69.4	69.4
М	Rear Track Dual — Rear	72.1/75.4	72.1/75.4	75.4	77.7	77.7

 $\textbf{NOTE:} \ \text{Front jacking point} - \text{located under the front radius arm rearward of the sloped section (use flat space provided)}.$

NOTE: Rear jacking point — located under rear axle between U-bolts.

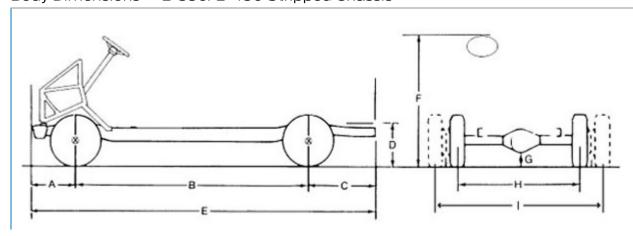
2024 E-Series > **Specs** > Dimensions/Weights/Capacities

Interior Dimensions — E-350/E-450 Cutaway

Series		E-350		E-4	150
Madal		Cutaway		Cuta	away
Model	SRW/DRW	SRW/DRW	DRW	DRW	DRW
Description					
Head Room (in.)	42.0	42.0	42.0	42.0	42.0
Max. Leg Room (in.)	42.1	42.1	42.1	42.1	42.1
Hip Room (in.)	65.6	65.6	65.6	65.6	65.6
Shoulder Room (in.)	68.1	68.1	68.1	68.1	68.1

2024 E-Series > Specs > Dimensions/Weights/Capacities

Body Dimensions — E-350/E-450 Stripped Chassis



Model		Stripped Chassis				
Series		E-350	E-350/E-450	E-350/E-450		
Series		DRW	DRW	DRW		
Code	Description					
А	Frame to Front Axle	26.2	26.2	26.2		
В	Wheelbase	138.0	158.0	176.0		

С	Rear Overhang	68.5	68.5	50.5
D	Load Height (Loaded)	26.2	26.2/26.0	26.2/26.0
E	Overall Length	232.7	252.7	252.7
F	Height at Top of Steering Wheel (Loaded)	71.9	71.9/71.7	71.8/71.7
G	Rear Axle Clearance, Loaded	7.0	7.0	7.0
Н	Front Track	69.4	69.4	69.4
ı	Rear Track	75.4	75.4/77.7	75.4/77.7

NOTE: Front jacking point — located under the front radius arm rearward of the sloped section (use flat space provided).

 $\textbf{NOTE:} \ \text{Rear jacking point} - \text{located under rear axle between U-bolts}.$

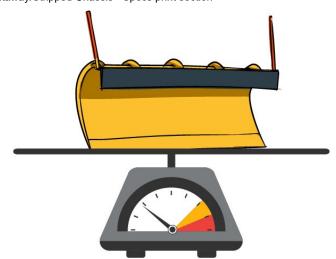
2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Accessory Reserve Capacity (ARC) Calculation

This section provides the information needed to calculate the effect that vehicle options have on the payload capacity of Ford commercial vehicles.

This information is useful when the plan is to add aftermarket accessories or haul cargo at or near the vehicle's maximum capacity.

This section includes charts for each series, listing the maximum allowable weights for each GVWR.



ACCESSORY RESERVE CAPACITY

You can help prospective buyers estimate the total weight of accessories, equipment and modifications that may be added to the completed vehicle.

Ford vehicles are certified for compliance with the following FMVSS (Federal Motor Vehicle Safety Standards) or CMVSS (Canadian Motor Vehicle Safety Standards):⁽¹⁾

- 204 Steering Column Rearward Displacement
- 208 Occupant Crash Protection
- 212 Windshield Mounting
- 219 Windshield Zone Intrusion
- 301 Fuel System Integrity
- 303 CNG Fuel System Integrity (Canadian Standard 301.2)

The total added accessory weight must not exceed the allowable weight shown in the tables. Awareness is critical if the vehicle is going to be modified or have accessories installed.

If the modification or installation of accessories or equipment causes the unloaded weight of the vehicle, as revised with the added equipment, to exceed the test vehicle weight, the U.S. vehicle alterer $^{(2)}$ may be responsible to certify the altered vehicle according to Title 49, Code of Federal Regulations 567.7 and 568.8. A Canadian vehicle alterer may be responsible to certify the altered vehicle according to Section 6 of the Canadian Motor Vehicle Safety Regulations.

In this section, each vehicle has a worksheet that addresses Total Accessory Reserve Capacity only. It does not consider Front Axle Accessory Reserve Capacity and does not include DSO option weights in the calculations.

To approximate the amount of accessory equipment or modification weight that can be added to a Ford light truck without exceeding the test vehicle weight, calculate an estimated Total Accessory Reserve Capacity as follows:

- Determine the "Total Actual Regular Production Option Content Weight" of the desired regular production options from the corresponding Accessory Reserve Capacity Calculation/Worksheet on the following page
- 2. Subtract the "Total Actual Regular Production Option Content Weight" from the "Maximum Allowable Weight (Regular Production Options & Aftermarket Equipment)" for the appropriate model. The difference is the estimated "Total Accessory Reserve Capacity"

Maximum Allowable Weight (Regular Production Options & Aftermarket Equipment)

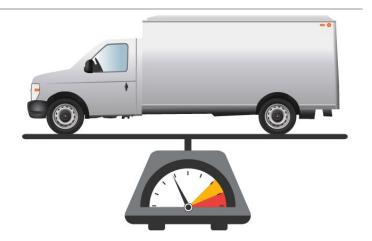
- Total Actual Regular Production Option Content Weight
- = Total Accessory Reserve Capacity

Warning: The Accessory Reserve Capacity weight information addresses FMVSS and CMVSS Nos. 204, 208, 212, 219, 301 and 303 compliance only. For all light-duty trucks with a GVW rating under 8,500 lbs., federally certified trucks with a GVW rating of 8,500 to 10,000 lbs. that are optionally emissions certified to light-duty standards and all California complete vehicles with a GVW rating of 14,000 lbs. or less, if more than 500 lbs. is added to the vehicle's "maximum vehicle weight," (3) the modifier may be responsible for recertification to the applicable EPA or CARB emissions standards.

- (1) Ford Motor Company's certification of compliance with FMVSS/CMVSS is based on specific vehicle test weights. These standards are applicable to completed vehicles of 10,000-lb. GVWR or less. Maximum allowable weights shown in the tables for vehicles above 10,000-lb. GVWR are maximum recommended values for optimum performance, durability and customer satisfaction.
- (2) The same procedure to estimate the "Total Accessory Reserve Capacity" is recommended to completed vehicle alterers in Canada.
- (3) Important: "Maximum vehicle weight" is calculated in accordance with the definition provided in an EPA guidance letter dated July 13, 1979, from C.N. Freed of the EPA to M.H. McBride, legal counsel of the Recreation Vehicle Industry Association. The preceding conditions are based on that letter and on EPA Advisory Circular No. 64 a March 7, 1977, publication that provides guidance on the need for separate certification of vehicles modified after original manufacture, but prior to sale and delivery to the ultimate purchaser. Additional guidance or questions concerning EPA's policies with respect to alterers of completed vehicles should be directed to legal counsel or the Environmental Protection Agency.

Base Curb Weight

- The weight of the vehicle including standard equipment, oil, lubricants and a full tank of fuel. It does not include the weight of driver, passengers, cargo or any optional or aftermarket equipment
- Base curb weights for each engine/standard equipment transmission combination are listed in the Weight Ratings pages of each vehicle section (see Maximum Payload Weight Ratings for reference)
- Actual Regular Production Option Content Weights can be found in the charts under Actual Regular Production Option Content Weights



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Gross Axle Weight

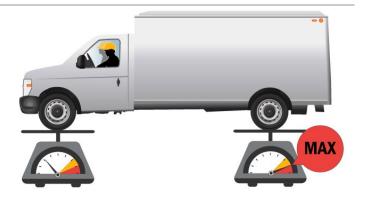
The total weight placed on each axle of the vehicle (front and rear).



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Gross Axle Weight Rating (GAWR)

The maximum allowable weight to be placed on an individual axle (front or rear). Gross Axle Weight Ratings are provided for both front and rear axles.



2024 E-Series > **Specs** > Dimensions/Weights/Capacities > General Truck Payload Information

Gross Combination Weight (GCW)

Gross vehicle weight plus the trailer weight.



2024 E-Series > **Specs** > Dimensions/Weights/Capacities > General Truck Payload Information

Gross Combination Weight Rating (GCWR)

The maximum allowable weight of the towing vehicle, the trailer and all associated passengers, cargo and equipment.

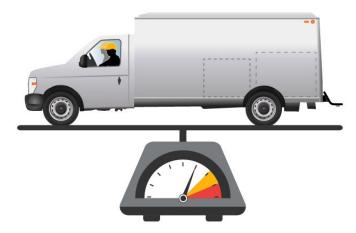
The point to remember is that the actual weights should never exceed the listed weight ratings. If recommended weight ratings are exceeded, the vehicle could be disqualified for warranty coverage.



2024 E-Series > **Specs** > Dimensions/Weights/Capacities > General Truck Payload Information

Gross Vehicle Weight (GVW)

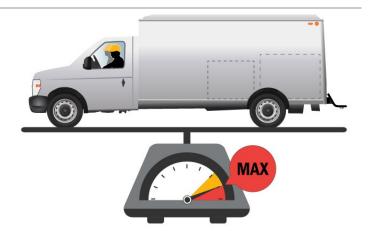
The weight of the vehicle including driver, passengers, optional and aftermarket equipment, and all cargo.



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Gross Vehicle Weight Rating (GVWR)

The maximum allowable weight of the fully loaded vehicle (including passengers and cargo).



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Maximum Payload Weight Rating

This is the advertised payload rating. It is the maximum allowable payload for the truck, including driver, passengers, optional and aftermarket equipment, and cargo. The weight of the engine and its standard transmission is already factored into the Maximum Payload Weight Rating. If the engine is also available with an optional transmission, that engine/transmission weight can be found in the Actual Regular Production Option Content Weight charts.

Vehicle Payload Calculation	Front/Total (lbs.)
Maximum Payload Weight Rating ⁽¹⁾	/
Less Total Actual Regular Production Option Content Weight (from Line A, Payload/GVWR Worksheet)	/
Equals Net Total Vehicle Payload (Front and rear axles and spring capacities will be sufficient to carry this payload uniformly distributed in vehicle cargo area)	/

⁽¹⁾ Weight for driver and passengers must be deducted. Refer to the individual vehicle weight rating pages for maximum payload weight ratings. Refer to Regular Production Option Content Weight.

NOTE: Front springs are computer selected to meet specific option requirements for each vehicle; HD front springs are standard if vehicle option weights require.

CAPABILITY NOTE: Maximum payload and towing capabilities are for properly equipped base vehicles with required equipment and a 150-lb. driver, and vary based on cargo, vehicle configuration, accessories and number of passengers. See label on doorjamb for carrying capacity of a specific vehicle.

2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Maximum Payload Weight Ratings

The Payload Weight Ratings and the Max. Option Weight/Max. Total Accessory Reserve Capacity (ARC) Weight Charts⁽¹⁾ are published and can be found in the weight ratings pages of the individual vehicle sections. This information is grouped together with other model, engine/transmission and maximum gross vehicle weight rating (GVWR) data for ease of use.



(1) OPT/ARC Weight is the maximum allowable weight for regular production options (OPT) and aftermarket equipment. Accessory Reserve Capacity (ARC) for models with standard equipment and the engine/transmission combination indicated.

2024 E-Series > **Specs** > Dimensions/Weights/Capacities > General Truck Payload Information

Option Weights

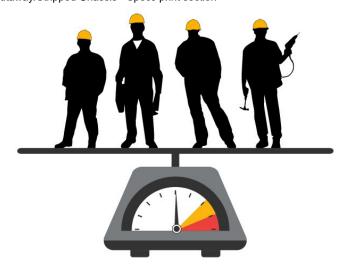
The weight of any added equipment that is not included in the base curb weight.



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Passenger Weight

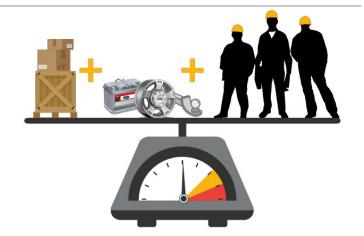
Defined as 150 lbs. multiplied by the number of safety-belted seating positions, including the driver, that the vehicle can carry.



2024 E-Series > **Specs** > Dimensions/Weights/Capacities > General Truck Payload Information

Payload

- Maximum payload is defined as the weight of all passengers, optional and aftermarket equipment, and cargo
- Net payload is defined as the weight that can be placed in the truck after subtracting for driver, passengers, and optional and aftermarket equipment



2024 E-Series > **Specs** > Dimensions/Weights/Capacities > General Truck Payload Information

Tongue Weight

The amount of the trailer's weight that bears down on the trailer hitch (10% to 15% of the total loaded conventional trailer weight or 15% to 25% of the total loaded 5th-wheel trailer weight).



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Trailer Weight

The weight of a fully loaded trailer, including all attachments, lights, etc.



2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Truck "Nominal Tonnage"

"Nominal Tonnage" is a term that Ford and other manufacturers have historically used to **generally categorize** the load capacity of a vehicle series; it is not a term defined by federal or state law.

Our COV (Certificate of Origin for a Vehicle) includes each particular vehicle's shipping weight, as well as the vehicle's gross vehicle weight rating or GVWR (from which one can determine the particular vehicle's rated carrying capacity, including driver, passengers, fluids, body upfit [if applicable] and aftermarket accessories). The COV also includes the vehicle's "Nominal Tonnage."

"Nominal Tonnage" provides the **general** usable cargo capability that most (but not all) of the vehicles with the designated nominal tonnage can expect to handle. That is, nominal tonnage states the general load capacity for each vehicle series, although particular vehicles may have a higher (or in some circumstances, lower) load capacity based on the specifications of the particular vehicle.

	Relevant Vehicle Series/Nominal Tonnage Relationship Categories
Nominal Tonnage	Vehicle
1∕2	Ranger, F-150, Transit Connect, Transit Passenger Van
3/4	E-350 Cutaway/Stripped Chassis, Transit-150 Cargo Van/Crew Van/Passenger Van, Transit-250 Cargo Van/Crew Van, Transit-350 Cargo Van/Crew Van/Passenger Van (GVWR 9,499 lbs.), Transit-250 Cutaway/Chassis Cab, F-250 Pickup
1	E-450 Cutaway/Stripped Chassis, Transit-350 Cargo Van/Crew Van/Passenger Van (GVWR 9,500 lbs.), Transit-350 Cutaway/Chassis Cab, F-350 Pickup, F-350 Chassis Cab
11/2	F-450 Pickup, F-450 Chassis Cab
2	F-550 Chassis Cab

2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Vehicle Class Ratings by GVWR

Weight Class	GVWR Range (lbs.)	Vehicle/Model
1	Up to 6,000	Transit Connect Cargo Van (5,110–5,302 lbs.) Transit Connect Passenger Wagon (5,302–5,420 lbs.)
2	6,001 to 10,000	Ranger (6,050 lbs.) Transit-150 Cargo Van/Passenger Van (8,670/8,550 lbs.) Transit-250 Cargo Van/Crew Van (9,070 lbs.) Transit-350 Cargo Van/Crew Van (9,250-9,950 lbs.) Transit-350 Passenger Van (9,250-9,550 lbs.) Transit-250 Cutaway/Chassis Cabs (9,070 lbs.) Transit-350 Cutaway/Chassis Cabs (9,070 lbs.) E-Transit T350 Cargo Van, Chassis Cab and Cutaway (9,500 lbs.) F-150 (6,070-7,850 lbs.) F-250 Pickup (9,900-10,000 lbs.) F-350 Chassis Cab SRW (9,800-10,000 lbs.)
3	10,001 to 14,000	E-350 Cutaway (10,050–12,500 lbs.) E-350 Stripped Chassis (11,500–12,500 lbs.) Transit-350 Cargo Van/Crew Van/Passenger Van (10,360 lbs.; 11,00 lbs. [Cargo Van only]) Transit-350 Cutaway/Chassis Cab (10,360 and 11,000 lbs.) F-250 Pickup (10,400–10,800 lbs.) F-350 SRW Pickup (10,100–12,400 lbs.) F-350 DRW Pickup (13,000(1)–14,000 lbs.) F-350 Chassis Cab SRW (10,500–11,500 lbs.) F-350 DRW Chassis Cab (14,000 lbs.) E-450 Cutaway (14,000 lbs.) E-450 Stripped Chassis (14,000 lbs.)
4	14,001 to 16,000	E-450 Cutaway (14,200–14,500 lbs.) E-450 Stripped Chassis (14,200–14,500 lbs.) F-450 Chassis (15,000–16,000 lbs.) F59 Commercial Stripped Chassis (16,000 lbs.) F53 Motorhome Chassis (16,000 lbs.)
5	16,001 to 19,500	F-450 Chassis Cab (16,500 lbs.) F-550 (17,500–19,500 lbs.) F59 Commercial Stripped Chassis (19,500 lbs.) F53 Motorhome Chassis (18,000 lbs.)
6	19,501 to 26,000	F-600 (22,000 lbs.) F-650 Gasoline (22,000–26,000 lbs.)/Diesel (22,000–26,000 lbs.) F59 Commercial Stripped Chassis (22,000 lbs.) F53 Motorhome Chassis (20,500–26,000 lbs.)
7	26,001 to 33,000	F-650 (27,500–29,000 lbs. Gas and Diesel) F-750 (31,000–33,000 lbs. Gas and Diesel)
8	33.001 and above	F-750 (34,200–37,000 lbs. Diesel)

(1) 13,000 lbs. Pickup Box Delete only.

2024 E-Series > Specs > Dimensions/Weights/Capacities > General Truck Payload Information

Weight Distribution

That portion of a vehicle's total weight that will be supported by each axle and each tire. Proper distribution of vehicle weight is critical to braking, handling and to the service life of components such as axles, springs, bearings and tires.



2024 E-Series > Specs > Dimensions/Weights/Capacities

GVWR/Payload/Spring & GAWR/Base Curb Weight

Madal	WB	Fording (Tunns	Maximum GVWR	Maximum	Spring/GAWR ⁽¹⁾	Base Curb Weight (lbs.)			
Model	(in.)	Engine/Trans.	(lbs.)	Payload ⁽¹⁾ (lbs.)	Front Range MinMax.	Rear	Front	Rear	Total
E-350 Cutaway	138 SRW	7.3L PFI V8 Premium/6R140	10,050	5,100	4,200	6,084	2,958	1,992	4,950
	138 DRW	7.3L PFI V8 Premium/6R140	11,500	6,270	4,050-4,600	7,800	3,001	2,224	5,225
	158 SRW	7.3L PFI V8 Premium/6R140	10,050	5,030	4,200	6,084	3,039	1,973	5,012
E-350 Cutaway	158 DRW	7.3L PFI V8 Premium/6R140	11,500	6,210	4,200-4,600	7,800	3,082	2,205	5,287
		7.3L PFI V8 Premium/6R140	12,500	7,210	4,200-5,000	8,500	3,082	2,205	5,287
	176 DRW	7.3L PFI V8 Premium/6R140	12,500	7,200	4,200-5,000	8,500	3,148	2,149	5,297
E-350 Stripped Chassis	138 DRW	7.3L PFI V8 Premium/6R140	11,500	6,870	4,400-4,600	7,800	2,421	2,204	4,625
	158 DRW	7.3L PFI V8 Premium/6R140	12,500	7,820	4,600-5,000	8,500	2,480	2,198	4,678
	176 DRW	7.3L PFI V8 Premium/6R140	12,500	7,760	4,600-5,000	8,500	2,535	2,197	4,732
E-450 Cutaway	158 DRW	7.3L PFI V8 Premium/6R140	14,200	8,680	4,600	9,600	3,078	2,434	5,512
		7.3L PFI V8 Premium/6R140	14,500	8,980	5,000	9,600	3,078	2,434	5,512
	176 DRW	7.3L PFI V8 Premium/6R140	14,200	8,680	4,600	9,600	3,161	2,358	5,519
		7.3L PFI V8 Premium/6R140	14,500	8,980	5,000	9,600	3,161	2,358	5,519
E-450 Stripped Chassis	158 DRW	7.3L PFI V8 Premium/6R140	14,500	9,690	5,000	9,600	2,531	2,274	4,805
	176	7.3L PFI V8	14,500	9,640	5,000	9,600	2,566	2,292	4,858

DRW | Premium/6R140

(1) Gross Axle Weight Rating is determined by the rated capacity of the minimum component of the axle system (axle, wheels, tires) of a specific vehicle. Front and rear GAWRs will, in all cases, sum to a number equal to or greater than the GVWR for the particular vehicle. Maximum loaded vehicle (including passengers, equipment and payload) cannot exceed the GVWR or GAWR (front or rear).

2024 E-Series > Specs > Dimensions/Weights/Capacities > Option Content Weight

Cutaway — Actual Regular Production Option Content Weight

Option Weight	(Front/Total) (lbs.)
REAR DIFFERENTIAL	
Limited-slip rear axle (E-350 SRW)	(0/7)
Limited-slip rear axle (E-350/E-450 DRW)	(0/4)
TIRES (add tire weight even if specified as standard equipment)	
LT225/75R16E (DRW)	(0/0)
LT245/75R16E (SRW)	(0/0)
TIRE EQUIPMENT	
Spare Tire (LT225/75R16E)	(-5/37)
Spare Tire (LT245/75R16E)	(-6/43)
Spare Wheel	(-5/35)
PACKAGES	
Auxiliary Heater Prep Package	(5/9)
Heater & A/C Prep Package	(18/21)
Heater & A/C Prep Package w/Rear Controls	(17/22)
Insulation Package	(1/1)
Power Windows/Locks Group	(9/13)
Seat Prep Package — Driver Only	(-27/-44)
Seat Prep Package — Driver and Passenger	(-57/-95)
Trailer Tow (Class I)	(1/2)
Jpgraded Trailer Tow (Class I)	(1/2)
OPTIONS	
A/C – delete	(-51/-49)
Airbag, passenger cutoff switch	(1/1)
Airbag, passenger delete	(-9/-11)
Alternator, extra-heavy-duty	(3/3)
Backup alarm, electric (102 dBA)	Not available
Battery, heavy-duty/auxiliary	(29/67)
Bumper, chrome front	(5/4)
Captain's chairs, without trim	(-3/-5)
Carpeting — front	(5/8)
Console, engine cover delete	(-9/-11)

,	• •
Cruise control	(2/2)
Daytime running lamps, non-configurable	Not available
Door delete, RH (138" WB)	(-58/-82)
Door delete, RH (158" WB)	(-61/-82)
Door delete, RH (176" WB)	(-63/-82)
Floor covering delete	(-6/-9)
Fuel tank, 40-gallon	(18/-107)
Fuel tank, 55-gallon	(-18/107)
Headlamps, halogen aerodynamic	(4/3)
Headliner delete	(-2/-4)
Heater, engine block	(1/1)
Jack, 2-ton mechanical (SRW)	(-1/6)
Jack, 4-ton hydraulic (DRW)	(-2/13)
License plate bracket, front	(1/1)
Mirror, exterior delete	(0/0)
Mirror, interior day/night	(1/1)
Mirrors, trailer tow — manual	(16/20)
Mirrors, trailer tow — power	(17/21)
Radio Prep Package with 2 speakers	Not available
Radio Prep Package with 4 speakers	Not available
Radio, delete	(-3/-4)
Rear View Camera Kit	(1/1)
Rear View Video Camera Kit	Not available
Remote Keyless Entry System	(1/1)
Running boards	(13/27)
Seat, power driver's	(6/10)
Seat delete, passenger	(-47/-77)
Spacers, alternate pattern frame (138" WB)	(-2/165)
Spacers, alternate pattern frame (158" WB)	(25/165)
Spacers, alternate pattern frame (176" WB)	(42/165)
Spacers, standard pattern frame, not included (138" WB)	(8/129)
Spacers, standard pattern frame, not included (158" WB)	(8/129)
Spacers, standard pattern frame, not included (176" WB)	(44/147)
Speakers, 4	(3/4)
Sun visor delete	(-1/-2)
Trailer brake controller	(2/2)
Upfitter switch pack	(2/2)
<u></u>	
Wheels, 16" x 7" forged aluminum	(-26/-52)
Wheels, 16" x 7" forged aluminum	(-26/-52)

2024 E-Series > Specs > Dimensions/Weights/Capacities > Option Content Weight

Stripped Chassis — Actual Regular Production Option Content Weight

Option Weight	(Front/Total) (lbs.)
REAR DIFFERENTIAL	
Limited-slip rear axle (E-350/E-450 DRW)	(0/4)
TIRE EQUIPMENT	
Spare tire (LT225/75R16E)	(-5/37)
Spare tire (LT245/75R16E)	(-6/43)
Spare wheel	(-5/35)
PACKAGES	·
A/C Prep	(24/25)
OPTIONS	·
Alternator, extra-heavy-duty	(3/3)
Daytime running lamps, non-configurable	(TBA/TBA)
Fuel tank, 40-gallon	(18/-107)
Fuel tank, 55-gallon	(18/-107)
Heater, engine block	(1/1)
Jack, 2-ton mechanical (SRW)	(-1/6)
Jack, 4-ton hydraulic (DRW)	(-2/13)
Upfitter switch pack	(2/2)
Wheels, sport wheel covers	(2/4)
Line A) Total Actual Option Content Weight: (Front/Total)	/

2024 E-Series > Specs > Standard Equipment

E-350 Cutaway Standard Equipment

REAR WHEEL	_S	SRW	DRW	SRW	DRW	DRW		
WHEELBASE (in.)		138	138	158	158	176		
POWERTRAIN	POWERTRAIN							
Engine	Application	Refer to order guide						
	Туре	7.3L PFI V8 premium-	7.3L PFI V8 premium-rated					
Transmission	Туре	6-speed TorqShift au	6-speed TorqShift auto					
AXLES	AXLES							

2, 10.07 AIVI		202	24 E-Series Culaway/Stripped Chassis - Spi	ood print decition					
Front Axle	Туре	Twin I-beam IFS							
	Capacity (Rating @ Ground)	5,000 lbs.	,000 lbs.						
Rear Axle	Туре	Full-floating, Dana 10	ull-floating, Dana 10.5"						
	Capacity (Rating @ Ground)	7,800 lbs.	8,500 lbs.						
BRAKES	1	1							
Front Disc	Туре	Dual-piston caliper (2.36" diameter piston)						
	Size (in.)	13.58 diameter rotor							
Rear Disc	Туре	Dual-piston caliper (ual-piston caliper (1.89" diameter piston)						
	Size (in.)	13.58 diameter rotor							
Power-Assist	Туре	Vacuum-boost (SRW	/)/Hydro-boost (DRW)						
Unit	Boost Ratio	13.46"	7.5:1 (SRW), 6.76:1 (DRW)						
Anti-Lock System	Туре	Dual diaphragm (SR)	Dual diaphragm (SRW), Hydro-boost (DRW)						
Parking Brake	Rear brake drum-in- hat	Foot-operated, push	oot-operated, push to apply/pull release lever to disengage						
ELECTRICAL	1	1							
Alternator	Rating	210 amperes, 2,835 v	vatts ⁽¹⁾						
Battery	Туре	Maintenance-free	faintenance-free						
	Rating	78-AH	8-AH						
Kit		Modified vehicle wiri	Modified vehicle wiring						
FUEL TANK	Capacity ⁽²⁾	40-gallon aft-of-rea	r-axle						
JACK	Capacity	2.0-ton (SRW), 4.0-1	on (DRW)						
STEERING	Туре	Gear assembly powe	rsteering						
	Ratio	17.0:1							
SUSPENSION	I								
Frame	Туре	_	ossmembers, 36,000-psi steel (includes 2 la 8" and 158" WB. or, 4 lateral spacers, 2 longi	-					
	Section Modulus	5.73 cu. in.							
Springs,	Туре	Coil, computer-selec	ted						
Front	Rating @ Ground (min.)	3,199 lbs.	3,100 lbs.	3,100 lbs.					
Springs, Rear	Туре	Multi-leaf, single-sta	ge	I					
	Rating @ Ground (min.)	7,310 lbs.	8,500 lbs.						
Shock Absorbers	Gas-type	35 mm							
Stabilizer Bar	Front/Rear— Diameter	Front — 25.4 mm (SF	RW)/23 mm (DRW); rear — 28.6 mm (DRW)						
TIRES	Туре	Four, truck-type stee	l-belted radial, all-season (six with DRW)						
	Size	LT245/75R16E	LT225/75R16E						
WHEELS	Type & Size	Four, 8-hole disc, 16"	x 7.0" K steel (six, 16" x 6.0" K with DRW)						

- (1) Rated current (@ 6,000 rpm) per ISO 8854: 1988 (E) and SAE J56 JUN1999. Actual output is temperature- and application-dependent.
- (2) Also includes 7.5-gallon plastic transit fuel tank (may be deleted), Auxiliary Fuel Port and Fuel System Conversion Kit.

2024 E-Series > Specs > Standard Equipment

E-350 Stripped Chassis Standard Equipment

REAR WHEELS		DRW	DRW	DRW	DRW	DRW				
WHEELBASE	(in.)	138	158	176	158	176				
POWERTRAII	N									
Engine	Application	Refer to order guide								
	Туре	7.3L PFI V8 premium	IL PFI V8 premium-rated							
Transmission	Туре	6-speed TorqShift au	ito							
AXLES										
Front Axle	Туре	Twin I-beam IFS	win I-beam IFS							
	Capacity (Rating @ Ground)	5,000 lbs.								
Rear Axle	Туре	Full-floating, Dana 10).5"							
	Capacity (Rating @ Ground)	6,340 lbs.	340 lbs. 8,500 lbs. 7,800 lbs.							
BRAKES										
Front Disc	Туре	Dual piston caliper (2.36" diameter piston)								
	Size (in.)	13.58 diameter rotor								
Rear Disc	Туре	Dual piston caliper (1	.89" diameter piston)							
	Size (in.)	13.58 diameter rotor								
Power-Assist	Boost Ratio	Hydro-Boost 6.76:1 (I	DRW)							
Unit	Effective Diameter	13.46"								
Anti-Lock Sys	tem	4-wheel								
Parking Brake	Rear brake drum-in- hat	Foot-operated, push	to apply/pull release l	ever to disengage						
ELECTRICAL										
Alternator	Rating	210 amperes, 2,835 v	vatts ⁽¹⁾							
Battery	Туре	Maintenance-free								
	Rating	78-AH								
Kit		Modified vehicle wiring								
FUEL TANK	Capacity	40-gallon aft-of-rea	-axle							
STEERING	Туре	Gear assembly powe	r steering							
	Ratio	17.0:1								
SUSPENSION	1									
Frame	Туре	Single-channel, 6 cro	ossmembers, 36,000-p	osi steel						
	Section Modulus	5.73 cu. in.								
Springs,	Туре	Coil, computer-selec	ted							
Front										

2024 E-Series Cutaway/Stripped Chassis - Specs print section

	Rating @ Ground (min.)	3,100 lbs.	3,550 lbs.	3,800 lbs.	4,050 lbs.				
Springs, Rear	Туре	Multi-leaf, single-sta	ge						
	Rating @ Ground (min.)	8,500 lbs. (DRW)	500 lbs. (DRW)						
Shock Absorbers	Gas-type	35 mm	5 mm						
Stabilizer	Front — Diameter	23 mm (DRW)							
Bar	Rear — Diameter	28.6 mm (DRW)							
TIRES	Туре	Truck-type steel-belt	ed radial, all-season						
	Size	Six, LT225/75R16E ⁽²⁾	ix, LT225/75R16E ⁽²⁾						
	Spare tire carrier	None	None						
WHEELS	Type & Size	Six, 8-hole disc, 16" x	6.0" K steel ⁽²⁾						

2024 E-Series > Specs > Standard Equipment

E-450 Cutaway Standard Equipment

REAR WHEELS		DRW	DRW			
WHEELBASE (in.))	158	176			
POWERTRAIN						
Engine	Application	Refer to order guide				
	Туре	7.3L PFI V8 premium-rated				
Transmission	Туре	6-speed TorqShift auto				
AXLES						
Front Axle	Туре	Twin I-beam IFS				
	Capacity (Rating @ Ground)	4,600 lbs.				
Rear Axle Type		Full-floating, Dana 10.75" HD				
	Capacity (Rating @ Ground)	9,600 lbs.				
BRAKES						
Front Disc	Туре	Dual piston caliper (2.36" diameter piston)				
	Size (in.)	13.58 diameter rotor				
Rear Disc	Туре	Dual piston caliper (2.12" diameter piston)				
	Size (in.)	13.58 diameter rotor				
Power-Assist Unit	Boost Ratio	Hydro-Boost, 6.76:1				
Anti-Lock System		4-wheel				
Parking Brake	Rear brake drum-in-hat	Foot-operated, push to apply/pull release lever	to disengage			
ELECTRICAL						
Alternator	Rating	210 amperes, 2,835 watts ⁽¹⁾				

⁽¹⁾ Rated current (@ 6,000 rpm) per ISO 8854: 1988 (E) and SAE J56 JUN1999. Actual output is temperature- and application-dependent.

⁽²⁾ Spare tire and wheel are shipped temporarily mounted to the top of the frame.

Battery	Туре	Maintenance-free
	Rating	78-AH
Kit	'	Modified vehicle wiring
FUEL TANK	Capacity ⁽²⁾	55-gallon, aft-of-rear-axle
STEERING	Туре	Gear assembly power steering
	Ratio	17.0:1
SUSPENSION		
Frame	Туре	Single-channel, 6 crossmembers, 36,000-psi steel
	Section Modulus	6.40 cu. in.
Springs, Front	Туре	Coil
	Rating @ Ground (min.)	4,600 lbs.
Springs, Rear	Туре	Multi-leaf, single-stage
	Rating @ Ground (min.)	9,600 lbs.
Shock Absorbers	Gas-type	35 mm
Stabilizer Bar	Front — Diameter	23 mm
	Rear — Diameter (DRW only)	28.6 mm
TIRES	Туре	Six truck-type steel-belted radial, all-season
	Size	LT225/75R16E
WHEELS	Type & Size	Six, 8-hole disc, 16" x 6.0" K steel

2024 E-Series > Specs > Standard Equipment

E-450 Stripped Chassis Standard Equipment

REAR WHEELS		DRW	DRW			
WHEELBASE (i	n.)	158	176			
POWERTRAIN						
Engine	Application	Refer to order guide				
	Туре	7.3L PFI V8 premium-rated				
Transmission	Туре	6-speed TorqShift auto				
AXLES						
Front Axle	Туре	Twin I-beam IFS				
	Capacity (Rating @ Ground)	5,000 lbs.				
Rear Axle	Туре	Full-floating, Dana 10.75" HD				
	Capacity (Rating @ Ground)	9,600 lbs.				
BRAKES	,					
Front Disc	Туре	Dual piston caliper (2.36" diameter piston)				
	Size (in.)	13.58 diameter rotor				

⁽¹⁾ Rated current (@ 6,000 rpm) per ISO 8854: 1988 (E) and SAE J56 JUN1999. Actual output is temperature- and application-dependent.

⁽²⁾ Also includes 7.5-gallon plastic transit fuel tank (may be deleted), Auxiliary Fuel Port and Fuel System Conversion Kit.

		I .					
Rear Disc	Туре	Dual piston caliper (2.12" diameter piston)					
	Size (in.)	13.58 diameter rotor					
Power-Assist Unit	Туре	Hydro-Boost					
	Boost Ratio	6.76:1					
Anti-Lock System		4-wheel					
Parking Brake	Rear brake drum-in-hat	Foot-operated, push to apply/pull release lever	to disengage				
ELECTRICAL							
Alternator	Rating	210 amperes, 2,835 watts ⁽¹⁾					
Battery	Туре	Maintenance-free					
	Rating	78-АН					
Kit		Modified vehicle wiring					
FUEL TANK	Capacity	55-gallon					
STEERING	Туре	Gear assembly power steering					
	Ratio	17.0:1					
SUSPENSION							
Frame	Туре	Single-channel, 6 crossmembers, 36,000-psi steel					
	Section Modulus	5.730 cu. in.					
Springs, Front	Туре	Coil, computer-selected					
	Rating @ Ground (min.)	5,000 lbs.					
Springs, Rear	Туре	Multi-leaf, single-stage					
	Rating @ Ground (min.)	9,600 lbs.					
Shock Absorbers	Gas-type	35 mm					
Stabilizer Bar	Front — Diameter	Front — 23 mm	Rear — 28.6 mm				
TIRES	Туре	Truck-type steel-belted radial, all-season					
	Size	Six, LT225/75R16E					
	Spare tire carrier	None					
WHEELS	Type & Size	Six, 8-hole disc, 16" x 6.0" K steel ⁽²⁾					

2024 E-Series > Specs > Powertrain

Auxiliary Automatic Transmission Oil Cooler Applications

Model/Series	Engine	Transmission	Standard No. of Plates	Air Conditioning No. of Plates	Trailer Towing No. of Plates
E-350/E-450	7.3L PFI V8 Premium-rated	TorqShift	20 — 1/2" Ports	20 — 1/2" Ports	24 — 1/2" Ports

⁽¹⁾ Rated current (@ 6,000 rpm) per ISO 8854: 1988 (E) and SAE J56 JUN1999. Actual output is temperature- and application-dependent.

 $[\]ensuremath{\text{(2)}}\ \mbox{Spare tire and wheel are shipped temporarily mounted to the top of the frame.}$

2024 E-Series > Specs > Powertrain

Cooling System Specifications

	Frontal		Core Size (in.)		Pows	Eine	Cooling System	Fan Specifications				
Engine	Cooling	Trans. Usage	Area (sq.	Height	Width	Thick.	Rows of hick. Tubes	f per	Cooling System Capacity (approx. quarts)	Type	No. of Blades	Blade Dia. (in.)
7.3L PFI V8 Premium-rated	All	Auto	708	23.6	30.0	1.4	1	16.5	30.4	Plastic	8	20.0

2024 E-Series > Specs > Powertrain

Engine

Driveline Layout	Front Engine, Rear Wheel (RWD)
Engine Type	7.3L PFI V8 Premium-Rated
Displacement (liters/cu. in.)	7.3/445
Horsepower @ rpm	325 @ 3,750
Torque (lbft.) @ rpm	450 @ 3,750
Compression Ratio	10.5:1
Valvetrain	SOHC
Valve Operation	Push rod
Bore & Stroke (in.)	4.21 x 3.98
Main Bearings	5
Induction	Naturally aspirated
Fuel System	Sequential Multiport
Fuel Requirement (octane)	87 (min.)
	I .

 $\textbf{PERFORMANCE NOTE:} \ \text{Horsepower and torque are independent attributes and may not be achieved simultaneously.}$

2024 E-Series > Specs > Powertrain

Fuel System Data

Electronic Fuel Injection	lectronic Fuel Injection 7.3L PFI V8 Premium-rated S	
Fuel Pump	7.3L PFI V8 Premium-rated	Electric-in-Tank High Pressure
Fuel Filter	7.3L PFI V8 Premium-rated	In-line Large Capacity (One)
Air Cleaner	7.3L PFI V8 Premium-rated	Dry Element, Replaceable

2024 E-Series > Specs > Powertrain

Transmission Specifications

Ford 6-Speed TorqShift Automatic
Totalo opeca forgoniti Automatic
7.3L PFI V8
3.97
2.31
1.51
1.14
0.85
0.67
3.12
305 mm, 3 Plate, 2 Stage
1.9
17.4
Double Ravigneaux
Oil to Air and In-Tank

2024 E-Series > Specs > Chassis

Front Axle Specifications

Model/Series		E-350/E-450
Max. Rating @ Ground	I (lbs.)	5,000
Туре		Twin-I-beam spindle with ball joints
Axle	Material	Nodular cast iron
	Spring Centers (in.)	47.0
Radius Arms	No.	2
	Material	High-strength low-alloy steel
Ball Joint		Lubed-for-life ball joints
Spindle Material		Nodular cast iron body with forged steel stem
Wheel Bearings	Туре	Tapered roller

2024 E-Series > Specs > Chassis

Rear Axle Specifications

Model/Series		E-350	E-450		
Make		Dana 10.5"	Dana 10.75" HD		
Rating @ Ground (lbs.)		7,800/8,500	9,600		
Туре		Full-floating	Full-floating		
Driveline Attachment, Circ	cular Flange	4.25"	4.75"		
Housing Type		Cast center	Cast center		
	Cover Attachment	Bolted	Bolted		
Section	Tube Diameter (in.)	3.50	4.00		
	Thickness (in.)	Thickness (in.) 0.39/0.56			
Lubricant Capacity (pt.)	<u> </u>	6.6	9.6		
Spring Centers (in.)		48.92	48.92		
Wheel Bearings	Туре	Tapered roller, 2 oppo	Tapered roller, 2 opposed		
Gears	Туре	Hypoid	Hypoid		
	Material	Alloy steel	Alloy steel		
Ring Gear	Pitch Diameter (in.)	10.50	10.75		
	Mounting	Overhung	Overhung		
Differential	Туре	2-pinion ⁽¹⁾	2-pinion ⁽¹⁾		
	L/S Type	Traction-Lok	Traction-Lok		
Axle Shaft	Spline — Minor Dia. (in.)	1.268	1.268		
	Spline — Major Dia. (in.)	1.375	1.375		
	Number of Splines	32	35		

2024 E-Series > Specs > Chassis

Brake Equipment Specifications — Front/Rear

Type Model/Series	Rotor Dia. (in.)		Brake Lining Segment	Area (sq. in.)/ Width (in.)/ Thickness (in.)	Caliper Piston	Gross Lining Area Per Axle	Total Swept Area Per Axle (sg. in.)	
		OD	ID	Segment	Tillckiless (III.)	Dia. (III.)	(sq. in.)	Axte (sq. III.)
Disc	All (Front)	13.58	8.70	Outboard	7.16/2.34/0.489	2.36	47.8	341.6
				Inboard	_			
	E-450 (Rear)	13.58	9.88	Outboard	5.96/1.74/0.51	2.12	43.65	272.70
				Inboard	_			
	E-350 (Rear)	13.58	9.88	Outboard	6.65/2.33/0.346	1.89	39.50	272.70
				Inboard	5.31/2.03/0.413			

2024 E-Series > Specs > Chassis

^{(1) 4-}pinion for limited-slip.

Brake Master Cylinder Specifications

Туре	Model/Series	Bore Diameter (in.)
Dual System, Dash-mounted	E-350 SRW	1.31
	E-350/E-450 DRW	1.38

2024 E-Series > Specs > Chassis

Power Brakes Hydraulic Booster Specifications

Туре	Model/Series	Ratio
Hydro-Boost	E-350 (DRW)/E-450	6.76:1

2024 E-Series > Specs > Chassis

Power Brakes Vacuum Booster Specifications

Туре	Model/Series	Ratio	Diaphragm Type
Bendix,® Dash-mounted	E-350 (SRW)	7.5:1	Dual

2024 E-Series > Specs > Chassis

Frame Specifications

Model/Series	Wheelbase (in.)	Maximum Side Rail Section (in.)	Section Modulus (cu. in.)	Yield Strength (psi)
E-350/E-450 Cutaway/Stripped Chassis	138, 158, 176	7.69 x 3.18 x 0.228	5.73	36,000
E-450 Cutaway	158, 176	7.69 x 3.18 x 0.248	6.40	36,000

2024 E-Series > Specs > Chassis

Shock Absorber Specifications

		Front & Rear				
Model/Series	Usage	Number	Piston Diameter (mm)	Туре		
E-350/E-450	Standard	4	35 mm	Gas-pressurized		

2024 E-Series > Specs > Chassis

Spring Specifications — Front Coil

Model/Series	GVWR (lbs.)	Combined Rating @ Ground (lbs.)	Normal Working Height of Spring (in.)	Wire Diameter (in.)	Deflection Rate @ Ground (lbs. per in. each)	Inside Diameter (in.)	Rating Each @ Pad (lbs. per spring)
E-350	10,050	3,800	12.0	0.72	328	4.0	2,165
Cutaway	(SRW), 11,500,	3,900	12.0	0.73	341	4.0	2,224
	12,500	4,050	12.0	0.74	354	4.0	2,318
		4,200	12.0	0.74	354	4.0	2,414
		4,400	12.0	0.76	366	4.0	2,542
		4,600	12.0	0.78	366	4.0	2,670
		5,000	12.0	0.79	418	4.0	2,900
E-350	11,500,	3,800	12.0	0.72	328	4.0	2,165
Stripped Chassis	3,900 4,050 4,200	3,900	12.0	0.73	341	4.0	2,229
		4,050	12.0	0.74	354	4.0	2,318
		4,200	12.0	0.74	354	4.0	2,414
		4,400	12.0	0.76	366	4.0	2,542
		4,600	12.0	0.78	366	4.0	2,670
		5,000	12.0	0.79	418	4.0	2,900
E-450 Cutaway/ Stripped Chassis	14,200	4,600	12.0	0.78	366	4.0	2,670
	14,500	5,000	12.0	0.79	418	4.0	2,900

2024 E-Series > Specs > Chassis

Spring Specifications — Rear Main Leaf

Model/Series	Combined Rating @ Ground (lbs.)	Number of Leaves	Total Thickness @ Pad (in.)	Length (in.)	Width (in.)	Deflection Rear (lbs. per in. per spring) ⁽¹⁾	Rating Each @ Pad (lbs. per spring)
E-350 Extended Cutaway	6,195	4	1.99	55.0	3.00	373.0/699.0	2,772
E-350 Cutaway/ Stripped Chassis SRW	7,310	9	3.59	55.0	3.00	924.7	3,296
E-350 Cutaway/ Stripped Chassis DRW	8,500	9	3.79	58.5	3.00	1,087	3,790
E-450 Cutaway/ Stripped Chassis	9,600	11	4.66	58.5	3.00	1,138	4,288

(1) Dual numbers indicate two-stage spring.

2024 E-Series > Specs > Chassis

Steering Specifications

Model/Series	Wheelbase (in.)	Power Steering ⁽¹⁾		Turning Diameter (ft.) ⁽²⁾	
Model/ Series	Wheelbase (III.)	Gear Ratio	Overall Ratio	Curb-to-Curb	Wall-to-Wall
E-350 SRW	138	17:1	21.2:1	48.6	50.0/50.0(3)
E-350 DRW	138	17:1	21.2:1	48.6	50.0/50.1 ⁽³⁾
E-350 SRW	158	17:1	21.2:1	54.9	56.2 ⁽³⁾
E-350 DRW/	158	17:1	21.2:1	54.8	56.2 ⁽³⁾
E-450	176	17:1	21.2:1	60.3	61.8 ⁽³⁾

2024 E-Series > Specs > Chassis

Tire Specifications

Type/Size	SRW/ DRW	Rim Width (in.)	Section Width (in.)	Ply Rating	Load Rating	Maximum Inflation Pressure (psi)	Load Limits @ Maximum Inflation Pressure (lbs.)	Static Loaded Radius (in.)	Revolutions Per Mile @ 45 mph
LT225/75Rx16	DRW	6.0	9.60	10	E	80	2,680/2,470 ⁽¹⁾	14.60	709
LT245/75Rx16	SRW	7.0	10.20	10	E	80	3,042	14.10	677

2024 E-Series > Specs > Chassis

Wheel Specifications

Wheel Type	Wheel Size	Nominal Offset (mm)	No. of Studs	Bolt Circle (in.)	Max. Wheel Capacity Load (lbs. @ ground)
Steel	16" x 7.0" K	0.25	8	6.5	2,300 Front 3,045 Rear
	16" x 6.0" K (Dual)	5.15	8	6.5	2,500 Front 2,500 Rear
Aluminum	16" x 7.0" J	0.25	8	6.5	3,045

^{(1) 15 1/2&}quot; diameter steering wheel. Cutaway and Stripped Chassis models include HD steering gear.

⁽²⁾ Average of left and right turns with standard tires.

⁽³⁾ Cutaway only.

⁽¹⁾ Tire rating when in the front single position/rating when in the dual position.

2024 E-Series > Specs > Special Applications

Trailer Towing Information

For additional towing information, refer to the RV & Trailer Towing Guide, available as a printable PDF on **eSourceBook**, or the vehicle Owner's



2024 E-Series > **Specs** > Special Applications

Snow Plow Applications

Not recommended for Snow Plow Applications.



2024 E-Series > Specs > Electrical

Alternator Specifications

Output ⁽¹⁾ (amperes)	210	240	240/157
Output (watts)	2,835	3,240	5,360

(1) Actual output is temperature- and application-dependent.

2024 E-Series > Specs > Electrical > Alternator Performance Curves

210-Ampere Alternator

Engine	Pulley Ratio	Model Application
7.3L PFI V8	3.03:1	E-Series Cutaway and Stripped Chassis

2024 E-Series > **Specs** > Electrical > Alternator Performance Curves

240-Ampere Alternator

Engine	Pulley Ratio	Model Application
7.3L PFI V8	3.03:1	E-Series Cutaway and Stripped Chassis (optional)

2024 E-Series > Specs > Electrical > Alternator Performance Curves

240-/157-Ampere Alternator

Engine	Pulley Ratio	Model Application
7.3L PFI V8 (Premium-rated)	3.03:1/2.80:1	E-Series Cutaway and Stripped Chassis (optional)

2024 E-Series > Specs > Electrical

Battery Applications

Ampere-Hour Rating Cold-Cranking Amps at 0°F	78 750	Dual 78
E-Series		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	Std.	Opt.

2024 E-Series > Specs > Electrical

Cold Weather Recommendations

Equipment	
Dual 78 Amp-Hr Batteries (opt.)	Engine Block Heater
Suggested	Not Needed
Recommended	Suggested
Recommended	Recommended
	Dual 78 Amp-Hr Batteries (opt.) Suggested Recommended

Below -20° F Strongly Recommended Strongly Recommended

DEFINITIONS

Suggested: Helpful, but not needed.

Recommended: Could improve reliability in less-than-ideal conditions.

Strongly Recommended: Will give definite improvement over the standard components.

Dual Batteries: Higher-capacity batteries available. (Usage varies by model.)

Engine Block Heater: Available equipment for all engines. (Usage and heater capacity vary with engine requirements.)

2024 E-Series > Specs > Electrical

Standard Lighting/Reflector Equipment

Light Reflector	Application
Headlamps (Halogen)	All Series — Two replaceable bulbs with all models
Parking Lamps	All Series — Integral with turn signals
Front/Rear Turn Signals	All Series
Front Side Marker Lamps	All Series
Front Side Reflectors	All Series
Rear Side Reflectors	All Series
Rear Side Marker Lamps	All Series — Integral with taillamps
License Plate Lamps	All Series
Two Combination Taillamps with Integral Stop, Turn Signal and Backup Lamps and Reflective Surface	All Series
Rear Reflectors	All Series
Front Daytime Running Lamps	All Vehicles Registered in Canada

2024 E-Series > Specs > Electrical

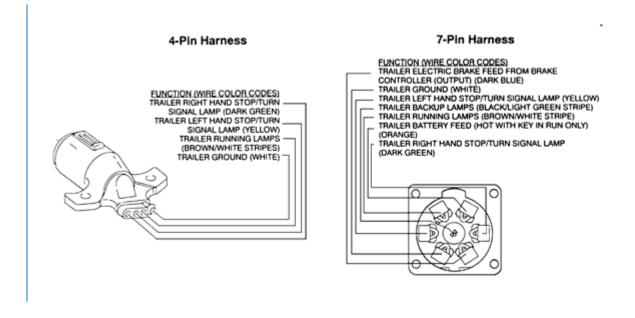
Light Specifications and Usage

Lamp	Code	Description	Usage
Daytime Running Lamps — Configurable	STD	(2) Replaceable Bulbs, Halogen	All Vehicles Registered in Canada
Headlamps	STD	(2) Replaceable Bulbs, Halogen	All Vehicles Registered in U.S. and Canada

2024 E-Series > Specs > Electrical

Trailer Towing Wiring Harness

Circuit Number	Circuit Description	Color Code
RAT08	Ground	White
CAT17	Parking Lamps	Brown
CAT14	Trailer Battery Feed	Orange
CAT19	To Electric Brakes	Dark Blue
CAT09	RH Turn Signal and Stop Lamps	Dark Green
CAT06	LH Turn Signal and Stop Lamps	Yellow
CAT03/CAT16	Trailer Backup Lamps	Gray with Brown Stripe
CBP30	Front Brake Controller Running Lamp Feed/Park Lamp Feed	Yellow with Blue Stripe
CBP40	Rear Brake Controller Running Lamp Feed/Park Lamp Feed	Yellow with Green Stripe
CLS30	Brake Controller Running Lamp Feed/Park Lamp Feed	Violet with White Stripe
CCB08	Vehicle Stop Lamps	Violet with White Stripe
SBB18/SBB17	B+ to Electric Brake Controller	Yellow with Red Stripe
		



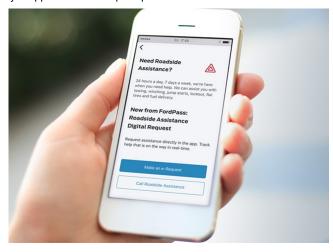
2024 E-Series > Specs

Warranties

24-HOUR ROADSIDE ASSISTANCE⁽¹⁾

- Owners can call the toll-free number (1-800-241-3673) 24 hours a day
- FordPass⁽²⁾ App key functionality
 - Tap the Service symbol on the bottom menu
 - Tap on 24/7 Assistance to make a request
 - Follow the prompts, which allow owners to identify the type of service they need

- Owners can follow real-time progress of their request on the FordPass map
- Services available include flat tire change, towing to the nearest Ford dealership, fuel delivery, jump start and lockout assistance
- The FordPass App also offers a link to Accident Assistance under Vehicle Details/Vehicle Support
 - Accident Assistance includes information on what to do in an accident and about collision repairs
 - It also provides a collision shop locator that identifies the nearest Ford Certified Collision Center



POWERTRAIN LIMITED WARRANTY

- Powertrain Limited Warranty for Ford vehicles is 5 years or 100,000 miles, whichever comes first
- That's an additional 2 years/64,000 miles (whichever comes first) of coverage for components such as the engine, transmission and rearwheel-drive parts (refer to the vehicle Owner's Manual for a more comprehensive list of all the parts covered) beyond the vehicle's 3-year/36,000-mile (whichever comes first) bumper-to-bumper limited warranty

NEW VEHICLE LIMITED WARRANTIES

- 3-year/36,000-mile (whichever comes first) bumper-to-bumper; no deductible
- 5-year/unlimited-mileage (whichever comes first) Corrosion Perforation (aluminum panels don't require perforation)
- 5-year/60,000-mile (whichever comes first) Safety Restraint Warranty
- (1) Roadside Assistance is included for certain owners and available to everyone for a per-service fee. Ford reserves the right to change program details without obligations. Ford Roadside Assistance is a complimentary offering to all Ford owners for up to 5 years or 60,000 miles (from the date of sale), whichever occurs first. Ford reserves the right to change program details without obligations.
- (2) FordPass App, compatible with select smartphone platforms, is available via a download. Message and data rates may apply.

NOTE: See dealer for limited warranty details.

NOTE: See **www.motorcraftservice.com** for a link to a printable PDF of the Warranty Guide.

® Copyright 2022, Ford Motor Company | Rights are granted to dealership personnel to download the contents of this web page in electronic or paper form. All other rights are reserved, including the rights to create derivative works and/or other web pages. Content is confidential and not to be posted on other sites or shared.

2023 FORD E-SERIES CUTAWAY

TECHNICAL SPECIFICATIONS



BODY

Construction/materials	High-strength C-section, steel frame
Body style	Body-on-frame
Final assembly location	Ohio Assembly Plant Avon Lake Ohio

DRIVETRAIN

Layout Front-engine, rear-drive

ENGINES

	7.3-liter premium V8 (standard)	7.3-liter economy V8 (optional)
Configuration	90-degree V8, single in-block cam	90-degree V8, single in-block cam
Block/head material	Cast iron block, aluminum heads	Cast iron block, aluminum heads
Displacement	7.3 liters (445 cubic inches)	7.3 liters (445 cubic inches)
Bore x stroke	4.22 x 3.97	4.22 x 3.97
Compression ratio	10.5:1	10.5:1
Valvetrain	Pushrod and rocker arms, two valves per cylinder	Pushrod and rocker arms, two valves per cylinder
Recommended fuel	87 octane	87 octane
Fuel delivery	Sequential multiport electronic	Sequential multiport electronic
Engine control system	Electronic	Electronic
Intake manifold	Naturally aspirated, tuned intake	Naturally aspirated, tuned intake
Dyno certified horsepower	350 @ 3,900 rpm	300 @ 3,750 rpm
Dyno certified torque	468 lbft. @ 3,900 rpm	425 lbft. @ 3,250 rpm
Oil-life monitor	Oil-minder system	Oil-minder system

ELECTRICAL

Alternator Standard 210-amp, optional 240-amp, or optional dual 240-amp/157-amp

Battery group 12-volt; 750-CCA 78-amp/hr

TRANSMISSION

Configuration Aluminum 6-speed with two overdrive speeds and tow/haul; auxiliary cooler

Gear ratios:	
First	3.974:1
Second	2.318:1
Third	1.516:1
Fourth	1.149:1
Fifth	0.858:1
Sixth	0.674:1
Reverse	-3.128:1



CHASSIS SPECIFICATIONS

Front suspension	Twin I-beam independent with computer-selected coil springs and stabilizer bar
Rear suspension	Multileaf single-stage leaf springs/solid axle and stabilizer bar (DRW only)
Front and rear shocks	Heavy-duty gas-pressurized
Steering	Recirculating ball, power-assisted

BRAKES

Туре	Power four-wheel vented discs, ABS, traction control
Front (rotor diameter)	13.58 inches (345 millimeters)
Rear (rotor diameter)	13.58 inches (345 millimeters)

WHEELS

Туре	Steel
Size	16 inches
Number of studs	Eight
Bolt-circle diameter	6.5 inches

EXTERIOR DIMENSIONS (INCHES UNLESS OTHERWISE NOTED)

	138-inch wheelbase E-350 SRW	158-inch wheelbase E-350 SRW	138-inch wheelbase E-350 DRW	158-inch wheelbase E-350 DRW	176-inch wheelbase E-350 DRW	158-inch wheelbase E-450 DRW	176-inch wheelbase E-450 DRW
Overall length	241.1	261.1	241.1	261.1	261.1	261.1	261.1
Overall width	79.4	79.4	94.9	94.9	94.9	94.9	94.9
Rear track	72.1	72.1	75.4	75.4	75.4	77.7	77.7
Cab, rear to rear axle	80	100	80	100	118	100	118
Rear axle to end of frame	68.5	68.5	68.5	68.5	50.5	68.5	50.5
Front overhang	34.6	34.6	34.6	34.6	34.6	34.6	34.6

INTERIOR DIMENSIONS

	E-350/E-450 Cutaway
First row headroom	42 inches
First row shoulder room	68.1 inches
First row hip room	65.6 inches
First row maximum legroom	42.1 inches



PASSENGER AND FUEL CAPACITIES

	E-350 SRW, DRW	E-450 DRW
Seating capacity	Two (one optional)	Two (one optional)
Fuel capacity	40 gallons (55 optional)	55 gallons (40 optional)

PAYLOAD PACKAGE SELECTOR (LBS.)

	Engine	GCWR	GVWR	Payload
E-350 SRW 138-inch wheelbase	7.3-liter economy	13,000	10,050	5,100
E-350 SRW 138-inch wheelbase	7.3-liter premium	18,500	10,050	5,100
E-350 DRW 138-inch wheelbase	7.3-liter economy	13,000/17,000	11,500	6,270
E-350 DRW 138-inch wheelbase	7.3-liter premium	18,500	11,500	6,270
E-350 SRW 158-inch wheelbase	7.3-liter economy	13,000	10,050	5,030
E-350 SRW 158-inch wheelbase	7.3-liter premium	18,500	10,050	5,030
E-350 DRW 158-inch wheelbase	7.3-liter economy	13,000/17,000	11,500	6,210
E-350 DRW 158-inch wheelbase	7.3-liter premium	18,500	11,500	6,210
E-350 DRW 158-inch wheelbase	7.3-liter economy	13,000	12,500	7,210
E-350 DRW 158-inch wheelbase	7.3-liter premium	18,500	12,500	7,210
E-350 DRW 176-inch wheelbase	7.3-liter economy	13,000/17,000	12,500	7,200
E-350 DRW 176-inch wheelbase	7.3-liter premium	18,500	12,500	7,200
E-450 DRW 158-inch wheelbase	7.3-liter economy	18,000	14,000	8,480
E-450 DRW 176-inch wheelbase	7.3-liter premium	22,000	14,200/14,500	8,680/8,980

WARRANTY

Bumper to bumper:	Three years/36,000 miles	
Powertrain:	Five years/60,000 miles	
Safety restraint system:	Five years/60,000 miles	
Corrosion (perforation only):	Five years/unlimited miles	
Roadside assistance program:	Five years/60,000 miles	



1200 New Jersey Avenue SE Washington, D.C. 20590



September 18, 2009

Vince Cline Design Engineer Glaval Bus 914 County Road 1 North Elkhart, IN 46514

Dear Mr. Cline:

This is in response to your letter dated April 16, 2009, in which you requested assistance from the Federal Transit Administration (FTA) concerning the applicability of the Bus Testing Regulation (49 CFR Part 665) to a version of the Glaval Sport (Primetime) bus model built on the Ford E-Series chassis. Your letter states that:

- Glaval has had its 96-inch wide Universal model built on a Ford E-Series chassis tested at the Altoona Bus Testing Center (Altoona) in the 5-year/150,000-mile service life category (Report No. PTI-BT-R9910). The Universal model also completed partial testing (Structural Durability and Reliability) in the 7-year/200,000-mile service life category (Report No. PTI-BT-R0122-P).
- Glaval has had its 84-inch wide Sport model built on a GM chassis tested at Altoona in the 5year/150,000-mile service life category (Report No. PTI-BT-R0805).
- Glaval now proposes to offer a version of the 84-inch wide Sport model on the Ford E-Series
 chassis, which will be "built with the same concepts" as the version tested on the GM chassis.
 This version was to have been called Primetime, however you subsequently advised FTA that
 Glaval has since decided to call this model Sport also.

You have asked FTA to "grandfather" the Sport/Primetime model built on the Ford E-Series chassis from additional Altoona testing based on its similarity to previously-tested models.

FTA has reviewed your request and accompanying documentation and has determined that **no additional testing** will be required for the Sport/Primetime bus model built on the Ford E-Series chassis, provided that it is offered in no higher than the 5-year/150,000-mile service life category. This determination is based on the following conclusions drawn from information submitted by Glaval or contained in our files:

- The Glaval Sport bus model built on a GM chassis has been tested at Altoona (Report No. PTI-BT-R0805). Consequently, the Sport is eligible for Partial Testing procedures; only those tests in which significantly different data may be expected would need to be repeated.
- The Ford E-Series chassis has been evaluated at Altoona with the Glaval Universal bus model, as well as numerous other bus models built by various manufacturers.
- Under FTA's "family of vehicles" concept, outlined in FTA's November 3, 1993 Federal
 Register notice, FTA generally permits a manufacturer of a bus body that has been tested on
 one unmodified third-party chassis to offer the same or closely related body built on another
 similar unmodified third-party chassis that has been tested at Altoona (on one of its own
 buses or on a competitor's similar bus), without requiring additional testing. This generally
 includes changes in bus length, such as from one standard wheelbase offering to another.
- The family of vehicles concept does not apply to buses in the 7-year or higher service life categories.

Before final acceptance (i.e., the release of FTA funds by a grantee) of a bus, the grantee must certify that it possesses the applicable Bus Testing Report(s) for that bus model. In the case of the Glaval Sport built on the E-Series chassis, Glaval would need to provide report number PTI-BT-R0805 on the Sport with GM chassis, as well as report number PTI-BT-R9910 of a bus built on the Ford chassis (a report including the chassis data from another manufacturer's similar size and weight bus built on the Ford chassis would also be acceptable).

This determination is based on the changes detailed in your letter or mentioned above. Should you make any other changes to the vehicle, additional testing may be required. If you require any further assistance with this or other matters concerning bus testing, I encourage you to consult the resources provided at www.fta.dot.gov/bustesting. If you still have questions after checking this website, please feel free to contact me at the address above, or by e-mail (marcel.belanger@dot.gov), fax (202-366-3765), or telephone (202-366-0725).

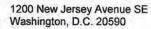
Sincerely,

Marcel Belanger

Bus Testing Program Manager

Office of Mobility Innovation, TRI-12

O:\TRI\BUSTEST\GLAVAL\Glaval 041609 - Sport or Primetime on Ford E-Series.doc





May 6, 2019

Larry Hall
StarCraft Bus, Division
Forest River, Inc. A Berkshire Hathaway Company
2367 Century Drive
Goshen In.46528
(via email: lhall@forestriverinc.com)

Dear Mr. Hall:

This is in response to your email with attached letter, model comparison chart, and drawings dated April 19, 2019. Your submission asked the Federal Transit Administration (FTA) to determine whether the Bus Testing Regulation (49 CFR Part 665) requires additional testing for the StarCraft Allstar, StarTrans Senator II, and Glaval Universal bus models manufactured by Forest River. Taken together, your submissions state that:

- Forest River has consolidated three of its bus divisions, StarCraft, StarTrans, and Glaval.
 These divisions manufacture bus models called the Allstar, Senator II, and Universal, respectively.
- The StarCraft Allstar completed FTA Bus Testing in the 7-year/200,000-mile service life category, resulting in Bus Testing Report number PTI-BT-R0518.
- All three divisions build these bus models on mass-produced chassis, and the bus bodies are mounted to the chassis using the same process and materials.
- All three bus bodies use the same gauge of steel.
- Differences between the models are limited to:
 - Cosmetic differences in the front and rear fiberglass caps and body lines.
 - Spray-primed coating on the steel structure of the StarCraft, and aluminized coating on the steel structure of the StarTrans and Glaval.
 - Hand-hugged exterior skin on the StarCraft, and Pinched-laminated exterior skin on the StarTrans and Glaval.

Your submission included a sampling of drawings for each bus model to illustrate the similarities.

FTA has reviewed your request and accompanying documentation and has determined that no additional testing will be required for the StarTrans Senator II and Glaval Universal bus models built by Forest River divisions. Our rationale for this determination is as follows:

- The StarCraft Allstar completed full testing in the 7-year/200,000-mile service life category at the Altoona Bus Testing Center (Report # PTI-BT-R0518). The Allstar test unit had a gross vehicle weight rating (GVWR) of 14,050 pounds, and a wheelbase of 190 inches. Consequently, variants of the Allstar, such as the StarTrans Senator II and Glaval Universal, are eligible for Partial Testing procedures; only those tests in which we would expect to obtain significantly different data would need to be repeated.
- The Glaval and StarTrans models feature the use of aluminized steel in their construction compared with an epoxy spray coating on the StarCraft model. The coatings are not expected to affect the results of the Structural Durability and Reliability tests directly, corrosion resistance is not specifically evaluated under the Bus Testing Program, and corrosion rarely occurs to any significant degree during FTA Bus Testing.
- The StarCraft Allstar and StarTrans Senator II appear to have identical fiberglass endcaps.
 The Glaval Universal appears to have cosmetic differences in the fiberglass end caps
 compared with the other two models. FTA has typically treated cosmetic shape changes to
 fiberglass end caps as minor changes and we do not expect significantly different data in the
 Durability and Reliability tests.
- The lamination process of the Glaval and StarTrans models is "Pinched-laminated," compared with the "hand-hugged" lamination of the exterior skin panels on the StarCraft. These processes would be expected to produce a similar quality of lamination of the exterior panels and would not be expected to produce significantly different results in the Durability and Reliability tests.
- The three subject bus models have buses have similar (though not identical) structures. The previously-tested StarCraft Allstar uses wall bows with a modified C-channel cross section, while the StarTrans Senator II and Glaval Universal use closed rectangular tubing. We would anticipate that the open modified C-channel may be less rigid than the closed tubes, and would therefore be a "worse case" for structural integrity. Since the Allstar is considered a worse case structurally, and no structural failures were documented during testing of the Allstar (Report PTI-BT-R0518), we would not expect additional testing of the Senator II or Universal to produce significantly different results in the Durability and Reliability tests.
- The StarCraft, StarTrans, and Glaval bus models are all similar or identical in size shape and weight and as such would not be expected to produce significantly different results in the Performance, Noise, Fuel Economy, Safety, and Emissions tests.

Bus Testing Report PTI-BT-R0518 on the StarCraft Allstar bus model satisfies Bus Testing requirements for the closely-related gasoline-powered StarTrans Senator II and Glaval Universal bus models without additional testing, provided that they do not significantly exceed the tested unit's key specifications. For example, buses with a longer overall length or wheelbase, buses with a greater GVWR, and/or buses offered in the 10-year or higher service life category are not included in this determination. This determination is based on the information

and claims in your submission or mentioned above. If Forest River or its subsidiaries make significant changes to these bus models, additional testing may be required.

If you require any further assistance with this or other matters concerning Bus Testing, I encourage you to consult the resources provided at www.transit.dot.gov/research-innovation/bustesting. If you still have questions after checking this website, please feel free to contact me.

Sincerely,

Marcel Belanger

Bus Testing Program Manager Office of Infrastructure & Asset Management

TRI-20

marcel.belanger@dot.gov

202-366-0725

O:\TRI\BUSTEST\Forest River\Forest River 041919 - Forest River Brands Comparison - Allstar, Senator II, Universal.docx

1200 New Jersey Avenue SE Washington, D.C. 20590



December 30, 2020

Larry Hall
Director of Engineering
StarCraft Bus
A Division of Forest River
2367 Century Drive
Goshen, IN 46528

(via email: lhall@forestriverinc.com)

Dear Mr. Hall:

This is in response to your letter and attachments dated June 6, 2019, in which you requested assistance from the Federal Transit Administration (FTA) concerning the applicability of the Bus Testing Regulation (49 CFR Part 665) to the StarCraft Starlite, Glaval Primetime, and StarTrans Candidate II bus models manufactured by the respective divisions of Forest River. Your submissions, which are attached and incorporated by reference, state that:

- The StarCraft, Glaval, and StarTrans divisions of Forest River build essentially similar bus models called the Starlite, Primetime, and Candidate II, respectively.
- The differences between the models are limited to:
 - o Front and rear fiberglass caps body lines only cosmetic.
 - o Coating on the steel frame, Glaval and StarTrans aluminized, StarCraft is spray primed.
 - o Exterior skin, Glaval and StarTrans is pinched laminated, StarCraft is hand hugged.
- These models are offered on Ford E-350 and E-450 chassis.
- FTA issued a previous determination recognizing similarities between the StarCraft Allstar and Starlite models.

You have asked FTA to determine whether these bus models qualify as a "family group" or whether additional FTA Bus Testing is required for any of these bus models.

FTA has reviewed your request and accompanying documentation and has determined that no additional testing will be required for the StarCraft Starlite, Glaval Primetime, and StarTrans Candidate II bus models manufactured by the respective divisions of Forest River. Our rationale for this determination is as follows:

- The StarCraft Allstar has completed FTA Bus Testing in the 7-year, 200,000-mile service life category (Bus Testing Report # PTI-BT-R0518). Consequently, variants of the Allstar, such as the Glaval Primetime, and StarTrans Candidate II, are eligible for Partial Testing procedures; only those tests in which we would expect to obtain significantly different data would need to be repeated.
- The Glaval and StarTrans models feature the use of aluminized steel in their construction compared with an epoxy spray coating on the StarCraft model. The aluminized steel coating is arguably superior to the spray epoxy coating however corrosion is not a factor, nor is it measured during the relatively short testing duration at LTI. As corrosion resistance is not specifically tested and would not influence other testing, significantly different test data would not be expected in the Structural Integrity and Reliability tests.
- The StarCraft Starlite and StarTrans Candidate II have identical fiberglass endcaps. The
 Glaval Primetime has "cosmetic" differences in the fiberglass end caps compared with the
 other two models. FTA has typically treated cosmetic shape changes to fiberglass end
 caps as minor changes and significantly different data would not be expected in the
 Structural Integrity and Reliability tests.
- The lamination process of the StarCraft and StarTrans models is "pinched laminated" compared with the "hand hugged" lamination of the exterior skin panels on the Glaval. These processes would be expected to produce a similar quality of lamination of the exterior panels and would not be expected to produce significantly different results in the Structural Integrity and Reliability tests.
- The three subject bus models have buses have similar structures. The previously tested StarCraft Allstar/Starlite has a slightly different tube extrusion profile in the wall structure. The different profile is not considered a major change to the structure and would not be expected to produce significantly different results in the Structural Integrity and Reliability tests.
- The Starlite, Primetime, and Candidate II bus models are all built on the Ford E-350 and E-450 cutaway chassis and are similar in size, shape, and weight. Therefore, we would not expect to obtain significantly different data in the Accessibility, Performance, Noise, Fuel Economy, Safety, and Emissions tests.

Based on these considerations, **Bus Testing Report PTI-BT-R0518 satisfies Bus Testing requirements for the StarCraft Starlite, Glaval Primetime, and StarTrans Candidate II bus models manufactured by the respective divisions of Forest River.**

This determination is based on the information and representations in your submission or mentioned above. If Forest River makes any other changes to the vehicles, additional testing may be required. If you require any further assistance with this or other matters concerning Bus Testing, I encourage you to consult the resources provided at www.transit.dot.gov/research-innovation/bus-testing. If you still have questions after checking this website, please feel free to contact me.

Sincerely,

Marcel Belanger

Bus Testing Program Manager Office of Infrastructure, Safety, and

Marel Belong

Asset Innovation, TRI-20

marcel.belanger@dot.gov

202-366-0725

Attachments: June 6, 2019 Forest River letter and attachments

O:\TRI\BUSTEST\Forest River\Forest River 060619 - Narrow Starlite Primetime Candidate II model comparison.docx



June 6, 2019

Marcel Belanger
Bus Testing Program Manager
Federal Transit Administration
Office of Mobility Innovation, TRI-12
Room E43-471
1200 New Jersey Ave.SE
East Building, 4th floor
Washington, DC 20590

Re: Brand Comparison of Forest River Commercial Bus Group StarCraft Bus, Model Starlite, Glaval Bus, Model Primetime, and StarTrans Bus, model Candidate II.

Dear Mr. Belanger:

Forest River Bus has consolidated three of their bus divisions, Glaval Bus, Starcraft Bus, and StarTrans Bus. We are asking that FTA recognize the "Family Group" to minimize the testing load of our product line "Altoona Testing".

All three divisions build on mass produced chassis, the bus body is mounted to the chassis using the same process and materials. All three brands are built with the same gage of steel.

The different between models:

- a- Front and rear fiberglass caps body lines only cosmetic.
- b- Coating on the steel frame, Glaval and StarTrans aluminized, Starcarft is spray primed.
- c- Exterior skin, Glaval and StarTrans is pinched laminated, Starcraft is hand hugged.

Attached to this E-mail are detailed frame prints to illustrate the similarities in the construction of the frame, and a model comparison chart. Along with a previous FTA determination letter recognizing similarities between that Allstar and Starlite models. Please refer to test number PTI-BT-R0518

If FTA decides that additional testing is required, please indicate which test is needed.

Sincerely,

Larry Hall

Director of Engineering

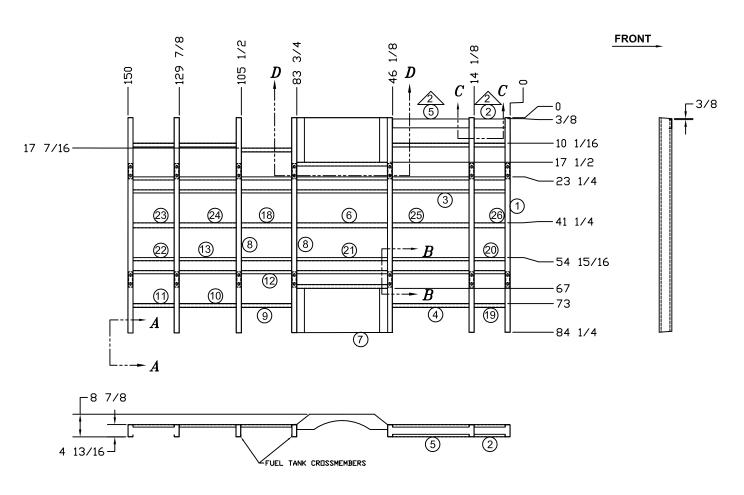
Starcraft Bus

A Division of Forest River, Inc.

	Commercial Bus Comparison 2019										
Starcraft Bus Glaval Bus StarTrans Bus											
Model	Chassis	Prefix	Suffix	Model	Chassis	Prefix	Suffix	Model	Chassis	Prefix	Suffix
Starlite	Ford E-350 Ford E-450	STL	В	Primetime	Ford E-350 Ford E-450	GPJ	Р	Candidate II	Ford E-350 Ford E-450	CBL	СТ
				_							

USAGE: FORD E-350 138" WHEEL BASE NARROW BODY





NOTES:

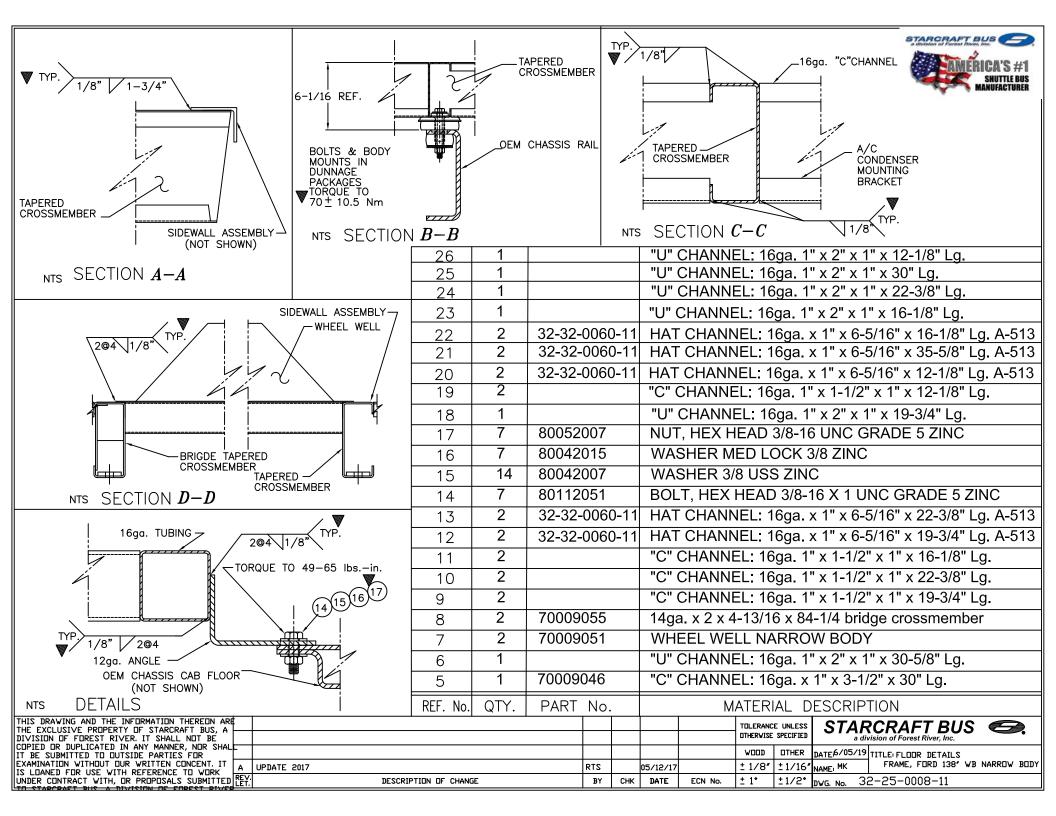
1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.

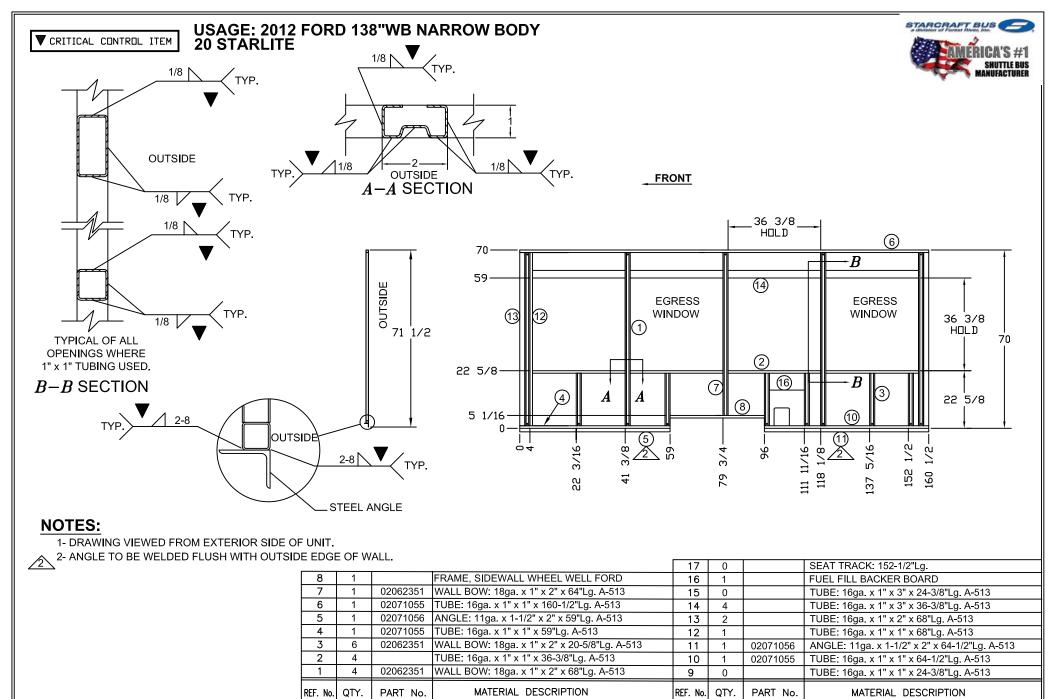
2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSIDE EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.

3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

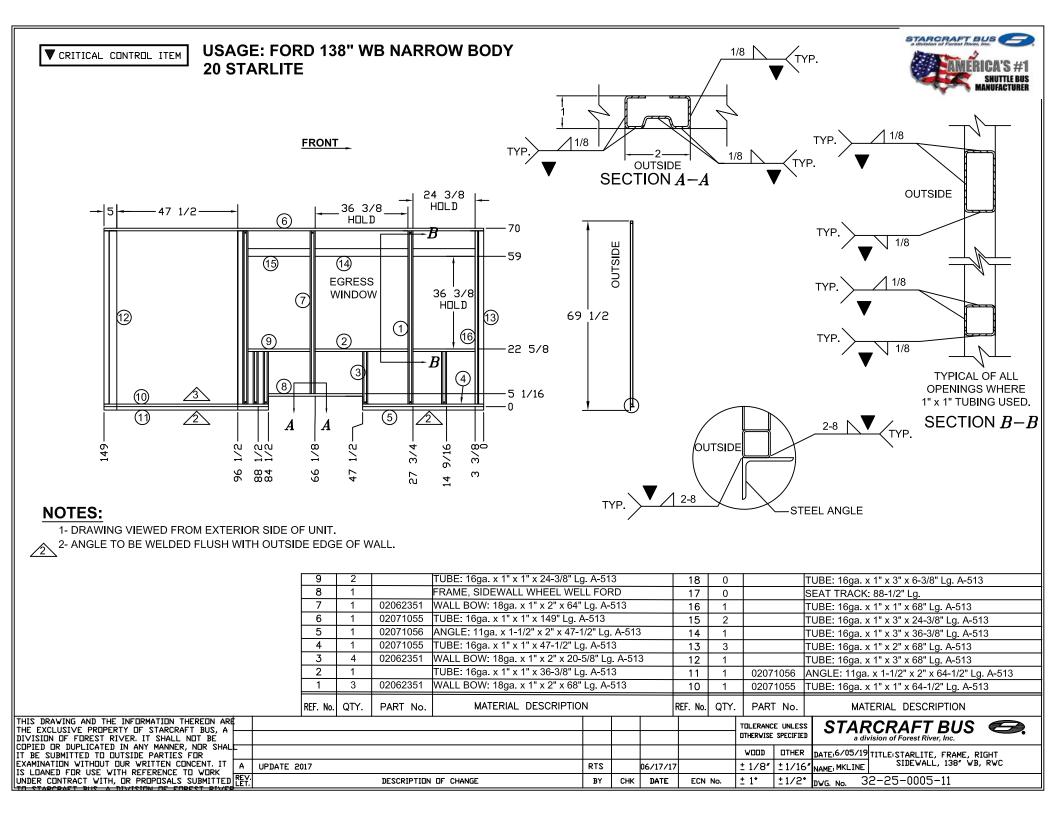
.	4	2		"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.
-	3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513
	2	1		"C" CHANNEL: 16ga. x 1" x 3-1/2" x 12-1/8" Lg.
	1	5	71009018	14ga. x 2 x 4-13/16 x 84-1/4 CROSSMEMBER A-365
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

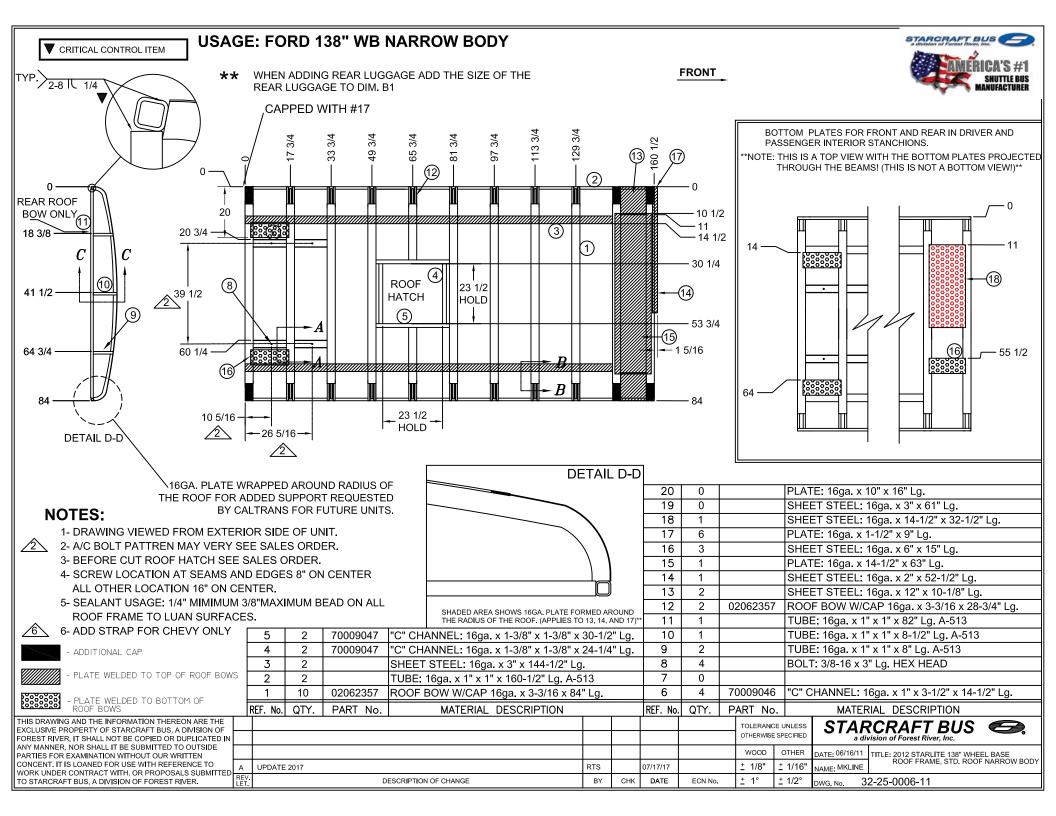
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF STARCRAFT BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE						TOLERANC OTHERWISE	E UNLESS SPECIFIED	STAF	RCRAFT BUS (Sivision of Forest River, Inc.
COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR						WOOD	OTHER	DATE:6/05/19	TITLE, FLOOR FRAME,
EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT						± 1/8"	±1/16"	NAME: MDK	FORD 138" WB NARROW BODY
UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED REV.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.	± 1°	±1/2°	DWG. No. 3	2-25-0008-11

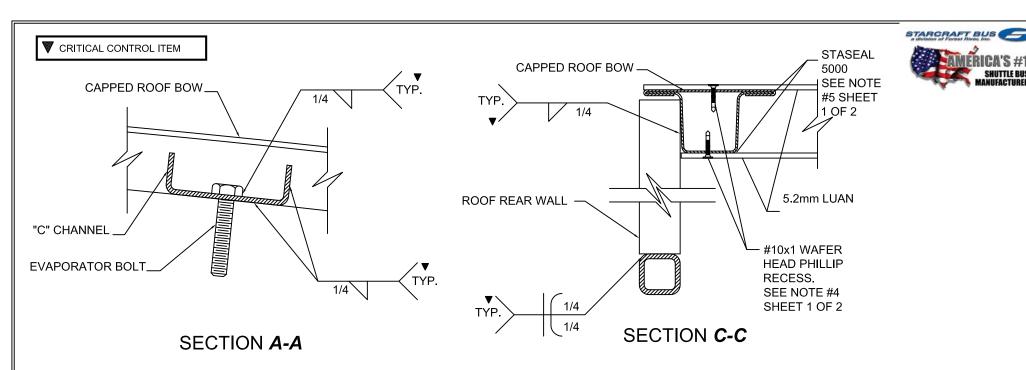


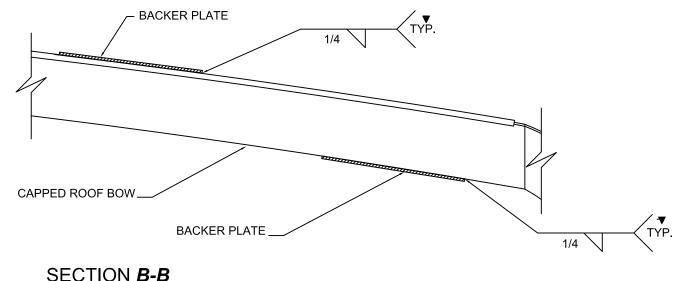


- 1											
	THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF STARCRAFT BUS, A							TOLERANO		STAF	RCRAFT BUS 👄
	DIVISION OF FOREST RIVER IT SHALL NOT BE							OTHERWISE	SPECIFIED	a di	vision of Forest River, Inc.
	COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR							WOOD	OTHER	DATE:6/05/19	TITLE:STARLITE, FRAME, LEFT
	EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT A UPI IS LOANED FOR USE WITH REFERENCE TO WORK	DATE 2017		RTS		07/17/17		± 1/8"	±1/16"	NAME: MK	SIDEWALL, 138"WB, ALL PASS.
	UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED REV.	DESCRIF	TION OF CHANGE	BY	CHK	DATE	ECN No.	± 1°	±1/2°	DWG. No. 3	2-25-0001-11
	THE CLASS BALL SITE A HISTORIAN THE FIRST CONTROL										









_					
	T/A-71 NEW STYLE	33-5/8	30	10	12-1/4
	ACC 23022 SERIES	38	20	10	14-3/4
	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4
ſ	T/A-77	18-1/4	59-1/2	10	10-3/8
ſ	T/A-73	28-1/4	39-1/2	10	9-1/2
	T/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4
	T/A-70	36-3/4	22-1/2	10	11-5/8
ſ	T/A-30	31	34	10	9-1/2
ſ	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2
ľ	EM-6 & RE-10	36	24	10	9-1/2
	EM-3 & RE-30	28-1/4	39-1/2	10	16
ſ	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2
ſ	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2
[EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2
ſ	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2
[EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2
	EVAPORATOR MODEL	A-1	A-2	B-1	B - 2
	<u>^</u>	4000			

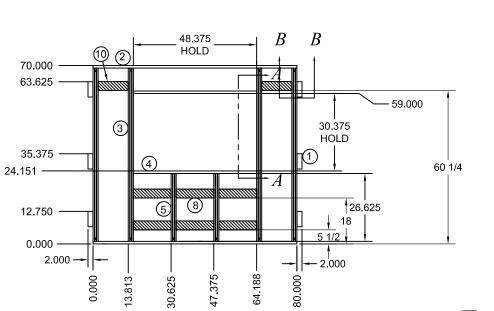
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF STARCRAFT BUS, A DIMISION OF FOREST RIVER, IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO STARCRAFT BUS. A DIVISION OF FOREST RIVER.

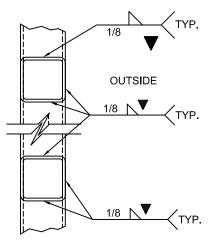
STARCRAFT BUS a division of Forest River, Inc. TOLERANCE UNLESS OTHERWISE SPECIFIED DATE: 06/16/11 TITLE:2012 STARLITE, FRAME, ROOF FORD WOOD OTHER 138" WB NARROW BODY ± 1/8" NAME: MKD UPDATE 2017 RTS 06/17/17 ± 1/16" ± 1/2° DESCRIPTION OF CHANGE DATE 32-25-0006-11



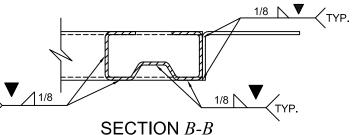
USAGE: STARLITE, REAR WINDOW







SECTION A-A



OUTSIDE

	10	2		STEEL SHEET: 16ga. x 3" x 11-13/16"Lg.					
	9	0	02062351	WALL BOW: 18ga. x 1" x 2" x 65"Lg. A-513					
	8	2		STRAP: 11ga. x 3-1/2" x 52-3/8"Lg.					
	7	0		WALL BOW: 18ga. x 1" x 2" x 7"Lg. A-513					
*	6	0	02071055	TUBE: 16ga. x 1" x 1" x 17-3/4"Lg. A-513					
	5	2	02062351	WALL BOW: 18ga. x 1" x 2" x 26-5/8"Lg. A-513					
	4	2		TUBE: 16ga. x 1" x 1" x 48-3/8"Lg. A-513					
	3	4		WALL BOW: 18ga. x 1" x 2" x 68"Lg. A-513					
	2	2	02071055	TUBE: 16ga. x 1" x 1" x 80"Lg. A-513					
	1	6		ANGLE: 16ga. x 1" x 2" x 3"Lg. A-513					
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION					
			TOLERANCE OTHERWISE SE	STANGNALL BUS					
_									

32-25-0010-11

NOTES:

1- DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.

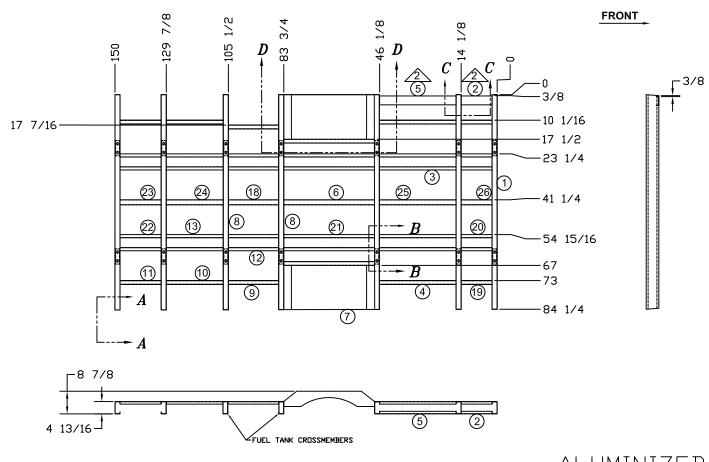
★ 2- DON'T INSTALL THIS TUBE ON NEW STYLE REAR CAPS.

ı	THIS DRAWING AND THE INFORMATION THEREON ARE THE
ı	EXCLUSIVE PROPERTY OF STARCRAFT BUS. A DIVISION OF
ı	FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN
ı	ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE
ı	PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN
ı	CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO
ı	WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED
ı	TO STARCRAFT BUS, A DIVISION OF FOREST RIVER.

				INC. 140.	Q 11.	17411114	·	1VI/ (1 L1	WIL DESCRI	.1011
						TOLERAN	CE UNLESS	STAF	RCRAFT	BUS 😂
						OTHERWIS	E SPECIFIED	a division of Forest River, Inc.		
						WOOD	OTHER	DATE: 06/05/19		II, Rear Window
						<u>+</u> 1/8"	± 1/16"	NAME: MK	W/ 30" x 48" WINDOW	
Έγ.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.	± 1°	± 1/2°	DWG No. 3	32-25-0010-11	

▼ CRITICAL CONTROL ITEM

USAGE: FORD E-350 138" WHEEL BASE NARROW BODY



NOTES:

1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.

- 2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSID EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.
 - 3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

ALUMINIZED

±1/16" NAME: MK

±1/2° DWG. No.

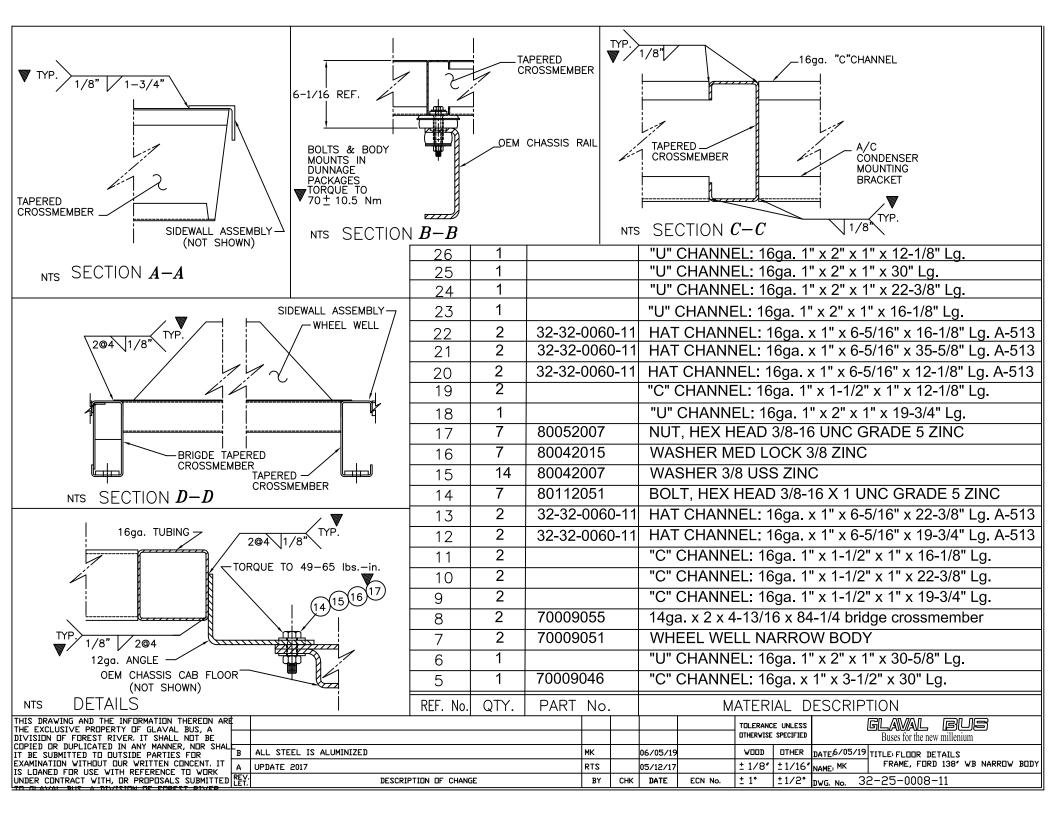
DE	4	2	"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.								
_	3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513							
	2	1		"C" CHANNEL: 16ga. x 1" x 3-1/2" x 12-1/8" Lg.							
	1	5	71009018	14ga. x 2 x 4-13/16 x 84-1/4 CROSSMEMBER A-365							
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION							
				TOLERANCE UNLESS GLAVAL BUS							

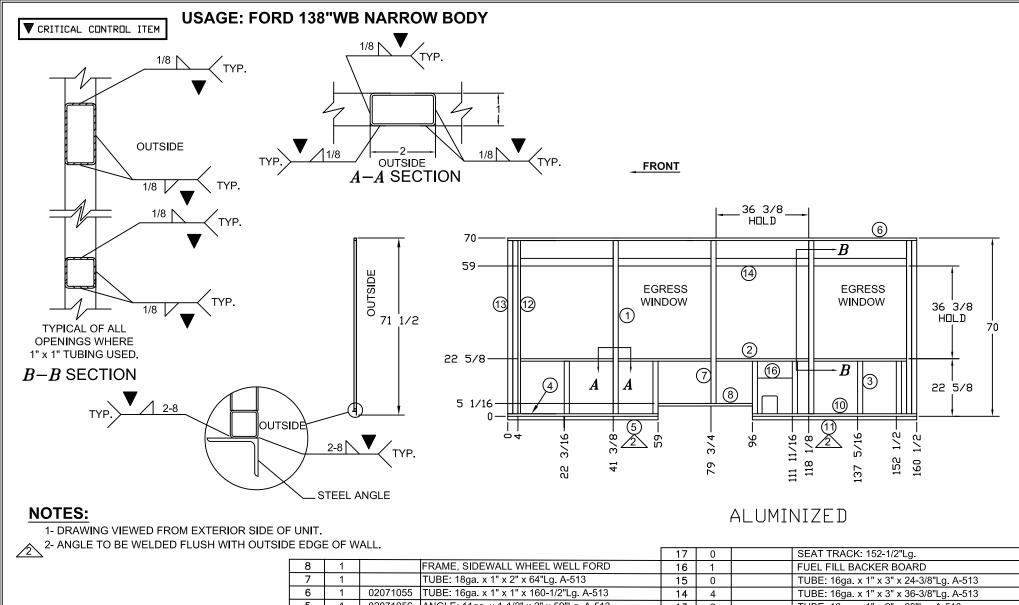
THIS DRAWING AND THE INFORMATION THEREON ARE
THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A
DIVISION OF FOREST RIVER. IT SHALL NOT BE
COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL
IT BE SUBMITTED TO OUTSIDE PARTIES FOR
B EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED REV

						TOLERANCI	E UNLESS
						OTHERWISE	SPECIFIED
8	ALL STEEL IS ALUMINIZED	MK		06/05/19		WOOD	OTHER
7	UPDATE 2017	RTS		05/12/17		± 1/8"	±1/16"
EV.	DESCRIPTION OF CHANGE	ΒV	CHK	DATE	ECN No	+ 10	+1/2*

GLAVAL BUS Buses for the new millenium DATE:6/05/19 TITLE: FLOOR FRAME, FORD 138" WB NARROW BODY

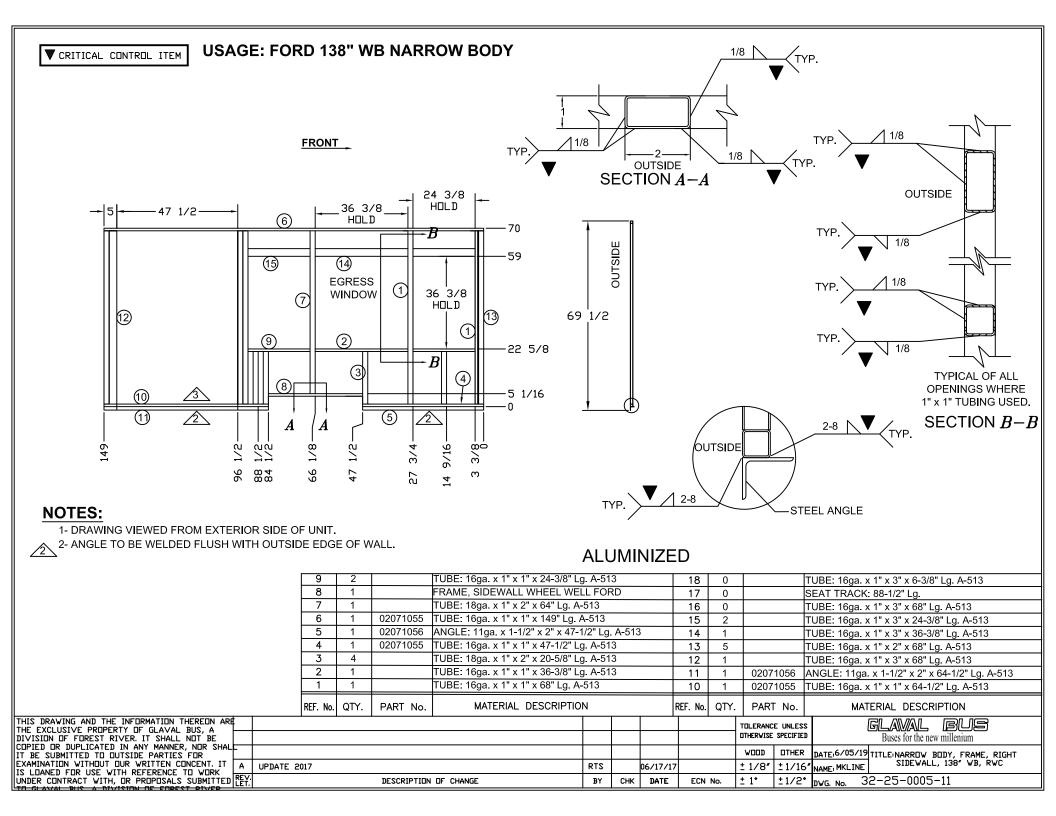
32-25-0008-11

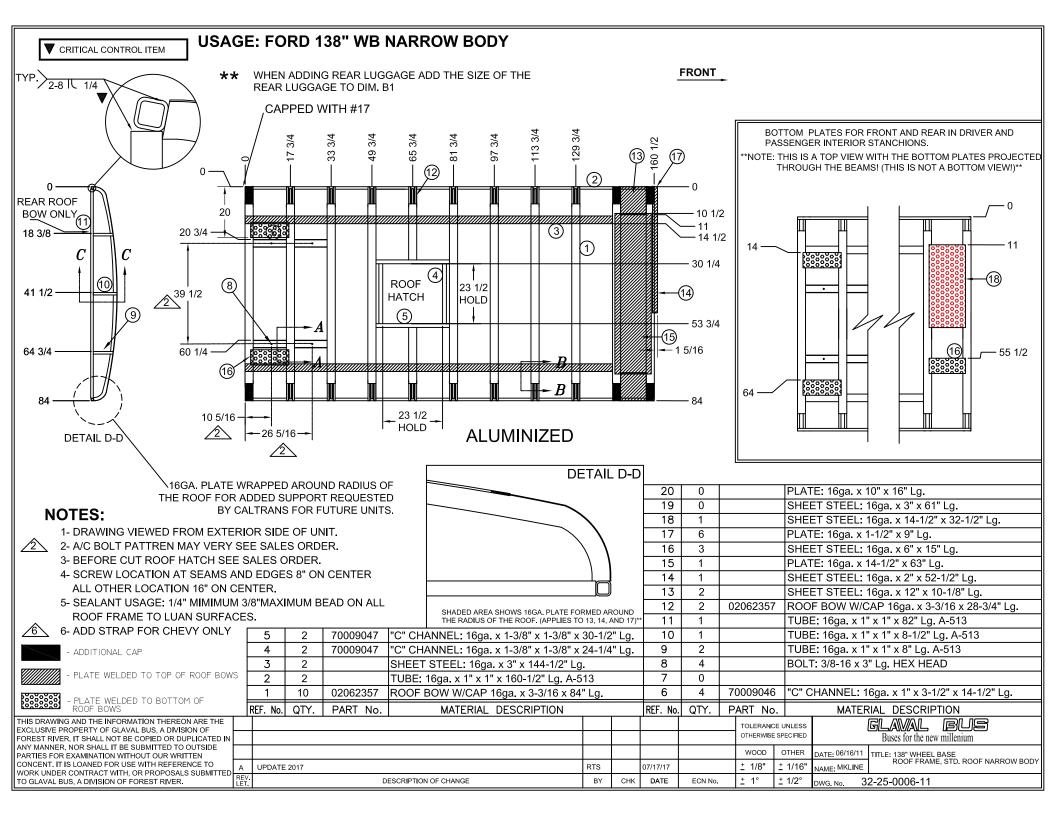


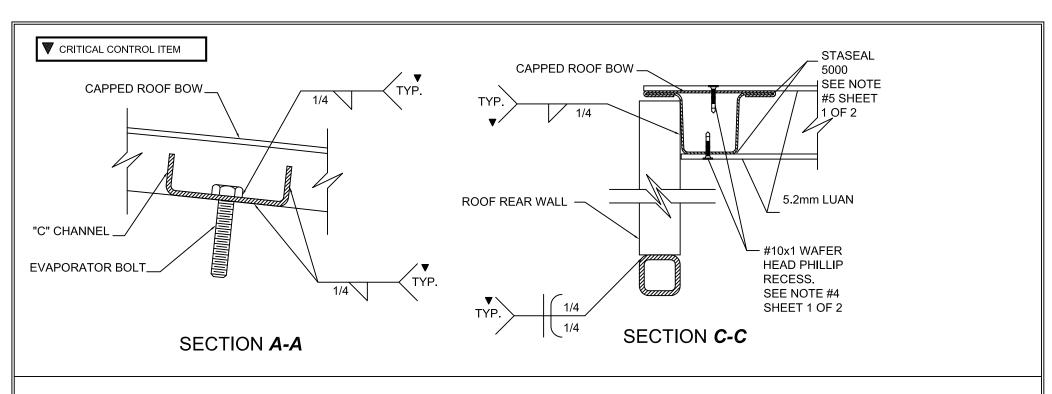


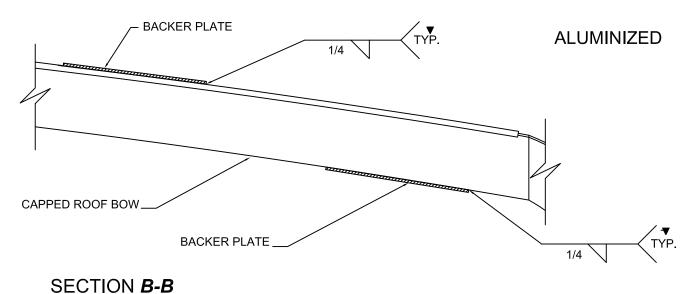
					'/	U		3LAT TRACK. 132-1/2 Lg.
	8	1		FRAME, SIDEWALL WHEEL WELL FORD	16	1		FUEL FILL BACKER BOARD
	7 1 TUBE: 18ga. x 1" x 2" x 64"Lg. A-513		15	0		TUBE: 16ga. x 1" x 3" x 24-3/8"Lg. A-513		
Į	6 1 02071055 TUBE: 16ga. x 1" x 1" x 160-1/2"Lg. A-513		14	4		TUBE: 16ga. x 1" x 3" x 36-3/8"Lg. A-513		
	5	1	02071056	ANGLE: 11ga. x 1-1/2" x 2" x 59"Lg. A-513	13	2		TUBE: 16ga. x 1" x 2" x 68"Lg. A-513
	4	1	02071055	TUBE: 16ga. x 1" x 1" x 59"Lg. A-513	12	1		TUBE: 16ga. x 1" x 1" x 68"Lg. A-513
	3	6		TUBE: 18ga. x 1" x 2" x 20-5/8"Lg. A-513	11	1	02071056	ANGLE: 11ga. x 1-1/2" x 2" x 64-1/2"Lg. A-513
	2	4		TUBE: 16ga. x 1" x 1" x 36-3/8"Lg. A-513	10	1	02071055	TUBE: 16ga. x 1" x 1" x 64-1/2"Lg. A-513
ļ	1	4		TUBE: 18ga. x 1" x 2" x 68"Lg. A-513	9	0		TUBE: 16ga. x 1" x 1" x 24-3/8"Lg. A-513
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION

THIS DRAWING AND THE INFORMATION THEREON ARE
THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A
DIVISION OF FOREST RIVER: IT SHALL NOT BE
COPIED OR DUPLICATED IN ANY MANNER, NOR SHAL
IT BE SUBMITTED TO OUTSIDE PARTIES FOR
EXAMINATION WITHOUT DUR WRITTEN CONCENT. IT A
IS IDANED FOR ISSE WITH REFERENCE TO WORK BUS GLAVAL TOLERANCE UNLESS OTHERWISE SPECIFIED Buses for the new millenium DATE 6/05/19 TITLE NARROW BODY, FRAME, LEFT OTHER WOOD ± 1/8" SIDEWALL, 138'WB, ALL PASS. UPDATE 2017 RTS 07/17/17 ±1/16" NAME: MK IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED REYLEFT. ±1/2° DWG. No. 32-25-0001-11 DESCRIPTION OF CHANGE DATE ECN No.





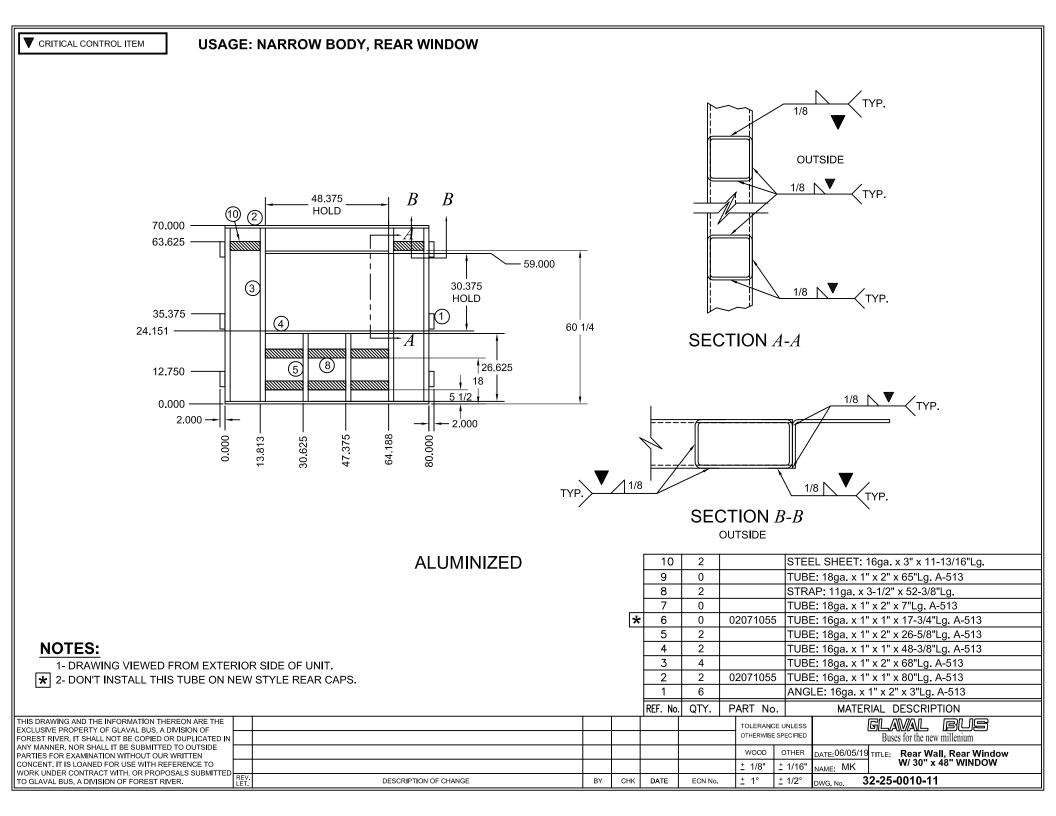




1	TOLERANCE UNLESS	GLA	\\\\/\a\/L /		
	EVAPORATOR MODEL	A-1	A - 2	B-1	B - 2
	EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2
	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2
	EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2
	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2
F	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2
	EM-3 & RE-30	28-1/4	39-1/2	10	16
	EM-6 & RE-10	36	24	10	9-1/2
	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2
	T/A-30	31	34	10	9-1/2
	T/A-70	36-3/4	22-1/2	10	11-5/8
Т	/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4
	T/A-73	28-1/4	39-1/2	10	9-1/2
	T/A-77	18-1/4	59-1/2	10	10-3/8
1	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4
1	ACC 23022 SERIES	38	20	10	14-3/4
Т	/A-71 NEW STYLE	33-5/8	30	10	12-1/4

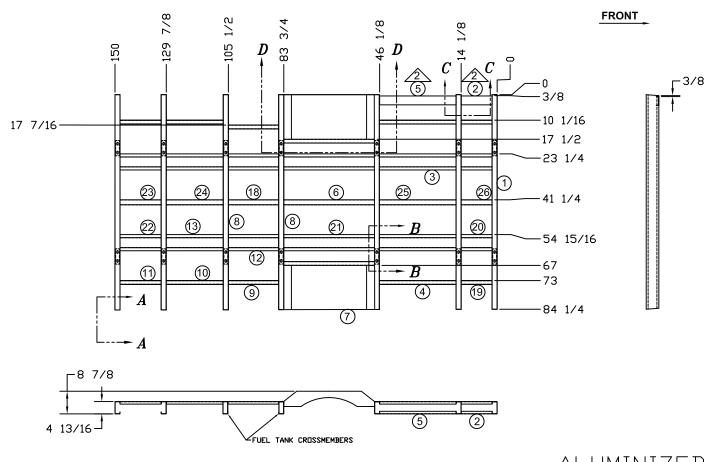
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF GLAVAL BUS, A DIVISION OF FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED TO GLAVAL BUS. A DIVISION OF FOREST RIVER.

TOLERANCE UNLESS OTHERWISE SPECIFIED Buses for the new millenium WOOD OTHER DATE: 06/16/11 TITLE: FRAME, ROOF FORD 138" WB NARROW BODY ± 1/8" NAME: MKD UPDATE 2017 RTS 06/17/17 ± 1/16" REV. LET. <u>†</u> 1/2° DESCRIPTION OF CHANGE DATE 32-25-0006-11



▼ CRITICAL CONTROL ITEM

USAGE: FORD E-350 138" WHEEL BASE NARROW BODY



NOTES:

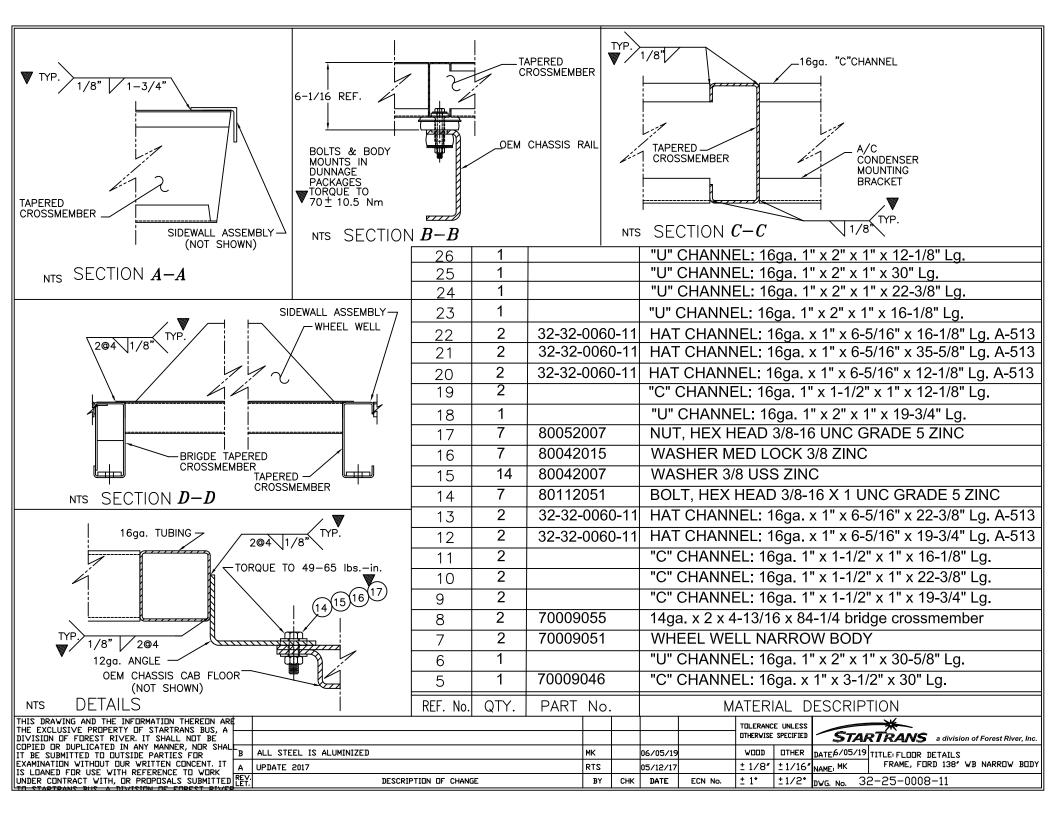
1- DRAWING VIEWED FROM INTERIOR SIDE OF UNIT.

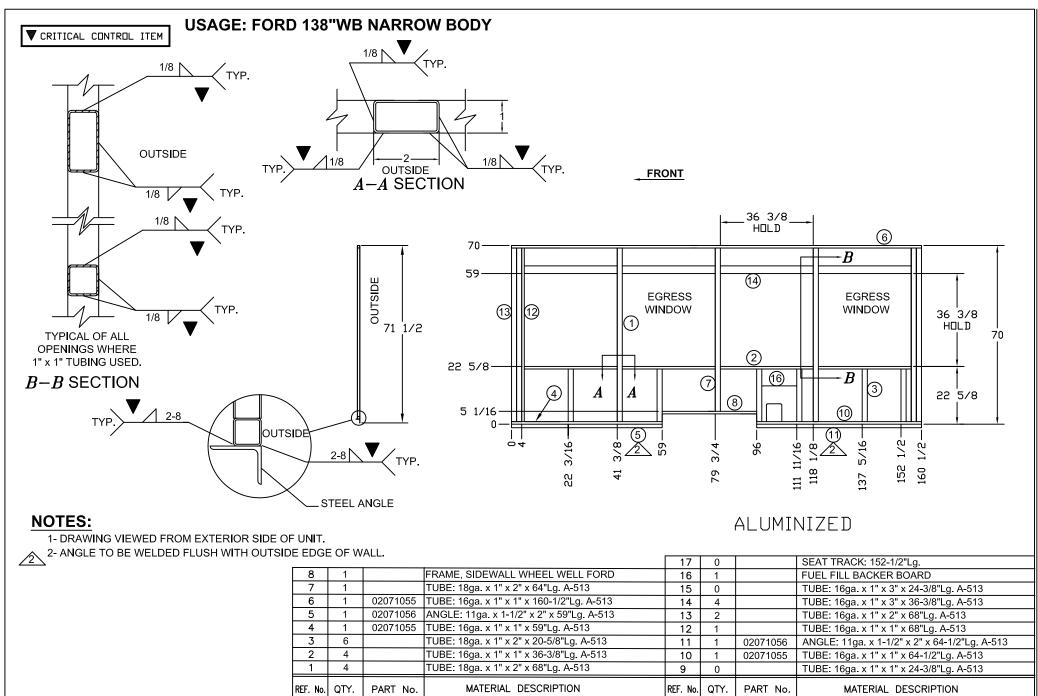
- 2- LOCATION OF A/C BRACKETS: ONE MOUNT FLUSH WITH OUTSID EDGE OF CROSSMEMBER. THE OTHER MOUNTS 14-3/4" FROM OUTSIDE EDGE OF CROSSMEMBER.
 - 3- SEE SHEET 2 OF 2 FOR DETAILS, TORQUE SPECIFICATIONS, SECTION VIEWS AND CUT LIST.

ALUMINIZED

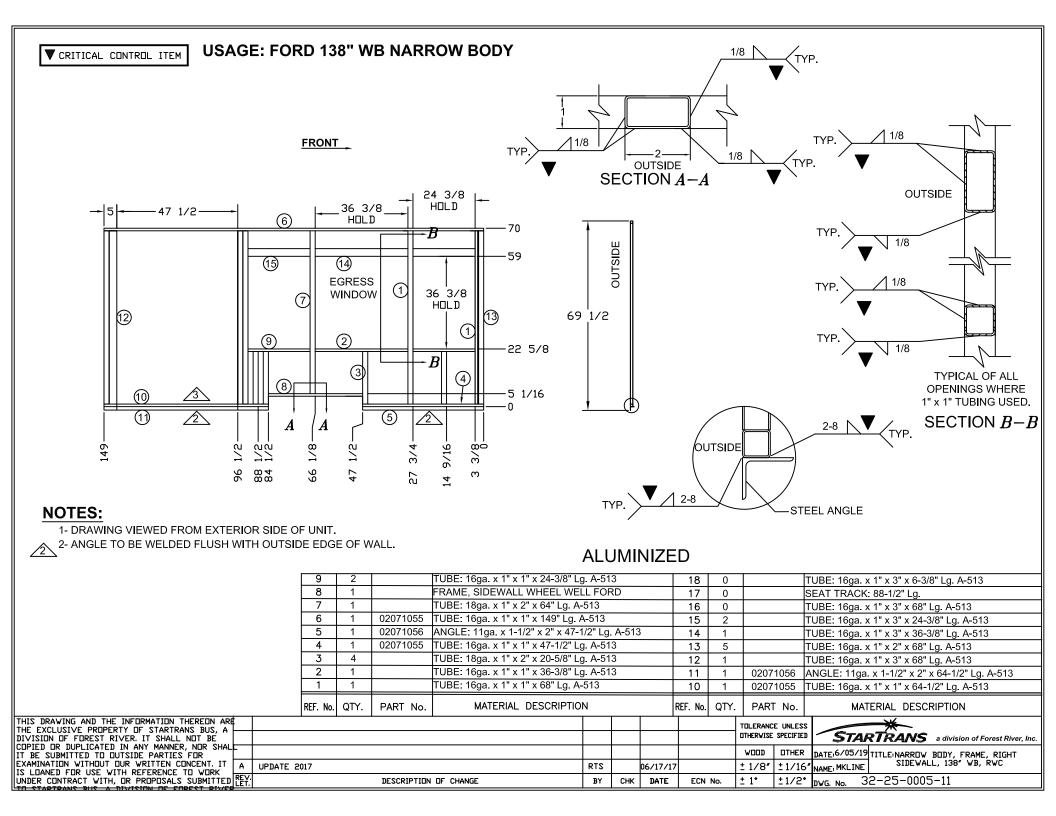
DE	4	2		"C" CHANNEL: 16ga. 1" x 1-1/2" x 1" x 30" Lg.							
_ [3	2	32-32-0060-11	HAT CHANNEL: 16ga. x 1" x 6-5/16" x 30" Lg. A-513							
	2	1		"C" CHANNEL: 16ga. x 1" x 3-1/2" x 12-1/8" Lg.							
	1	1 5 71009018 14ga. x 2 x 4-13/16 x 8		14ga. x 2 x 4-13/16 x 84-1/4 CROSSMEMBER A-365							
	REF. No.	QTY.	PART No.	MATERIAL DESCRIPTION							
				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \							

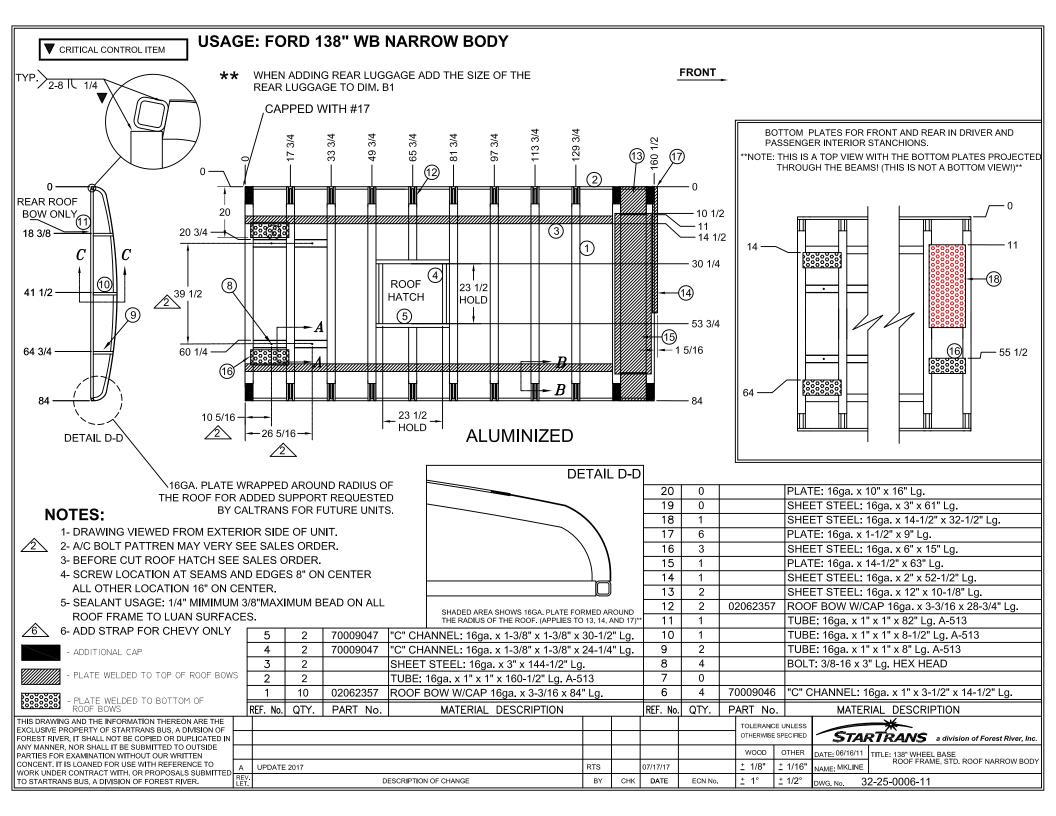
THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF STARTRANS BUS, A TOLERANCE UNLESS DIVISION OF FOREST RIVER IT SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER, NOR SHALL IT BE SUBMITTED TO DUTSIDE PARTIES FOR OTHERWISE SPECIFIED STARTRANS a division of Forest River, Inc. ALL STEEL IS ALUMINIZED DATE:6/05/19 TITLE: FLOOR FRAME, MK 06/05/19 WOOD OTHER FORD 138" WB NARROW BODY EXAMINATION WITHOUT OUR WRITTEN CONCENT. IT ± 1/8" ±1/16" NAME: MK UPDATE 2017 RTS 05/12/17 IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED REV ±1/2° DWG. No. DESCRIPTION OF CHANGE DATE ECN No. 32-25-0008-11

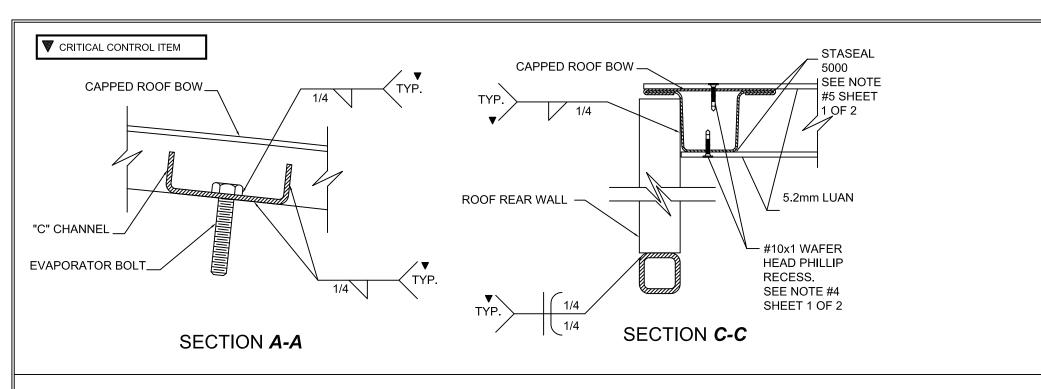


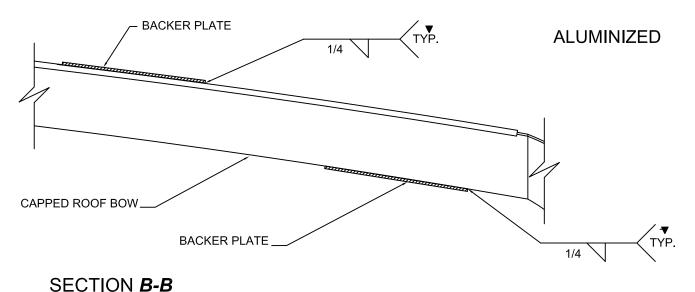


THIS DRAWING AND THE INFORMATION THEREON ARE THE EXCLUSIVE PROPERTY OF STARTRANS BUS, A TOLERANCE UNLESS OTHERWISE SPECIFIED STARTRANS a division of Forest River, Inc. DIVISION OF FOREST RIVER, IT SHALL NOT BE IT SHALL NOT BE COPIED OF THE STATE OF THE SHALL IT BE SUBMITTED TO OUTSIDE PARTIES FOR EXAMINATION WITHOUT DUR WRITTEN CONCENT. IT DATE: 6/05/19 TITLE:NARROW BODY, FRAME, LEFT WOOD DTHER SIDEWALL, 138"WB, ALL PASS. UPDATE 2017 RTS 07/17/17 ± 1/84 ±1/16* IS LOANED FOR USE WITH REFERENCE TO WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED REV BY CHK DATE ± 1° ±1/2° 32-25-0001-11 DESCRIPTION OF CHANGE ECN No. DWG. No.









Т	7/A-71 NEW STYLE	33-5/8	30	10	12-1/4					
	ACC 23022 SERIES	38	20	10	14-3/4					
	ACC 23023 SERIES	33-5/8	28-3/4	10	14-3/4					
	T/A-77	18-1/4	59-1/2	10	10-3/8					
	T/A-73	28-1/4	39-1/2	10	9-1/2					
Т	/A-71 OLD STYLE	33-5/8	28-3/4	10	12-1/4					
	T/A-70	36-3/4	22-1/2	10	11-5/8					
	T/A-30	31	34	10	9-1/2					
	EM-14 & RE-29	30-3/4	34-1/2	10	9-1/2					
	EM-6 & RE-10	36	24	10	9-1/2					
	EM-3 & RE-30	28-1/4	39-1/2	10	16					
	RE-15 & RE-20	28-1/4	39-1/2	10	9-1/2					
	EM-1 & EM-2	28-1/4	39-1/2	10	9-1/2					
	EM-7 GEN 5	36-1/8	23-3/4	10	9-1/2					
	EM-2 GEN 5	32-3/8	31-1/16	10	9-1/2					
	EM-1 GEN 5	28-3/16	39-5/8	10	9-1/2					
	EVAPORATOR MODEL	A-1	A-2	B-1	B - 2					
TOLERANCE UNLESS										

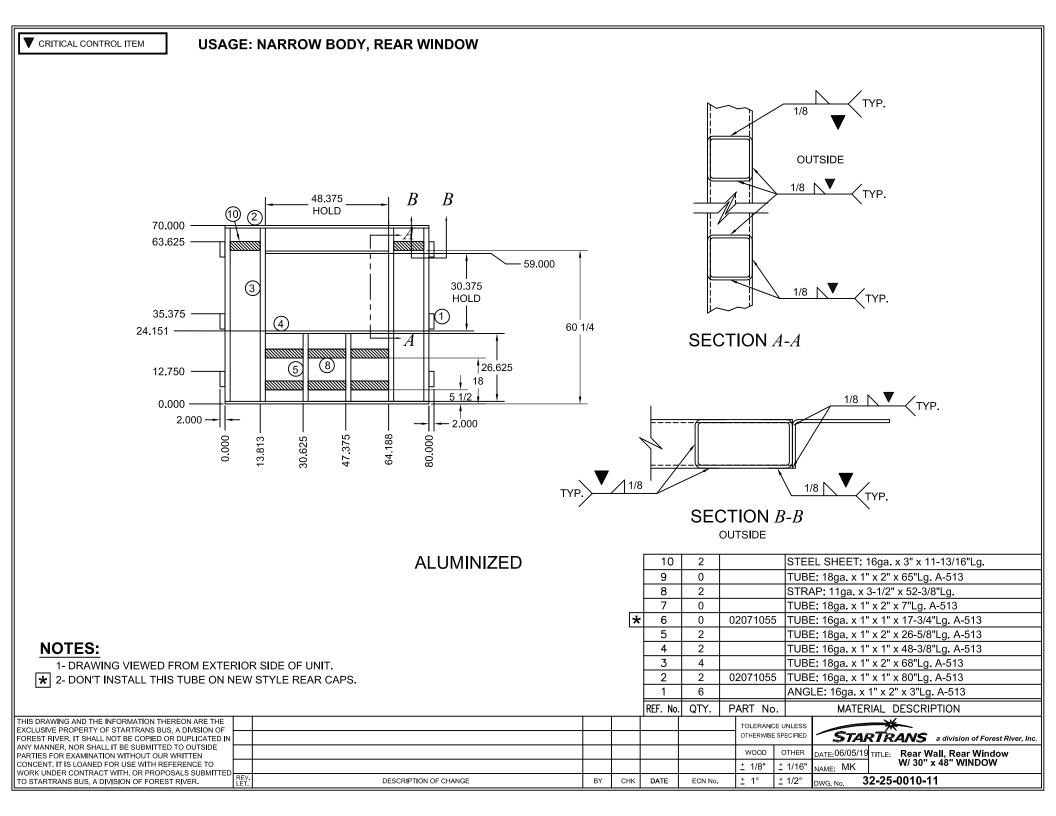
THIS DRAWING AND THE INFORMATION THEREON ARE THE
EXCLUSIVE PROPERTY OF STARTRANS BUS, A DIVISION OF
FOREST RIVER. IT SHALL NOT BE COPIED OR DUPLICATED IN
ANY MANNER, NOR SHALL IT BE SUBMITTED TO OUTSIDE
PARTIES FOR EXAMINATION WITHOUT OUR WRITTEN
CONCENT. IT IS LOANED FOR USE WITH REFERENCE TO
WORK UNDER CONTRACT WITH, OR PROPOSALS SUBMITTED
TO STARTRANS BUS. A DIVISION OF FOREST RIVER.

	MODEL							
		TOLERAN	TOLERANCE UNLESS					
					OTHERWIS	OTHERWISE SPECIFIED		
					WOOD	OTHER	DA	
UPDATE 2017	RTS		06/17/17		<u>+</u> 1/8"	± 1/16"	NA	
DESCRIPTION OF CHANGE	BY	СНК	DATE	ECN No.	+ 1°	+ 1/2°	DIA	

STARTRANS a division of Forest River, Inc.

DATE: 06/16/11
TITLE: FRAME, ROOF FORD
138" WB NARROW BODY

NAME: MKD 138" WB





U.S. Department of Transportation Federal Transit Administration 400 Seventh St., S.W. Washington, D.C. 20590

November 14, 2002

Mr. Arthur Henderson National Sales Manager Starcraft Bus & Mobility P.O. Box 1903 2703 College Avenue Goshen, IN 46526

Dear Mr. Henderson:

This is in response to your letter dated October 31, 2002, in which you requested assistance from the Federal Transit Administration (FTA) concerning the applicability of the Bus Testing Regulation (49 CFR Part 665) to the Starlite bus model manufactured by Starcraft. Your letter states that the Starlite is the "same" as the previously tested Allstar model, "except for the width," and you submitted a package of specifications and drawings in support of that assertion.

You have asked FTA to confirm your interpretation that the Starlite is part of the same family of vehicles as the Allstar, and thus does not require further testing.

FTA has reviewed your request and accompanying documentation and has determined that no additional testing will be required for Starcraft to offer the Starlite in the 5-year, 150,000-mile service life category. This determination is based on the following conclusions drawn from information submitted by Starcraft or contained in our files:

- The Starlite is smaller and lighter overall than the Allstar, but otherwise is constructed with substantially the same design, using the same materials, cross sections, support spacing, and construction methods. The method and location of the body-to-chassis attachments are substantially the same.
- Both the Allstar and Starlite are built on mass-produced chassis differing only in the wheelbase.
- The Allstar model has been fully tested at Altoona in the 5-year, 150,000-mile service life category (Report No. 9814-01-99).

For the reasons stated above, FTA considers the Starlite to be part of the Allstar family of vehicles. Due to the greater size and GVWR of the Allstar, the existing test of the Allstar satisfies testing requirements for smaller vehicles in the Allstar family of vehicles. We would not

expect to obtain substantially different or more adverse data from additional testing of the Starlite.

This determination is based on the changes detailed in your letter or mentioned above. Should you make any other changes to the vehicle, additional testing may be required. If you require any further assistance with this or other matters concerning bus testing, please feel free to contact me at the address above, or by e-mail (marcel.belanger@fta.dot.gov), fax (202-366-3765), or telephone (202-366-0725).

Sincerely,

Marcel Belanger

Bus Testing Program Manager Office of Technology, TRI-20

O:\BUSTEST\Stercraft\Starcraft 103102 - Starlite.doc

1200 New Jersey Avenue SE Washington, D.C. 20590



July 7, 2017

Larry Hall
Director of Engineering
Starcraft Bus, Division of Forest River, Inc.
2367 Century Drive
Goshen, IN 46528

Dear Mr. Hall,

You sent letters to FTA dated November 7, 2014 and November 13, 2014 and an email dated December 2, 2014 in which you requested assistance from the Federal Transit Administration (FTA) concerning the applicability of the Bus Testing Regulation (49 CFR Part 665) to Starcraft bus models being sold as Startrans bus models. In those letters, email and subsequent phone discussions you indicated that:

- Forest River Inc. has purchased the "Startrans" brand. As a result, Forest River intends to offer comparable Starcraft bus models branded as existing Startrans bus models and leverage the existing Startrans bus dealer network to deliver them to FTA grantees.
- The future Startrans bus models will be produced on the same production line as the comparable Starcraft bus models. All future StarTrans Bus models will be structurally the same as the Starcraft Bus model, but will cosmetically have the StarTrans Bus model body lines and badging.
- The remaining Startrans bus production runs to fulfill open contracts will be completed on the Startrans production lines. Once those are completed, all future Startrans bus models will be Starcraft products.
- Starcraft would like to use the existing Starcraft bus testing reports as evidence of satisfying the Bus Testing regulation for the future Startrans bus models built on the Starcraft production lines. The corresponding Starcraft bus model for each Startrans bus model is provided in the table below. The test report for the Starcraft Allstar is PTI-BT-0518. This report also covers the Starlite bus model which is a narrow body version of the Allstar. The test report for the Allstar XL is PTI-BT-0815.

Existing Startrans Bus Model	Corresponding Starcraft Bus Model
Senator II	Allstar
Chassis: Ford E-350/450 & GM 3500/4500	Chassis: Ford E-350/450 & GM 3500/4500
Senator II MFSAB	Allstar
Chassis: Ford E-350/450 & GM 3500/4500	Chassis: Ford E-350/450 & GM 3500/4500
Candidate II	Starlite
Chassis: Ford E-350/450	Chassis: Ford E-350/450
Senator II HD	Allstar XL
Chassis: Ford F-450/550	Chassis: Ford F-450/550

You asked FTA to determine if any testing would be required to offer the existing Starcraft bus models with the "Startrans" name as identified above. FTA reviewed your request and determined that the Starcraft Allstar, Starlite, and Allstar XL built on the Starcraft production line can be offered to FTA grantees as the Startrans Senator II, Senator II MFSAB, Candidate II, Senator II HD without any additional testing. You were advised that Starcraft should submit the latest comparable chassis test report that reflects the correct chassis, fuel type and fuel conversion supplier (if an alternative fuel conversion) and powertrain of the Startrans bus being offered to FTA grantees, in addition to submitting the applicable Starcraft test report (PTI-BT-0518 or PTI-BT-0815).

This revised letter is to confirm that **Starcraft Starlite Transit is the same as the StarTran's Candidate II Transit**. Similarly to your previous representation, both buses are built on the Ford Transit chassis on the same assembly line in the same manner and with the same materials. Bus Testing Report number LTI-BT-R1609 is applicable to both buses.

Existing Startrans Bus Model	Corresponding Starcraft Bus Model
Candidate II	Starlite
Chassis: Ford Transit	Chassis: Ford Transit

This determination is based on the changes outlined to FTA as stated above. Should you make any other changes to the bus models, additional testing may be required. If you require any further assistance with this or other matters concerning Bus Testing, I encourage you to consult the resources provided at www.transit.dot.gov/research-innovation/bus-testing. If you still have questions after checking this website, please feel free to contact me.

Sincerely,

Marcel Belanger

Bus Testing Program Manager Office of Technology, TRI-20 marcel.belanger@dot.gov

202-366-0725

STURAA TEST

7 YEAR

200,000 MILE BUS

from

STARCRAFT BUS, A DIVISION of FOREST RIVER INC.

MODEL ALLSTAR -25

FEBRUARY 2006

PTI-BT-R0518



The Pennsylvania Transportation Institute

201 Research Office Building The Pennsylvania State University University Park, PA 16802 (814) 865-1891

Bus Testing and Research Center

2237 Old Route 220 N. Duncansville, PA 16635

(814) 695-3404

TABLE OF CONTENTS

	<u>Pa</u>	<u>ige</u>
EXECUTIVE S	SUMMARY	3
ABBREVIATIO	DNS	5
BUS CHECK-I	N	6
1. MAINTAIN	ABILITY	
1.1 1.2	ACCESSIBILITY OF COMPONENTS AND SUBSYSTEMSSERVICING, PREVENTATIVE MAINTENANCE, AND REPAIR AND MAINTENANCE DURING TESTING	
1.3	REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS	
	TY - DOCUMENTATION OF BREAKDOWN AND REPAIR	26
3. SAFETY - A	A DOUBLE-LANE CHANGE (OBSTACLE AVOIDANCE TEST)	28
	ANCE - AN ACCELERATION, GRADEABILITY, AND TOP	31
5. STRUCTU	RAL INTEGRITY	
5.1	STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL SHAKEDOWN TEST	35
5.2	STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL DISTORTION	39
5.3	STRUCTURAL STRENGTH AND DISTORTION TESTS - STATIC TOWING TEST	51
5.4	STRUCTURAL STRENGTH AND DISTORTION TESTS - DYNAMIC TOWING TEST	52
5.5	STRUCTURAL STRENGTH AND DISTORTION TESTS - JACKING TEST	55
5.6	STRUCTURAL STRENGTH AND DISTORTION TESTS - HOISTING TEST	57
5.7	STRUCTURAL DURABILITY TEST	
	NOMY TEST - A FUEL CONSUMPTION TEST USING AN ATE OPERATING CYCLE	65
7. NOISE		
7.1 7.2	INTERIOR NOISE AND VIBRATION TESTS	80 86

EXECUTIVE SUMMARY

Starcraft Bus, a Division of Forest River Inc. submitted a model Allstar-25, gasoline-powered 17 seat (including the driver) 25-foot bus, for a 7 yr/200,000 mile STURAA test. The odometer reading at the time of delivery was 529.0 miles. Testing started on December 6, 2005 and was completed on February 14, 2006. The Check-In section of the report provides a description of the bus and specifies its major components.

The primary part of the test program is the Structural Durability Test, which also provides the information for the Maintainability and Reliability results. The Structural Durability Test was started on December 14, 2005 and was completed on February 1, 2006.

The interior of the bus is configured with seating for 17 passengers including the driver + 1 wheelchair position. Free floor space will accommodate 10 standing passengers resulting in a potential capacity of 27 persons + 1 wheelchair position. At 150 lbs per person 600 lbs per wheelchair position, this load results in a measured gross vehicle weight of 13,950 lbs. The first segment of the Structural Durability Test was performed with the bus loaded to a GVW of 13,950 lbs. The middle segment was performed at a seated load weight of 12,500 lbs and the final segment was performed at a curb weight of 9,510 lbs. Durability driving resulted in no unscheduled maintenance and failures.

Accessibility, in general, was adequate, components covered in Section 1.3 (Repair and/or Replacement of Selected Subsystems) along with all other components encountered during testing, were found to be readily accessible and no restrictions were noted.

The Reliability section compiles failures that occurred during Structural Durability Testing. Breakdowns are classified according to subsystems. The data in this section are arranged so that those subsystems with more frequent problems are apparent. The problems are also listed by class as defined in Section 2. The test bus encountered no failures during the Structural Durability Test.

The Safety Test, (a double-lane change, obstacle avoidance test) was safely performed in both right-hand and left-hand directions up to a maximum test speed of 45 mph. The performance of the bus is illustrated by a speed vs. time plot. Acceleration and gradeability test data are provided in Section 4, Performance. The average time to obtain 50 mph was 13.75 seconds.

The Shakedown Test produced a maximum final loaded deflection of 0.224 inches with a permanent set ranging between -0.003 to 0.005 inches under a distributed static load of 10,725 lbs. The Distortion Test was completed with all subsystems, doors and escape mechanisms operating properly. Water leakage observed during the test at the top of the rear door between the door and the door frame.

The test bus was not equipped with any type of tow eyes or tow hooks, therefore, the Static Towing Test was not performed. The Dynamic Towing Test was performed by means of a front-lift tow. The towing interface was accomplished using a hydraulic under-lift wrecker. The bus was towed without incident and no damage resulted from the test. The manufacturer does not recommend towing the bus from the rear; therefore, a rear test was not performed. The Jacking and Hoisting Tests were also performed without incident. The bus was found to be stable on the jack stands, and the minimum jacking clearance observed with a tire deflated was 8.8 inches.

A Fuel Economy Test was run on simulated central business district, arterial, and commuter courses. The results were 6.39 mpg, 6.90 mpg, and 10.17 mpg respectively; with an overall average of 7.32 mpg.

A series of Interior and Exterior Noise Tests was performed. These data are listed in Section 7.1 and 7.2 respectively.

STURAA TEST

7 YEAR

200,000 MILE BUS

from

STARCRAFT BUS, A DIVISION of FOREST RIVER INC.

MODEL ALLSTAR -25

FEBRUARY 2006

PTI-BT-R0518



The Pennsylvania Transportation Institute

201 Research Office Building The Pennsylvania State University University Park, PA 16802 (814) 865-1891

Bus Testing and Research Center

2237 Old Route 220 N. Duncansville, PA 16635

(814) 695-3404

TABLE OF CONTENTS

	<u>Pa</u>	<u>ige</u>
EXECUTIVE S	SUMMARY	3
ABBREVIATIO	DNS	5
BUS CHECK-I	N	6
1. MAINTAIN	ABILITY	
1.1 1.2	ACCESSIBILITY OF COMPONENTS AND SUBSYSTEMSSERVICING, PREVENTATIVE MAINTENANCE, AND REPAIR AND MAINTENANCE DURING TESTING	
1.3	REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS	
	TY - DOCUMENTATION OF BREAKDOWN AND REPAIR	26
3. SAFETY - A	A DOUBLE-LANE CHANGE (OBSTACLE AVOIDANCE TEST)	28
	ANCE - AN ACCELERATION, GRADEABILITY, AND TOP	31
5. STRUCTU	RAL INTEGRITY	
5.1	STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL SHAKEDOWN TEST	35
5.2	STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL DISTORTION	39
5.3	STRUCTURAL STRENGTH AND DISTORTION TESTS - STATIC TOWING TEST	51
5.4	STRUCTURAL STRENGTH AND DISTORTION TESTS - DYNAMIC TOWING TEST	52
5.5	STRUCTURAL STRENGTH AND DISTORTION TESTS - JACKING TEST	55
5.6	STRUCTURAL STRENGTH AND DISTORTION TESTS - HOISTING TEST	57
5.7	STRUCTURAL DURABILITY TEST	
	NOMY TEST - A FUEL CONSUMPTION TEST USING AN ATE OPERATING CYCLE	65
7. NOISE		
7.1 7.2	INTERIOR NOISE AND VIBRATION TESTS	80 86

EXECUTIVE SUMMARY

Starcraft Bus, a Division of Forest River Inc. submitted a model Allstar-25, gasoline-powered 17 seat (including the driver) 25-foot bus, for a 7 yr/200,000 mile STURAA test. The odometer reading at the time of delivery was 529.0 miles. Testing started on December 6, 2005 and was completed on February 14, 2006. The Check-In section of the report provides a description of the bus and specifies its major components.

The primary part of the test program is the Structural Durability Test, which also provides the information for the Maintainability and Reliability results. The Structural Durability Test was started on December 14, 2005 and was completed on February 1, 2006.

The interior of the bus is configured with seating for 17 passengers including the driver + 1 wheelchair position. Free floor space will accommodate 10 standing passengers resulting in a potential capacity of 27 persons + 1 wheelchair position. At 150 lbs per person 600 lbs per wheelchair position, this load results in a measured gross vehicle weight of 13,950 lbs. The first segment of the Structural Durability Test was performed with the bus loaded to a GVW of 13,950 lbs. The middle segment was performed at a seated load weight of 12,500 lbs and the final segment was performed at a curb weight of 9,510 lbs. Durability driving resulted in no unscheduled maintenance and failures.

Accessibility, in general, was adequate, components covered in Section 1.3 (Repair and/or Replacement of Selected Subsystems) along with all other components encountered during testing, were found to be readily accessible and no restrictions were noted.

The Reliability section compiles failures that occurred during Structural Durability Testing. Breakdowns are classified according to subsystems. The data in this section are arranged so that those subsystems with more frequent problems are apparent. The problems are also listed by class as defined in Section 2. The test bus encountered no failures during the Structural Durability Test.

The Safety Test, (a double-lane change, obstacle avoidance test) was safely performed in both right-hand and left-hand directions up to a maximum test speed of 45 mph. The performance of the bus is illustrated by a speed vs. time plot. Acceleration and gradeability test data are provided in Section 4, Performance. The average time to obtain 50 mph was 13.75 seconds.

The Shakedown Test produced a maximum final loaded deflection of 0.224 inches with a permanent set ranging between -0.003 to 0.005 inches under a distributed static load of 10,725 lbs. The Distortion Test was completed with all subsystems, doors and escape mechanisms operating properly. Water leakage observed during the test at the top of the rear door between the door and the door frame.

The test bus was not equipped with any type of tow eyes or tow hooks, therefore, the Static Towing Test was not performed. The Dynamic Towing Test was performed by means of a front-lift tow. The towing interface was accomplished using a hydraulic under-lift wrecker. The bus was towed without incident and no damage resulted from the test. The manufacturer does not recommend towing the bus from the rear; therefore, a rear test was not performed. The Jacking and Hoisting Tests were also performed without incident. The bus was found to be stable on the jack stands, and the minimum jacking clearance observed with a tire deflated was 8.8 inches.

A Fuel Economy Test was run on simulated central business district, arterial, and commuter courses. The results were 6.39 mpg, 6.90 mpg, and 10.17 mpg respectively; with an overall average of 7.32 mpg.

A series of Interior and Exterior Noise Tests was performed. These data are listed in Section 7.1 and 7.2 respectively.

ABBREVIATIONS

ABTC - Altoona Bus Test Center

A/C - air conditioner

ADB - advance design bus

ATA-MC - The Maintenance Council of the American Trucking Association

CBD - central business district

CW - curb weight (bus weight including maximum fuel, oil, and coolant; but

without passengers or driver)

dB(A) - decibels with reference to 0.0002 microbar as measured on the "A" scale

DIR - test director
DR - bus driver

EPA - Environmental Protection Agency

FFS - free floor space (floor area available to standees, excluding ingress/egress areas,

area under seats, area occupied by feet of seated passengers, and the vestibule area)

GVL - gross vehicle load (150 lb for every designed passenger seating

position, for the driver, and for each 1.5 sq ft of free floor space)

GVW - gross vehicle weight (curb weight plus gross vehicle load)

GVWR - gross vehicle weight rating

MECH - bus mechanicmpg - miles per gallonmph - miles per hour

PM - Preventive maintenance

PSBRTF - Penn State Bus Research and Testing Facility

PTI - Pennsylvania Transportation Institute

rpm - revolutions per minute

SAE - Society of Automotive Engineers

SCH - test scheduler

SEC - secretary

SLW - seated load weight (curb weight plus 150 lb for every designed passenger seating

position and for the driver)

STURAA - Surface Transportation and Uniform Relocation Assistance Act

TD - test driver

TECH - test technician
TM - track manager
TP - test personnel

TEST BUS CHECK-IN

I. OBJECTIVE

The objective of this task is to log in the test bus, assign a bus number, complete the vehicle data form, and perform a safety check.

II. TEST DESCRIPTION

The test consists of assigning a bus test number to the bus, cleaning the bus, completing the vehicle data form, obtaining any special information and tools from the manufacturer, determining a testing schedule, performing an initial safety check, and performing the manufacturer's recommended preventive maintenance. The bus manufacturer must certify that the bus meets all Federal regulations.

III. DISCUSSION

The check-in procedure is used to identify in detail the major components and configuration of the bus.

The test bus consists of a Starcraft Bus, model Allstar-25. The bus has a front door, rear of the front axle, and a dedicated handicap entrance rear of the rear axle. Note: the test bus was not equipped with a handicap device. Power is provided by a gasoline-fueled, Ford Motor Co. model 6.8 L EFI V10 engine coupled to a Ford Motor Co. model Elec 5-spd AOD transmission.

The measured curb weight is 3,810 lbs for the front axle and 5,700 lbs for the rear axle. These combined weights provide a total measured curb weight of 9,510 lbs. There are 17 seats including the driver, 1 wheelchair position and room for 10 standing passengers bringing the total passenger capacity to 27 + 1 wheelchair position. Gross load is 150 lb x 27 = 4,050 lbs + 600 lbs (wheelchair position) = 4,650 lbs. At full capacity, the measured gross vehicle weight is 13,950 lbs.

VEHICLE DATA FORM

Bus Number: 0518	Arrival Date: 12-6-05
Bus Manufacturer: Starcraft Bus	Vehicle Identification Number (VIN): 1FDXE45516HA98012
Model Number: Allstar-25	Date: 12-6-05
Personnel: S.C.	

WEIGHT:

Individual Wheel Reactions:

Weights	hts Front Axle		Middle Axle		Rear Axle	
(lb)	Right	Left	Right	Left	Right	Left
CW	1,970	1,840	N/A	N/A	2,930	2,770
SLW	2,180	2,080	N/A	N/A	4,170	4,070
GVW	2,370	2,250	N/A	N/A	4,750	4,580

Total Weight Details:

Weight (lb)	CW	SLW	GVW	GAWR
Front Axle	3,810	4,260	4,620	4,600
Middle Axle	N/A	N/A	N/A	N/A
Rear Axle	5,700	8,240	9,330	9,450
Total	9,510	12,500	13,950	GVWR: 14,050

Dimensions:

Length (ft/in)	25 / 11
Width (in)	98
Height (in)	112
Front Overhang (in)	33
Rear Overhang (in)	88
Wheel Base (in)	190
Wheel Track (in)	Front: 68.3
, ,	Rear: 78.0

Bus Number: 0518	Date: 12-6-05

CLEARANCES:

Lowest Point Outside Front Axle	Location: Steering linkage	Clearance(in): 11.4
Lowest Point Outside Rear Axle	Location: Exhaust	Clearance(in): 11.2
Lowest Point between Axles	Location: Step	Clearance(in): 8.3
Ground Clearance at the center (in)	9.6	
Front Approach Angle (deg)	22.1	
Rear Approach Angle (deg)	9.5	
Ramp Clearance Angle (deg)	8.2	
Aisle Width (in)	17.1	
Inside Standing Height at Center Aisle (in)	92.2	

BODY DETAILS:

DOD'I DE ITALES:				
Body Structural Type	Integral			
Frame Material	Steel	Steel		
Body Material	Aluminum, fiberglas	s & steel		
Floor Material	Plywood			
Roof Material	Fiberglass			
Windows Type	□ Fixed	■ Movable		
Window Mfg./Model No.	Safety DOT 269 / A	SE M180		
Number of Doors	1 Front	1 Rear		
Mfr. / Model No.	A & M Systems / 2133.1/213380			
Dimension of Each Door (in)	Front - 32.6 x 81.5 Rear – 45.6 x 70.0			
Passenger Seat Type	□ Cantilever	■ Pedestal	□ Other (explain)	
Mfr. / Model No.	Freedman Seating Co. / Mid-Back Double			
Driver Seat Type	□ Air	□ Spring	■ Other (Cushion)	
Mfr. / Model No.	Freedman Seating Co. / Hi-Back			
Number of Seats (including Driver)	17			

Bus Number: 0518	
Bus Number: 0518	Date: 12-6-05

BODY DETAILS (Contd..)

Free Floor Space (ft ²)	16.4
Height of Each Step at Normal	Front 1. 10.0 2. 9.6 3. 10.1 4. N/A
Position (in)	Middle 1. <u>N/A</u> 2. <u>N/A</u> 3. <u>N/A</u> 4. <u>N/A</u>
	Rear 1. <u>N/A</u> 2. <u>N/A</u> 3. <u>N/A</u> 4. <u>N/A</u>
Step Elevation Change - Kneeling (in)	N/A

ENGINE

ENGINE			
Туре	□ C.I.	□ Alternate Fuel	
	■ S.I.	□ Other (explain)	
Mfr. / Model No.	Ford Motor Co. / 6.8	3 L EFI V10	
Location	■ Front	□ Rear	□ Other (explain)
Fuel Type	■ Gasoline	□ CNG	□ Methanol
	□ Diesel	□ LNG	□ Other (explain)
Fuel Tank Capacity (indicate units)	55 gals		
Fuel Induction Type	■ Injected	□ Carburetion	
Fuel Injector Mfr. / Model No.	Ford Motor Co. / 6.8 L EFI V10		
Carburetor Mfr. / Model No.	N/A		
Fuel Pump Mfr. / Model No.	Ford Motor Co. / 6.8 L EFI V10		
Alternator (Generator) Mfr. / Model No.	Motorcraft / 3GF		
Maximum Rated Output (Volts / Amps)	14.4 / 110		
Air Compressor Mfr. / Model No.	N/A		
Maximum Capacity (ft ³ / min)	N/A		
Starter Type	■ Electrical	□ Pneumatic	□ Other (explain)
Starter Mfr. / Model No.	Visteon / AY05J2		

Bus Number: 0518	Date: 12		2-6-05	
TRANSMISSION				
Transmission Type	□ Manual		■ Automatic	
Mfr. / Model No.	Ford Moto	or Co. / Ele	ec 5-spd AOD	
Control Type	■ Mechan	ical	□ Electrical	□ Other
Torque Converter Mfr. / Model No.	Ford Moto	or Co. / Ele	ec 5-spd AOD	
Integral Retarder Mfr. / Model No.	N/A			
SUSPENSION				
Number of Axles	2			
Front Axle Type	■ Indepen	dent	□ Beam Axle	
Mfr. / Model No.	Ford Moto	or Co. / Tw	vin I-Beam	
Axle Ratio (if driven)	N/A			
Suspension Type	■ Air		□ Spring	□ Other (explain)
No. of Shock Absorbers	2			
Mfr. / Model No.	Motorcraft	:/ C259Y2	2	
Middle Axle Type	□ Indepen	dent	□ Beam Axle	
Mfr. / Model No.	N/A			
Axle Ratio (if driven)	N/A			
Suspension Type	□ Air		□ Spring	□ Other (explain)
No. of Shock Absorbers	N/A			
Mfr. / Model No.	N/A			
Rear Axle Type	□ Indepen	dent	■ Beam Axle	
Mfr. / Model No.	Dana / Ful	II Floating	Dana 10.5H-D	
Axle Ratio (if driven)	4.56		_	_
Suspension Type	□ Air		■ Spring	□ Other

(explain)

No. of Sho	ock Absorbers	2				
Mfr. / Model No.		Motorcraft / C260Y1				
Bus Number: 0518			Date: 12	2-6-05		
WHEELS &	TIRES	<u> </u>				
Front	Wheel Mfr./ Model No.	Ford / 8-Ho	ole Disc, ´	16 x 6.0 St	eel	
	Tire Mfr./ Model No.	Michelin L	TX / LT22	5/75R 16		
Rear	Wheel Mfr./ Model No.	Ford / 8-Ho	ole Disc, ´	16 x 6.0 Ste	eel	
	Tire Mfr./ Model No.	Michelin L	TX / LT22	5/75R 16		
BRAKES						
Front Axle	e Brakes Type	□ Cam	■ D	isc	□ Other (explain)
Mfr. / Mo	odel No.	TRW / na				
Middle Ax	le Brakes Type	□ Cam	□ D	isc	□ Other (explain)
Mfr. / Model No.		N/A	N/A			
Rear Axle	Brakes Type	□ Cam	■ D	■ Disc □ Other (expla		explain)
Mfr. / Model No.		Kelsey Hayes / na				
Retarder ⁻	Туре	N/A				
Mfr. / Mo	odel No.	N/A				
HVAC						
Heating S	ystem Type	□ Air		■ Water		□ Other
Capacity	(Btu/hr)	35,000				
Mfr. / Mo	odel No.	Ford Motor Co. / na				
Air Condit	ioner	■ Yes		□ No		
Location		Dash & Interior ceiling				
Capacity (Btu/hr)		55,000				
A/C Compressor Mfr. / Model No.		Ford / O.E.M.				
STEERING						
Steering Gear Box Type		Hydraulic (gear			

Mfr. / Model No.	Ford / 6C22 3504 AA
Steering Wheel Diameter	15.0
Number of turns (lock to lock)	4.0

Bus Number: 0518	Deta: 12.6.05
Bus Number: 0518	Date: 12-6-05

OTHERS

Wheel Chair Ramps	Location: N/A	Type: N/A
Wheel Chair Lifts	Location: N/A	Type: N/A
Mfr. / Model No.	N/A	
Emergency Exit	Location: Windows Doors	Number: 3 1

CAPACITIES

Fuel Tank Capacity (units)	55 gals
Engine Crankcase Capacity (gallons)	1.5
Transmission Capacity (gallons)	4.4
Differential Capacity (gallons)	2.1
Cooling System Capacity (quarts)	8.2
Power Steering Fluid Capacity (gallons)	Not available.

VEHICLE DATA FORM

ı			١
	Bus Number: 0518	Date: 12-6-05	١

List all spare parts, tools and manuals delivered with the bus.

Part Number	Description	Qty.
Michelin LTX M/S LT225/75R 16	Tires/wheels	6
XC2Z-2C026-BB	Brake rotors	2
FBUZ-1102-DA	Brake rotors	2
FA-1769	Air filter	1
FD-4606	Fuel water separator	1
FL-2016	Oil filter	1
AT-164-G F5UZ-18125-A	Shock absorber	2
AT-163-G F5UZ-18124-B	Shock absorber	2
FT-145	Transmission filter	1
FT-144	Screen assembly	1
BR1276 YU2Z-2V200-BA	Brake pads	1
1C3Z-2001-BA	Brake pads	1
2006 E-Series 6C2J19G219GA	Owner's guide	1
NA	Allstar Owner Manual	1
NA	Trans/Air owner manual	1

COMPONENT/SUBSYSTEM INSPECTION FORM

Bus Number: 0518	Date: 12-6-05

Subsystem	Checked	Comments
Air Conditioning Heating and Ventilation		
Body and Sheet Metal		
Frame		
Steering		
Suspension		
Interior/Seating		
Axles		
Brakes		
Tires/Wheels		
Exhaust		
Fuel System		Gasoline.
Power Plant		
Accessories		
Lift System		Not equipped with a handicap device.
Interior Fasteners		
Batteries		

CHECK - IN



STARCRAFT BUS MODEL ALLSTAR-25



1. MAINTAINABILITY

1.1 ACCESSIBILITY OF COMPONENTS AND SUBSYSTEMS

1.1-I. <u>TEST OBJECTIVE</u>

The objective of this test is to check the accessibility of components and subsystems.

1.1-II. TEST DESCRIPTION

Accessibility of components and subsystems is checked, and where accessibility is restricted the subsystem is noted along with the reason for the restriction.

1.1-III. DISCUSSION

Accessibility, in general, was adequate. Components covered in Section 1.3 (repair and/or replacement of selected subsystems), along with all other components encountered during testing, were found to be readily accessible and no restrictions were noted.

ACCESSIBILITY DATA FORM

Bus Number: 0518	Date: 2-9-06	

Component	Checked	Comments
ENGINE :		
Oil Dipstick		
Oil Filler Hole		
Oil Drain Plug		
Oil Filter		
Fuel Filter		
Air Filter		
Belts		
Coolant Level		
Coolant Filler Hole		
Coolant Drain		
Spark / Glow Plugs		
Alternator		
Diagnostic Interface Connector		
TRANSMISSION:		
Fluid Dip-Stick		
Filler Hole		Fill through dip tube.
Drain Plug		
SUSPENSION:		
Bushings		
Shock Absorbers		
Air Springs	N/A	
Leveling Valves	N/A	
Grease Fittings		

ACCESSIBILITY DATA FORM

Bus Number: 0518	Date: 2-9-06

Component	Checked	Comments
HVAC:		
A/C Compressor		
Filters		
Fans		
ELECTRICAL SYSTEM :		
Fuses		
Batteries		
Voltage regulator		Internal.
Voltage Converters	N/A	
Lighting		
MISCELLANEOUS:		
Brakes		
Handicap Lifts/Ramps	N/A	
Instruments		
Axles		
Exhaust		
Fuel System		
OTHERS:		

1.2 SERVICING, PREVENTIVE MAINTENANCE, AND REPAIR AND MAINTENANCE DURING TESTING

1.2-I. TEST OBJECTIVE

The objective of this test is to collect maintenance data about the servicing, preventive maintenance, and repair.

1.2.-II. TEST DESCRIPTION

The test will be conducted by operating the NBM and collecting the following data on work order forms and a driver log.

- 1. Unscheduled Maintenance
 - a. Bus number
 - b. Date
 - c. Mileage
 - d. Description of malfunction
 - e. Location of malfunction (e.g., in service or undergoing inspection)
 - f. Repair action and parts used
 - g. Man-hours required
- 2. Scheduled Maintenance
 - a. Bus number
 - b. Date
 - c. Mileage
 - d. Engine running time (if available)
 - e. Results of scheduled inspections
 - f. Description of malfunction (if any)
 - g. Repair action and parts used (if any)
 - h. Man-hours required

The buses will be operated in accelerated durability service. While typical items are given below, the specific service schedule will be that specified by the manufacturer.

- A. Service
 - 1. Fueling
 - 2. Consumable checks
 - 3. Interior cleaning
- B. Preventive Maintenance
 - 4. Brake adjustments
 - 5. Lubrication
 - 6. 3,000 mi (or equivalent) inspection

- 7. Oil and filter change inspection
- 8. Major inspection
- 9. Tune-up

C. Periodic Repairs

- 1. Brake reline
- 2. Transmission change
- 3. Engine change
- 4. Windshield wiper motor change
- 5. Stoplight bulb change
- 6. Towing operations
- 7. Hoisting operations

1.2-III. DISCUSSION

Servicing and preventive maintenance were performed at manufacturer-specified intervals. The following Scheduled Maintenance Form lists the mileage, items serviced, the service interval, and amount of time required to perform the maintenance. Table 1 is a list of the lubricating products used in servicing. Finally, the Unscheduled Maintenance List along with Unscheduled Maintenance-related photographs is included in Section 5.7, Structural Durability. This list supplies information related to failures that occurred during the durability portion of testing. The Unscheduled Maintenance List includes the date and mileage at which the malfunction occurred, a description of the malfunction and repair, and the time required to perform the repair.

(Page 1 of 1) SCHEDULED MAINTENANCE Starcraft Bus 0518

DATE	TEST MILES	SERVICE	ACTIVITY	DOWN TIME	HOURS
12-21-05	1,185	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-06-06	2,375	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-13-06	4,131	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-18-06	5,137	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-24-06	6,407	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
01-31-06	7,404	P.M. / Inspection Fuel Economy Prep	Linkage, tie rods, universals/u-joints all lubed; all fluids checked.	4.00	4.00
02-01-06	7,500	P.M. / Inspection	Linkage, tie rods, universals/u-joints all lubed. Oil changed. Oil, fuel, and air filters changed. Transmission oil and filter changed.	8.00	8.00

Table 1. STANDARD LUBRICANTS

The following is a list of Texaco lubricant products used in bus testing conducted by the Penn State University Altoona Bus Testing Center:

<u>ITEM</u>	PRODUCT CODE	TEXACO DESCRIPTION
Engine oil	#2112	URSA Super Plus SAE 30
Transmission oil	#1866	Automatic Trans Fluid Mercon/Dexron II Multipurpose
Gear oil	#2316	Multigear Lubricant EP SAE 80W90
Wheel bearing & Chassis grease	#1935	Starplex II

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS

1.3-I. <u>TEST OBJECTIVE</u>

The objective of this test is to establish the time required to replace and/or repair selected subsystems.

1.3-II. TEST DESCRIPTION

The test will involve components that may be expected to fail or require replacement during the service life of the bus. In addition, any component that fails during the NBM testing is added to this list. Components to be included are:

- 1. Transmission
- 2. Alternator
- 3. Starter
- 4. Batteries
- 5. Windshield wiper motor

1.3-III. <u>DISCUSSION</u>

During the test, no additional components were removed for repair or replacement.

At the end of the test, the remaining items on the list were removed and replaced. The transmission assembly took 4.0 man-hours (two men 2.0 hrs) to remove and replace. The time required for repair/replacement of the four remaining components is given on the following Repair and/or Replacement Form.

REPLACEMENT AND/OR REPAIR FORM

Subsystem	Replacement Time
Transmission	4.00 man hours
Wiper Motor	0.50 man hours
Starter	0.50 man hours
Alternator	0.50 man hours
Batteries	1.00 man hours

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS



TRANSMISSION REMOVAL AND REPLACEMENT (4.00 MAN HOURS)



WIPER MOTOR REMOVAL AND REPLACEMENT (0.50 MAN HOURS)

1.3 REPLACEMENT AND/OR REPAIR OF SELECTED SUBSYSTEMS CONT.



STARTER REMOVAL AND REPLACEMENT (0.50 MAN HOURS)



BATTERY REMOVAL AND REPLACEMENT (1.00 MAN HOURS)

2. RELIABILITY - DOCUMENTATION OF BREAKDOWN AND REPAIR TIMES DURING TESTING

2-I. TEST OBJECTIVE

The objective of this test is to document unscheduled breakdowns, repairs, down time, and repair time that occur during testing.

2-II. TEST DESCRIPTION

Using the driver log and unscheduled work order forms, all significant breakdowns, repairs, man-hours to repair, and hours out of service are recorded on the Reliability Data Form.

CLASS OF FAILURES

Classes of failures are described below:

- (a) <u>Class 1: Physical Safety</u>. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- (b) <u>Class 2: Road Call</u>. A failure resulting in an en route interruption of revenue service. Service is discontinued until the bus is replaced or repaired at the point of failure.
- (c) <u>Class 3:</u> <u>Bus Change</u>. A failure that requires removal of the bus from service during its assignments. The bus is operable to a rendezvous point with a replacement bus.
- (d) <u>Class 4: Bad Order</u>. A failure that does not require removal of the bus from service during its assignments but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.

2-III. DISCUSSION

A listing of breakdowns and unscheduled repairs is accumulated during the Structural Durability Test. The following Reliability Data Form lists all unscheduled repairs under classes as defined above. These classifications are somewhat subjective as the test is performed on a test track with careful inspections every two hours. However, even on the road, there is considerable latitude on deciding how to handle many failures.

The classification of repairs according to subsystem is intended to emphasize those systems which had persistent minor or more serious problems. The bus submitted for testing encountered no failures during the Structural Durability Test.

3. SAFETY - A DOUBLE-LANE CHANGE (OBSTACLE AVOIDANCE)

3-I. <u>TEST OBJECTIVE</u>

The objective of this test is to determine handling and stability of the bus by measuring speed through a double lane change test.

3-II. TEST DESCRIPTION

The Safety Test is a vehicle handling and stability test. The bus will be operated at SLW on a smooth and level test track. The bus will be driven through a double lane change course at increasing speed until the test is considered unsafe or a speed of 45 mph is reached. The lane change course will be set up using pylons to mark off two 12 foot center to center lanes with two 100 foot lane change areas 100 feet apart. The bus will begin in one lane, change to the other lane in a 100 foot span, travel 100 feet, and return to the original lane in another 100 foot span. This procedure will be repeated, starting first in the right-hand and then in the left-hand lane.

3-III. DISCUSSION

The double-lane change was performed in both right-hand and left-hand directions. The bus was able to safely negotiate the test course in both the right-hand and left-hand directions up to the maximum test speed of 45 mph.

SAFETY DATA FORM

Bus Number: 0518	Date: 2-2-06
Personnel: B.S., S.C. & T.S.	

Temperature (°F): 35	Humidity (%): 93	
Wind Direction: Calm	Wind Speed (mph): Calm	
Barometric Pressure (in.Hg): 29.91		

SAFETY TEST: DOUBLE LANE CHANGE				
Maximum safe speed tested for double-lane change to left	45 mph			
Maximum safe speed tested for double-lane change to right	45 mph			
Comments of the position of the bus during the lane change: A sa	afe profile was			
maintained through all portions of testing.				
Comments of the tire/ground contact patch: Tire/ground contact was maintained				
through all portions of testing.				

3. SAFETY



RIGHT - HAND APPROACH



LEFT - HAND APPROACH

4. PERFORMANCE - AN ACCELERATION, GRADEABILITY, AND TOP SPEED TEST

4-I. TEST OBJECTIVE

The objective of this test is to determine the acceleration, gradeability, and top speed capabilities of the bus.

4-II. TEST DESCRIPTION

In this test, the bus will be operated at SLW on the skid pad at the PSBRTF. The bus will be accelerated at full throttle from a standstill to a maximum "geared" or "safe" speed as determined by the test driver. The vehicle speed is measured using a Correvit non-contacting speed sensor. The times to reach speed between ten mile per hour increments are measured and recorded using a stopwatch with a lap timer. The time to speed data will be recorded on the Performance Data Form and later used to generate a speed vs. time plot and gradeability calculations.

4-III. DISCUSSION

This test consists of three runs in both the clockwise and counterclockwise directions on the Test Track. Velocity versus time data is obtained for each run and results are averaged together to minimize any test variability which might be introduced by wind or other external factors. The test was performed up to a maximum speed of 50 mph. The fitted curve of velocity vs. time is attached, followed by the calculated gradeability results. The average time to obtain 50 mph was 13.75 seconds.

PERFORMANCE DATA FORM

	PERFORIVIANCE DATA FORIVI				
Bus Number: 0518	3	Date: 2-2-06			
Personnel: B.S., S	.C. & T.S.				
Temperature (°F):	37	Humidity (%): 93	Humidity (%): 93		
Wind Direction: Ca	alm	Wind Speed (mph):	Calm		
Barometric Pressu	ıre (in.Hg): 29.91				
Air Conditioning co	ompressor-OFF	Checked			
Ventilation fans-O	N HIGH	Checked			
Heater pump moto	or-Off	Checked			
Defroster-OFF		Checked			
Exterior and interio	or lights-ON	Checked			
Windows and door	rs-CLOSED	Checked			
Į.	ACCELERATION, GRA	ADEABILITY, TOP SP	EED		
	Counter Clockwise F	Recorded Interval Time	es .		
Speed	Run 1	Run 2	Run 3		
10 mph	2.02	2.15	1.90		
20 mph	3.77	4.24	3.84		
30 mph	5.99	6.24	5.87		
40 mph	9.68	9.84	9.43		
Top Test Speed(mph) 50	14.09 14.40		14.20		
Clockwise Recorded Interval Times					
Speed	Run 1 Run 2 Run 3		Run 3		
10 mph	2.11 2.17		2.08		
20 mph	3.88	4.14	3.86		
30 mph	6.08	6.07	6.08		
40 mph	9.36	9.28	9.30		
Top Test Speed(mph) 50	13.42	13.08	13.33		

0518.ACC

PERFORMANCE SUMMARY SHEET

BUS MANUFACTURER :Starcraft BUS NUMBER :0518 BUS MODEL :Allstar-25 TEST DATE :2/2/06

TEST CONDITIONS :

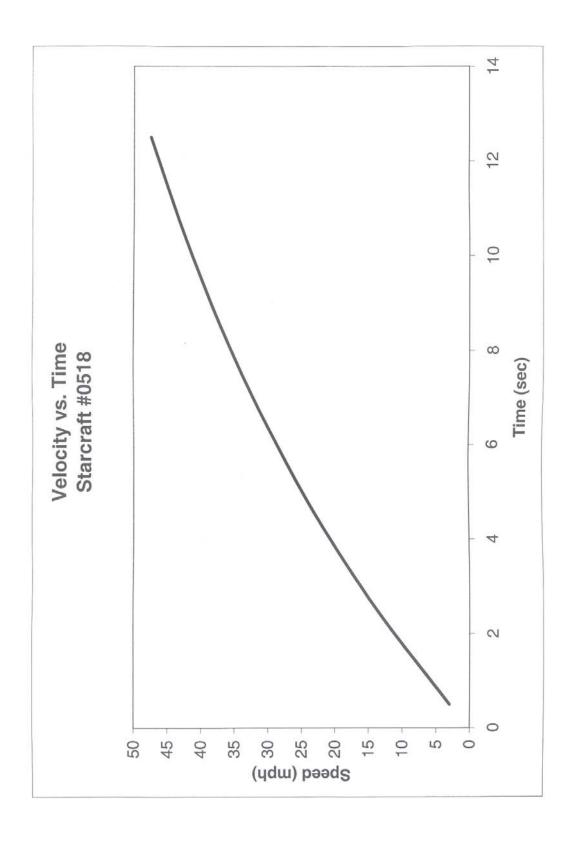
TEMPERATURE (DEG F) : 37.0 WIND DIRECTION : calm WIND SPEED (MPH) : .0 HUMIDITY (%) : 93 BAROMETRIC PRESSURE (IN. HG) : 29.9

VEHICLE SPEED	AVERAGE TIME (SEC)		
(MPH)	CCW DIRECTION	CW DIRECTION	TOTAL
10.0 20.0 30.0 40.0 50.0	2.02 3.95 6.03 9.65 14.23	2.12 3.96 6.08 9.31 13.28	2.07 3.96 6.06 9.48 13.75

TEST SUMMARY :

VEHICLE SPEED (MPH)	TIME	ACCELERATION	MAX. GRADE
	(SEC)	(FT/SEC^2)	(%)
1.0	.16	8.9	28.6
5.0	.85	8.3	26.8
10.0	1.76	7.7	24.6
15.0	2.76	7.1	22.4
20.0	3.85	6.4	20.3
25.0	5.05	5.8	18.3
30.0	6.38	5.2	16.4
35.0	7.87	4.7	14.6
40.0	9.54	4.1	12.9
45.0	11.45	3.6	11.2
50.0	13.64	3.1	9.7

NOTE: Gradeability results were calculated from performance test data. Actual sustained gradeability performance for vehicles equipped with auto transmission may be lower than the values indicated here.



5. STRUCTURAL INTEGRITY

5.1 STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL SHAKEDOWN TEST

5.1-I. DISCUSSION

The objective of this test is to determine certain static characteristics (e.g., bus floor deflection, permanent structural deformation, etc.) under static loading conditions.

5.1-II. TEST DESCRIPTION

In this test, the bus will be isolated from the suspension by blocking the vehicle under the suspension points. The bus will then be loaded and unloaded up to a maximum of three times with a distributed load equal to 2.5 times gross load. Gross load is 150 lb for every designed passenger seating position, for the driver, and for each 1.5 sq ft of free floor space. For a distributed load equal to 2.5 times gross load, place a 375-lb load on each seat and on every 1.5 sq ft of free floor space. The first loading and unloading sequence will "settle" the structure. Bus deflection will be measured at several locations during the loading sequences.

5.1-III. **DISCUSSION**

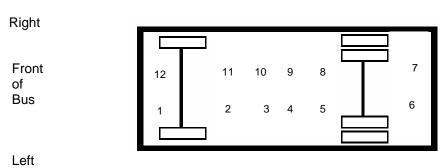
This test was performed based on a maximum passenger capacity of 27 people including the driver and one wheelchair position. The resulting test load is $(27 \times 375 \text{ lb})$ = 10,125 lb + 600 lbs (wheelchair position) = 10,725 lbs. The load is distributed evenly over the passenger space. Deflection data before and after each loading and unloading sequence is provided on the Structural Shakedown Data Form.

The unloaded height after each test becomes the original height for the next test. Some initial settling is expected due to undercoat compression, etc. After each loading cycle, the deflection of each reference point is determined. The bus is then unloaded and the residual (permanent) deflection is recorded. On the final test, the maximum loaded deflection was 0.224 inches at reference point 9. The maximum permanent deflection after the final loading sequence ranged from -0.003 inches at reference point 6 to 0.005 inches at reference points 1, 4 and 12.

STRUCTURAL SHAKEDOWN DATA FORM

Bus Number: 0518	Date: 12-13-06
Personnel: D.L., E.L., K.D. & S.C.	Temperature (°F): 65
Loading Sequence: ■ 1 □ 2 □ 3 (check one) Test Load (lbs): 10,725	

Indicate Approximate Location of Each Reference Point



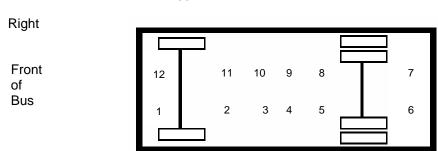
Top View

Reference Point No.	A (in) Original Height	B (in) Loaded Height	B-A (in) Loaded Deflection	C (in) Unloaded Height	C-A (in) Permanent Deflection
1	0	085	085	015	015
2	0	.119	.119	.012	.012
3	0	.221	.221	.052	.052
4	0	.232	.232	.039	.039
5	0	.205	.205	.024	.024
6	0	066	066	011	011
7	0	015	015	021	021
8	0	.277	.277	.068	.068
9	0	.269	.269	.045	.045
10	0	.244	.244	.045	.045
11	0	.123	.123	.028	.028
12	0	009	009	011	011

STRUCTURAL SHAKEDOWN DATA FORM

Bus Number: 0518	Date: 12-13-05
Personnel: D.L., E.L., T.S. & S.C.	Temperature (°F):
Loading Sequence: □ 1 ■ 2 □ 3 (check one) Test Load (lbs): 10,725	

Indicate Approximate Location of Each Reference Point



Left Top View

Reference Point No.	A (in) Original Height	B (in) Loaded Height	B-A (in) Loaded Deflection	C (in) Unloaded Height	C-A (in) Permanent Deflection
1	015	086	071	020	.005
2	.012	.120	.108	.015	.003
3	.052	.228	.176	.056	.004
4	.039	.233	.194	.044	.005
5	.024	.205	.181	.027	.003
6	011	061	050	008	003
7	021	010	.011	023	.002
8	.068	.285	.217	.070	.002
9	.045	.269	.224	.047	.002
10	.045	.245	.200	.046	.001
11	.028	.124	.096	.032	.004
12	011	010	.001	016	.005

5.1 STRUCTURAL SHAKEDOWN TEST



DIAL INDICATORS IN POSITION BUS LOADED TO 2.5 TIMES GVL (10,725 LBS)

5.2 STRUCTURAL STRENGTH AND DISTORTION TESTS - STRUCTURAL DISTORTION

5.2-I. <u>TEST OBJECTIVE</u>

The objective of this test is to observe the operation of the bus subsystems when the bus is placed in a longitudinal twist simulating operation over a curb or through a pothole.

5.2-II. TEST DESCRIPTION

With the bus loaded to GVWR, each wheel of the bus will be raised (one at a time) to simulate operation over a curb and the following will be inspected:

- 1. Body
- 2. Windows
- 3. Doors
- 4. Roof vents
- 5. Special seating
- 6. Undercarriage
- 7. Engine
- 8. Service doors
- 9. Escape hatches
- 10. Steering mechanism

Each wheel will then be lowered (one at a time) to simulate operation through a pothole and the same items inspected.

5.2-III. <u>DISCUSSION</u>

The test sequence was repeated ten times. The first and last test is with all wheels level. The other eight tests are with each wheel 6 inches higher and 6 inches lower than the other three wheels.

All doors, windows, escape mechanisms, engine, steering and handicapped devices operated normally throughout the test. The undercarriage and body indicated no deficiencies. Water leakage was observed during the test at the top of the rear door between the door and the door frame. The results of this test are indicated on the following data forms.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)			
All wheels level	■ before	□ after	
Left front	□ 6 in higher	□ 6 in lower	
Right front	□ 6 in higher	□ 6 in lower	
Right rear	□ 6 in higher	□ 6 in lower	
Left rear	□ 6 in higher	□ 6 in lower	
Right center	□ 6 in higher	□ 6 in lower	
Left center	□ 6 in higher	□ 6 in lower	

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	■ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	■ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	■ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	■ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
■ Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	■ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	■ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	■ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	□ after
Left front	□ 6 in higher	■ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
■ Undercarriage	No deficiencies.
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

Bus Number: 0518	Date: 12-14-05
Personnel: T.S., E.L., D.L. & S.C.	Temperature(°F): 65

Wheel Position : (check one)		
All wheels level	□ before	■ after
Left front	□ 6 in higher	□ 6 in lower
Right front	□ 6 in higher	□ 6 in lower
Right rear	□ 6 in higher	□ 6 in lower
Left rear	□ 6 in higher	□ 6 in lower
Right center	□ 6 in higher	□ 6 in lower
Left center	□ 6 in higher	□ 6 in lower

	Comments
■ Windows	No deficiencies.
■ Front Doors	No deficiencies.
■ Rear Doors	Leak at top between door and door frame.
■ Escape Mechanisms/ Roof Vents	No deficiencies.
■ Engine	No deficiencies.
Handicapped Device/ Special Seating	Not equipped with a handicap device.
■ Undercarriage	No deficiencies
■ Service Doors	No deficiencies.
■ Body	No deficiencies.

■ Windows/ Body Leakage	No deficiencies.
■ Steering Mechanism	No deficiencies.

5.2 STRUCTURAL DISTORTION TEST



LEFT REAR WHEEL SIX INCHES LOWER



LEFT FRONT WHEEL SIX INCHES HIGHER

5.3 STRUCTURAL STRENGTH AND DISTORTION TESTS - STATIC TOWING TEST

5.3-I. <u>TEST OBJECTIVE</u>

The objective of this test is to determine the characteristics of the bus towing mechanisms under static loading conditions.

5.3-II. TEST DESCRIPTION

Utilizing a load-distributing yoke, a hydraulic cylinder is used to apply a static tension load equal to 1.2 times the bus curb weight. The load will be applied to both the front and rear, if applicable, towing fixtures at an angle of 20 degrees with the longitudinal axis of the bus, first to one side then the other in the horizontal plane, and then upward and downward in the vertical plane. Any permanent deformation or damage to the tow eyes or adjoining structure will be recorded.

5.3-III. <u>DISCUSSION</u>

The test bus submitted for testing was not equipped with any type of tow eyes or tow hooks, therefore, the Static Towing Test was not performed.

5.4 STRUCTURAL STRENGTH AND DISTORTION TESTS - DYNAMIC TOWING TEST

5.4-I. <u>TEST OBJECTIVE</u>

The objective of this test is to verify the integrity of the towing fixtures and determine the feasibility of towing the bus under manufacturer specified procedures.

5.4-II. TEST DESCRIPTION

This test requires the bus be towed at curb weight using the specified equipment and instructions provided by the manufacturer and a heavy-duty wrecker. The bus will be towed for 5 miles at a speed of 20 mph for each recommended towing configuration. After releasing the bus from the wrecker, the bus will be visually inspected for any structural damage or permanent deformation. All doors, windows and passenger escape mechanisms will be inspected for proper operation.

5.4-III. **DISCUSSION**

The bus was towed using a heavy-duty wrecker. The towing interface was accomplished by incorporating a hydraulic under lift. A front lift tow was performed. Rear towing is not recommended. No problems, deformation, or damage was noted during testing.

DYNAMIC TOWING TEST DATA FORM

Date: 2-13-06

Bus Number: 0518

Personnel: T.S. & S.C.		
Temperature (°F): 32	Humidity (%): 59	
Wind Direction: NW	Wind Speed (mph): 8	
Barometric Pressure (in.Hg): 30.05		
Inspect tow equipment-bus interface.		
Comments: A safe and adequate connection was made between the tow equipment		
and the bus.		
Inspect tow equipment-wrecker interface.		
Comments: A safe and adequate connection was made between the tow equipment		
and the wrecker.		
Towing Comments: A front lift tow was performed incorporating a hydraulic under		
lift wrecker.		
Description and location of any structural damage: None noted.		
General Comments: No problems were encountered with the tow or towing		
interface.		

5.4 DYNAMIC TOWING TEST



TOWING INTERFACE

5.5 STRUCTURAL STRENGTH AND DISTORTION TESTS – JACKING TEST

5.5-I. <u>TEST OBJECTIVE</u>

The objective of this test is to inspect for damage due to the deflated tire, and determine the feasibility of jacking the bus with a portable hydraulic jack to a height sufficient to replace a deflated tire.

5.5-II. <u>TEST DESCRIPTION</u>

With the bus at curb weight, the tire(s) at one corner of the bus are replaced with deflated tire(s) of the appropriate type. A portable hydraulic floor jack is then positioned in a manner and location specified by the manufacturer and used to raise the bus to a height sufficient to provide 3-in clearance between the floor and an inflated tire. The deflated tire(s) are replaced with the original tire(s) and the hack is lowered. Any structural damage or permanent deformation is recorded on the test data sheet. This procedure is repeated for each corner of the bus.

5.5-III. **DISCUSSION**

The jack used for this test has a minimum height of 8.75 inches. During the deflated portion of the test, the jacking point clearances ranged from 8.8 inches to 20.1 inches. No deformation or damage was observed during testing. A complete listing of jacking point clearances is provided in the Jacking Test Data Form.

JACKING CLEARANCE SUMMARY

Condition	Frame Point Clearance
Front axle – one tire flat	15.3"
Rear axle – one tire flat	20.1"
Rear axle – two tires flat	17.7"

JACKING TEST DATA FORM

Bus Number: 0518	Date: 12-7-05
Personnel: E.L. & D.L.	Temperature (°F): 68

Record any permanent deformation or damage to bus as well as any difficulty encountered during jacking procedure.

		T	T
Deflated Tire	Jacking Pad Clearance Body/Frame (in)	Jacking Pad Clearance Axle/Suspension (in)	Comments
Right front	17.3 " I 15.3 " D	11.2 " I 9.3 " D	None noted.
Left front	17.3 " I 15.3 " D	11.3 " I 9.3 " D	u
Right rear—outside	20.2 " I 20.1 " D	11.4 " I 11.2 " D	и
Right rear—both	20.2 " I 17.7 " D	11.4 " I 8.9 " D	u
Left rear—outside	20.3 " I 20.1 " D	11.4 " I 11.1 " D	и
Left rear—both	20.3 " I 17.7 " D	11.4 " I 8.8 " D	u
Right middle or tag—outside	NA	NA	
Right middle or tag—both	NA	NA	
Left middle or tag— outside	NA	NA	
Left middle or tag— both	NA	NA	
Additional comments of any deformation or difficulty during jacking:			
None noted.			

5.6 STRUCTURAL STRENGTH AND DISTORTION TESTS - HOISTING TEST

5.6-I. <u>TEST OBJECTIVE</u>

The objective of this test is to determine possible damage or deformation caused by the jack/stands.

5.6-II. TEST DESCRIPTION

With the bus at curb weight, the front end of the bus is raised to a height sufficient to allow manufacturer-specified placement of jack stands under the axles or jacking pads independent of the hoist system. The bus will be checked for stability on the jack stands and for any damage to the jacking pads or bulkheads. The procedure is repeated for the rear end of the bus. The procedure is then repeated for the front and rear simultaneously.

5.6-III. <u>DISCUSSION</u>

The test was conducted using four posts of a six-post electric lift and standard 19 inch jack stands. The bus was hoisted from the front wheel, rear wheel, and then the front and rear wheels simultaneously and placed on jack stands.

The bus easily accommodated the placement of the vehicle lifts and jack stands and the procedure was performed without any instability noted.

HOISTING TEST DATA FORM

Bus Number: 0518	Date: 12-12-05
Personnel: T.S. & S.C.	Temperature (°F): 66

Comments of any structural damage to the jacking pads or axles while both the front wheels are supported by the jack stands:
None noted.
Comments of any structural damage to the jacking pads or axles while both the rear wheels are supported by the jack stands:
None noted.
Comments of any structural damage to the jacking pads or axles while both the front and rear wheels are supported by the jack stands:
None noted.

5.7 STRUCTURAL DURABILITY TEST

5.7-I. <u>TEST OBJECTIVE</u>

The objective of this test is to perform an accelerated durability test that approximates up to 25 percent of the service life of the vehicle.

5.7-II. TEST DESCRIPTION

The test vehicle is driven a total of 7,500 miles; approximately 5,000 miles on the PSBRTF Durability Test Track and approximately 2,500 miscellaneous other miles. The test will be conducted with the bus operated under three different loading conditions. The first segment will consist of approximately 3,000 miles with the bus operated at GVW. The second segment will consist of approximately 1,500 miles with the bus operated at SLW. The remainder of the test, approximately 3,000 miles, will be conducted with the bus loaded to CW. If GVW exceeds the axle design weights, then the load will be adjusted to the axle design weights and the change will be recorded. All subsystems are run during these tests in their normal operating modes. All recommended manufacturers servicing is to be followed and noted on the vehicle maintainability log. Servicing items accelerated by the durability tests will be compressed by 10:1; all others will be done on a 1:1 mi/mi basis. Unscheduled breakdowns and repairs are recorded on the same log as are any unusual occurrences as noted by the driver. Once a week the test vehicle shall be washed down and thoroughly inspected for any signs of failure.

5.7-III. **DISCUSSION**

The Structural Durability Test was started on December 14, 2005 and was conducted until February 1, 2006. The first 3,000 miles were performed at a GVW of 13,950 lbs. and completed on January 6, 2006. The next 1,500 mile SLW segment was performed at 12,500 lbs and completed on January 16, 2006, and the final 3,000 mile segment was performed at a CW of 9,510 lbs and completed on February 1, 2006.

The following mileage summary presents the accumulation of miles during the Structural Durability Test. The driving schedule is included, showing the operating duty cycle. A detailed plan view of the Test Track Facility and Durability Test Track are attached for reference. Also, a durability element profile detail shows all the measurements of the different conditions. The test bus encountered no failures during the Structural Durability Test.

STARCRAFT - TEST BUS #0518 MILEAGE DRIVEN/RECORDED FROM DRIVERS= LOGS

DATE	TOTAL DURABILITY TRACK	TOTAL OTHER MILES	TOTAL
12/12/05 TO 12/18/05	496.00	74.00	570.00
12/19/05 TO 12/25/05	801.00	138.00	939.00
12/26/05 TO 01/01/06	0.00	0.00	0.00
01/02/06 TO 01/08/06	703.00	309.00	1012.00
01/09/06 TO 01/15/06	889.00	875.00	1764.00
01/16/06 TO 01/22/06	972.00	728.00	1700.00
01/23/06 TO 01/29/06	1139.00	180.00	1319.00
01/30/06 TO 02/05/06	0.00	196.00	196.00
TOTAL	5000.00	2500.00	7500.00

Table 4. Driving Schedule for Bus Operation on the Durability Test Track.

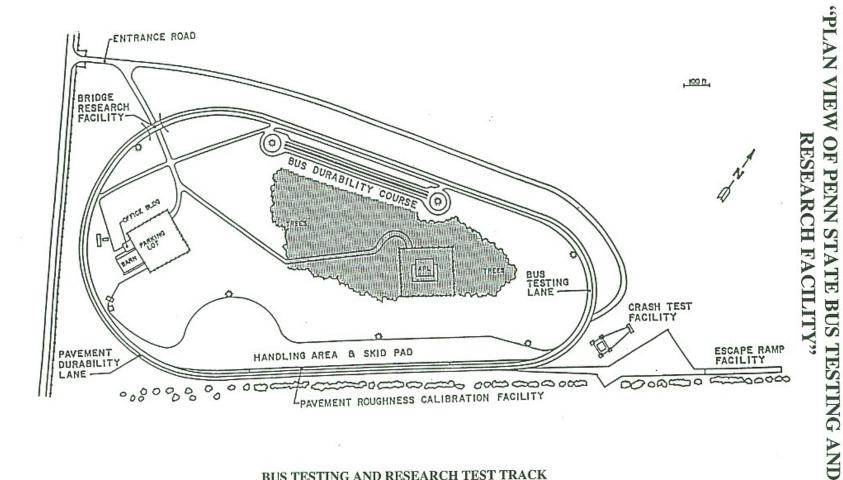
STANDARD OPERATING SCHEDULE

Monday th	rough	Friday
-----------	-------	--------

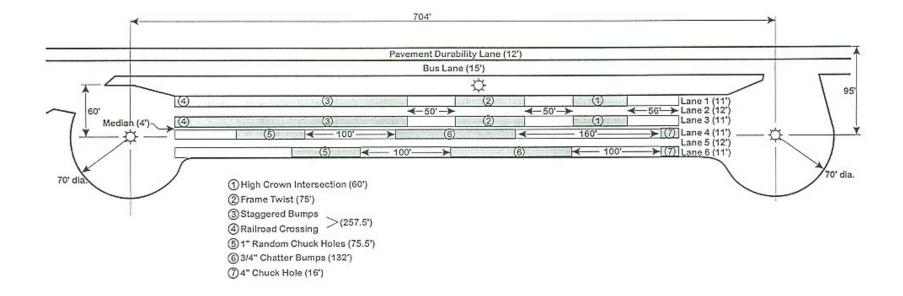
	HOUR	ACTION
Shift 1	midnight	D
	1:40 am	C
	1:50 am	В
	2:00 am	D
	3:35 am	С
	3:45 am	В
	4:05 am	D
	5:40 am	C
	5:50 am	В
	6:00 am	D
	7:40 am	C
	7:50 am	F
Shift 2	8:00 am	D
	9:40 am	C
	9:50 am	В
	10:00 am	D
	11:35 am	C
	11:45 am	В
	12:05 pm	D
	1:40 pm	C
	1:50 pm	В
	2:00 pm	D
	3:40 pm	C
	3:50 pm	F
Shift 3	4:00 pm	D
	5:40 pm	C
	5:50 pm	В
	6:00 pm	D
	7:40 pm	C
	7:50 pm	В
	8:05 pm	D
	9:40 pm	C
	9:50 pm	В
	10:00 pm	D
	11:40 pm	C
	11:50 pm	F

B---Break

C----Cycle all systems five times, visual inspection, driver's log entries D----Drive bus as specified by procedure F----Fuel bus, complete driver's log shift entries



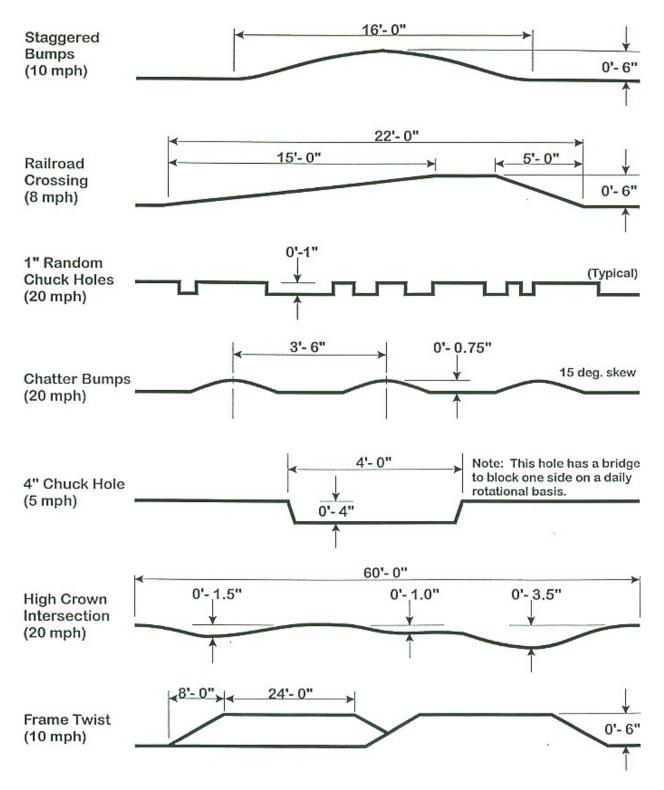
BUS TESTING AND RESEARCH TEST TRACK UNIVERSITY PARK, PA



Plan View

Vehicle Durability Test Track

The Pennsylvania Transportation Institute Penn State



Durability Element Profiles

The Pennsylvania Transportation Institute Penn State

6. FUEL ECONOMY TEST - A FUEL CONSUMPTION TEST USING AN APPROPRIATE OPERATING CYCLE

6-I. <u>TEST OBJECTIVE</u>

The objective of this test is to provide accurate comparable fuel consumption data on transit buses produced by different manufacturers. This fuel economy test bears no relation to the calculations done by the Environmental Protection Agency (EPA) to determine levels for the Corporate Average Fuel Economy Program. EPA's calculations are based on tests conducted under laboratory conditions intended to simulate city and highway driving. This fuel economy test, as designated here, is a measurement of the fuel expended by a vehicle traveling a specified test loop under specified operating conditions. The results of this test will not represent actual mileage but will provide data that can be used by recipients to compare buses tested by this procedure.

6-II. <u>TEST DESCRIPTION</u>

This test requires operation of the bus over a course based on the Transit Coach Operating Duty Cycle (ADB Cycle) at seated load weight using a procedure based on the Fuel Economy Measurement Test (Engineering Type) For Trucks and Buses: SAE 1376 July 82. The procedure has been modified by elimination of the control vehicle and by modifications as described below. The inherent uncertainty and expense of utilizing a control vehicle over the operating life of the facility is impractical.

The fuel economy test will be performed as soon as possible (weather permitting) after the completion of the GVW portion of the structural durability test. It will be conducted on the bus test lane at the Penn State Test Facility. Signs are erected at carefully measured points which delineate the test course. A test run will comprise 3 CBD phases, 2 Arterial phases, and 1 Commuter phase. An electronic fuel measuring system will indicate the amount of fuel consumed during each phase of the test. The test runs will be repeated until there are at least two runs in both the clockwise and counterclockwise directions in which the fuel consumed for each run is within \forall 4 percent of the average total fuel used over the 4 runs. A 20-minute idle consumption test is performed just prior to and immediately after the driven portion of the fuel economy test. The amount of fuel consumed while operating at normal/low idle is recorded on the Fuel Economy Data Form. This set of four valid runs along with idle consumption data comprise a valid test.

The test procedure is the ADB cycle with the following four modifications:

- 1. The ADB cycle is structured as a set number of miles in a fixed time in the following order: CBD, Arterial, CBD, Arterial, CBD, and Commuter. A separate idle fuel consumption measurement is performed at the beginning and end of the fuel economy test. This phase sequence permits the reporting of fuel consumption for each of these phases separately, making the data more useful to bus manufacturers and transit properties.
- 2. The operating profile for testing purposes shall consist of simulated transit type service at seated load weight. The three test phases (figure 6-1) are: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph; an arterial phase of 2 miles with 2 stops per mile and a top speed of 40 mph; and a commuter phase of 4 miles with 1 stop and a maximum speed of 40 mph. At each designated stop the bus will remain stationary for seven seconds. During this time, the passenger doors shall be opened and closed.
- 3. The individual ADB phases remain unaltered with the exception that 1 mile has been changed to 1 lap on the Penn State Test Track. One lap is equal to 5,042 feet. This change is accommodated by adjusting the cruise distance and time.
- 4. The acceleration profile, for practical purposes and to achieve better repeatability, has been changed to "full throttle acceleration to cruise speed".

Several changes were made to the Fuel Economy Measurement Test (Engineering Type) For Trucks and Buses: SAE 1376 July 82:

- 1. Sections 1.1, and 1.2 only apply to diesel, gasoline, methanol, and any other fuel in the liquid state (excluding cryogenic fuels).
- 1.1 SAE 1376 July 82 requires the use of at least a 16-gal fuel tank. Such a fuel tank when full would weigh approximately 160 lb. It is judged that a 12-gal tank weighing approximately 120 lb will be sufficient for this test and much easier for the technician and test personnel to handle.

- 1.2 SAE 1376 July 82 mentions the use of a mechanical scale or a flowmeter system. This test procedure uses a load cell readout combination that provides an accuracy of 0.5 percent in weight and permits on-board weighing of the gravimetric tanks at the end of each phase. This modification permits the determination of a fuel economy value for each phase as well as the overall cycle.
- 2. Section 2.1 applies to compressed natural gas (CNG), liquefied natural gas (LNG), cryogenic fuels, and other fuels in the vapor state.
- 2.1 A laminar type flowmeter will be used to determine the fuel consumption. The pressure and temperature across the flow element will be monitored by the flow computer. The flow computer will use this data to calculate the gas flow rate. The flow computer will also display the flow rate (scfm) as well as the total fuel used (scf). The total fuel used (scf) for each phase will be recorded on the Fuel Economy Data Form.
 - 3. Use both Sections 1 and 2 for dual fuel systems.

FUEL ECONOMY CALCULATION PROCEDURE

A. For diesel, gasoline, methanol and fuels in the liquid state.

The reported fuel economy is based on the following: measured test quantities-distance traveled (miles) and fuel consumed (pounds); standard reference values-density of water at 60EF (8.3373 lbs/gal) and volumetric heating value of standard fuel; and test fuel specific gravity (unitless) and volumetric heating value (BTU/gal). These combine to give a fuel economy in miles per gallon (mpg) which is corrected to a standard gallon of fuel referenced to water at 60EF. This eliminates fluctuations in fuel economy due to fluctuations in fuel quality. This calculation has been programmed into a computer and the data processing is performed automatically.

The fuel economy correction consists of three steps:

1.) Divide the number of miles of the phase by the number of pounds of fuel consumed

		total miles
phase	miles per phase	per run
CBD	1.9097	5.7291
ART	1.9097	3.8193
COM	3.8193	3.8193

2.) Convert the observed fuel economy to miles per gallon [mpg] by multiplying by the specific gravity of the test fuel Gs (referred to water) at 60EF and multiply by the density of water at 60EF

$$FEo_{mpg} = FEc_{mi/lb} \times Gs \times Gw$$

where
$$\mathbf{Gs} = \text{Specific gravity of test fuel at } 60\text{EF} \text{ (referred to water)}$$
 $\mathbf{Gw} = 8.3373 \text{ lb/gal}$

3.) Correct to a standard gallon of fuel by dividing by the volumetric heating value of the test fuel (H) and multiplying by the volumetric heating value of standard reference fuel (Q). Both heating values must have the same units.

$$FEc = FEo_{mpg} \times \underline{Q}$$
H

where

H = Volumetric heating value of test fuel [BTU/gal]

Q = Volumetric heating value of standard reference fuel

Combining steps 1-3 yields

4.) Covert the fuel economy from mpg to an energy equivalent of miles per BTU. Since the number would be extremely small in magnitude, the energy equivalent will be represented as miles/BTUx10⁶.

Eq = Energy equivalent of converting mpg to mile/BTUx 10^6 .

$$Eq = ((mpg)/(H))x10^6$$

B. CNG, LNG, cryogenic and other fuels in the vapor state.

The reported fuel economy is based on the following: measured test quantities-distance traveled (miles) and fuel consumed (scf); density of test fuel, and volumetric heating value (BTU/lb) of test fuel at standard conditions (P=14.73 psia and T=60 EF).

These combine to give a fuel economy in miles per lb. The energy equivalent (mile/BTUx10⁶) will also be provided so that the results can be compared to buses that use other fuels.

1.) Divide the number of miles of the phase by the number of standard cubic feet (scf) of fuel consumed.

		total miles
phase	miles per phase	per run
CBD	1.9097	5.7291
ART	1.9097	3.8193
COM	3.8193	3.8193

2.) Convert the observed fuel economy to miles per lb by dividing FEo by the density of the test fuel at standard conditions (Lb/ft³).

Note: The density of test fuel must be determined at standard conditions as described above. If the density is not defined at the above standard conditions, then a correction will be needed before the fuel economy can be calculated.

where Gm = Density of test fuel at standard conditions

3.) Convert the observed fuel economy (FEomi/lb) to an energy equivalent of (miles/BTUx10⁶) by dividing the observed fuel economy (FEomi/lb) by the heating value of the test fuel at standard conditions.

$$Eq = ((FEomi/lb)/H)x10^6$$

where

Eq = Energy equivalent of miles/lb to mile/BTUx10⁶
H = Volumetric heating value of test fuel at standard conditions

6-III. DISCUSSION

This is a comparative test of fuel economy using unleaded gasoline fuel with a heating value of 20,025.0 btu/lb. The driving cycle consists of Central Business District (CBD), Arterial (ART), and Commuter (COM) phases as described in 6-II. The fuel consumption for each driving cycle and for idle is measured separately. The results are corrected to a reference fuel with a volumetric heating value of 127,700.0 btu/gal.

An extensive pretest maintenance check is made including the replacement of all lubrication fluids. The details of the pretest maintenance are given in the first three Pretest Maintenance Forms. The fourth sheet shows the Pretest Inspection. The next sheet shows the correction calculation for the test fuel. The next four Fuel Economy Forms provide the data from the four test runs. Finally, the summary sheet provides the average fuel consumption. The overall average is based on total fuel and total mileage for each phase. The overall average fuel consumption values were; CBD – 6.39 mpg, ART – 6.90 mpg, and COM – 10.17 mpg. Average fuel consumption at idle was 4.10 lb/hr (0.65 gph).

FUEL ECONOMY PRE-TEST MAINTENANCE FORM

Bus Number: 0518	Date: 1-30-06	SLW (lbs): 12,500
Personnel: T.S., E.L. & D.L.		

		1	
FUEL SYSTEM	OK	Date	Initials
Install fuel measurement system		1/30/06	T.S.
Replace fuel filter		1/30/06	T.S.
Check for fuel leaks		1/30/06	T.S.
Specify fuel type (refer to fuel analysis)	Gasoli	ine	
Remarks: None noted.			
BRAKES/TIRES	OK	Date	Initials
Inspect hoses		1/30/06	T.S.
Inspect brakes		1/30/06	T.S.
Relube wheel bearings		1/30/06	T.S.
Check tire inflation pressures (mfg. specs.)		1/30/06	T.S.
Remarks: None noted.			
COOLING SYSTEM	OK	Date	Initials
Check hoses and connections		1/30/06	D.L.
Check system for coolant leaks		1/30/06	D.L.
Remarks: None noted.			
I.			

FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 2)

Bus Number: 0518	Date: 1-30-06		
Personnel: T.S., E.L. & D.L.			
ELECTRICAL SYSTEMS	OK	Date	Initials
Check battery		1/30/06	T.S.
Inspect wiring		1/30/06	T.S.
Inspect terminals		1/30/06	T.S.
Check lighting		1/30/06	T.S.
Remarks: None noted.			
DRIVE SYSTEM	ОК	Date	Initials
Drain transmission fluid		1/30/06	D.L.
Replace filter/gasket		1/30/06	E.L.
Check hoses and connections		1/30/06	D.L.
Replace transmission fluid		1/30/06	E.L.
Check for fluid leaks		1/30/06	E.L.
Remarks: None noted.			
LUBRICATION	OK	Date	Initials
Drain crankcase oil		1/30/06	E.L.
Replace filters		1/30/06	D.L.
Replace crankcase oil		1/30/06	T.S.
Check for oil leaks		1/30/06	E.L.
Check oil level		1/30/06	T.S.
Lube all chassis grease fittings		1/30/06	E.L.
Lube universal joints		1/30/06	E.L.
Replace differential lube including axles		1/30/06	D.L.
Remarks: None noted.			

FUEL ECONOMY PRE-TEST MAINTENANCE FORM (page 3)

Bus Number: 0518	Date: 1-		<u> </u>	90 07
Personnel: T.S., E.L. & D.L.	Date. 1	50 00		
			_	
EXHAUST/EMISSION SYSTEM		OK	Date	Initials
Check for exhaust leaks			1/30/06	T.S.
Remarks: None noted.				
ENGINE		OK	Date	Initials
Replace air filter			1/30/06	E.L.
Inspect air compressor and air system		N/A	1/30/06	E.L.
Inspect vacuum system, if applicable			1/30/06	D.L.
Check and adjust all drive belts			1/30/06	E.L.
Check cold start assist, if applicable		N/A	1/30/06	E.L.
Remarks: None noted.				
STEERING SYSTEM		OK	Date	Initials
Check power steering hoses and connectors			1/30/06	E.L.
Service fluid level			1/30/06	E.L.
Check power steering operation			1/30/06	E.L.
Remarks: None noted.				
		OK	Date	Initials
Ballast bus to seated load weight			1/30/06	T.S.
TEST DRIVE		OK	Date	Initials
Check brake operation			1/30/06	T.S.
Check transmission operation			1/30/06	T.S.
Remarks: None noted.				

FUEL ECONOMY PRE-TEST INSPECTION FORM

Bus Number: 0518	Date: 1-31-06				
Personnel: T.S. & S.C.					
PRE WARM-UP		If OK, Initial			
Fuel Economy Pre-Test Maintenance Form i	s complete	T.S.			
Cold tire pressure (psi): Front <u>80</u> Middle <u>N/A</u>	Rear <u>80</u>	T.S.			
Tire wear:		T.S.			
Engine oil level		T.S.			
Engine coolant level		T.S.			
Interior and exterior lights on, evaporator fan	on	T.S.			
Fuel economy instrumentation installed and	T.S.				
Fuel line no leaks or kinks	T.S.				
Speed measuring system installed on bus. Sinstalled in front of bus and accessible to TE	S.C. & T.S.				
Bus is loaded to SLW	T.S.				
WARM-UP	If OK, Initial				
Bus driven for at least one hour warm-up		S.C.			
No extensive or black smoke from exhaust		S.C.			
POST WARM-UP		If OK, Initial			
Warm tire pressure (psi): Front <u>80</u> Middle <u>N//</u>	<u>A</u> Rear <u>80</u>	T.S.			
Environmental conditions Average wind speed <12 mph and maximul Ambient temperature between 30°F(-1C°) a Track surface is dry Track is free of extraneous material and cle interfering traffic	and 90°F(32°C)	T.S.			

Bus Number: 05	mber: 0518 Manufacturer: Starcraft Date: 1-31-06						
Run Number: 1		Personne	el: B.S., T.S. & S	.C.			
Test Direction:	CW or CC W	Temperat	ture (°F): 38		Humidity (%	6): 61	
SLW (lbs): 12,50	0	Wind Spe	ed (mph) & Dire	ection: 12/WNW	Barometric	Pressure (in.	Hg): 29.80
Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell F	Load Cell Reading (lb)	
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:20	8:20	5.5	0	1.95	1.95
ART #1	0	3:54	3:54	4.5	0	1.74	1.74
CBD #2	0	8:25	8:25	4.5	0	1.82	1.82
ART #2	0	3:59	3:59	4.5	0	1.70	1.70
CBD #3	0	8:21	8:21	4.5	0	1.88	1.88
COMMUTER	0	0 5:51		4.0	0	2.37	2.37
Total Fuel = 11.46 lbs							

20 minute idle: Total Fuel Used = 1.36 lbs

Heating Value = 20,025.0 BTU/LB

18	Manufact	Manufacturer: Starcraft Date: 1-31-06				
	Personne	el: B.S., T.S. & S	.C.			
CW or □CCW	Temperat	ture (°F): 38		Humidity (%	6): 61	
0	Wind Spe	ed (mph) & Dire	ection: 12/WNW	Barometric	Pressure (in.	Hg): 29.80
Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell F	Load Cell Reading (lb)	
Start	Finish		Start	Start	Finish	
0	8:45	8:45	4.0	0	1.82	1.82
0	3:57	3:57	4.0	0	1.68	1.68
0	8:25	8:25	3.5	0	1.88	1.88
0	3:56	3:56	3.5	0	1.80	1.80
0	8:24	8:24	3.5	0	1.87	1.87
0 6:06		6:06	3.5	0	2.40	2.40
Total Fuel = 11.45 lbs						
	CW or □CCW Time (r Start 0 0 0 0	Personne CW or □CCW Temperat Wind Spe Time (min:sec) Start Finish 0 8:45 0 3:57 0 8:25 0 3:56 0 8:24	Personnel: B.S., T.S. & S CW or □CCW Temperature (°F): 38 0 Wind Speed (mph) & Dire Time (min:sec) Cycle Time (min:sec) Start Finish 0 8:45 0 3:57 0 8:25 0 3:56 0 3:56 0 8:24	Personnel: B.S., T.S. & S.C. CW or □CCW Temperature (°F): 38 0 Wind Speed (mph) & Direction: 12/WNW Time (min:sec) Cycle Time (min:sec) Fuel Temperature (°C) Start Finish Start 0 8:45 8:45 4.0 0 3:57 3:57 4.0 0 8:25 8:25 3.5 0 3:56 3:56 3.5 0 8:24 8:24 3.5	Personnel: B.S., T.S. & S.C. CW or □CCW Temperature (°F): 38 Humidity (% 0 Wind Speed (mph) & Direction: 12/WNW Barometric Time (min:sec) Cycle Time (min:sec) Fuel Temperature (°C) Load Cell Fuel Temperature (°C) Start Finish Start Start Start 0 8:45 8:45 4.0 0 0 3:57 3:57 4.0 0 0 8:25 8:25 3.5 0 0 3:56 3:56 3.5 0 0 8:24 8:24 3.5 0	Personnel: B.S., T.S. & S.C. CW or □CCW Temperature (°F): 38 Humidity (%): 61 0 Wind Speed (mph) & Direction: 12/WNW Barometric Pressure (in.) Time (min:sec) Cycle Time (min:sec) Fuel Temperature (°C) Start Finish Start Start Finish 0 8:45 4.0 0 1.82 0 3:57 3:57 4.0 0 1.68 0 8:25 8:25 3.5 0 1.88 0 3:56 3:56 3.5 0 1.80 0 8:24 8:24 3.5 0 1.87 0 6:06 6:06 3.5 0 2.40

20 minute idle: Total Fuel Used = N/A lbs

Heating Value = 20,025.0 BTU/LB

Bus Number: 05	Number: 0518 Manufacturer: Starcraft Date: 2/1/06						
Run Number: 3		Personne	l: B.S., T.S. & S	.C.			
Test Direction:	CW or CCW	Temperat	ure (°F): 36		Humidity (%)	: 65	
SLW (lbs): 12,50	SLW (lbs): 12,500 Wir			ction: 5/SSW	Barometric P	ressure (in.H	lg): 29.96
Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Us		Fuel Used (lbs)
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:51	8:51	4.0	0	1.87	1.87
ART #1	0	3:53	3:53	4.0	0	1.77	1.77
CBD #2	0	8:33	8:33	4.0	0	1.89	1.89
ART #2	0	3:55	3:55	4.0	0	1.76	1.76
CBD #3	0	8:36	8:36	4.5	0	1.93	1.93
COMMUTER	0	6:05	6:05	4.5	0	2.39	2.39

Total Fuel = 11.61 lbs

20 minute idle : Total Fuel Used = N/A lbs

Heating Value = 20,025.0 BTU/LB

Bus Number: 05	18	Manufacturer: Starcraft		Date: 2-1-06				
Run Number: 4		Personnel: B.S., T.S. & S.C.						
Test Direction:	■CW or □CCW	Temperature (°F): 36			□CCW Temperature (°F): 36 Humidity (%): 65			
SLW (lbs): 12,50	00	Wind Speed (mph) & Direction: 5/SSW		ection: 5/SSW	Barometric Pressure (in.H	g): 29.96		
Cycle	Time (min:	sec)	Cycle Time (min:sec)	Fuel Temperature	Load Cell Reading (lb)	Fuel Used		

Cycle Type	Time (min:sec)		Cycle Time (min:sec)	Fuel Temperature (°C)	Load Cell F	Reading (lb)	Fuel Used (lbs)
	Start	Finish		Start	Start	Finish	
CBD #1	0	8:38	8:38	3.5	0	1.94	1.94
ART #1	0	3:59	3:59	4.5	0	1.81	1.81
CBD #2	0	8:37	8:37	5.5	0	1.92	1.92
ART #2	0	3:55	3:55	5.5	0	1.76	1.76
CBD #3	0	8:36	8:36	4.5	0	1.93	1.93
COMMUTER	0	5:58	5:58	5.0	0	2.35	2.35

Total Fuel = 11.71 lbs

20 minute idle: Total Fuel Used = 1.37 lbs

Heating Value = 20,025.0 BTU/LB

0518.FUL FUEL ECONOMY SUMMARY SHEET

BUS MANUFACTURER :Starcraft BUS NUMBER :0518 TEST DATE :1/31/06

FUEL TYPE : GASOLINE SP. GRAVITY : .7512 HEATING VALUE : 20025.00 BTU/Lb

Standard Conditions : 60 deg F and 14.7 psi Density of Water : 8.3373 lb/gallon at 60 deg F

CYCLE TOTAL FUEL TOTAL MILES FUEL ECONOMY FUEL ECONOMY USED (Lb) M/Lb(Measured) MPG(Corrected) -----Run # :1, CCW
CBD 5.65 5.73 1.01
ART 3.44 3.82 1.11
COM 2.37 3.82 1.61
TOTAL 11.46 13.37 1.17 7.03 10.20 7.38 Run # :2, CW CBD 5.57 ART 3.48 COM 2.40 5.73 1.03 3.82 1.10 3.82 1.59 13.37 1.17 6.51 6.95 COM 10.07 TOTAL 11.45 Run # :3, CCW CBD 5.69 ART 3.53 5.73 1.01 3.82 1.08 3.82 1.60 13.37 1.15 6.37 6.85 2.39 COM 10.11 TOTAL 11.61 Run # :4, CW CBD 5.79 ART 3.57 5.73 .99 3.82 1.07 3.82 1.63 13.37 1.14 6.26 6.77 2.35

IDLE CONSUMPTION

TOTAL 11.71

First 20 Minutes Data: 1.36 Lb Last 20 Minutes Data: 1.37 Lb Average Idle Consumption: 4.10 Lb/Hr

RUN CONSISTENCY: % Difference from overall average of total fuel used -----

7.22

Run 1 : .8 Run 2 : .9 Run 3 : -.5 Run 4 : -1.3

SUMMARY

COM

Average Idle Consumption : .65 G/Hr
Average CBD Phase Consumption : 6.39 MPG
Average Arterial Phase Consumption : 6.90 MPG
Average Commuter Phase Consumption : 10.17 MPG
Overall Average Fuel Consumption : 7.32 MPG
Overall Average Fuel Consumption : 58.37 Miles/ Million BTU

7. NOISE

7.1 INTERIOR NOISE AND VIBRATION TESTS

7.1-I. <u>TEST OBJECTIVE</u>

The objective of these tests is to measure and record interior noise levels and check for audible vibration under various operating conditions.

7.1-II. TEST DESCRIPTION

During this series of tests, the interior noise level will be measured at several locations with the bus operating under the following three conditions:

- 1. With the bus stationary, a white noise generating system shall provide a uniform sound pressure level equal to 80 dB(A) on the left, exterior side of the bus. The engine and all accessories will be switched off and all openings including doors and windows will be closed. This test will be performed at the ABTC.
- 2. The bus accelerating at full throttle from a standing start to 35 mph on a level pavement. All openings will be closed and all accessories will be operating during the test. This test will be performed on the track at the Test Track Facility.
- 3. The bus will be operated at various speeds from 0 to 55 mph with and without the air conditioning and accessories on. Any audible vibration or rattles will be noted. This test will be performed on the test segment between the Test Track and the Bus Testing Center.

All tests will be performed in an area free from extraneous sound-making sources or reflecting surfaces. The ambient sound level as well as the surrounding weather conditions will be recorded in the test data.

7.1-III. <u>DISCUSSION</u>

This test is performed in three parts. The first part exposes the exterior of the vehicle to $80.0 \, dB(A)$ on the left side of the bus and the noise transmitted to the interior is measured. The overall average of the six measurements was $48..0 \, dB(A)$; ranging from $47.1 \, dB(A)$ at the rear passenger seats to $50.9 \, dB(A)$ at the driver's seat. The interior ambient noise level for this test was $< 34.0 \, dB(A)$.

The second test measures interior noise during acceleration from 0 to 35 mph. This noise level ranged from 69.4 dB(A) at the front passenger seats to 71.7 dB(A) at the rear passenger seats. The overall average was 71.0 dB(A). The interior ambient noise level for this test was 38.6 dB(A).

The third part of the test is to listen for resonant vibrations, rattles, and other noise sources while operating over the road. No vibrations or rattles were noted.

INTERIOR NOISE TEST DATA FORM Test Condition 1: 80 dB(A) Stationary White Noise

Bus Number: 0518	Date: 2/8/06
Personnel: T.S. & S.C.	
Temperature (°F): 33	Humidity (%): 67
Wind Speed (mph): Calm	Wind Direction: Calm
Barometric Pressure (in.Hg): 30.10	
Initial Sound Level Meter Calibration: ■ che	ecked by: S.C.
Interior Ambient Noise Level dB(A): < 34.0	Exterior Ambient Noise Level dB(A): 45.1
Microphone Height During Testing (in): 48.	0

Measurement Location	Measured Sound Level dB(A)
Driver's Seat	50.9
Front Passenger Seats	47.6
In Line with Front Speaker	47.8
In Line with Middle Speaker	47.6
In Line with Rear Speaker	47.2
Rear Passenger Seats	47.1

Final Sound Level Meter Calibration: ■ checked by: S.C.

Comments: All readings taken in the center aisle.					

INTERIOR NOISE TEST DATA FORM Test Condition 2: 0 to 35 mph Acceleration Test

Bus Number: 0518	Date: 2-2-06				
Personnel: B.S., S.C. & T.S.					
Temperature (°F): 37	Humidity (%): 93				
Wind Speed (mph): Calm	Wind Direction: Calm				
Barometric Pressure (in.Hg): 29.91					
Initial Sound Level Meter Calibration: ■ che	ecked by: S.C.				
Interior Ambient Noise Level dB(A): 38.6	Exterior Ambient Noise Level dB(A): 53.2				
Microphone Height During Testing (in): 48.	Microphone Height During Testing (in): 48.0				

Measurement Location	Measured Sound Level dB(A)
Driver's Seat	71.5
Front Passenger Seats	69.4
Middle Passenger Seats	71.5
Rear Passenger Seats	71.7

Final Sound Level Meter Calibration: ■ checked by: S.C.

Comments: All readings taken in the center aisle.			

INTERIOR NOISE TEST DATA FORM Test Condition 3: Audible Vibration Test

Bus Number: 0518	Date: 2-2-06	
Personnel: B.S., S.C. & T.S.		
Temperature (°F): 37	Humidity (%): 93	
Wind Speed (mph): Calm	Wind Direction: Calm	
Barometric Pressure (in.Hg): 29.91		

Describe the following possible sources of noise and give the relative location on the bus.

Source of Noise	Location
Engine and Accessories	None noted.
Windows and Doors	None noted.
Seats and Wheel Chair lifts	None noted.

Comment on any other vibration or noise source which may have occurred			
that is not described above: None noted.			

7.1 INTERIOR NOISE TEST



TEST BUS SET-UP FOR 80 dB(A) INTERIOR NOISE TEST

7.2 EXTERIOR NOISE TESTS

7.2-I. TEST OBJECTIVE

The objective of this test is to record exterior noise levels when a bus is operated under various conditions.

7.2-II. TEST DESCRIPTION

In the exterior noise tests, the bus will be operated at a SLW in three different conditions using a smooth, straight and level roadway:

- 1. Accelerating at full throttle from a constant speed at or below 35 mph and just prior to transmission up shift.
- 2. Accelerating at full throttle from standstill.
- 3. Stationary, with the engine at low idle, high idle, and wide open throttle.

In addition, the buses will be tested with and without the air conditioning and all accessories operating. The exterior noise levels will be recorded.

The test site is at the PSBRTF and the test procedures will be in accordance with SAE Standards SAE J366b, Exterior Sound Level for Heavy Trucks and Buses. The test site is an open space free of large reflecting surfaces. A noise meter placed at a specified location outside the bus will measure the noise level.

During the test, special attention should be paid to:

- 1. The test site characteristics regarding parked vehicles, signboards, buildings, or other sound-reflecting surfaces
- 2. Proper usage of all test equipment including set-up and calibration
- The ambient sound level.

7.2-III. DISCUSSION

The Exterior Noise Test determines the noise level generated by the vehicle under different driving conditions and at stationary low and high idle, with and without air conditioning and accessories operating. The test site is a large, level, bituminous paved area with no reflecting surfaces nearby.

With an exterior ambient noise level of 51.6 dB(A), the average test result obtained while accelerating from a constant speed was 73.2 dB(A) on the right side and 73.0 dB(A) on the left side.

When accelerating from a standstill with an exterior ambient noise level of 53.7 dB(A), the average of the results obtained were 72.7 dB(A) on the right side and 71.4 dB(A) on the left side.

With the vehicle stationary and the engine, accessories, and air conditioning on, the measurements averaged 48.0 dB(A) at low idle, 56.2 dB(A) at high idle, and 67.1 dB(A) at wide open throttle. With the accessories and air conditioning off, the readings averaged 0.5 dB(A) higher at low idle, 0.8 dB(A) higher at high idle, and 0.3 dB(A) higher at wide open throttle. The exterior ambient noise level measured during this test was 50.9 dB(A).

EXTERIOR NOISE TEST DATA FORM Accelerating from Constant Speed

Bus Number: 0518	Date: 2-2-06	
Personnel: B.S., S.C. & T.S.		
Temperature (°F): 41	Humidity (%): 85	
Wind Speed (mph): 5	Wind Direction: SW	
Barometric Pressure (in.Hg): 29.91		
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ■ checked by: S.C.		
Initial Sound Level Meter Calibration: ■ checked by: S.C.		
Exterior Ambient Noise Level dB(A): 51.6		

Accelerating from Constant Speed Curb (Right) Side		Accelerating from Constant Speed Street (Left) Side		
Run #	Measured Noise Level dB(A)	Run #	Measured Noise Level dB(A)	
1	72.6	1	73.2	
2	72.4	2	72.7	
3	73.0	3	72.5	
4	73.2	4	72.6	
5	73.1	5	72.7	
Average of two highest actual noise levels = 73.2 dB(A)		Average of two highest actual noise levels = 73.0 dB(A)		
Final Sound Level Meter Calibration Check: ■ checked by: S.C.				
Comments: None noted.				

EXTERIOR NOISE TEST DATA FORMAccelerating from Standstill

Bus Number: 0518	Date: 2-2-06		
Personnel: B.S., S.C. & T.S.			
Temperature (°F): 41	Humidity (%): 85		
Wind Speed (mph): 5	Wind Direction: SW		
Barometric Pressure (in.Hg): 29.91			
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ■ checked by: S.C.			
Initial Sound Level Meter Calibration: ■ checked by: S.C.			
Exterior Ambient Noise Level dB(A): 53.7			

Accelerating from Standstill Curb (Right) Side		Accelerating from Standstill Street (Left) Side	
Run #	Measured Noise Level dB(A)	Run #	Measured Noise Level dB(A)
1	72.4	1	71.3
2	72.9	2	71.4
3	72.1	3	71.0
4	72.5	4	71.3
5	72.4	5	71.2
Average of two highest actual noise levels = 72.7 dB(A)		Average of two highest actual noise levels = 71.4 dB(A)	

Final Sound Level Meter Calibration Check: ■ checked by: S.C.

Comments: None noted.

EXTERIOR NOISE TEST DATA FORMStationary

Stationary					
Bus Number: 0518 Date: 2-2-06					
Personnel: B.S., S.C.	Personnel: B.S., S.C. & T.S.				
Temperature (°F): 41		Humidity (%): 85			
Wind Speed (mph): 5		Wind Direction: SW	Wind Direction: SW		
Barometric Pressure (i	in.Hg): 29.91				
Verify that microphone height is 4 feet, wind speed is less than 12 mph and ambient temperature is between 30°F and 90°F: ■ checked by: S.C.					
Initial Sound Level Me	ter Calibration: ■ cl	necked by: S.C.			
Exterior Ambient Noise	e Level dB(A): 50.9				
	Accessories and	Air Conditioning ON			
Throttle Position	Engine RPM	Curb (Right) Side dB(A)	Street (Left) Side db(A)		
		Measured	Measured		
Low Idle	703	47.8	48.2		
High Idle	2,050	54.3	58.1		
Wide Open Throttle	3,602	67.0	67.2		
	Accessories and Air Conditioning OFF				
Throttle Position	Engine RPM	Curb (Right) Side dB(A)	Street (Left) Side db(A)		
		Measured	Measured		
Low Idle	750	48.0	49.0		
High Idle	2,153	54.7	59.3		
Wide Open Throttle	3,651	66.9	67.8		
Final Sound Level Meter Calibration Check: ■ checked by: S.C.					
Comments: None noted.					

7.2 EXTERIOR NOISE TESTS



TEST BUS UNDERGOING EXTERIOR NOISE TESTING



Filename: Report.0518.doc

Directory: E:

Template: C:\Documents and Settings\vnocek\Application

 $Data \backslash Microsoft \backslash Templates \backslash Normal.dot$

Title: 5

Subject:

Author: Sondra Hoover

Keywords: Comments:

Creation Date: 2/20/2006 10:52:00 AM

Change Number: 2

Last Saved On: 2/20/2006 10:52:00 AM

Last Saved By: PTI
Total Editing Time: 1 Minute

Last Printed On: 3/6/2007 10:41:00 AM

As of Last Complete Printing Number of Pages: 102

> Number of Words: 14,310 (approx.) Number of Characters: 70,410 (approx.)



2367 Century Drive · Goshen, Indiana 46528 · 1.800.348.7440

FMVSS/CMVSS Compliance Summary 2022

Starcraft Bus, StarTrans Bus, Glaval Bus, Eldorado Bus, Champion Bus, Elkhart Coach- Commercial Product Only

This vehicle conforms to all applicable U.S Federal Motor Vehicle Safety Standards and Canadian Motor Vehicle Safety Standards in effect on the date of

C/FMVSS No.	Standard Description	Compliance Action			
101	Control Location, Identification and Illumination	Forest River Bus does not alter the OEM controls or displays. Any aftermarket seats and/or controls or displays subject to the standard meet this standard. Test data on file.			
102	Transmission Shift Lever Sequence, Starter Interlock & Transmission Braking Effect	Compliance is deferred to the chassis manufacturer.			
103	Windshield Defrosting & Defogging Systems	Compliance is deferred to the chassis manufacturer.			
104	Windshield Wiping & Washing Systems	Compliance is deferred to the chassis manufacturer.			
105	Hydraulic Brake Systems	Test data kept on file for vehicles that have had the frame stretched, or have had other system modifications. For Non-stretched vehicles compliance is deferred to the chassis manufacturer.			
106	Brake Hoses	Vehicles with stretched frames have additional lines installed by chassis modifiers using OEM components. Other vehicles that have had system modifications use OEM or OEM-approved components and are tested for compliance. For Non-stretched vehicles compliance is deferred to the chassis manufacturer.			
108	Lamps, Reflective Devices & Associated Equipment	Forest River Bus does not alter OEM lighting. Additional lighting to include brake, turn, clearance and reverse lamps meet standard. Data on file.			
108.1	Alternative Requirements for Headlamps	Forest River Bus does not alter OEM lighting. Compliance is deferred to the chassis manufacturer.			
110	Tire Selection and Rim for Motor Vehicles with a GVWR of 4,536kg (10,000 lbs.) or Less	Forest River Bus does not manufacture vehicles with a GVWR of 4,536kg (10,000 lbs.) or Less.			
111	Rear View Mirrors	All aftermarket mirrors installed by Forest River Bus meet this standard and DOT regulations. Data on file			
112	Headlamp Concealment Devices	Forest River Bus does not manufacture vehicles with headlamp concealment devices.			
113	Hood latch systems	Compliance is deferred to the chassis manufacturer.			
114	Theft Protection	Compliance is deferred to the chassis manufacturer.			
115	Vehicle Identification Number	Compliance is deferred to the chassis manufacturer.			
116	Hydraulic Brake Fluids	Forest River Bus does not alter brake systems. Vehicles with stretched frames have additional fluid added by chassis modifiers using OEM instruction and materials. All other system modifications utilize only OEM- approved fluid. For Non-stretched vehicles compliance is deferred to the chassis manufacturer.			
118	Power Operated Window, Partition, and Roof Panel Systems	Compliance is deferred to the chassis manufacturer.			
120	Tire Selection and Rim for Motor Vehicles with a GVWR of 4,536kg (10,000 lbs.) or More	Compliance is deferred to the chassis manufacturer.			
121	Air Brake Systems	Vehicles with stretched frames have additional lines installed by chassis modifiers using OEM components. Other vehicles that have had system modifications use OEM or OEM-approved components and are tested for compliance. For Non-stretched vehicles compliance is deferred to t chassis manufacturer.			
124	Accelerator Control Systems	Forest River Bus does not alter the OEM accelerator system, with the exception of the addition of aftermarket fast idle systems on some vehicles. These systems meet this standard when installed in accordance with instructions.			
125	Warning Devices	All vehicles manufactured by Forest River Bus that are equipped with aftermarket (3) triangle kit meet this standard.			
131	School Bus Pedestrian Safety Devices	All vehicles manufactured by Forest River Bus are not completed to be used as school buses.			
135	Light Vehicle Brake System with a GVWR of 3,500kg (7,716lbs.) or Less	Forest River Bus does not manufacture vehicles with a GVWR of 3,500kg (7,716 lbs.) or Less.			
201	Occupant Protection in Interior Impact	All vehicles applicable to the standard (under 10,000 lbs.) do not have alterations made that affect the compliance to this standard. Compliance is deferred to the chassis manufacturer.			
202	Head Restraints	All vehicles applicable to the standard (under 10,000 lbs.) have seating installed that meets this standard Compliance is deferred to the chassis manufacturer.			

This vehicle conforms to all applicable U.S Federal Motor Vehicle Safety Standards and Canadian Motor Vehicle Safety Standards in effect on the date of manufacture				
203	Impact Protection for the Driver from the Steering Control System	Compliance is deferred to the chassis manufacturer.		
204	Steering Control Rearward Displacement	Compliance is deferred to the chassis manufacturer.		
205	Glazing Materials	No modifications are made to the OEM Glazing materials. Additional glazing materials meet the standard. Data on file.		
206	Door Locks and Door Retention Devices	All vehicles manufactured by Forest River Bus (non-buses) that are subject to this standard have no modifications made which affect compliance to the standard. Compliance is deferred to the chassis manufacturer.		
207	Seating System	All seating installed by Forest River Bus meets this standard. Test data on file.		
208	Occupant Crash Protection	No alterations are made to the OEM seat belts, air bag systems or associated hardware. Any seat belt systems added meet the standard. Test data on file.		
209	Seat Belt Assemblies	No alterations are made to the OEM seat belts or associated hardware. Any seat belt systems added meet the standard. Test data on file.		
210	Seat Belt Assembly Anchorage	No alterations are made to the OEM seat belts or associated hardware. Seat belt systems and their installation meet the standard. Test data on file.		
210.1	User-ready Tether Anchorages for Restraint System	No alterations are made to the OEM seat belts or associated hardware. Seat belt systems and their installation meet the standard. Data on file.		
210.2	Lower Universal Anchorage Systems for Restraint Systems and Booster Cushions	No alterations are made to the OEM seat belts or associated hardware. Seat belt systems and their installation meet the standard. Data on file.		
212	Windshield Mounting	Compliance is deferred to the chassis manufacturer.		
213	Child Restraint Systems	Vehicles manufactured by Forest River Bus that are subject to this standard (under 10,000 lbs.) have seating installed that meets this standard. Test data on file.		
213.4	Built-in Child Restraint Systems and Built-in Booster Cushions	Vehicles manufactured by Forest River Bus that are subject to this standard (under 10,000 lbs.) have seating installed that meets this standard. Test data on file.		
214	Side Impact Protection with a GVWR of 4,536kg (10,000 lbs.) or Less	Forest River Bus does not manufacture vehicles with a GVWR of 4,536kg (10,000 lbs.) or Less		
216	Roof Crush Resistance	Forest River Bus does not manufacture vehicles that are subject to this standard.		
217	Bus Window Retention and Release	No modifications are made to the OEM windows. Additional windows meet the standard. Test data on file.		
219	Windshield Zone Intrusion	Compliance is deferred to the chassis manufacturer.		
220	School Bus Rollover Testing	All vehicles manufactured by Forest River Bus are not completed to be used as school buses, however, Forest River Bus does test vehicles to meet standard.		
221	School Bus Body Joint Strength	All vehicles manufactured by Forest River Bus are not completed to be used as school buses, however, Forest River Bus does test vehicles to meet standard.		
222	School Bus Passenger Seating and Crash Protection	All vehicles manufactured by Forest River Bus are not completed to be used as school buses.		
225	Child Restraint Anchorage Systems	Vehicles manufactured by Forest River Bus that are subject to this standard (under 10,000 lbs.) have seating installed that meets this standard.		
301	Fuel System Integrity	Compliance is deferred to the chassis manufacturer.		
301.1	LPG Fuel System Integrity	Compliance is deferred to the chassis manufacturer.		
301.2	CNG Fuel System Integrity	Compliance is deferred to the chassis manufacturer.		

This vehicle conforms to all applicable U.S Federal Motor Vehicle Safety Standards and Canadian Motor Vehicle Safety Standards in effect on the date of manufacture				
302	Flammability of Interior Materials	Materials installed in the interior of Forest River Bus products meet the standard. Test data on file.		
303	Fuel System Integrity of Compressed Natural Gas Systems	Forest River Bus does not typically produce vehicles with CNG systems. All vehicles equipped with CNG systems exceed the applicability (10,000 lbs. or less) of this standard.		
304	Compressed Natural Gas Fuel Container Integrity	Forest River Bus does not typically produce vehicles with CNG systems. All vehicles equipped with CNG systems exceed the applicability (10,000 lbs. or less) of this standard.		
305	Electrolyte Spillage and Electrical Shock Protection	Forest River Bus does not produce vehicles that use electricity as propulsion power.		
403	Platform Lift System for Motor Vehicles	Forest River Bus does not alter the platform lift system. Forest River Bus install lift system in strict compliance with the manufacturers installation instructions. Forest River Bus meets strength requirements. Test data on file.		
404	Platform Lift Installation on Motor Vehicles	Compliance is deferred to the lift manufacturer.		
1106	Noise Emissions	Forest River Bus does not alter the OEM Chassis in the area which is stated in the incomplete vehicle documents. Data on file.		

 Date: 01/04/2022



Summary of Warranties

Ford E450 Cutaway Chassis Engine, Transmission, Drive Axle, Brake System See document titled 7.12.2 Ford Warranty

Bus Body Bumper to Bumper

See document titled 7.12.2, 7.12.3, 7.12.5 Glaval Limited warranty

Basic Body Structure Integrity

See document titled 7.12.2, 7.12.3, 7.12.5 Glaval Limited warranty

Wheelchair Lift System

Five Year Limited Warranty

All Add On Components

Two Years, Unlimited Miles



Warranty Provider Locations

Fleetpride 3204 Maccorkle Ave SW, South Charleston, WV 25303

Matheny Motors 50 Matheny Lane Mineral Wells, WV 26150

Matheny Motors 4125 1st Ave Nitro, WV 25143

Matheny Motors 1375 US Rt 52 Kenova, WV 25530

2023 FORD E-SERIES CUTAWAY

TECHNICAL SPECIFICATIONS



BODY

Construction/materials	High-strength C-section, steel frame
Body style	Body-on-frame
Final assembly location	Ohio Assembly Plant Avon Lake Ohio

DRIVETRAIN

Layout Front-engine, rear-drive

ENGINES

	7.3-liter premium V8 (standard)	7.3-liter economy V8 (optional)
Configuration	90-degree V8, single in-block cam	90-degree V8, single in-block cam
Block/head material	Cast iron block, aluminum heads	Cast iron block, aluminum heads
Displacement	7.3 liters (445 cubic inches)	7.3 liters (445 cubic inches)
Bore x stroke	4.22 x 3.97	4.22 x 3.97
Compression ratio	10.5:1	10.5:1
Valvetrain	Pushrod and rocker arms, two valves per cylinder	Pushrod and rocker arms, two valves per cylinder
Recommended fuel	87 octane	87 octane
Fuel delivery	Sequential multiport electronic	Sequential multiport electronic
Engine control system	Electronic	Electronic
Intake manifold	Naturally aspirated, tuned intake	Naturally aspirated, tuned intake
Dyno certified horsepower	350 @ 3,900 rpm	300 @ 3,750 rpm
Dyno certified torque	468 lbft. @ 3,900 rpm	425 lbft. @ 3,250 rpm
Oil-life monitor	Oil-minder system	Oil-minder system

ELECTRICAL

Alternator Standard 210-amp, optional 240-amp, or optional dual 240-amp/157-amp

Battery group 12-volt; 750-CCA 78-amp/hr

TRANSMISSION

Configuration Aluminum 6-speed with two overdrive speeds and tow/haul; auxiliary cooler

Gear ratios:	
First	3.974:1
Second	2.318:1
Third	1.516:1
Fourth	1.149:1
Fifth	0.858:1
Sixth	0.674:1
Reverse	-3.128:1



CHASSIS SPECIFICATIONS

Front suspension	Twin I-beam independent with computer-selected coil springs and stabilizer bar	
Rear suspension	Multileaf single-stage leaf springs/solid axle and stabilizer bar (DRW only)	
Front and rear shocks	Heavy-duty gas-pressurized	
Steering	Recirculating ball, power-assisted	

BRAKES

Туре	Power four-wheel vented discs, ABS, traction control
Front (rotor diameter)	13.58 inches (345 millimeters)
Rear (rotor diameter)	13.58 inches (345 millimeters)

WHEELS

Туре	Steel
Size	16 inches
Number of studs	Eight
Bolt-circle diameter	6.5 inches

EXTERIOR DIMENSIONS (INCHES UNLESS OTHERWISE NOTED)

	138-inch wheelbase E-350 SRW	158-inch wheelbase E-350 SRW	138-inch wheelbase E-350 DRW	158-inch wheelbase E-350 DRW	176-inch wheelbase E-350 DRW	158-inch wheelbase E-450 DRW	176-inch wheelbase E-450 DRW
Overall length	241.1	261.1	241.1	261.1	261.1	261.1	261.1
Overall width	79.4	79.4	94.9	94.9	94.9	94.9	94.9
Rear track	72.1	72.1	75.4	75.4	75.4	77.7	77.7
Cab, rear to rear axle	80	100	80	100	118	100	118
Rear axle to end of frame	68.5	68.5	68.5	68.5	50.5	68.5	50.5
Front overhang	34.6	34.6	34.6	34.6	34.6	34.6	34.6

INTERIOR DIMENSIONS

	E-350/E-450 Cutaway
First row headroom	42 inches
First row shoulder room	68.1 inches
First row hip room	65.6 inches
First row maximum legroom	42.1 inches



PASSENGER AND FUEL CAPACITIES

	E-350 SRW, DRW	E-450 DRW
Seating capacity	Two (one optional)	Two (one optional)
Fuel capacity	40 gallons (55 optional)	55 gallons (40 optional)

PAYLOAD PACKAGE SELECTOR (LBS.)

	Engine	GCWR	GVWR	Payload
E-350 SRW 138-inch wheelbase	7.3-liter economy	13,000	10,050	5,100
E-350 SRW 138-inch wheelbase	7.3-liter premium	18,500	10,050	5,100
E-350 DRW 138-inch wheelbase	7.3-liter economy	13,000/17,000	11,500	6,270
E-350 DRW 138-inch wheelbase	7.3-liter premium	18,500	11,500	6,270
E-350 SRW 158-inch wheelbase	7.3-liter economy	13,000	10,050	5,030
E-350 SRW 158-inch wheelbase	7.3-liter premium	18,500	10,050	5,030
E-350 DRW 158-inch wheelbase	7.3-liter economy	13,000/17,000	11,500	6,210
E-350 DRW 158-inch wheelbase	7.3-liter premium	18,500	11,500	6,210
E-350 DRW 158-inch wheelbase	7.3-liter economy	13,000	12,500	7,210
E-350 DRW 158-inch wheelbase	7.3-liter premium	18,500	12,500	7,210
E-350 DRW 176-inch wheelbase	7.3-liter economy	13,000/17,000	12,500	7,200
E-350 DRW 176-inch wheelbase	7.3-liter premium	18,500	12,500	7,200
E-450 DRW 158-inch wheelbase	7.3-liter economy	18,000	14,000	8,480
E-450 DRW 176-inch wheelbase	7.3-liter premium	22,000	14,200/14,500	8,680/8,980

WARRANTY

Bumper to bumper:	Three years/36,000 miles	
Powertrain:	Five years/60,000 miles	
Safety restraint system:	Five years/60,000 miles	
Corrosion (perforation only):	Five years/unlimited miles	
Roadside assistance program:	Five years/60,000 miles	





GLAVAL BUS WARRANTY

NOTICE

Please return the warranty registration card to register the warranty with GLAVAL BUS so that GLAVAL BUS may record your rights under this limited warranty and to assure prompt assistance. Your dealer will provide the warranty card for you to sign. If you do not remember signing a GLAVAL BUS warranty card at the time of delivery, please contact your dealer.

1. Who Warrants the product

The product, as described and limited here, is warranted by the manufacturer and installer of the body: GLAVAL BUS, Division of Forest River, Inc., hereinafter referred to as GLAVAL BUS, 2367 Century Drive, Goshen, IN; an Indiana Corporation; and is administered by the GLAVAL BUS Customer Service Dept., Goshen, Indiana 46528.

2. Who Is Covered

GLAVAL BUS, the warrantor, extends this limited warranty to the original owner of the vehicle during the WARRANTY PERIOD.

3. What Is Covered

GLAVAL BUS, your warrantor, extends the following limited warranty to you, which limited warranty covers your conversion only as to material defects in all materials and workmanship supplied by or performed by GLAVAL BUS.

4. Warranty Period

The GLAVAL BUS limited warranty is for a period of one (1) year from the date of first delivery or 12,000 miles, whichever occurs first, except for other coverages listed under "Other Warranties that may Apply" and items listed under "Exclusions and Limitations" and "Limits of the Warranty."

5. Extended Warranty on Structural Items

Warrantor warrants to the original purchaser for a period of five (5) years from the date of first delivery or 100,000 miles, whichever comes first, that this produce shall be free of SUBSTANTIAL DEFECTS arising out of or relating to the structural portion of the product. THIS STRUCTURAL WARRANTY IS INTENDED TO COVER ONLY THE PERFORMANCE OF THE STEEL CAGE STRUCTURE OF THE BUS BODY.

Custom paint and/or tape application, if performed by GLAVAL BUS, is warranted to be free of substantial defects in workmanship and materials provided by GLAVAL BUS for one (1) year (12 months) from date of original purchase.

6. Other Warranties That May Apply

GLAVAL BUS does not warrant the base vehicle itself. The vehicle engine, chassis, drive train, suspension system, battery, and other chassis components are covered by a separate warranty offered by the manufacturer of the vehicle and administered by the manufacturer's authorized dealers. The tire manufacturer separately warrants tires. Examples of other manufacturer warranties, which may include the following, but not limited to:

- · Electrical Components
- Air Conditioning and Heater(s)
- · Wheelchair Restraints and Wheelchair Lifts

For a complete list of items and their respective warrantor, please contact GLAVAL BUS Customer Service Department.

7. Owner's Responsibility

Proper maintenance and cleaning of the exterior and interior of the vehicle is the responsibility of the owner. See the owner's manual for proper care instructions. Defects or damage as a result of improper care or maintenance are not covered by the warranty.

8. Exclusions and Limitations

Damage caused by abuse, misuse, neglect, failure to observe reasonable and required maintenance practices, acid rain, accidents, natural disasters, acts of war and normal wear and tear and facing of fabrics, carpeting and/or fiberglass are not covered. Light bulbs and fuses are not covered.

Damage or deterioration to the physical appearance of the unit if such damage is the result of normal use, wear and tear, or exposure to the elements.

Damages that may occur to the chassis, frame, other parts or components that occur due to overloading will not be covered and may invalidate portions of the GLAVAL BUS warranty.

Cosmetic or surface corrosion resulting from stone chips or scratches in paint are not covered.

GLAVAL BUS does not cover accessories covered by their own manufacturer's warranties. Those items listed in paragraph 6 above are not covered or warranted by GLAVAL BUS.

Replacement parts provided under terms of the warranty will whenever possible, match original equipment. When necessary, GLAVAL BUS will substitute parts of comparable function and value. Defective items may be replaced with new, remanufactured, reconditioned or repaired components.

Modifications, alterations or repairs performed by unauthorized personnel may invalidate portions of the GLAVAL BUS warranty. In addition, USING THIS VEHICLE TO TOW ANOTHER VEHICLE IS PROHIBITED AND MAY VOID WARRANTY. Contact GLAVAL BUS Customer Service before you make any changes.

9. Recovery Limitations

NO PERSON SHALL BE ENTITLED TO RECOVER FROM WARRANTOR FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES ARISING OUT OF OR RELATING TO ANY DEFECT IN THE PRODUCT. These limitations include, but are not limited to, loss of time; loss of use; loss of revenues, salaries or commissions; towing charges; bus fares; car rentals; gasoline expenses; telephone charges; inconvenience or other incidental damages.

10. How to get warranty service

To obtain warranty service, contact or visit the dealership where you originally purchased your vehicle or another warranty service facility designated by GLAVAL BUS. Have the dealership contact GLAVAL BUS Customer Service Department for authorization to have a warranty claim submitted. If you or your dealer has moved, or if your dealer is no longer in business, contact GLAVAL BUS Customer Service Department (see address and telephone numbers below) for the name of a GLAVAL BUS dealer nearest you. Your claim must be made within 30 days of the discovery of the defect. Based on the determination of GLAVAL BUS, and subject to the terms of the warranty, the warranty repair work will be authorized by GLAVAL BUS.

All warranty claims must be reported within the warranty period. Warranty personnel must authorize all warranty service prior to performance. Warranty service may be reported directly to the warrantor or to one of their authorized dealers. If warranty personnel approve warranty service, you must leave the unit at the appropriate warranty service location for a sufficient time to perform service.

11. Who Performs Warranty Service

The best place to obtain warranty service is at the dealership where you originally purchased your bus. If the dealership cannot perform the service work, they should call GLAVAL BUS Customer Service Department for assistance (see number below). If you are unable to visit your original dealer, contact GLAVAL BUS Customer Service Department (address below) for the name and location of a GLAVAL BUS dealer near you.

12. Dispute Resolution

Should you be unable to resolve a disagreement with your dealer regarding your right to pursue warranty coverage for a needed repair, contact the GLAVAL BUS Customer Service Department (see address below). If a dispute about warranty service arises between GLAVAL BUS and you, the owner, the disagreement will be resolved in accordance with the customary procedures of the American Arbitration Association relating to commercial transactions, or the dispute will be submitted to a panel of three (3) arbitrators for decision. The panel will be made up of one member appointed by GLAVAL BUS, one member appointed by the complainant/owner, and one member from the arbitrators group mentioned above. Any and all legal remedies shall be available to the owner after pursuing this informal dispute resolution if a ruling is entered against GLAVAL BUS and GLAVAL BUS fails to abide by the ruling. The expenses of arbitration will be paid by the party against whom the arbitrator(s) rule.

13. Limits Of Warranty

This written statement of limited warranty represents the entire warranty authorized and offered by GLAVAL BUS. There are no warranties or representations beyond those expressed in this written document. Any dealership, salesperson or agent cannot amend it. It expressly limits all warranties, including, but not limited to, by way of specification, both express and implied warranties, including warranties or merchantability and fitness for a particular purpose along with all other liabilities or obligations of GLAVAL BUS.

FEDERAL COMPLIANCE

THE TERMS OF THE WARRANTOR'S UNDERTAKING EXPRESSED IN THIS LIMITED WARRANTY ARE DRAFTED TO COMPLY WITH THE MAGNUSEN MOSS WARRANTY LEGISLATION, P.L. 93-637 OF 1974, AND OTHER APPLICABLE LAW. ANY WARRANTY PROVISIONS PROMULGATED BY THE FEDERAL TRADE COMMISSION PURSUANT TO RULES OR ANY OTHER LAW RELATIVE THERETO ARE EXPRESSLY INCORPORATED HEREIN. TO THE EXTENT ANY PROVISIONS OF THIS LIMITED WARRANTY ARE INCONSISTENT WITH STATE LAWS, ONLY THOSE PARTS INCONSISTENT ARE VOID.

GLAVAL BUS Division of Forest River, Inc. CUSTOMER SERVICE DEPT. 2367 Century Drive Goshen, IN 46528 Phone: 877.258.1391 Fax: 574.970.6815



Trans/Air Manufacturing Corporation Limited Warranty FTA Funded Vehicles 36 Month (Unlimited Mileage)

Subject to the conditions and limitations set forth below, for a period of thirty six (36) months (with unlimited mileage) starting at the date of delivery to the End User and with proper registration documentation, Trans/Air Manufacturing Corporation (Trans/Air) warrants to the original owner, if still the user, that each manufactured system/component will be free from defects in factory workmanship and materials when used and maintained in accordance with the recommended procedures. Trans/Air will furnish new or remanufactured replacements parts and cover the cost of repair labor for thirty six (36) months following delivery in accordance with the current Trans/Air flat rate labor schedule when performed at an authorized Trans/Air Service Center. This is the End User's sole and exclusive remedy.

THIS IS TRANS/AIR'S SOLE WARRANTY AND IT IS FURNISHED IN LIEU OF ANY AND ALL OTHER WARRANTIES. TRANS/AIR MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES WHATSOEVER. NO WARRANTY OF MERCHANTIABILITY AND NO WARRANTY OF FITNESS FOR PARTICULAR PURPOSE IS MADE BY TRANS/AIR.

Conditions and Limitations

- 1) In order for a thirty six (36) month system warranty to apply, the customer must purchase the evaporator(s), condenser(s), compressor(s), piping kits, electrical kits, mount kits and refrigeration hose from Trans/Air. If the full system is not purchased from Trans/air, the thirty six (36) month warranty applies to Trans/Air supplied evaporators and condensers only. All compressors, piping kits, and electrical kits purchased outside of a full system, will be considered a service part and will carry a 180 day warranty. All mount kits purchased outside of a full system, and used on a Trans/Air system, will be considered a service part and will carry a 180 day warranty. All mount kits purchased outside of a full system, and used on a system other than Trans/Air, will carry no warranty. All other components supplied by Trans/Air are covered by standard parts warranty (see #4 below). Extended warranty coverage may be purchased from Trans/Air at the time of purchase of the unit or system. Correction of a failure under this warranty does not extend the warranty beyond the standard thirty six (36) month warranty period.
- 2) Service parts are warranted for a 180 day period from the date of sale or until the expiration of the original equipment warranty, whichever is later. (Compressors are warranted for 1 year) If required, parts covered by warranty must be returned to Trans/Air's factory in Dallastown, PA, by specified carrier freight prepaid, within standard Return Goods Authorization procedures, for evaluation, in order for Trans/Air to authorize any warranty claim.
- 3) Trans/Air will be responsible for the costs of repairs or replacement covered by warranty only if performed at an authorized Trans/Air Service Center. The Service Center is responsible for effecting repairs or replacement during the warranty period in accordance with current Trans/Air warranty procedures. A customer requesting service at a location other than an approved Service Center, or one requesting overtime, shall be responsible for all additional warranty repair expenses in excess of the flat rate allowed. Trans/Air is not responsible for towing charges.
- 4) If the customer has not properly registered the Trans/Air system, the Service Center is not authorized to render warranty services without charge. All information on the warranty registration from must be completed in its entirety and returned to Trans/air to activate the warranty.



- 5) Trans/Air does not warrant the installation of Trans/Air products unless installed by Trans/Air or an authorized Trans/Air Turnkey installation facility. In the cases of installation related failures, which are not covered by warranty Trans/Air specifically is not responsible for failures attributable to inadequate provision by the installer of structural support or inadequate provision of electrical requirements.
- 6) This warranty does not apply in cases of a failure of Trans/Air product which is attributable to improper evacuation procedures, or the introduction of non-approved refrigerant oil, additives, or other contaminants into the system.
- 7) This warranty does not apply in cases of failure of Trans/Air product, which is attributable to failure of the end user to perform or provide preventative maintenance in accordance with Trans/Air's guidelines. Examples include, but are not limited to, failure to properly maintain belt tension, clean condenser coils, replace evaporator filters, maintain electrical systems to provide proper voltage to components, or check and tighten hardware or fittings, which may have loosened due to vibration. (See Trans/Air Preventive Maintenance Schedule)
- 8) This warranty does not apply to loss of refrigerant or any damage caused by loss of refrigerant unless directly attributable to the failure of a Trans/Air product which, at the time of the failure, was under warranty.
- 9) Trans/Air reserves the right to make changes in design or improvements to its products or parts thereof, without obligation to make or install of such changes or improvements on existing units or upon products covered by this warranty.
- 10) If Trans/Air makes a product improvement program available to the End User, Trans/Air reserves the right to limit the duration of the programs unless it is safety related. Expenses incurred in completing said product improvements after the closing date of the program are the responsibility of the End User.
- 11) Trans/Air's warranty shall not apply in the case of damage incurred during shipment, accidental damage, abuse, misuse, act of nature, or if the serial number is missing, or to any product which, in the sole opinion of Trans/Air, has been installed, altered or repaired in a manner affecting the efficiency or performance of the unit or inconsistent with Trans/Air's written procedures.
- 12) This warranty applies only within the boundaries of the whole United States, its territories, and Canada. For other available coverage that may be purchased, contact Trans/Air.

TRANS/AIR'S LIABILITY TO THE PURCHASER FOR DAMAGES FROM ANY CAUSE WHATSOEVER AND REGARDLESS OF THE FORM (S) OF ACTION, WHETHER IN CONTACT OR TORT, INCLUDING NEGLIGENCE OR OTHERWISE, SHALL BE LIMITED TO THE VALUE OF REPAIRS TO OR REPLACEMENT OF THE DEFECTIVE COMPONENTS DURING THE WARRANTY PERIOD, AS THE EXCLUSIVE REMEDY, AND STRAIGHT TIME LABOR CHARGES AS OUTLINED IN ITS CURRENT WARRANTY PROCEDURE MANUAL AND FLATE RATE LABOR SCHEDULE. IN NO EVENT SHALL TRANS/AIR BE LIABLE WHATSOEVER FOR ANY PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR FOR LOST PROFITS OR OTHER COMMERCIAL LOSSES FROM ANY CAUSE WHATSOEVER, WHETHER OR NOT TRANS/AIR HAS RECEIVED NOTICE OF THE POSSIBILITY OR CERTAINTY OF SUCH DAMAGES OR LOSSES. TRANS/AIR WILL NOT BE LIABLE FOR ANY LOSS OCCURING BECAUSE THE EQUIPMENT IS OUT OF SERVICE. NO ACTION OR PROCEEDING ARISING OUT OF, FOR BREACH OF, OR IN ANY MANNER RELATING TO THIS WARRANTY MAY BE BROUGHT BY ANYONE AFTER SIX (6) MONTHS FROM NOTIFICATION TO TRANS/AIR OF AN IN-WARRANTY FAILURE.





Creative Care Owner's Guide

Department Overview

Creative Bus Sales would like to thank you and congratulate you on the purchase of your recent vehicle. We value your trust in our company and we will do our best to meet your expectations. With nearly 40 years of listening to our customers' needs and delivering vehicles within their budget, we are the nation's largest bus dealership. We have a dedicated nationwide network of Parts, Service, Warranty, and Customer Care departments to ensure that we continue to meet your expectations!

Below you will find an overview of your Creative Bus Sales support team in the event any issues or concerns arise.

Creative Care

Our customer care department is here to respond to your inquires or concerns about your vehicle purchase. Customer care is available to help resolve any issue that may arise over the serviceable life of your vehicle. Customer care is also your primary resource to assist you in reaching the correct department or individual that you desire to speak with. To reach our Creative Care department call 1.844.374.8915 or email CreativeCare@CreativeBusSales.com

Service Department

Our service department will work diligently to ensure that your vehicles are maintained to the highest standard. Creative Bus Sales service departments welcomes our customers vehicles for any maintenance or service-related concerns. With an appointment, our service team will make sure to get your vehicle back on the road as quickly as possible. To reach our service department call 1.800.326.2877 or email Service@CreativeBusSales.com

Parts Department

Creative Bus Sales stocks a large variety of parts to ensure we have what you need to keep your vehicles operational. The parts department staff includes experienced parts sales associates, shipping and receiving associates, inventory specialists, and delivery drivers where applicable. To reach our parts department, call 1.888.993.5040 or email Parts@CreativeBusSales.com

Warranty

Our warranty department will work for you to address any warranty concerns that you have with your vehicle. Creative Bus Sales warranty department will act as liaison between the customer and chassis manufacturer to expedite a satisfactory resolution for you concerns. Our warranty department will ensure that all your warrantable concerns are corrected to the manufacturer standards. To reach your warranty department please call 1.800.326.2877 or email Warranty@CreativeBusSales.com

Our staff is standing by, please do not hesitate to contact us!

Warranty Procedure

Dealer Warranty Statement

Warranty restitution can only be applied to repairs made if proper procedures are followed and it is determined that the issue is covered under the chassis, body, or component warranty.

Before any work is performed on your vehicle, please contact our warranty department at Warranty@CreativeBusSales.com so that they can assist. The following information will be needed in order to determine warranty coverage.

- Make
- Model
- VIN Number
- Mileage

Chassis Warranty Items

Contact your local chassis dealer and/or contact Creative Bus Sales for assistance in locating your local chassis dealer.

Bus Warranty Items

Contact Creative Bus Sales

Note: Failure to follow this procedure may result in the denial of any future vehicle warranty claims.

About Your Warranty — FAQs

If you are near a Creative Bus Sales location, we invite you to come and visit us for all warranty repairs. We do realize that you may not be close to any of our service locations. If that is the case, our warranty team will assist in locating a repair facility that can complete the needed warranty repairs. After determining where the repairs will be completed, a repair estimate must be provided to the Creative warranty team. No repairs are authorized to be completed for warranty purposes until the warranty team has approved the estimate provided.

Below you will find a list of FAQs regarding the warranty process. If there are still questions, please do not hesitate to reach out to Warranty@CreativeBusSales.com and someone will respond promptly.

How long does it take for someone to respond after I contact Warranty@CreativeBusSales.com?

Our targeted response time is within 24 hours however, we strive to achieve a quicker response time when possible.

Where can I go for warranty service?

Depending on the warrantable concern, your Warranty Administrator will discuss with you the best way to get you bus repaired. We invite you to come into any of our Creative Bus Sales service locations for any repair issues. If you are not close to our facility please contact Warranty@CreativeBusSales.com and our team will be happy to assist you in locating a authorized warranty repair facility near your area.

If the issue you are experiencing is OEM (Ford, Chevy, Dodge) related such as engine, transmission or a check engine light, the bus must be taken to the appropriate manufacturer dealership in your area. Creative Bus Sales is not authorized to complete warranty repairs on any OEM related failure.

What procedure do I follow when warranty repairs are made at my own facility?

Warranty repairs should not be performed without contacting Warranty@CreativeBusSales.com for prior authorization. Once Creative is contacted we will acquire authorization from the manufacturer and provide you with a claim number so you can receive a credit/payment for the warranty repairs that you performed. Failure to get prior authorization before repairs are completed may result in claim denial.

How do I get parts for warranty repairs performed at my own facility?

Please contact Warranty@CreativeBusSales.com and your warranty administrator will acquire the authorizations needed and arrange for parts to be shipped to your location at no charge. However, it is imperative that all defective parts be kept until up to 90 days after repair has been completed or otherwise notified. Neglecting to do so can result in claim denial.

About Your Warranty — FAQs (Continued)

Does warranty cover the cost of transporting the bus to and from authorized warranty repair centers?

No, you are responsible for the cost of transporting the bus to and from the authorized warranty service center.

Is towing covered under warranty?

If the failure is OEM related (engine, transmission, check engine light, etc.) the tow will be covered under warranty through Ford, Chevy or Dodge roadside. Again, the tow must be set up through the perspective roadside customer service line. If you need OEM roadside assistance please reach out to Warranty@CreativeBusSales.com and a warranty administrator can assist.

Ford roadside: 1.800.241.3673Chevy roadside: 1.888.899.1327Freightliner: 1.800.385.4357

If the failure is related to the after market body side of the bus, towing is not covered.

What should I do when I have problems with the bus while under warranty but cannot get it in for repairs right away?

If you have a warranty concern that you are unable to address at the time please contact Warranty@CreativeBusSales.com so we can document the complaint with the manufacturer.

How long does it take to receive credit for my warranty claims?

We want to expedite the processing of your warranty claims. We are committed to crediting you within thirty days after receipt of all the paperwork and failed parts.

Note: It is extremely important to file your warranty claim within 30 days of the repair, or your claim could be subject to disapproval.

Service Department



With numerous service locations across the U.S., Creative Bus Sales is equipped to accommodate all your bus servicing needs rapidly and efficiently. Our bus service bays are equipped with the newest state-of-the-art equipment to service your light, medium, and heavy-duty vehicles. Combined with our extensively trained and certified service technicians, you can count on Creative Bus Sales to provide the highest level of service and reliability.

Creative Bus Sales offers:

- OEM Factory Trained Technicians / ASE Certified
 - Ford / GM / IC / ARBOC / Starcraft / ENC
 - Braun & Ricon Lift
 - TransAir / Valeo / ACT
- Preventive Maintenance / Warranty / Advanced Repairs
 - Preventive Maintenance
 - State and Federal Inspections
 - Warranty Services
 - A/C Service & Repairs
 - Alignment
 - Engine Overhaul
- Remote & Onsite Service & Warranty Repairs
- Maintenance Plans
 - Monthly / Annual Plans Available
 - Parts Delivery & Mobile Service

Service Department — FAQs

Who do I call if one of my buses needs maintenance, repair, an option installed, or some other service? Call our toll-free Customer Care number at 1.844.374.8915

What kinds of service work can I expect Creative Bus Sales Service Facility to perform?

We are fully prepared to meet your bus service needs. We are experts in installing special options like wheelchair lifts, wheelchair securement, air conditioners, and roof vents. We can, also, provide service as it relates to chassis and body repair.

Our service facility can meet your extremely important routine maintenance functions, ensuring all warranty prerequisites are met.

If you need major repairs, like engine work, transmission or brake repairs, we will make sure your bus is operational as soon as possible.

How long will it take to get my bus repaired?

Of course, the length of time necessary to repair your bus will depend on the type of repair necessary, its severity, and the availability of parts.

It is the goal of Creative Bus Sales to expedite repairs. Once an assessment has been made, we will be able to give a more accurate estimate of repair time.

What can I expect to pay?

Our service department rates are both reasonable and competitive. Each job will be evaluated so that you receive the level of service needed to best accommodate the repair. We provide written estimates upon request.

What kind of warranty do I receive on the service work performed?

Our standard policy is to provide a 30-day warranty covering parts and labor on any service work we perform. Any other arrangements for specialized services need to be agreed upon in writing prior to the work being performed.

Don't Forget

Creative Bus Sales has a wide range of offerings to help you in all stages of bus ownership. Please contact Creative Care (1.844.374.8915 | CreativeCare@CreativeBusSales.com) if you're interested in any of the additional services listed below.

Mobile Repair Team Service

Our mobile service is available through most of our full service locations. Our quick mobile response vehicles are fully equipped for on-site repairs. This new service provides the same reliable maintenance service currently offered by Creative Bus Sales but at your location.

Graphics Packages

Wrap your bus in custom graphics and promote your brand's visibility. Creative Bus Sales can coordinate the work to your exact needs and specifications. Your bus will leave our facility completely decked out with your logo and branding.

Graphics Services Available:

- · New Vehicle Graphics
- Re-branding Current Vehicles
- Graphic Design / Installation / Project Management

Green Alternative Systems

Green Alternative Systems is the largest Ford Recognized Qualified Vehicle Modifier (QVM) Alternative Fuel Program Installer in North America, with multiple dedicated facilities that focus on the installation and up-fitting of Compressed Natural Gas (CNG) and Propane fuel conversion systems for fleet customers.

Why Green Alternative Systems?

- Over 10,000 vehicles converted to alternative fuels
- Ford QVM's Largest Alternative Fuel Participant
- Propane, Natural Gas, and Electric
- Tier One Supplier to Multiple OEM's
- CNG Fuel System Inspections
- · Certified Alternative Fuel Technicians
- Natural Gas / Propane / Bi-Fuel / Electric

Contact Information

Creative Bus Sales (Chino, CA Corporate Headquarters)	Phone	909.465.5528	
	Fax	909.465.5529	
	Website	CreativeBusSales.com	
Creative Care	Phone	1.844.374.8915	
	Fax	909.465.5529	
	Email	CreativeCare@CreativeBusSales.com	
Service Department	Phone	1.800.326.2877	
	Fax	909.465.5529	
	Email	Service@CreativeBusSales.com	
Parts Department	Phone	888.993.5040	
	Fax	909.993.5766	
	Email	Parts@CreativeBusSales.com	
Warranty	Phone	1.800.326.2877	
	Fax	909.465.5529	
	Email	Warranty@CreativeBusSales.com	
Corporate Management Team	Toll Free	800.326.2877	

Our staff is standing by, please do not hesitate to contact us!



BID FORM #1

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

Location(s) of the Technical Service Representative(s) and parts distribution center(s) closest or in the State of West Virginia.

	Location(s) of the technical service representative(s).	
Name:	Creative Bus Sales, Inc Indiana	
Address:	9365 Counselors Row, Suite 112, Indianapolis, Indiana, 46240	
	Contact: Matt Mashuda - Transit Bus Sales	
Telephone:	412-922-0184	
Name:	Creative Bus Sales, Inc Georgia	
Address:	1926 Hyannis Court, College Park, Georgia, 30337	
	Contact: Carl Henderson - Eastern Service Manager	
Telephone:	844-374-8915	
	Location(s) of parts distribution center(s).	
Name:	Creative Bus Sales, Inc Indiana	
Address:	57475 County Road, Elkhart, Indiana, 46517	
	·	
Telephone:	877-686-9448	
Name:	Creative Bus Sales, Inc Parts Distribution Warehouse	
Address:	3832 E. Roeser, Phoenix, Arizona, 85040	
Telephone:	888-993-5040	

REQUIRED BID DOCUMENTATION CHECKLIST

Mod	el Year: <u>2024 l</u>	Ford Model: Glaval PrimeTime
Man	datory Bid Fori	ns – must be submitted with bid:
	Bid Form #1:	Locations of Technical Service Representatives and Parts Distribution Centers
	Bid Form #2:	Certification for Air & Water Pollution
	Bid Form #3:	Disadvantaged Business Enterprise Vendors/Manufacturers Certification The vendor shall also supply with bid FTA TVM DBE Goal Concurrence for the Current Fiscal Year Approval Letter.
_ ✓	_	Buy America Certification Rolling Stock Should the Vendor be declared responsive and low bid, pursuant to Pre- Award and Post Delivery Audit Requirements, the Division will require the
		Vendor to submit documentation (with the bid or prior to any award) that lists:
		1) Component and sub-component parts of the rolling stock to be purchased identified b manufacturer of the parts, their country of origin and cost: and
		2) The location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly.
	Bid Form #5:	Federal Motor Vehicle Safety Standards Certification Vendor shall also supply with bid a breakdown of FMVSS standards to be met with proposed vehicle.
1.354 x2.11 1° 1.51 1.1 <u>11 √</u>	Bid Form #6:	U.S. Comptroller's Debarment List Certification
	Bid Form #7:	Certification of Primary Participant Regarding Debarment, Suspension, and Other Responsibility Matters
, , , <u> √.</u>	Bid Form #8:	Vendor's Certification of Understanding and Acceptance
	Bid Form #9:	Certification of Restrictions on Lobbying
	Bid Form #10 A copy o	: Certification of Compliance with FTA's Vehicle Testing Requirements f the vehicle testing report (if available) shall be included with the bid.
\checkmark	_ Exhibit A Pric	cing Page (8)



Training

Creative Bus Sales understands and is prepared to meet the training requirements as outlined in section 3.43.1.

If any further information is needed, please contact Mike Wilson at mikew@creativebussales.com.



CRFQ DMT2300000010 138" Wheelbase Dual Rear Wheel (DRW) Narrow Body Cutaway Vehicle

13.2.I References

Tri River Transit 753 Marconi Drive Hamlin, WV 25523 (304) 824-2944

Buckwheat Express 108 Senior Center Drive Kingwood, WV 26357 (304) 329-0464

Berkeley Senior Services 217 North High Street Martinsburg, WV 25404 (304) 263-8873

Heart 2 Heart Volunteers Inc. 667 Stone Shannon Road Wheeling, WV 26003 (304) 277-4657

Logan-Mingo Area Mental Health Inc. 300 Prosperity Lane Logan, WV 25601 (304) 792-7130



I, Mac Warner, Secretary of State of the State of West Virginia, hereby certify that

CREATIVE BUS SALES, INC.

a corporation formed under the laws of California filed an application to be registered as a foreign corporation authorizing it to transact business in West Virginia. The application was found to conform to law and a "Certificate of Authority" was issued by the West Virginia Secretary of State on December 01, 2016.

I further certify that the corporation has not been revoked by the State of West Virginia nor has a Certificate of Withdrawal been issued to the corporation by the West Virginia Secretary of State.

Accordingly, I hereby issue this Certificate of Authorization

CERTIFICATE OF AUTHORIZATION

Validation ID:5WV55_S32CW

Given under my hand and the Great Seal of the State of West Virginia on this day of

September 23, 2020

Mac Warner

Secretary of State



CRFQ DMT2300000010 138" Wheelbase Dual Rear Wheel (DRW) Narrow Body Cutaway Vehicle

LOCATION OF CONVERSION:

Glaval Bus 2367 Century Drive Goshen, IN 46528

Activities:

Chassis receipt from Ford

The complete assembly of the bus on the chassis including all components and subsystems.

RAIN BOOTH INFORMATION

Constructed as part of a corporate-wide pre-delivery inspection facility, the Forest River 20' x 50' motorized vehicle rain booth utilized by Glaval Bus offers exceptional performance in the area of water leak detection.



The motorized vehicle rain booth adds front wall nozzles to the design of the towable rain booth, simulating the pelting of oncoming rain at highway speeds. Both booths include two 1200 gallon recycling tanks and utilize a 12Horsepower pump with multi-bank filters capable of delivering 40 – 60 p.s.i. That equates to 300 gallons per minute pushed through the spray heads, or the equivalent of a 24 inchper-hour downpour!

With nozzles directed at the roof, sidewalls, front and undercarriage, nothing goes untouched in our quest for leak elimination. Using both velocity and volume in our test procedure ensures our valuable customers that we are doing the utmost to deliver a leak-free product to them.



Visitors are always welcome to witness the test booths whenever they are in operation.





An ISO 9001:2015 Registered Company

Gateway

High Idle and Shift Interlock System

Overview

- All-in-one wheelchair interlock and high idle system to ensure full functionality of the vehicle's systems while using the lift
- Provides battery charge protection and improves air conditioning performance
- System is fully compliant with FMVSS 403/404 and the Americans with Disabilities Act (ADA) for wheelchair lift interlocks
- Simple plug and play connections to the OEM chassis

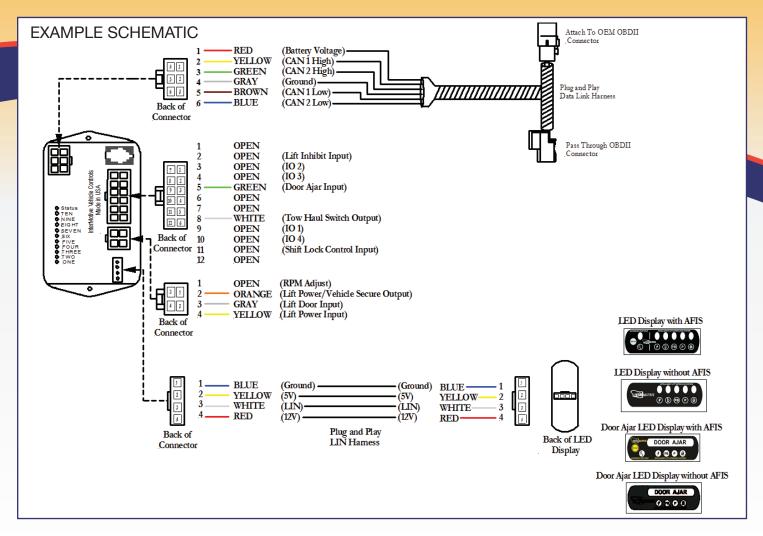


- Prevents vehicle movement while the lift is in use by locking the shifter in Park
- Monitors OEM sensor inputs from the transmission, engine, charging system and ambient air temperature
- Programmable RPM for high idle
- Prevents driving with the park brake set
- Can provide real-time chassis data
- Diagnostic trouble codes available
- Optional BrakeMax add-on: automatically places vehicle in "tow haul" mode for reduced brake wear
- Uses Intermittent Fault Filter™ (IFF) technology to eliminate erroneous lift door signals

Product features may vary by make, model or year. See instructions for complete details.



Details



SPECIFICATIONS	
Number of Inputs	Five inputs (lift inhibit, door ajar, shift lock, lift door and RPM adjust)
Number of Outputs	Four configurable outputs, plus one lift power/vehicle secure output and one tow haul switch output
Current Draw	~120 mA
Quiescent Draw	~2 mA (sleep current)
CAN Speed	High and medium speed
Temperature Range	-40°C to 80°C
Dimensions	4" L x 2" W x 1" H

a division of Forest River, Inc.







ROSCO

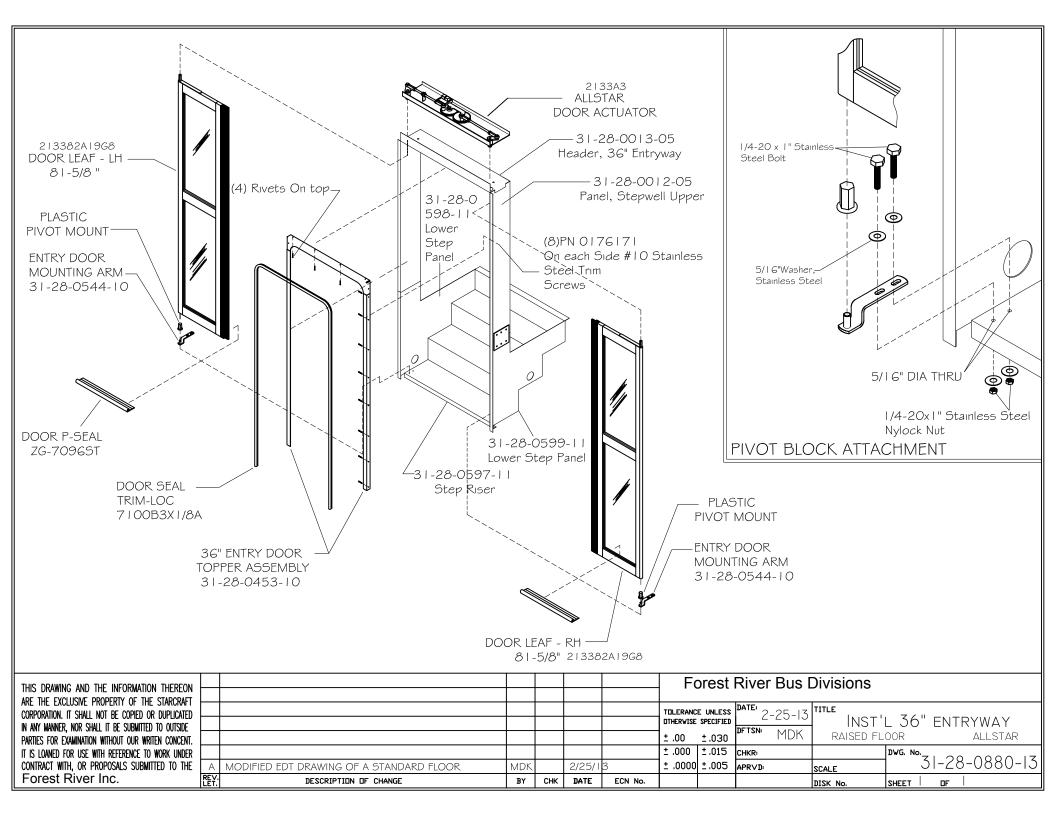
LEADING THE INDUSTRY IN REAR VISION SAFETY



of the STSK4750B backup camera system.

STSM244 MONIT	FOR SPECS	STSC130	B CAMERA SPECS
SCREEN SIZE	7"	TV LINES	420 TVL
RESOLUTION	800*480 pixels	FIELD OF VIEW (DIAGONAL)	150°
MONITOR BRIGHTNESS	700cd/m2	MINIMUM ILLUMINATION	0.2 LUX
NUMBER OF CAMERA INPUTS	1	DUST/WATER RATING	IP69K
INPUT FORMAT	13-pin	POWER SUPPLY	12 Vdc
VIEWING ANGLES	L/75°, R/75°, UP/60°, DOWN/60°	OPERATING TEMPERATURE	-22°F to 140°F -30°C TO 65°C
SHOCK RATING	2G		
VIBRATION RATING	6G	- Series	
POWER SUPPLY	12 ~ 32 VDC		
OPERATING TEMPERATURE RANGE	-4°F to 158°F -20°C to 70°C		1-800-227-2095





The Industry Leader in Bus Doors and Actuators

About

Products

Support Resources

Service Request

Suggestions

Electric Door Actuators



Product Features

- Powder-coated base plate
- → Plated push rods
- Permanently lubricated pivot points
- Motor Control PC Board
- Proprietary, heavy-duty motor
- Available remote control
- 1-year warranty
- New! Optional Auto Reopen Switch

Harmony of Movement

- Our design produces completely <u>perpendicular door opening</u>--always.
- No need to rely on spring-loaded push-pull rods--ever.

Secure Closing

- Our design ensure an unequalled, strong closing.
- The actuator will reliably hold the door shut, even at highway speeds.

Serviceability

- The reliability of the design,
- and the documentation tools we provide,

Maintenance

Minimal periodic maintenance of this product is recommended. The frequency varies, of course, by climate and use. Periodically **inspect** the entire mechanism.

As a rule, **lubricate** all moving parts on a semi-annual basis using a white, lithium, aerosol grease.

Support Documentation

- DOCooo66, A&M Systems Header Option Chart and Details (pdf, 326 KB)
- - ✓ Model 1000E Family (pdf, 1.10 MB)
 - ✓ Model 1100E Family (pdf, 1.08 MB)
 - <u>■Model 1200E Family</u> (pdf, 1.08 MB)
 - <u>■Model 1300E Family</u> (pdf, 1.08 MB)
 - <u>■Model 1400E Family</u> (pdf, 1.08 MB)
 - <u>■Model 1500E Family</u> (pdf, 1.08 MB)
 - <u>■Model 1600E Family</u> (pdf, 1.08 MB)
 - ✓ Model 2100E Family (pdf, 1.10 MB)
 - <u> Model 2100.1E Family</u> (pdf, 346 KB)
 - <u>■Model 2200E Family</u> (pdf, 1.08 MB)
 - ✓ Model 2300E Family (pdf, 1.08 MB)

 - ✓ Model 2400E Family (pdf, 1.18 MB) ✓Model 2729.X Family (pdf, .81 MB)
 - <u>→Model 2800E Family</u> (pdf, 1.08 MB)

 - <u>■ Model 2800.1E Family</u> (pdf, 1.00 MB)
 - <u>■Model 3000E Family</u> (pdf, 362 KB)
 - <u>■Model 3400E Family</u> (pdf, 1.08 MB)
 - <u>■Model 3500E Family</u> (pdf, 931 KB)
 - <u>■Model 3501E</u> (pdf, 461 KB)
 - <u>■Model 3600E Family</u> (pdf, 1.43 MB)
 - <u>Model 4000E Family</u> (pdf, 679 KB)
 - <u>■Model 4400E Family</u> (pdf, 678 KB)
 - ✓Model 5142E Family (pdf, 834 KB)
 - <u>■Model 5300E Family</u> (pdf, 637 KB)
 - ✓ Model 5500E Family (pdf, 362 KB)
 - <u>■Model 6200E Family</u> (pdf, 535 KB)
 - ■***NEW PC Board and Wires Chart (pdf, 171 KB)
- Assembly & Rigging Instructions (pdf, 98 KB)
- Replacements
 - Actuator Arm Replacement (pdf, 21 KB)
 - Emergency Release Lever Replacement (pdf, 21 KB)

 - Motor Replacement (pdf, 20 KB)
 - PC Board Replacement, Quick Check™ Enabled (pdf, 21 KB)
 - PC Board Replacement, Standard (pdf, 21 KB)
- **✓** Troubleshooting
 - Motor Control PC Board with Auto Reopen (pdf, 10 KB)
- <u>Simplified Schematic</u> (pdf, 75 KB)
- Wireless remote option flyer (pdf, 158 KB)



Note: You need Adobe Acrobat Reader to open or or view pdf formatted documents. Acrobat Reader is available free from Adobe. Click here to get it.

The Industry Leader in Bus Doors and Actuators

About

Products

Support Resources

Service Request

Suggestions

Door Leaves



Product Features

- Distinctive door leaf design

- **■** Torque arm on upper hinge
- <u>■ Tempered glass</u>
- Tough, clear coat, anodized finish (204 R1 rated)
- → Ambidextrous! (Use in either forward or aft position)

Harmony of Movement

- Our design produces completely <u>perpendicular door opening</u>--always.
- No need to rely on spring-loaded push-pull rods--ever.

Secure Closing

- ┛ Our design ensure an unequalled, strong closing.
- The actuator will reliably hold the door shut, even at highway speeds.

Serviceability

- The reliability of the design,
- together with the ease-of-access,

Support Documentation

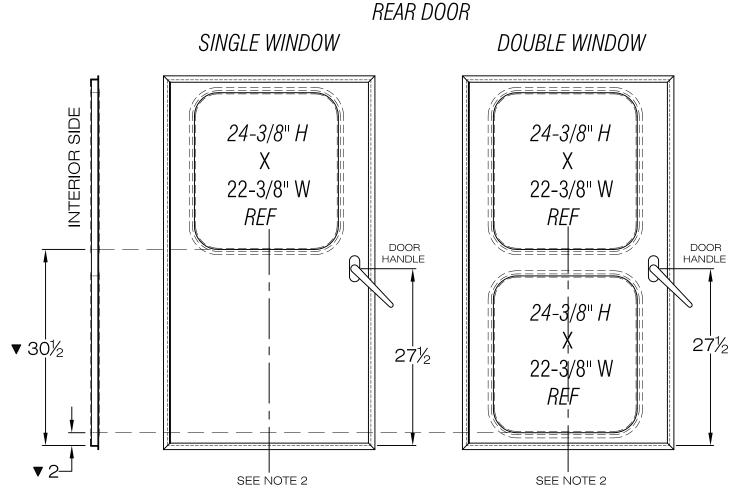
- DOCooo65, A&M Systems Door Option Chart and Details.pdf (pdf, 1128 KB)
- Glass Replacement (pdf, 20 KB)
- <u>Door Parts List</u> (pdf, 262 KB)
- D.O.T. Window Retention Certification (pdf, 912 KB)



Note: You need Adobe Acrobat Reader to open or or view pdf formatted documents. Acrobat Reader is available free from Adobe. Click here to get it.

Home | About | Products | Support Resources | Service Request | Suggestions

Questions or problems regarding this web site should be directed to webmaster@anmsystems.com. Copyright © 2006 A&M Systems, Inc. All rights reserved.



REAR DOOR ROUGH FRAME OPENING 38-1/2" X 59"

NOTES:

- 1- DIMENSIONS FOR THE WINDOW CUTOUT DO NOT INCLUDE DOOR OR WINDOW TRIM.
- 2 CENTER WINDOW HORIZONTALLY IN DOOR.
- $\it 3$ TWO (2) PANELS ARE REQUIRED FOR W/C DOOR.

▼ CRITICAL CONTROL ITEM

CAD DRAWING: DO NOT SCALE OR MANUALLY REVISE

TOLERANCE UNLESS OTHERWISE SPECIFIED		Forest River Bus			
WOOD			TITLE: LOCATION, RR DR		
± 1/8"			WINDOW		
± 1°	±1/2°	DWG. No. 31-28-0108-06			

NARROW BODY BUS AND STANDARD WIDE BODY BUS RAISED FLOOR WIDE BODY BUS 3/16 INTERIOR SIDE INTERIOR SIDE DOOR **HANDLE ▼** 27 243/4 ▼ 22 243/4 Rough Opening for 33-34" Lifts 47.5" x 71.88" SEE NOTE 3 SEE NOTE 3 Rough Opening for 37" Lifts 49.9" x 71.88" 1- DIMENSIONS FOR THE WINDOW CUTOUT Offset hinges are utilized, maximizing clear DO NOT INCLUDE DOOR OR WINDOW TRIM. ▼ CRITICAL CONTROL ITEM opening available. $2 - 36\frac{1}{4}$ " X 12 $\frac{1}{2}$ " ROUGH WINDOW OPENING 3 - CENTER WINDOW HORIZONTALLY IN DOOR. CAD DRAWING: DO NOT SCALE OR MANUALLY REVISE Forest River Bus TOLERANCE UNLESS

OTHERWISE SPECIFIED VOOD

OTHER

± 1/8" ± 1/16" NAME: EDT ±1/2° DWG. No.

DATE3-8-06 TITLE:

LOCATION, W/C DOOR WINDOW

31-28-0105-06

NOTES:





An ISO 9001:2015 Registered Company

Gateway

High Idle and Shift Interlock System

Overview

- All-in-one wheelchair interlock and high idle system to ensure full functionality of the vehicle's systems while using the lift
- Provides battery charge protection and improves air conditioning performance
- System is fully compliant with FMVSS 403/404 and the Americans with Disabilities Act (ADA) for wheelchair lift interlocks
- Simple plug and play connections to the OEM chassis



- Prevents vehicle movement while the lift is in use by locking the shifter in Park
- Monitors OEM sensor inputs from the transmission, engine, charging system and ambient air temperature
- Programmable RPM for high idle
- Prevents driving with the park brake set
- Can provide real-time chassis data
- Diagnostic trouble codes available
- Optional BrakeMax add-on: automatically places vehicle in "tow haul" mode for reduced brake wear
- Uses Intermittent Fault Filter™ (IFF) technology to eliminate erroneous lift door signals

Product features may vary by make, model or year. See instructions for complete details.



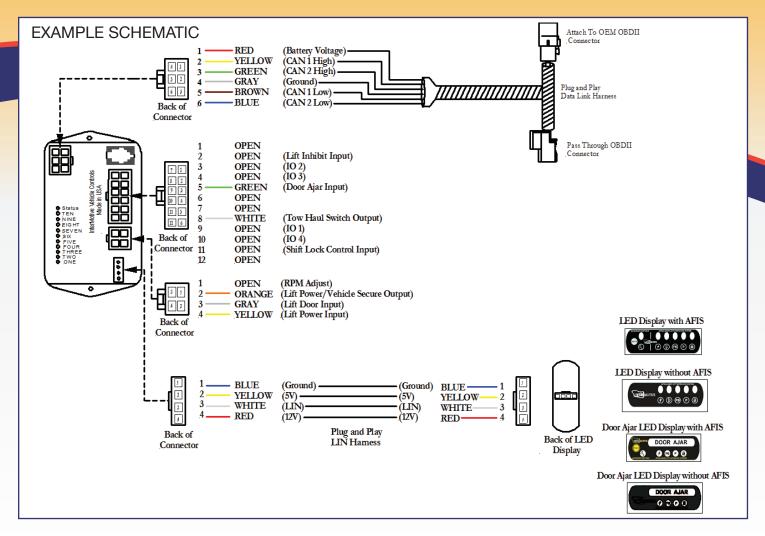
Proudly distributed by

LGS GROUP

AUTOMOTIVE TECHNOLOGIES

(775) 831-2002

Details



SPECIFICATIONS	
Number of Inputs	Five inputs (lift inhibit, door ajar, shift lock, lift door and RPM adjust)
Number of Outputs	Four configurable outputs, plus one lift power/vehicle secure output and one tow haul switch output
Current Draw	~120 mA
Quiescent Draw	~2 mA (sleep current)
CAN Speed	High and medium speed
Temperature Range	-40°C to 80°C
Dimensions	4" L x 2" W x 1" H

HEAVY DUTY ENERGY ABSORBING BUMPERS



PROTECTS VEHICLE IN LOW SPEED IMPACTS







SAFETYProtects vehicle from damage in low speed collisions



OPTIONSAvailable in various widths and custom end trims



EXTREME TEMPSpecified on buses in extreme climates



IMPACT AND SCRATCH RESISTANT Durable skin is puncture and tear resistant



CORROSION RESISTANT Withstands years of harsh elements and road chemicals



WARRANTY 1 year

- Outer Skin Can be Painted to Match or Compliment the Vehicle
- Two piece construction offers exchangeable symmetrical halves
- Less Parts Reduces Inventory Requirements and Cost
- Widths Available from 96" to 102

MEDIUM DUTY ENERGY RANSPEC **ABSORBING BUMPERS**



PROTECTS VEHICLE IN LOW SPEED IMPACTS





SAFETY Protects vehicle from damage in low speed collisions



OPTIONS Available in various widths and custom end trims



EXTREME TEMP Specified on buses in extreme climates



IMPACT AND SCRATCH RESISTANT Durable skin is puncture and tear resistant



CORROSION RESISTANT Withstands years of harsh elements and road chemicals



WARRANTY 1 year

- **Two Piece Construction offers Exchangeable - Symmetrical Halves**
- **Fewer Parts Reduces Inventory Requirements and Cost**
- Less Weight = Higher Fuel **Efficiency**
- Widths available 80" to 96"



CENTURY SERIES NCL1000-2 WHEELCHAIR LIFTS

THE ONE-STOP-SHOP FOR ALL YOUR MOBILITY TRANSPORTATION NEEDS

Since 1963, BraunAbility® has been the trusted industry leader. Our wheelchair accessible vehicles and lifts are designed to meet your specific needs, with performance, safety, and reliability that will keep your fleet up and running day after day, year after year. With the most diverse product portfolio of any mobility vehicle company in the industry, BraunAbility delivers the right solution to every commercial mobility need.

NCL1000-2 CENTURY SERIES WHEELCHAIR LIFT

STANDARD FEATURES

- •1,000-pound lifting capacity
- · NHTSA-compliant
- Fully automatic FMVSS 403-compliant lift, operated by an attendant
- · Interfaces with OEM interlocks
- · Long-lasting LED lift-mounted lights
- · Side or rear door application*
- · Platform options up to 37" wide
- · Floor to ground lift heights up to 48"
- · Made in the USA
- * Vehicle suspension dynamics affect body roll and FMVSS 404 platform tilt allowance. Before selecting a lift with a 1000# rated capacity, ensure this load does not induce excessive platform tilt.

SAFETY FEATURES

- Locking mechanical Inboard Barrier (IB), powder coated yellow for safety and high visibility, prevents operation if occupied
- Visual and audible warnings alert both passengers and attendants to unsafe conditions
- · Interlocked gas spring activated outer barrier
- · Dual handrails for security and convenience
- · Pump design prevents platform folding when occupied

EASE OF USE FEATURES

- · Hand-held control box with illuminated functions
- Durable redesigned baseplate reduces lift weight, and allows for quicker and easier service
- Bridging feature permits the wheelchair user to board the lift from sidewalks
- · Equipped with an adjustable anti-rattle feature
- Lift-Tite™ system stows the lift platform securely while the vehicle is in transit
- Pump module with removable cover offers easy access to all components
- · Integrated back-up pump

BRAUNABILITY'S UNRIVALED SERVICE

Every BraunAbility® commercial mobility product comes with our team of commercial mobility experts. They will work to find the ideal mobility transportation solution, no matter the requirements, complexity, or scale. And after you make a purchase, they will continue to work just as hard to offer you all the service and repair support you need.

The NC1000-2 Century Series Wheelchair Lift from BraunAbility

With dual hydraulic lift arms, and a design that has withstood the test of time, the Century Series offers all the benefits and quality of a BraunAbility wheelchair lift in a streamlined, economical package. The simplified electrical system offers trouble-free operation, while the non-hydraulic spring-loaded outer barrier keeps the wheelchair safely and securely on the wheelchair lift platform throughout the lifting cycle. In addition to all these standard features, the NCL1000-2 also comes equipped with an increased lifting capacity of 1000 pounds.



The NCL1000-2 Century Series also features new and improved inboard barriers, baseplates, vertical channels, and lower parallel arms for a more rigid and stable ride.

BraunAbility offers several models of the Century 2 Wheelchair Lift to address the right application, including usable platforms of 33" x 51", 34" x 51", 34" x 54", as well as 37" x 51" and 37" x 54". The models also vary based on the placement of the front or rear pump module, the lifting capacity (1,000 pounds), and the overall floor-to-ground lift height (up to 48"). The Century 2 Wheelchair Lift is available with or without the handrail belt. See your BraunAbility dealer or braunability.com for lift models available for your specific application.





631 West 11th Street • Winamac, IN 46996 (574) 946-6153 | 1-800-THE-LIFT www.braunability.com/commercial

All illustrations, descriptions and specifications in this brochure are based on the latest product information at the time of publication. BraunAbility reserves the right to make changes at any time without notice. © 2019 The Braun Corporation 405245





An ISO 9001:2015 Registered Company

Gateway

High Idle and Shift Interlock System

Overview

- All-in-one wheelchair interlock and high idle system to ensure full functionality of the vehicle's systems while using the lift
- Provides battery charge protection and improves air conditioning performance
- System is fully compliant with FMVSS 403/404 and the Americans with Disabilities Act (ADA) for wheelchair lift interlocks
- Simple plug and play connections to the OEM chassis



- Prevents vehicle movement while the lift is in use by locking the shifter in Park
- Monitors OEM sensor inputs from the transmission, engine, charging system and ambient air temperature
- Programmable RPM for high idle
- Prevents driving with the park brake set
- Can provide real-time chassis data
- Diagnostic trouble codes available
- Optional BrakeMax add-on: automatically places vehicle in "tow haul" mode for reduced brake wear
- Uses Intermittent Fault Filter™ (IFF) technology to eliminate erroneous lift door signals

Product features may vary by make, model or year. See instructions for complete details.



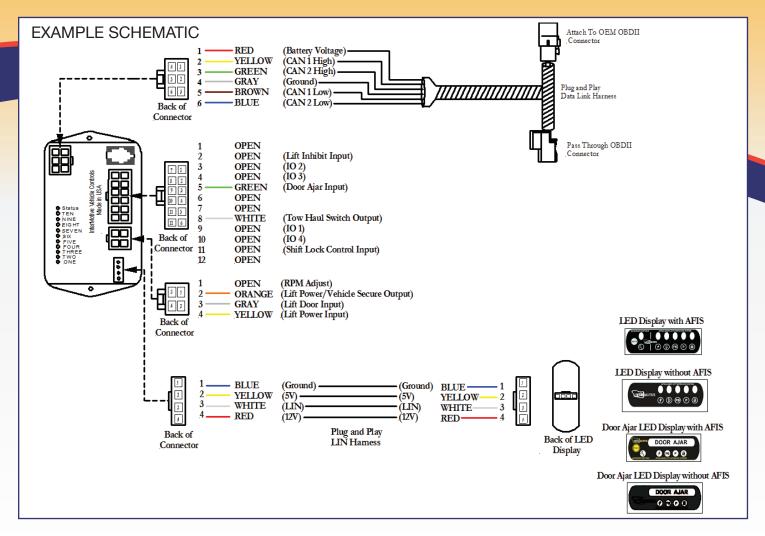
Proudly distributed by

LGS GROUP

AUTOMOTIVE TECHNOLOGIES

(775) 831-2002

Details



SPECIFICATIONS	
Number of Inputs	Five inputs (lift inhibit, door ajar, shift lock, lift door and RPM adjust)
Number of Outputs	Four configurable outputs, plus one lift power/vehicle secure output and one tow haul switch output
Current Draw	~120 mA
Quiescent Draw	~2 mA (sleep current)
CAN Speed	High and medium speed
Temperature Range	-40°C to 80°C
Dimensions	4" L x 2" W x 1" H



SMC Condensers

SMC3L & SMC2S microchannel skirt mounted condensers that can be used with almost every standard Trans/Air evaporator / compressor combination to complete an optimal climate control system.

Industry exclusive 2 year, unlimited mileage, limited warranty

CAUTION
1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMETER

1/ HOLA

PARAMET

Constructed of corrosion-resistant powder-coated galvannealed steel

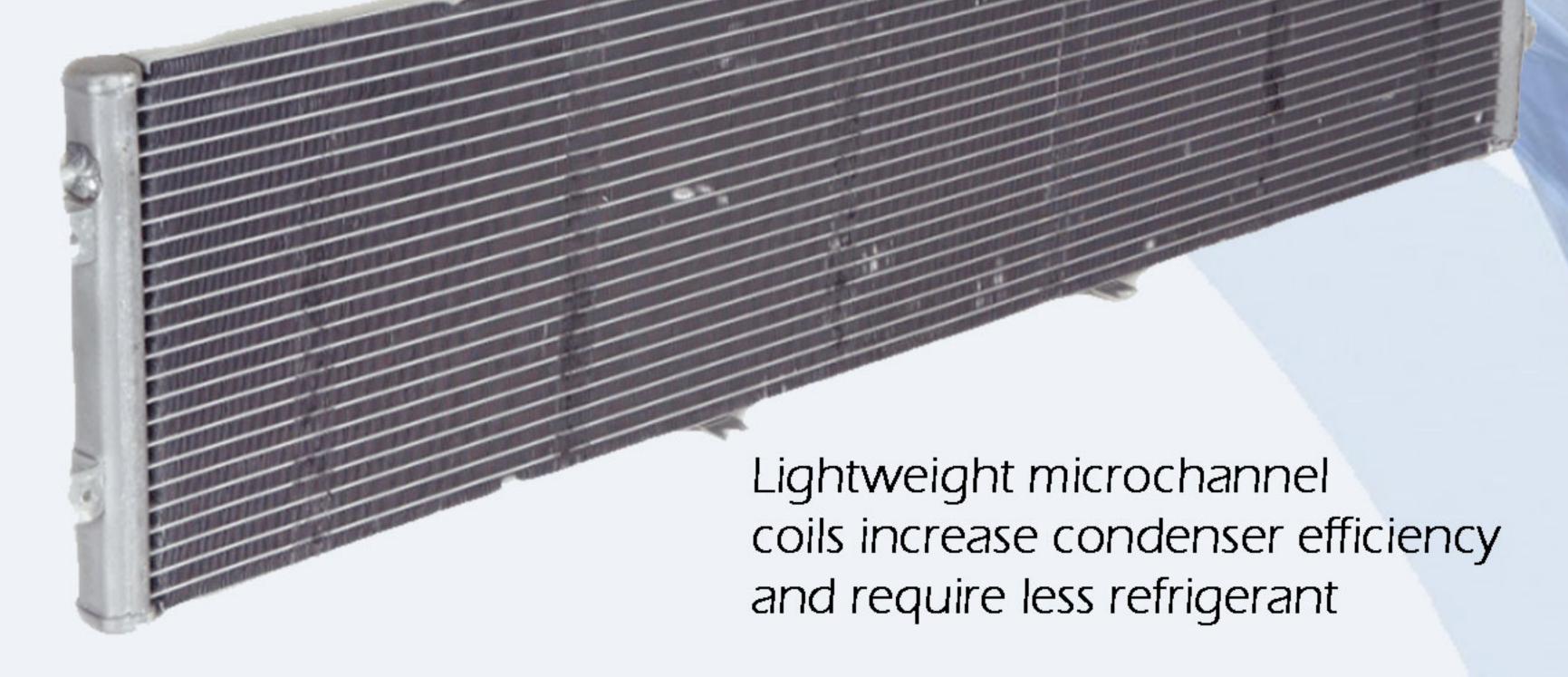
Stainless steel housing option is also available (Stainless Steel SMC2S pictured below)

Flexible mounting pattern (optional channels available to attach condenser to vehicle stringer in lieu of standard floor mounting)



Optional non-powder coated screens, stacking kits, and winter cover kits

16 cubic inch filter drier with sight glass mounted on the side for easy serviceability





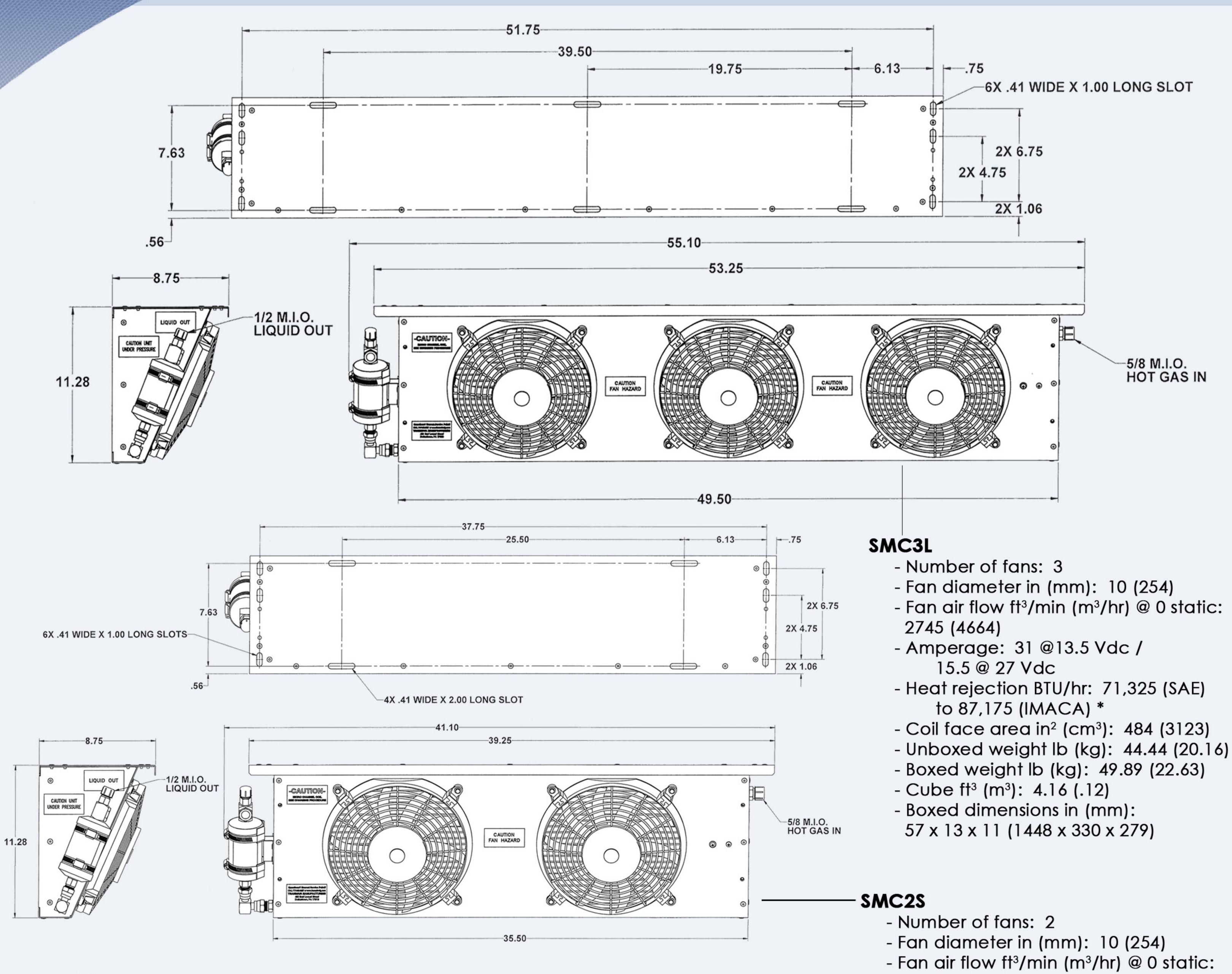
10" weather-proof condenser fans provide maximum air flow

School & Commercial Bus Climate Control Design | Manufacture | Install | Service





SMC Condensers



General (SMC2S & SMC3L)

- Skirt mounted
- Housing: powder-coated galvanealed steel (stainless steel optional)
- 92% flow-through aluminum grill
- Coil fins: 0.008 in thick
- Filter drier: 16 in³

Fan Motor Assembly (SMC2S & SMC3L)

- Low profile surface mount
- Closed permanent magnet motor with ball bearings

Sight Glass (SMC2S & SMC3L)

- Moisture indicator
- Visible from outside of vehicle

Warranty

- 2 year unlimited mileage limited warranty within the continental U.S. and Canada. Terms of Trans/Air's domestic and export warranty policies are available upon request.
- * Actual BTU/hr is dependant on system combination and rating conditions used
- Specifications subject to change without notice
- All measurements in standard
- Contact Trans/Air for more information

- 1830 (3109)
- Amperage: 21.3 @13.5 Vdc / 10.7 @ 27 Vdc
- Heat rejection BTU/hr: 48,364 (SAE) to 59,112 (IMACA) *
- Coil face area in² (cm³): 363 (2342)
- Unboxed weight lb (kg): 33.82 (15.33)
- Boxed weight lb (kg): 38.58 (17.50)
- Cube ft³ (m³): 3.09 (.09)
- Boxed dimensions in (mm): 43 x 13 x 11 (1092 x 330 x 279)

480 East Locust Street, Dallastown, PA USA 17313 717-246 2627 | 800-673-2446 | Fx: 717-244-7088



TA77 Evaporator



Durable ABS cover with unique drain pan that promotes proper condensate removal (available in white, gray, and spring white)



A rear mounted freeblow evaporator that can be used as a tie-in with OEM components or as part of a complete Trans/Air system





Blower assemblies come equipped with larger blower wheels for maximum air flow and motors utilize custom wound armatures for lower current draw and greater efficiency



4 Ton externally equalized, thermostatic expansion valves that precisely control refrigerant and prevent liquid slugging to the compressor(s) or starved evaporator(s)



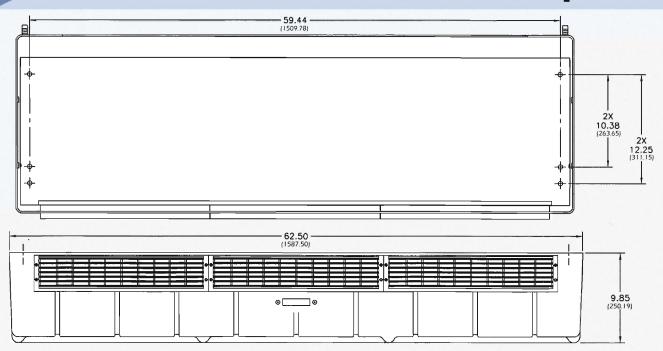


School & Commercial Bus Climate Control Design | Manufacture | Install | Service





TA77 Evaporator



General

- Freeblow air distribution
- Weight lb (kg): 100 (45)
- Box Size in (mm): 66 x 20 x 16 (1676 x 508 x 406)
- Cube ft3 (m3): 12.22 (.34)

Cooling Capacity

- BTU/hr: 57,458 (SAE) to 96,826 (IMACA) *

Heating Capacity

- BTU/hr: 67,374 (Actual capacity varies based on engine operating temperature and hot water flow rate

Cover

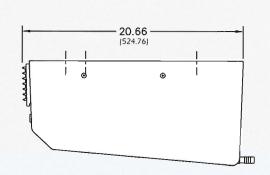
- ABS cover
- Integral drain pan
- (3) Multi-directional louvers
- Washable / reusable filter
- (2) 5/8 in ID drain hoses

Blower Assemlies

- (6) 4.5 in diameter blower wheels
- Amperage draw: 20.0 Amps @ 13.5 Vdc (10.0 Amps @ 27 Vdc)
- Total air flow 2220 ft3/min (3772 m3/hr) @ 0 static
- (3) Double shafted, single speed, permanent magnet motors

Evaporator Coil

- (2) Coils
- Each coil face area in2 (cm2): 204 (1316)
- 3/8 in enhanced copper tubing
- Fins: 0.006 in raised lance, 10 FPI
- (3) Row



Electrical

- Color coded in fire retardant loom
- Low and high pressure swtiches

Expansion Valve

- (2) 4 Ton externally equalized thermostatic type

Available Options

- Metal cover for use with with OEM installation
- Heat coil used with positive isolator valve. Isolator valve and heater hose not inlcuded.
- Coil corrosion protection

Warranty

 2 year unlimited mileage limited warranty within the continental U.S. and Canada.
 Terms of Trans/Air's domestic and export warranty policies are available upon request.

- Actual BTU/hr is dependant on system combination and rating conditions used
- Specifications subject to change without notice
- All measurements in standard (metric)
- Contact Trans/Air for more information

480 East Locust Street, Dallastown, PA USA 17313 717-246 2627 | 800-673-2446 | Fx: 717-244-7088

TECHNICAL DATA SHEET



COMPONENT SPECIFICATIONS

ProAir 435 / 445 / 465 Low Profile Heaters

Where a smaller height is required and high heat is of utmost importance the 435,445 and 465 Low Profile auxiliary heaters deliver maximum BTUs with outstanding CFMs.

Features: Long Life Motor, 3 Year Warranty, Standard Plug-In on Harness and Filter Option Available

435 /445 Heater Performance

35,000 Btu/hr 435 Heater and 45,000 Btu/hr 445 Heater Capacity

Power Requirement

12 Volts DC Draw is 5.0 Amps @ 13.5 Volts

Air Flow

313 CFM @ 0 static Pressure

Weight

8 Lbs. 435 Heater 9 Lbs. 445 Heater

Physical Size

W 10.25"x H 7.5"x D 9.5"



465 Heater Performance

65,000 Btu/hr Heating Capacity

Power Requirement

12 Volts DC Draw is 10.0 Amps @ 13.5 Volts

Air Flow

640 CFM @ 0 static Pressure

Weight

15 Lbs.

Physical Size

W 21"x H 7.5"x D 9.5"



Warranty

ProAir systems are covered by an industry-leading two-year warranty. Complete terms are outlined in our Warranty Statement, Consult ProAir for detailed information.

TARABUS FLOORING FOR BUS & COACH INTERIORS



INSTALLATION GUIDELINES



TABLE OF CONTENTS

INTRODUCTION	4
STEP 1: PREPARATION & INSPECTION	5
1.1 Storage & Handling	5 5 5
STEP 2: ROLL LAYOUT & CUTTING	6
2.1 Cutting to vehicle size	6 6
STEP 3: ADHESIVES & INSTALLATION	7
3.1 Tarabus Self-Adhesive 3.2 Water-based acrylic adhesives 3.3 Neoprene/Contact adhesives	7
STEP 4: LOGOS & INSTALLATION	8
STEP 5: HOT WELDING PROCESS FOR FLAT, COVED & VERTICAL AREAS	
5.1 Treatment of seams using hot welding process 5.2 Hot welding tools	10
STEP 6: CLEANING (refer to Tarabus Cleaning Guide)1	12
ANNEX: TARABUS RECOMMENDED TOOL LIST1	

INSTALLATION GUIDELINES

INTRODUCTION

Tarabus floorcoverings are designed to meet all global transportation industry requirements. To obtain optimum performance from Tarabus floorcoverings follow carefully our installation recommendations.

Important: failure to install Gerflor Transport products correctly will affect the product guarantee.

PRODUCT LIABILITY

Gerflor shall not be liable for any injury, loss or damage, whether direct, indirect, special, incident or consequential. arising out of the furnishing of, the use of, or any inability to use the Tarabus materials provided there trom. The remedies of the purchaser set forth herein are exclusive, and the liability of Gerflor with respect to any sale or anything done in connection therewith, whether in contract, in tort, negligence, under any warranty or otherwise, shall not, except as expressly provided herein, exceed the cost of replacement of Tarabus materials upon which such liability is based. Buyers assume all risks and liability for damage to persons or property resulting from buyer's use of the material.

STEP 1: PREPARATION & INSPECTION

■ 1.1 - STORAGE & HANDLING

- Tarabus flooring must be stored and installed at a temperature in between 15° and 30°Celsius.
- Tarabus flooring should not be exposed to water during transportation, storage, during and after installation.
 Thus, rolls should be stored in a protected environment (especially protected from rain and snow).
- Rolls (NT and MK backing) should be stored vertically, to reduce appearance of pressure marks. Rolls with NT backing can also be stored horizontally, individually on a foam insert.
- Rolls should be transported by use of a hand truck or with a fork lift
- Relax the floorcovering by laying the pieces flat for 24 hours before installation



Storage



Handlin

■ 1.2 - SUBFLOOR PREPARATION

1.2.1 - Subfloor preparation

For all types of subfloors make sure surfaces are clean, smooth, flat, dry and free from contamination. Cleaning of the subfloor should be in accordance with the vehicle manufacturers Standard Operating Procedure.

All cleaning products used should be compatible with the surface being cleaned.





1.2.2 - Vehicle inspection

Before installation, carry out a vehicle inspection. Check the subfloor is properly fixed and flat according the subfloor manufacturer recommendations.

1.2.3 - Timber subfloors

The subfloor panels should be securely fixed in place as per the specifications of individual vehicle manufacturers.

All joints between panels should be sanded and filled to ensure a smooth transition.

1.2.4 - Metal subfloors

The subfloor panels should be securely fixed in place as per the specifications of individual vehicle manufacturers.

Degrease and in case of corrosion abrade the metal floors. All joints between panels should be sanded and filled to ensure a smooth transition.

■ 1.3 - FLOORCOVERING INSPECTION

- See Label Description.
- Check product, colour, and batch reference before installation. Use the same batch throughout the vehicle.
- For traceability purposes, the batch number should be kept.





TARABUS Gerflor TARABUS Gerflor

INSTALLATION GUIDELINES

■ 1.4 - ADHESIVE SELECTION

- Choosing the correct adhesive will ensure that the installed materials will perform as expected in service.
- You can find below recommended generic adhesives. For any adhesive not validated by Gerflor, it is the responsability of the customer and adhesive manufacturer to ensure compatibility with subfloor and material.

RECOMMENDED ADHESIVE	APPLICATION	SUBSTRATES	FLEXIBILITY (grade from 1 to 5)	BOND STRENGTH (grade from 1 to 5)	DRYING TIME	REPOSITIONING
TARABUS SELF-ADHESIVE	Preapplied	All substrates	5	4	0 hour	Yes with care
WATER-BASED ACRYLIC	Subfloor only	Absorbant (not vertical)	5	4	12 hours	Yes up to 20/30 min.
NEOPRENE/CONTACT	Subfloor & Backing	All substrates	4	4	5-15 min (flash-off)	Yes with care

Gerflor will not accept responsability for any occurence where secondary additives or chemicals have been mixed with the primary adhesive. In such case, written confirmation from adhesive manufacturer should be provided.

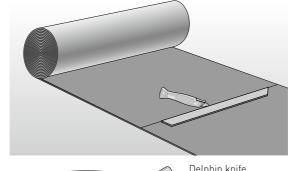
STEP 2: ROLL LAYOUT & CUTTING

■ 2.1 - CUTTING TO VEHICLE SIZE

Review the floor plan for the individual vehicle, establish the direction that the pieces will be installed in and define any weld position. Lay out the floorcovering on a clean, dry and flat working area. A template can be used to avoid cutting errors.

To optimize the installation process: Pre-cut and Pre-welded kits can be produced specifically to the individual requirements of the client. Please ask your sales representative for more information.

- Mark the lines to be cut-off or use a pattern as a template.
 Use a Delphin knife (E6000002) and a straight edge for cutting the material.
- Whether the material is to be installed flat or coved up the side of the vehicle Gerflor recommends that a minimum of 5 cm extra material is allowed on each end (10 cm overall) to ensure the piece is long enough and can be trimmed comfortably.
- \bullet When Joining Factory Edges Leave a gap of 1 \pm 0.5 mm maximum.
- Cut seams using any of the following methods:
- Overlap and trace,
- Underscribe (recess scriber method)





Delphin knife P/N: E6000002

When installing designs of a geometric nature, it is important to ensure that the material is installed straight. Particular attention should be paid to release cuts on external corners when trimming the waste for positioning. Failure to not cut the material as close as possible to the base of the external angle may cause deformation of the design. This is due to excess material being forced around the base on the external corner. When making release cuts or removing excess waste, always cut the material from the backside.

2.2 - PRE-CUT SHIPSETS

Gerflor in-house cutting department is able to supply pre-cut pieces to specific dimensions from plans supplied by the customer.





STEP 3: ADHESIVES & INSTALLATION

We propose 3 types of installation process depending on the adhesive solution.

■ 3.1 - TARABUS SELF-ADHESIVE

- In case of rolls, cut the flooring to the area size.
- Lay out the floor into the car.
- · Fold back one half.
- Use a hooked blade (E7520001) to cut the protective layer from the underside floor covering. Take care not to damage the floorcovering backing.



E7520001

- Pull off the protective layer from the exposed half area.
- Position the material into the targeted location and make sure the air is expelled out towards the edges.
- Repeat steps 3 to 6 to the remaining half.
- The material can be welded immediately.



■ 3.2 - WATER-BASED ACRYLIC ADHESIVES

Follow the adhesive manufacturer's instructions regarding subfloor types, correct trowel/blade size, open times, temperature and humidity conditions.

- Cut the flooring to the size required.
- Fold back the flooring halfway.
- Apply the adhesive to the subfloor. Use the recommended trowel and blade (Aluquick Spreader E6130001).
- Allow the adhesive to tack off (this will vary depending on temperature and subfloor absorbency).
- Place flooring into adhesive and smooth manually then use a pressure-roller.
- Repeat this process with the other half.
- Follow the manufacturer's guidelines for waiting times for welding and foot traffic.



■ 3.3 - NEOPRENE/CONTACT ADHESIVES

Follow the adhesive manufacturer's instructions regarding subfloor types, correct trowel/blade size, open times, temperature and humidity conditions.

- Cut the flooring to the size required.
- Lay out the flooring face down onto a flat working area.
- Apply adhesive to subfloor and to the back of the flooring.
 Adhesive can be applied by spray, trowel, or roller.
- Allow the adhesive to flash off and become touch dry.
- Position floor product on adhesive and roll thoroughly to ensure right contact with subfloor.
- The material can be repositioned with care.
- The material can be welded immediately.



With any adhesive system used to install the floorcovering, Gerflor always recommend the use of a cork press [E6640001] or cork broom [E6640002] to ensure a good initial contact and the expulsion of any air from beneath the product. On completion of the installation, the whole floor area should be rolled in the length and the width of the vehicle with a pressure-roller of 50 kg [E6320001].





TARABUS <u>Gerflor</u> TARABUS <u>Gerflor</u>

STEP 4: LOGOS & INSTALLATION

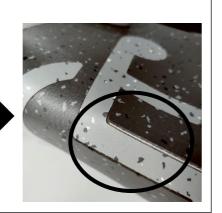
For complete watertightness, subfloor protection and high in-service performance Gerflor recommends the use of our laminate backed logos. It can be installed with self-adhesive backing or traditional glue.

TIP: Have a look at our Youtube video: <u>Tarabus Implantation Logo - YouTube</u>











• Position and mark where the pre-cut logo will be located.



• Remove the protective layer of the self-adhesive logo or apply the traditional adhesive on subfloor.



 Once the logo is in place, press it with a cork press, install the floorcovering over the installed logo, and press it too, to optimize adhesion.
 Recommended tools: Cork press [E6640001] or Cork broom [E6640002].



• Using a pressure roller, roll around the edge of the logo to identify its position. Recommended tool: Internal angle

roller [E6600001]



 Cut the waste from above the logo so that the main flooring material overlaps the logo by 5 cm max, leaving a 1 mm space all around. Recommended tool: Delphin knife [E6000002].



Using a recess scriber. Scribe around the logo while the pin in the scriber transfers and marks the surface of the main flooring material.

 Recommended tool: Recess Scriber [F8220002]



 Carefully follow the scribed line with the knife. This will provide a clean line between logo and material.



 Use a Linea Groover to create the groove between logo and main material. You may use our Triangular Groover to refine the groove.
 Recommended tools: Linea Groover (E8060001), Triangular Groover (E8000004).



 Hot weld the logo to the main flooring material using CR50. Recommended tools: Welding Gun Leister Triac'S (E8090002), Anti-Glaze Rapid Nozzle 4-5mm (E8100002)



 Using the Mozart 2 in 1 Trimming Knife, with the 0.7 mm spacer, carry out the first trim of the weld cord. Do not carry out the second trim until the weld is completely cold. Recommended tool: Mozart 2 in 1 Trimming Knife (E8300002).

- As final step, you may use a pressure-roller of 50 kg (E6320001) to optimize adhesion (rolling in the length and in the width).
- When installing self-adhesive flooring around a logo, before installing the flooring, cover the installed logo with a scrap piece of lining paper and secure at the perimeter with masking tape. This stops the selfadhesive layer sticking to the logo.

STEP 5: HOT WELDING PROCESS FOR FLAT, COVED & VERTICAL AREAS

■ 5.1 - TREATMENT OF SEAMS USING HOT WELDING PROCESS

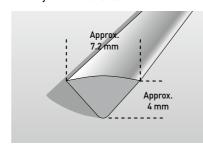
Hot Welding should only be completed after full cure of the adhesive. In case of self-adhesive, the welding can be completed right after the installation.

CR50 by Gerflor: Tarabus flat weld





CA72 by Gerflor: Tarabus corner weld





INSTALLATION GUIDELINES

■ 5.2 - HOT WELDING TOOLS

You can find below the recommended hot welding tools, divided into the 3 welding steps:

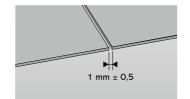
STEP	TOOL	PART NUMBER	
GROOVING	LINEA GROOVER	E8060001	
	ANTI-GLAZE RAPID NOZZLE 4-5 MM (flat weld)	E8100002	
WELDING	CA72 SPEED NOZZLE WITH WHEEL (corner weld)	E8100008	
	HOT WELDING GUN LEISTER TRIAC-S 220 V	E8090002	
TRIMMING	MOZART 2 IN 1 TRIMMING KNIFE	E8300002	

■ 5.3 - HOT WELDING PROCESS

TIP: have a look at our YouTube video. Hot Welding - Installation Guideline

5.3.1 - Preparation

- \bullet Ensure that the gap between the adjoining sections of the flooring to be elded does not exceed 1 \pm 0.5 mm.
- Seams must be grooved and clear of debris before welding.
- Ensure the nozzle is clear of debris.
- \bullet Turn on the gun adjusting the temperature dial to between 4.5 & 5 and leave to heat for 5 minutes before use.



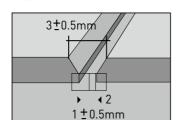
Tips: Test a weld on a small piece of waste flooring before starting welding in the vehicle. Weld rod should fuse without burning.

5.3.2 - Grooving

Various tools are available to produce a good quality and consistent groove. Gerflor recommends the Linea Groover [E8060001].



Linea Groover

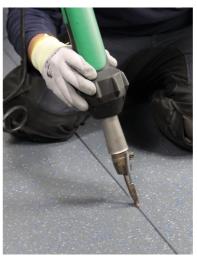


It's necessary to groove $2/3^{rds}$ thickness of the wearlayer and to have a gap between the edges of 1 ± 0.5 mm. On the top, the gap after grooving is 3 ± 0.5 mm.

5.3.3 - Welding

For flat welding, use a CR50 welding rod.

- Cut the colour matching weld cord to the required length.
- Hold the Hot Welding Gun Leister Triac-S (E8090002) at an upright angle and combine with constant pressure and speed as you progress along the weld. We recommend the use of our Anti-Glaze Rapid Nozzle 4-5 mm (E8100002).





For corner weld, use a CA72 welding rod.

- Cut the colour matching weld cord to the required length.
- Hold the Hot Welding Gun Leister Triac-S (E8090002) with an angle that allows the rod to cover the base of the corner and combine with constant pressure and speed as you progress along the weld. We recommend the use of our Speed Nozzle with wheel (E8100008).







5.3.4 - Trimming

Trimming the weld cord should be completed in two stages.

• Trim the weld while still warm using the Mozart 2 in 1 trimming knife (E8300002) with the 0.7 mm spacer in place. This action will allow the weld cord to contract and relax.

Retract the 0.7 mm spacer.

• Trim the remaining weld to produce a neat flush finish. THIS PROCESS SHOULD ONLY BE COMPLETED WHEN THE WELD IS COMPLETELY COLD.





For finishes, move aside the trimming guide. Don't forget to regularly change the blade.

TARABUS <u>Gerflor</u> TARABUS <u>Gerflor</u>

INSTALLATION GUIDELINES

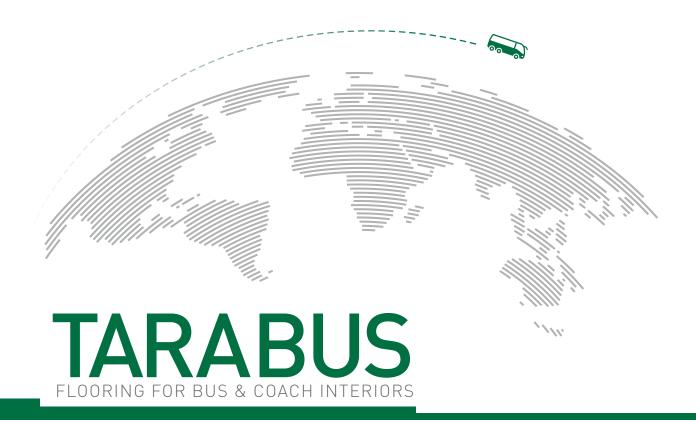
STEP 6: CLEANING (refer to Tarabus Cleaning Guide)

For further information, please contact your sales rep. For technical advice please contact: andrew.sedman@gerflor.com (or loyde.cordero@gerflorusa.com for US).

ANNEX: TARABUS RECOMMENDED TOOL LIST

PART NUMBER	DESCRIPTION		GENERAL Installation	WELDING	L0G0	SELF-ADHESIVE
E8360001	LEISTER CARRYING CASE					
E6000002	DELPHIN KNIFE (1 unit)	RELIE	✓	✓	✓	✓
E7510003	100 STRAIGHT BLADES	0000	√	√	✓	✓
E7520001	100 HOOKED BLADES		√	√	✓	✓
E6600001	INTERNAL ANGLE ROLLER		✓		✓	✓
E6640001	CORK PRESS with rounded edges 300 x 120 x 250 mm		✓		✓	✓
E8000004	TRIANGULAR GROOVER			√	√	
E8060001	LINEA GROOVER			✓		
E8300002	MOZART 2 IN 1 TRIMMING KNIFE			✓		
E8600001	WIRE BRUSH FOR NOZZLE DUCT			√		
E8100008	CA72 SPEED NOZZLE WITH WHEEL			✓		
E8100002	ANTI-GLAZE RAPID NOZZLE 4-5 mm			√		
E8090002	HOT WELDING GUN LEISTER TRIAC-S 220 V			✓	√	

		OPTION	AL			
PART NUMBER	DESCF	RIPTION	GENERAL INSTALLATION	WELDING	LOGO	SELF-ADHESIVE
E3060001	CARPET CLAW		✓			√
E6150004	CONVEX RULER 210 x 8 cm FLEXIBLE STEEL		√	√		✓
E6130001	ALUQUICK SPREADER		✓		✓	
E6310001	SPARE BLADE A1 280 mm (10 units)	A1	✓		✓	
E6310003	SPARE BLADE A2 280 mm (10 units)	A2	✓		✓	
E8220002	RECESS SCRIBER		✓		✓	✓
E6640002	CORK BROOM BALAI LIEGE	5-3	✓		✓	✓
E6320001	PRESSURE-ROLLER (50 kg)		✓		✓	√
E8610001	BALL PRESSURE SHAFT Ø 13 mm			\checkmark		
E8100001	PUSH FIT NOZZLE HOLDER NOZZLE 4-5 mm			√		
E8110002	RAPID NOZZLE MUSHROOM SH. ROD			√		
E8100009	ROLLER TURBO NOZZLE			\checkmark		
E8000001	ROUNDED GROOVER			\checkmark	✓	
E8190001	SPARE BLADES (10 units) for Rounded Groover			\checkmark	✓	
E8320001	TRIMMING GUIDE			\checkmark		
E8040001	SPARE BLADES MOZART (5 units)			\checkmark	√	
E8080001	TRIMMING GOUGE + 1 BLADE	0====		\checkmark		
E8300003	QUARTER MOON TRIMMING KNIFE	000		\checkmark		
E8330001	LEATHER POUCH - 1/4 MOON KNIFE			\checkmark		
E8120001	2 ROUNDED BLADES 6 mm			\checkmark		
E8120003	2 FLAT BLADES			\checkmark		
E8120004	2 POINTED BLADES			√		



43, Boulevard Garibaldi 69170 Tarare - France Tel.: +33 4 74 05 40 00

Fax: +33 4 74 05 06 83

Email: tarabus@gerflor.com www.tarabusbygerflor.com









TARABUS NT Specification Sheet

Product description and composition:

- The flooring shall be specially designed for buses.
- The flooring shall be flexible PVC flooring in 2.25 mm thickness, composed of a compact plasticized wear layer.
- The wear layer shall contain inlaid silicon carbide particles to improve slip resistance.
- The wear layer shall not contain aluminium oxide particles or quartz granules to prevent from maintenance and cleaning issues.
- The wear layer shall not contain fillers (fillers < 5phr).
- The design shall be inlaid through the whole thickness of the wear layer.
- The intermediate layer of the flooring shall be made of a glass fibre grid, providing outstanding dimensional stability: $\leq 0.2\%$ according to EN 434.
- The flooring shall have a special textile backing designed for public transport vehicles, to enable bonding with acrylic glues onto plywood substrates or plywood with phenolic film substrates or aluminium.
- The flooring shall not crack and no white line shall appear when bended by 180 degrees.
- The welding rods shall be manufactured by the flooring manufacturer to enable a perfect weld.

Environment:

- The flooring shall be free from heavy metals (Lead, Cadmium, Barium, Tin, Chromium...).
- The flooring shall be free from DEHP plasticizer.
- The manufacturer of the floor covering must be in possession of a valid ISO 14001 certificate.

Technical characteristics:

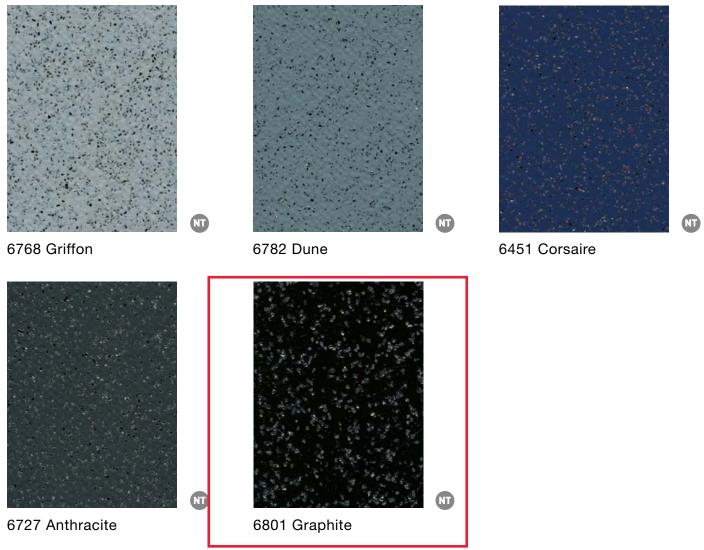
- Fire class: the flooring material shall conform to the European Directive 95/28/EC
- Fire class: the flooring material shall conform to the FMVSS/CMVSS 302
- Fire class: the flooring shall have been tested to UTAC ST 18502/1 (Type A) and ISO 3795/76 (0mm/mn)
- Fire class: the flooring shall obtain CRF>0.50 W/cm2 when tested according to NFPA 253 ASTM E648
- \bullet The manufacturer of the floor covering must be in possession of a valid quality systems certificate, showing compliance with ISO 9001.

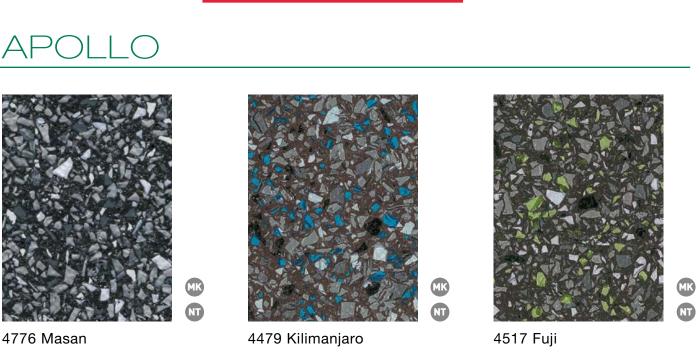
Installation:

• All joints must be welded using a hot welding gun and PVC welding rods. To ensure the right watertightness of the flooring system, no sealant shall be used between 2 flooring sheets.

GERFLOR Transport Flooring - June 2009

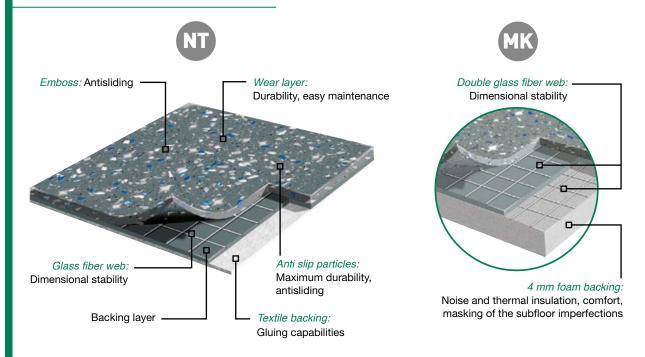
SIRIUS





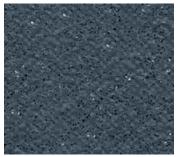


▶ Tarabus standard



► Safebus X'tra





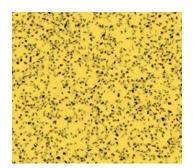
6822 Dark Grey



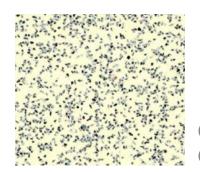
6727 Anthracite

NT

▶ Safebus



6602 Caledonia



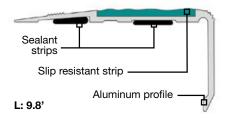
6203 Borneo



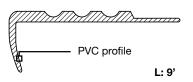
▶ Stepbus

► Step nosing











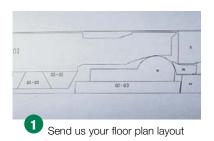
Yellow

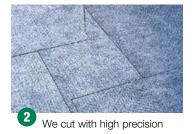


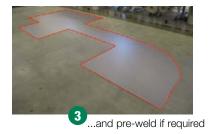
White

System

Pre-cut and pre-welded **TARABUS** floor covering system according to your drawings







TARABUS Self-Adhesive



TARABUS floor covering with self-adhesive backing

- > Environmental friendly bonding
- > Ready to bond
- > No curing time
- > Safer work conditions
- > Easy to use

TIME SAVING

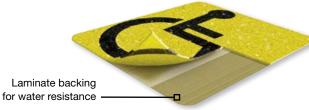
► TARABUS LOGO

Location for person with reduced mobility



Advertising & Promotion







Warranty Registration

TO REGISTER YOUR PRODUCT WARRANTY under the terms of Gerflor's North America Limited Product Warranty, please complete the form below and mail to:

Gerflor USA Inc

595 Supreme Dr Bensenville 60106 IL USA.

I acknowledge having received and read GERFLOR's technical documents and specifications concerning the product warranty:

Product Type:	
Roll numbers & Quantity (sq.yds/m²):
Installation Date:	
Transit Authority:	
Address:	
State/Prov:	Zip/Postal Code:
OEM:	
Address:	
State/Prov:	Zip/Postal Code:
Represented by:	
Signature:	

TARABUS PRODUCT WARRANTY



TARABUS FLOORCOVERINGS LIMITED WARRANTY AGREEMENT

Warranty Terms and Conditions

GERFLOR, as a manufacturer, expressly warrants that TARABUS floorcoverings for buses and coaches are conform to the technical data sheet in force at the time of delivery.

GERFLOR further expressly warrants that the wear layer of TARABUS floorcoverings shall be free from defects in material for 12 years (twelve years) from the date of sale, provided such floorcoverings are exclusively subject to normal use and service, and are installed and maintained in accordance exactly with GERFLOR's recommendations that the buyer declares to be aware of.

The wear layer consists of the material above the glass fiber web in the floorcovering. GERFLOR expressly warrants that the glass fiber web will not appear in the floorcovering for 12 years (twelve years) from the date of sale.

This entire warranty will become null and void if conditions of the subflooring and method of installation do not conform exactly to GERFLOR's specifications.

This entire warranty does not cover damage caused, in whole or in part, by conditions beyond the control of GERFLOR, including but not limited to:

- Use for which material is not designated.
- Fire, explosion, or natural disasters.
- Faulty installation
- Casualties
- Ordinary wear and tear
- Abuse
- Faulty design or construction of the vehicles.
- Failure of the adhesive to adhere to the subfloor because of presence of moisture.
- Fault in the subfloor.
- Failure of the welding









WARRANTY AND LIABILITY LIMITS

- Uneven wear of sections of the floorcovering.
- Alteration of the initial appearance of the floorcovering, particularly in high traffic areas exposed to extreme heavy wear.
- Damage caused by negligent or improper maintenance procedures and other causes not specified but beyond the control of GERFLOR.
- Fading or discoloration from sunlight or heat.
- Mechanical damages. burns, chemical soiling or damage due to clamp or inadequate cleaning, not recommended by GERFLOR.

The presence of moisture between the TARABUS and the subfloor shall be considered proof of subfloor failure or faulty design or construction.

This warranty will be applied only if the product is admitted to be the only cause of disorder.

The sole and exclusive remedy against GERFLOR arising from the purchase or use of TARABUS is limited to supply of material in replacement of the sole defective part of material (after examination. verification and approval by GERFLOR) with material of equivalent quality –(colour shade between brand new material and existing one will be accepted by the owner)-. All other compensation of whatever nature will be excluded.

If the claim is accepted by GERFLOR, with respect to the warranty of the wear layer, for the first 2 (two) years from the date of sale, GERFLOR will supply the material, in replacement of defective one, free of charge. More than 2 (two) years from the date of sale, until the expiration of this express warranty of the wear layer, a depreciation of 7% (seven per cent) per year of the cost of supplied material will apply.

THE ABOVE EXPRESSED MANUFACTURER's WARRANTY SHALL BE THE **EXCLUSIVE** WARRANTY AND LIMITED TO THE THE QUALITY OF PRODUCT, AND GERFLOR MAKES NO **OTHER** WARRANTIES. **GERFLOR** EXPRESSLY **DISCLAIMS** ANY IMPLIED WARRANTIES OF MERCHANBILITY AND IMPLIED WARRANTIES OF **FITNESS** FOR PARTICULAR PURPOSE.

IT IS AGREED THAT GERFLOR SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, including but not limited to, loss of income, loss of use, damage to other property, the cost of removing and reinstalling TARABUS floorcoverings, attorney's fees, and any liability you may have with respect to any other person.



TIME LIMIT FOR PLACING A CLAIM

To be admissible, all claims by means of this warranty contract must be carried out by **registered letter with return receipt** addressed to GERFLOR, at the address indicated at the top of this warranty contract, **accompanied by the purchase invoice** for the Product, within THIRTY DAYS following finding of irregularities and within the aforementioned warranty contract time limit. If any clauses of this Warranty Agreement conflicted with the law or a given jurisdiction, only said clause would be considered inapplicable, the remaining text of the Agreement remaining unaffected.

This Limited Warranty shall be governed and construed in accordance with the laws of the State of Illinois without regard to any choice of low principles: All disputes that may arise between You and GERFLOR relating in any way to this Limited Warranty Agreement, to the extent such disputes cannot be resolved by negotiation between You and GERFLOR, shall be decided by arbitration carried out in accordance with the Federal Arbitration Act and the Commercial Arbitration Rules of the American Arbitration Association. In the event of such a dispute, arbitration may be initiated by a request for arbitration by either party hereto addressed to the other party, and shall be completed within sixty (60) days of such request unless extended because of unavailability of an arbitrator or other events beyond the control either party. The arbitrator shall be chosen by mutual agreement of the parties and, in the event the parties cannot so agree, either party may file a written application to have the arbitrator designated by the American Arbitration Association. The arbitration proceeding shall take place in Chicago, Illinois or such other location as the parties shall agree and shall be conducted in accordance with the Commercial Arbitration "Expedited" Rules of the American Arbitration Association. The arbitrator shall have all powers necessary to determine the issues presented, including without limitation, but subject to the terms of this Limited Warranty, any damages. The decision of the arbitrator shall be final and conclusive, both as to costs and the merits, and the parties agree that they shall be bound by this decision.



FOLDAWAY BV & AM STYLES

Notch-Back, standard Bench-Back

and High-Back are shown.

Freedman Seating gives you the largest selection of Foldaways in the industry. Whether you need space for luggage or wheel chairs, we have the right seat. Easy to install and easier to operate, our Foldaways will provide you with miles and miles of happy riders and drivers. Maybe we should say, "smiles and smiles". Freedman Seating, "Not just seats—seating solutions."

Not Just Seats



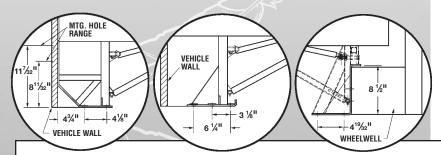
THE FEATHER WEIGHT SERIES BY

FREEDMAN

an ISO 9001:2000 certified company

Seating Solutions

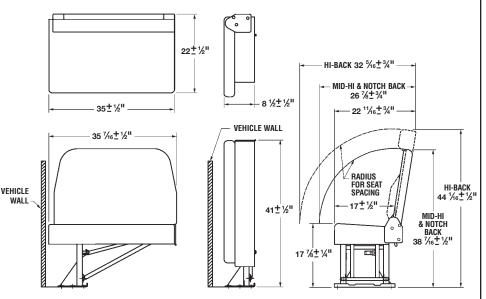
Foldaway BV & AM STYLES



AM2 Floor/Wall Mount

BV Floor Mount

BVWW3 Floor Mount



Corner Grabs

TDSS with belts

TDSS without belts



Standard Features:

- BV Foldaways mount to the vehicle with four bolts to the floor (no wall mount)
- AM Foldaways mount to the vehicle with four bolts to the floor and two to the wall mount
- Seat belt ready (FMVSS 210 compliant with no leg or tether)
- Ultra-thin backrest for added hip-to-knee room and lumbar support
- High quality molded polyurethane seat and back cushions
 - Folds up to less than 10" thick when in the stowed position
 - Cantilever design provides reduced installation time; no floor cutting for aisle leg and easy vehicle clean up
 - Wire mesh grid seat springs for even support
 - 2 locking mechanisms to hold seat in stowed position

Options:

- Single or double seats
- Bench back, notch back or high back
- Wheel well seats
- Wide variety of vinyl's or cloths
- Molded U.S. arms or upholstered arms
- Black or yellow top grabs (not on high backs)
- Black or yellow corner grabs (black only on high back)
- Vertical stitching
- FTA foam
- ABS backs (Notchback only)
- Adjustable headrests (Single and Notchback only)
- Shrouds to cover the Foldaway when stowed
- USR seat belts (Under Seat Retractors)
- CRS-225 hooks and tethers
- TDSS (Tie Down Storage System)

Not Just Seats —



THE FEATHER WEIGHT SERIES BY

FREEDMAN SEATING COMPANY

an ISO 9001:2000 certified company

4545 W. Augusta Blvd., Chicago, IL 60651 (773)524-2440 (800)443-4540 Fax: (773)252-7450 WWW.FREEDMANSEATING.COM e-mail: sales@freedmanseat.com

We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

-Seating Solutions



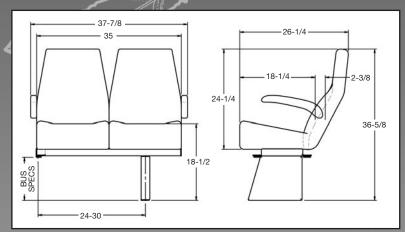


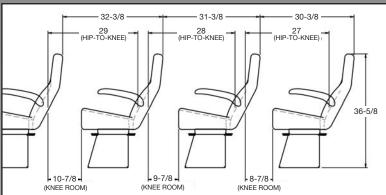


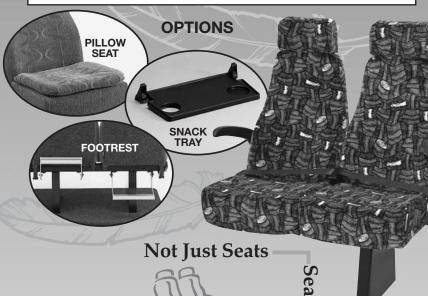
Seating Solutions

FEATHER WEIGHT









4545 W. Augusta Blvd., Chicago, IL 60651 (773)524-2440 (800)443-4540 Fax (773)252-7450 e-mail: sales@freedmanseat.com WWW.FREEDMANSEATING.COM

an ISO 9001:2000 certified company

Sustainable Seating Solutions

Whether your bus is for tour/charter, para-transit, or shuttle, Feather Weight Mid-Hi works for you. Optional adjustable headrests and reclining back-rests give you luxuries for long journeys, while grab rails and ABS plastic backs provide the function and safety required for shorter trips. The ultra-thin backrest gives outstanding support and creates more hip-to-knee room than any other seat in its class. The steel frame system meets or exceeds all applicable government standards for safety and durability. And, it's light as a feather!

Feather Weight Mid-Hi features include:

- An ultra-thin *Knee-Saver* type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17½" wide seat cushions
- 22½" back height off the seat cushion, 37" off the floor
- · Wire mesh-grid seat springs for even support
- FMVSS 210 compliance–all Feather Weight seats are seat belt ready
- Transit style-rigid backrests (starting weight without options-43 lbs.)
- Touring style-reclining backrests (starting weight without options-47 lbs.)
- Covers that can be removed and replaced easily and without the use of special tools

Feather Weight Mid-Hi options include:

- Black molded U.S. Arms or upholstered flip-up armrests
- · Adjustable headrests
- Black or yellow corner AV grab rails
- · Black or yellow top AV grab rails
- ABS plastic backs
- Mesh map pockets
- Vertical stitching
- FTA foam
- Snack trays
- · Aluminum folding footrests
- · Pillow seat cushions
- Rear row quick disconnect
- Side sliders
- 16", 18" or 19" wide seats available
- Rigid or reclining backrests
- Seat belts
 - Non-retracting seat belts
 - Retracting seat belts
 - USR (Under Seat Retractors)
- S3 Bio-Cushions (Made with vegetable oil)
- A wide variety of cloths and vinyls
- S3 cloths (Made with recycled yarn)

We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

ISO 9001:2000 registered

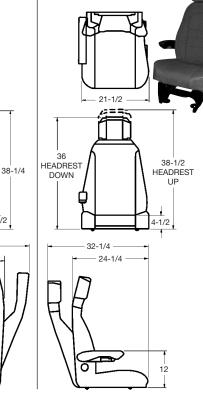
FREEDMAN SHIELD DRIVER SEATS NOW Shield **AVAILABLE** Rigid Sport Seat Seat Upgrade LeMans Adjustable Arm Sustainable Seating Solutions Freedman Seating Company Shield Recliner Seat Not Just Seats Seating Solutions

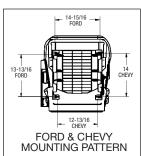
FREEDMAN SHIELD DRIVER SEATS Shield Rigid Seat 25-3/4 24-1/8 OPTIONAL **ARMREST** 37 13-5/8 5-11/32 - 11-1/2 -- 8 -+ 12-1/2 + - 14 ---Shield Recliner Sport Seat Seat

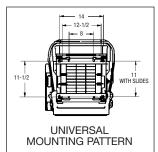
4-1/2

32-1/4

24-1/4







MARKETS

11-3/4











We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

Shield Rigid SeatStandard features:

- Designed and tested to comply with all applicable FMVSS requirements including 202A headrest standard Taller and wider headrest with decreased backset
 - "Cushier" headrest for dynamic impact headrest absorption
- Automotive grade 4-spring seat flex-o-later for even load support and long life
- J-clip upholstery fastening for quick change out with no special tools
- High quality molded polyurethane seat and back cushions
- Universal mounting holes to fit Freedman Seating pedestals and most aftermarket bases

Rigid Seat optional features:

- Flip arms: US Arm, AMA upholstered or wide upholstered
- Mesh map pocket
- · Vertical stitching
- Wide array of fabrics and vinyls
- 4-position adjustable lumbar support
- S3 Bio Cushions
- Fore/Aft slide tracks

Shield Recliner and Sport Seats Standard features:

- Designed and tested to comply with all applicable FMVSS requirements including 202A headrest standard Taller and wider headrest with decreased backset "Cushier" headrest for dynamic impact headrest absorption
- Mesh map pocket
- Automotive grade 4-spring seat flex-o-later for even load support and long life
- J-clip upholstery fastening for quick change out with no special tools
- High quality molded polyurethane seat and back cushions

Recliner Seat additional standard features:

- 4-position adjustable lumbar-LH lever (RH lever on copilot)
- RH Shield arm
- Heavy duty recliner mechanism
- Mounting brackets to fit Ford E-Series and Chevy cutaway seat delete bases

Recliner Seat optional features:

- Vertical stitching (not for Sport)
- Wide array of fabrics and vinyls
- FTA foam
- S3 Bio Cushions
- Universal mounting kit to fit Freedman Seating pedestals and aftermarket bases
- Fore/Aft slide tracks (not for Ford or Chevy seats), required for universal mounting

Sport Seat additional standard features:

- Infinitely adjustable 4-way lumbar (up/down and in/out)
- RH LeMans arm



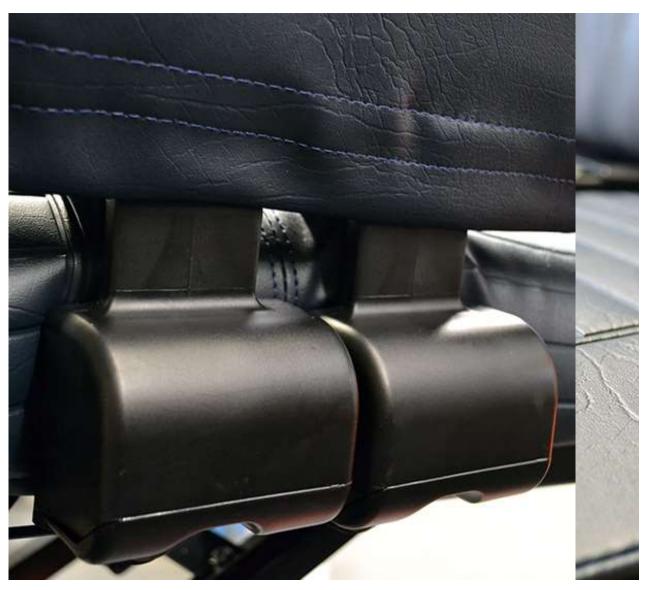


4545 W. Augusta Blvd., Chicago, IL 60651 (773)524-2440 (800)443-4540 Fax (773)252-7450 WWW.FREEDMANSEATING.COM e-mail: sales@freedmanseat.com





Product Line: Options/Accessories





HOME / SEAT ITEMS / OPTIONS/ACCESSORIES /

The solution to your seat belt needs. Our system places the seat belts right where you expect them. No more belts falling to the floor, safety concerns, or maintenance hassles.

FMVSS/CMVSS Notice

California residents see Prop 65 WARNINGS.

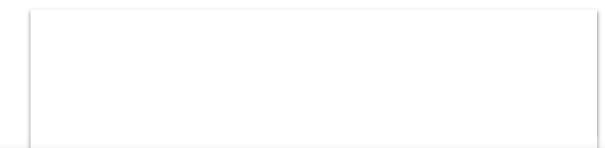
Standard Features

- Designed to be FMVSS 210 compliant
- Works on forward-facing and existing Feather Weight frames
- Light weight and durable
- All belts are permanently kept in the correct position
- Belts stay off the floor

Find Your Local	Representative
-----------------	----------------

/			•

RELATED SEATS & PRODUCTS





Passenger Seats Limited Warranty & Sales Terms

FREEDMAN SEATING COMPANY

WARRANTY:

Freedman Seating Company warrants to the original buyer that its Passenger Seats are free from defects in material and workmanship for the following components:

- Metal Components Five (5) years
- Plastic Components Three (3) years
- Moving Components Three (3) years
- Gas Shock Components One (1) year
- Upholstered Components (foam) Two (2) years

Cover Warranty is for defects in the material or sewing and is limited to replacement covers. It does not include labor:

- One (1) year for Level #1 in-stock FSC material and perforated vinyl
- Two (2) year for Level #3 in-stock FSC material and higher
- No warranty for COM (Customer Own/ supplied Material)

The warranty period begins at time of sales to customer or 180 days after shipment from the Freedman Seating Company's factory to the customer, whichever occurs first.

NON-PRORATED REPLACEMENT:

In the event that a warranty-covered failure should occur within the warranty period, Freedman Seating Company will repair or replace the seat without charge and without prorating, at Freedman Seating Company's option. This is the sole and exclusive remedy for breach of any warranty. Any replacement seat or part is only covered by this warranty for the remainder of warranty period applicable to the original seat.

EXCLUSIONS

This warranty specifically excludes foam, upholstery material, belts, and items exposed to normal wear and tear such as metal finish and paint and does not apply to any seat that is damaged as result of accident, derailment, improper installation, structural defects, intentional damage, abuse, vandalism, negligence, misuse, improper operating conditions, lack of maintenance, or extreme natural phenomena. Seats exposed to toxic or corrosive materials are excluded from this warranty. Seats exposed to cleaning solutions that are not listed on the Freedman Seating Company Cleaning Guide are excluded from this warranty. This warranty is provided directly to the purchaser only and does not extend to any subsequent party and is solely for the Freedman Seating Company product as it is originally manufactured.

INCIDENTAL, CONSEQUENTIAL DAMAGES, & LIMITATIONS:

This warranty shall be in lieu of any other warranty or terms, expressed warranty or terms, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. The purchaser's sole and exclusive remedy against Freedman Seating Company shall be for the repair and replacement of the defective product as provided herein. No other remedy; including but not limited to incidental or consequential damages for lost profits, lost sales, injury to person or property, shipping, freight, installation, removal, or any other incidental or consequential loss shall be available to the purchaser.

NOTIFICATION:

All reports, claims, or notices required by the warranty to be provided to Freedman Seating Company must be in writing and delivered to: Attention – Freedman Seating Company, Warranty Claim Department, 4545 W. Augusta Blvd., Chicago, IL 60630. Repairs being claimed for warranty must be sent to Freedman Seating Company for prior approval and warranty acceptance before any warranty claims can be made. Parts are being claimed for warranty must be sent to Freedman Seating Company for prior approval and warranty acceptance before any warranty claims can be made.

INSPECTION AND VERIFICATION:

The owner must provide access to the failed seat so that Freedman Seating Company's authorized representative can perform an onsite inspection. Alternatively, Freedman Seating Company may ask the owner to ship the failed seat to Freedman Seating Company's laboratory for inspection. Within 30 days of the inspection, either on-site or in the laboratory, Freedman Seating Company will render an opinion as to whether or not the claimed failure is covered by the warranty.

GENERAL MAINTENANCE:

Freedman Seating Company provides the proper maintenance instructions, as well as recommended service intervals with each seat. Warranty is contingent upon documented performance of recommended maintenance and service. All replacement parts should be recommended or authorized Freedman Seating Company components. Failure to purchase proper components will null and void the warranty.

DESIGN:

Freedman Seating Company reserves the right to modify parts and design specifications without notice as long as the seats meet general specifications, unless otherwise committed per contract. In case further non-conforming changes have to be incorporated, Freedman Seating Company will submit such changes to customer for prior approval.

OTHER:

The terms and warranty are contingent upon customers meeting agreed upon payment terms as specified in Freedman Seating Company proposals. Terms and warranty supersede any other terms including but not limited to customer terms printed on the back of Purchase Orders, listed on websites, or other sources from customers.

LEREDMAN, (Integrated Child Seat) KIDS & SAFETY **WHAT COULD BE MORE IMPORTANT?** Also available the ICS-10, for children up to 10 years old. Not Just Seats-Seating Solutions THE FEATHER WEIGHT SERIES BY

35 17 ½ **ADJUSTMENT** 15½-18 ICS 1514-1814 ICS-10 (3) BOOSTER 18 BUS SPECS **BUS SPECS** 29 18 ½ 26 3/4 42 3/4 0

SEATING 168

(Integrated Child Seat)

Kids and safety, what could be more important? Nothing!

That's the underlying principle behind the Freedman ICS (Integrated Child Seat) and ICS-10.

The ICS is designed for children from 22–51 lbs. and the ICS-10 can accommodate children up to 10 years old, 22–78 lbs. Both ICS seats are comfortable for adults and safe for children. A tapered back provides unrestricted viewing for drivers, and best of all, the shoulder belts can be adjusted in seconds without taking the seat apart or clumsy operations.

Standard Features:

- Accommodates children 22–51 lbs. (22–78 lbs for the ICS-10)
- Matching companion seat available
- Fold down tongue can be folded to act as a booster seat
- Easily adjustable shoulder straps
- Standard with FMVSS 213 and 210 seat belt anchorage compliance
- Retrofitable; Fits on most Feather Weight frames!

Options

- Available in a wide variety of vinyls and cloths
- Upholstered or US Arms
- Adjustable footrests
- Freedman USR (Under Seat Retractor)
- Available as a single or double
- · Grab rails



4545 W. Augusta Blvd., Chicago, IL 60651 (773)524-2440 (800)443-4540 Fax (773)252-7450 WWW.FREEDMANSEATING.COM e-mail: sales@freedmanseat.com

We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.







Sustainable Seating Solutions

Freedman Seating Company's Feather Weight seats are designed to be like feathers on a bird: light and airy to satisfy weight restrictions and ensure a smooth ride, yet durable for years of service and low maintenance.

Freedman Seating Feather Weight seats are the most severely tested in the company's history, and meet all applicable federal motor vehicle safety standards for strength andsafety (including 210 for seat belts). Less weight means one thing to bus builders and operators: they can get more passengers per bus. And when we say more passengers,

we mean more happy passengers.

Not Just Seats-



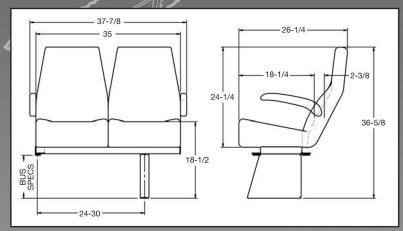
THE FEATHER WEIGHT SERIES BY

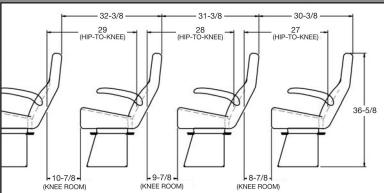
an ISO 9001:2000 certified company

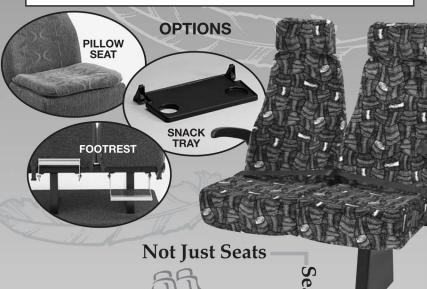
Seating Solutions

FEATHER WEIGHT









FREEDMAN

SEATING COMPANY
an ISO 9001:2000 certified company

4545 W. Augusta Blvd., Chicago, IL 60651 (773)524-2440 (800)443-4540 Fax (773)252-7450 e-mail: sales@freedmanseat.com WWW.FREEDMANSEATING.COM

Sustainable Seating Solutions

Whether your bus is for tour/charter, para-transit, or shuttle, Feather Weight Mid-Hi works for you. Optional adjustable headrests and reclining back-rests give you luxuries for long journeys, while grab rails and ABS plastic backs provide the function and safety required for shorter trips. The ultra-thin backrest gives outstanding support and creates more hip-to-knee room than any other seat in its class. The steel frame system meets or exceeds all applicable government standards for safety and durability. And, it's light as a feather!

Feather Weight Mid-Hi features include:

- An ultra-thin *Knee-Saver* type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17½" wide seat cushions
- 22½" back height off the seat cushion, 37" off the floor
- · Wire mesh-grid seat springs for even support
- FMVSS 210 compliance–all Feather Weight seats are seat belt ready
- Transit style-rigid backrests (starting weight without options-43 lbs.)
- Touring style-reclining backrests (starting weight without options-47 lbs.)
- Covers that can be removed and replaced easily and without the use of special tools

Feather Weight Mid-Hi options include:

- Black molded *U.S. Arms* or upholstered flip-up armrests
- · Adjustable headrests
- Black or yellow corner AV grab rails
- Black or yellow top AV grab rails
- · ABS plastic backs
- Mesh map pockets
- Vertical stitching
- FTA foam
- Snack trays
- Aluminum folding footrests
- · Pillow seat cushions
- Rear row quick disconnect
- Side sliders
- 16", 18" or 19" wide seats available
- · Rigid or reclining backrests
- Seat belts
 - Non-retracting seat belts
 - Retracting seat belts
 - USR (Under Seat Retractors)
- S3 Bio-Cushions (Made with vegetable oil)
- A wide variety of cloths and vinyls
- S3 cloths (Made with recycled yarn)

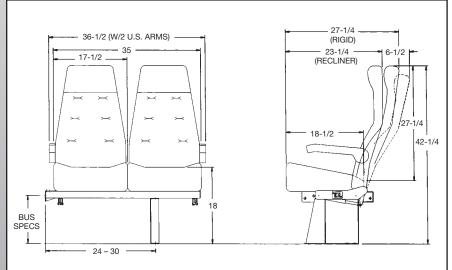
We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.

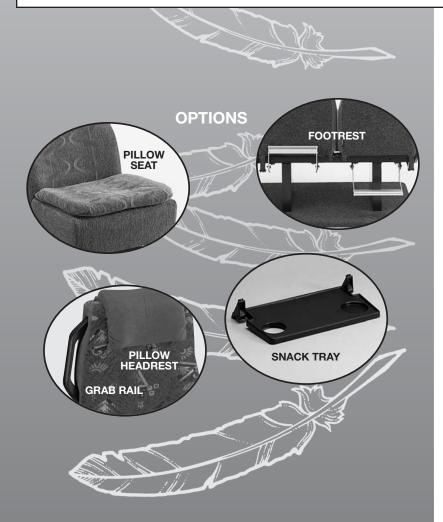
ISO 9001:2000 registered



THE FEATHER WEIGHT SERIES BY

HIGH-BACK SEAT





Cross-country or cross-town, the Freedman Feather Weight High-Back gets you there in safety and comfort. The headrest actually cradles your head, and provides unrestricted viewing. The ultra-thin backrest gives out-standing support and creates more hip-to-knee room than any other seat in its class. The steel frame system meets or exceeds all applicable government standards for safety and durability. And, it's light as a feather!

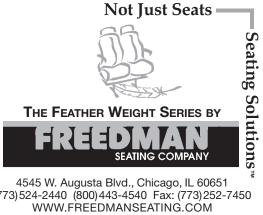
Feather Weight High-Back features include:

- An ultra-thin Knee-Saver type backrest for added hip-to-knee room and lumbar support
- Molded polyurethane seat and back cushions for comfort and long lasting support
- 17½" wide seat cushions
- 27½" back height off the seat cushion, 42½" off the floor
- Wire mesh-grid seat springs for even support
- FMVSS 210 compliance-all Feather Weight seats are seat belt ready
- Covers that can be removed and replaced easily and without the use of special tools

Feather Weight High-Back options include:

- Black molded U.S. Arms or upholstered flip-up armrests
- Mesh map pockets
- Vertical stitching
- FTA foam
- Snack trays
- Aluminum folding footrests
- Pillow seat cushions
- Pillow headrests

- Side grab rail
- U.S.R.—Under Seat Retractors
- 16" or 19" wide seats available
- Rear row quick disconnect
- CRS-225 hooks and tethers
- Side sliders
- Cup holders
- Seat belt loops



(773)524-2440 (800)443-4540 Fax: (773)252-7450

e-mail: sales@freedmanseat.com

We are constantly updating and improving our seats; therefore we reserve the right to change or modify specifications or materials without notice. All Freedman Seating Company seats meet or exceed FMVS standards.



SHIELD DRIVER | RECLINER | SEAT

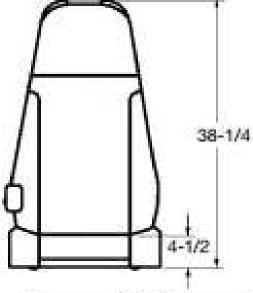
COMMERCIAL BUS / DELIVERY TRUCK

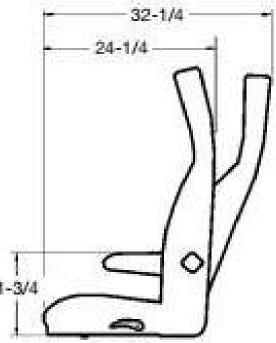
Shield driver seats are designed and tested to meet all applicable safety standards including 202A for superior head and neck support while providing superior comfort and style. The Shield recliner is the preferred driver seat for truck and buses, including 2011 and later Ford & Chevy cutaway buses. The Shield recliner mounts directly to the OEM base & slides on seat delete chassis.











features

- Meets FMVSS 207/210/202a
- Designed and tested to comply with all applicable FMVSS requirements including 202A headrest standard
- Taller and wider headrest with decreased backset
- 'Cushier' headrest for dynamic impact headrest absorption
- Automotive grade 4-spring seat flex-o-lator for even load support and long life
- J-clip upholstery fastening for quick change out with no special tools
- · High quality molded polyurethane seat and back cushions
- · 4-position adjustable lumbar support
- · Heavy duty recliner mechanism
- Mounting brackets to fit Ford E-series and Chevy Cutaway seat delete bases
- Modified vinyl seat cover to accommodate substantial usage in the field.

options

- · Shield or Lemans armrest
- Mesh map pockets
- Vertical Stitching
- Choice of fabric or vinyl
- Fore/Aft slide tracks, required for universal mounting
- Heater (seat mounted controls)
- Flame Blocker D-90 encapsulated cover
- Mesh Map Pocket
- Adnik Height Adjustable Power Pedestal Slides
- Driver Skirt for Power Pedestal





FREEDMAN

SEATING COMPANY

4545 W. Augusta Blvd., Chicago, IL 60651 (773) 524-2440 (800) 443-4540 Fax (773) 252-7450 freedmanseating.com | info@freedmanseating.com





RT 360



PREMIUM HEAVY-DUTY WHEELCHAIR RETRACTOR

QR-360°

Introducing the QRT-3 SERIES Wheelchair and Occupant Securement System

The first 4-point, heavy duty, fully automatic retractable tie-downs **built to withstand the higher loads of the WC18 standard** and be compatible with WC19 wheelchairs





Meets all requirements of the newest WC18 standards.
Also compatible with WC19 Wheelchairs.

WC18/WC19 at a Glance

As WC19 wheelchairs become increasingly popular, new higher standards have been recommended for wheelchair tie-downs to be fully compatible.

The revised RESNA WC18 standard for Wheelchair Tie-downs and Occupant Restraint Systems (WTORS) was instituted in 2015 and is now in effect.

The most significant implication of the revised standard is that wheelchair tiedowns must be stronger. WC19 covers the design and testing of wheelchairs for use in passenger transportation, and it brings about much needed passenger protection as well as some challenges for WTORS manufacturers.

These crash tested wheelchairs will feature lap belts that are integrally mounted onto the wheelchair frame, as opposed to relying on traditional WTORS equipment where the passenger belts are mounted separately. During a collision, this new dynamic produces loads on the WTORS up to 60% higher.

An All-New Design from the Floor Up

Stronger than any previous retractor, QRT-360 utilizes innovative energy management designs and material technologies to deliver the system's full strength for maximum load capacity.

QRT-360 retractors achieve a surrogate wheelchair rating that meets the requirements of WC18 with an energy-absorbing steel frame, new high strength 58mm webbing with fine-adjust self tensioning, and 25 high-strength teeth. A re-engineered Positive Locking Interface contributes to the system's ability to secure extremely heavy loads.



A More Secure Connection, Every Time

With Q'STRAINT J-hook attachments, operators can achieve a secure attachment on virtually any wheelchair. An updated Positive Lock Indicator provides the operator with clear and certain visual confirmation that the retractor is locked and the vehicle is ready to go. Our patented design eliminates the guesswork when passenger safety is involved.

Automatic Tightening Increases Safety

Q'STRAINT's industry-leading self-tensioning system automatically tightens the straps to eliminate any slack created by small wheelchair movements. The belts continue to tighten during low-g vehicle movements, which reduce the potential for dangerous excursions in the event of a collision.

Automatic Release Makes it Easy to Use

Securement is simplified by the compact and ergonomically designed knob. Thanks to Q'STRAINT auto-release, operators and attendants can pull and secure the wheelchair hook in one step without having to press a release button.

Compatible with Most Vehicles and Chairs

Like other Q'STRAINT systems, the QRT-360 is compatible with the widest variety of wheelchairs and scooters.



WWW.QSTRAINT.COM/QRT360

© 2018 Q'STRAINT®. All Rights Reserved. Q'STRAINT®, Q'STRAINT® logo and QRT-360™ are registered trademarks of Q'STRAINT®, Inc.

Q'STRAINT EUROPE

72-76 John Wilson Business Park Whitstable, Kent, CT5 3QT United Kingdom Tel: +44 (0)1227 773035

Tel: +44 (0)1227 773035 Fax: +44 (0)1227 770035 Email: info@qstraint.co.uk

Q'STRAINT AMERICA

4031 NE 12th Terrace
Oakland Park, FL 33334
Tel: 800-987-9987
Fax: 954-986-0021
Email: qstraint@qstraint.com

Q'STRAINT AUSTRALIA

Tramanco Pty Ltd.
21 Shoebury Street,
Rocklea, Australia, QLD. 4106
Tel: +61 7 3892 2311
Fax: +61 7 3892 1819
Email: info@tramanco.com.au



The LED Destinator® Series - perfect for fleets of all types - is available in a variety of sizes and colors to fit your installation and display needs. These versatile and highly adaptive signs offer full integration into Destination, Route, and Next Stop announcement services, always keeping your customers pointed towards their next destination.



SOFTWARE AND PROGRAMMING

Our signs and control modules are pre-programmed and include FREE software. Advanced controllers are available for J1708/J1587 system integration and Hands-Free operation, ensuring the safest and most reliable performance for any fleet.

STANDARD FEATURES

- Destination Messages
- Next Stop Announcements
- Public Relations Messaging
- Scrolling/Flashing/Stacked Messages



AVAILABLE ADVANCED FEATURES INCLUDE:

- Automated GPS message progression
- Hands-Free operation for safety
- Voice Announcements
- J1708/J1587 integration compatible
- Automatic brightness control
- Basic programming software included (USB)
- Maintenance free- ZERO cost of ownership
- Many OCU options to suit your needs



BUY AMERICA - MADE IN U.S.A.

Using the highest quality parts, our LED Destinator® Signs are proudly made in Detroit, Michigan USA in full compliance with **the Buy America Act.**

LED DESTINATOR™ WARRANTY INFO

With a lifetime warranty that outlasts the lifetime of most vehicles (100,000 hours at full brightness), our signs will exceed your expectations in reliability and performance.



ABOUT TRANSIGN

Established in 1959, Transign is a leading provider of high-quality signage for the transit industry. We remain committed to providing world-class U.S. based customer service and technical support.

Transign®, 281 Collier Road, Auburn Hills, Michigan 48326 Toll Free: 855.535.7446 | Main: 248.623.6400 | Fax: 248.623.2930 www.transignllc.com



LED Destinator® Electronic Signs - Dimensions

Signs	Pixel Count H x W (pixels)	Display H x W (in)	Enclosure H x W x D (in)
LD16160	16 x 160	6 ½ x 63 ½	9 ½ x 64 5/8 x 2 3/8
LD16128	16 x 128	6 ½ x 50 ½	9 ½ x 52 x 2 ¾
LD16112	16 x 112	6 ½ x 44 ½	9 ½ x 45 ¾ x 2 ¾
LD1696	16 x 96	6 ½ x 37 1/8	9 ½ x 39 ¾ x 2 ¾
LD1680	16 x 80	6 ½ x 31 5/8	9 ½ x 33 x 2 ¾
LD1632	16 x 32	6 ½ x 12 ¾	9 ½ x 14 x 2 3/8
LD12112	12 x 112	4 ⁷ / ₈ x 44 ¹ / ₈	8 x 45 ³ / ₄ x 2 ³ / ₈
LD1280	12 x 80	4 ⁷ / ₈ x 31 ⁵ / ₈	8 x 33 ½ x 2 ¾
LD1232	12 x 32	4 ³ / ₄ x 12 ³ / ₄	8 x 14 x 2 ³ / ₈
LD896	8 x 96	3 ½ x 37 ½	6 ³ / ₈ x 39 ³ / ₈ x 2 ³ / ₈
LD864	8 x 64	3 ½ x 25 ½	6 ³ / ₈ x 26 ³ / ₄ x 2 ³ / ₈

Be sure to check out our other great products!



Stop Request Signs

- Flush, ceiling or surface mount
- Any font/color combination
- Back-lit by efficient LED's



Interior Passenger Information Sign

- Easy to install
- ADA compliant
- LED's rated at 100K hours



Roller Curtain Signs

- High-res logos & graphics
- Perfect for large fleets
- Virtually maintenance free
- · Reliable, efficient LED backlight
- Available in 12 and 24 VDC
- Up to 120 destinations



Run Number Box

- Metal or plastic frame
- Available in 2, 3, or 4 digits
- Easy to read 4" lettering
- Spring loaded return
- · Reliable, efficient LED backlight
- Virtually maintenance free



LED Run Number Box

- Steel enclosure
- ADA compliant
- Reliable LED's
- Multiple colors
- Automatic brightness
- 12 and 24 VDC

Join Our Mailing List

www.transignllc.com/subscribe

ADA STOP REQUEST INFORMATION



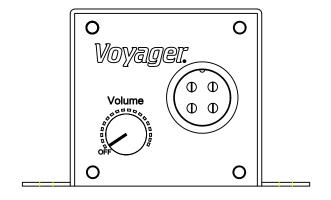
The ADA Occupant Stop Request Lights the Blue Side of the Sign and Signals Driver of an ADA Stop Request via Touch Tape Switches.

Ambulatory Stop Requests Light the Red Side of the Sign and Signals the Driver via Pull Cords.



PA500 Owner's/Installation Manual





Universal Public Address System for use with Vehicle Radios

Revision: B Date: 5/17/01

Audiovox Specialized Applications,LLC 23319 Cooper Dr. Elkhart, IN 46514 1-800-688-3135 www.asaelectronics.com



CAUTION: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with the arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Description:

The PA system amplifier connects between the vehicle's radio and the installed speakers. When the Push to Talk Microphone is activated, the speakers are electrically disconnected from the radio and the microphone amplifiers are automatically connected for use with the same speakers. The microphone volume can be set using the volume control on the PA500.

Operation:

The installed radio will operate normally. Use the radio's volume control to adjust the speaker volume. When the microphone is activated by the PTT (Push To Talk) switch, the speakers are automatically connected to the microphone amplifier. Microphone volume can be set using the control on the front face of the PA500. If the PA500 is installed in an enclosure, the volume level can be pre-set by the installer.

Installation Notes:				
_				

Optional Product List:

Te	lev	isi	OI	าร
	16 4		v	13

AVT988 9' Color Television with Remote (12V)	AVT988
AVT1498 13" Color Television with Remote (12V)	AVT1498
VCP and DVD Players	
for use with TV's and LCD	

AVP7000 Video Cassette Player (12V)	AVP7000
AVP7285 Video Cassette Player (12V)	AVP7285
Single Disc DVD Player	DVD2101

Headphones

Wireless Headphones	WHRF01
Headphones with Pivoting Earcup	HP175
Headphones with Volume Control on Cord	HP275
Studio Quality Headphones	HP375

Miscellaneous

Remote Controls	Please Call
Wallmount Family Radio Service with 4 Handsets	FRS4WM
Replacement Handset	FRS100Y
12V Corded Vacuum	VAC21
Rechargeable Flashlight	AVF1
Window Mount TV Antenna	AN350
2-Amp Adapter for use with AVP7000/7285 VCP	0891436
4-Amp Adapter for use with AVT988 9" & AVT1498 13" TV	0891412

Wallmount Radios

AM/FM Wallmount Manual Tune w/Cassette Player	AWM710
AM/FM Wallmount Electronic Tune w/Cassette Player	AWM820
AM/FM Wallmount Stereo w/CD Player	AWM930
RA .	-

Marine

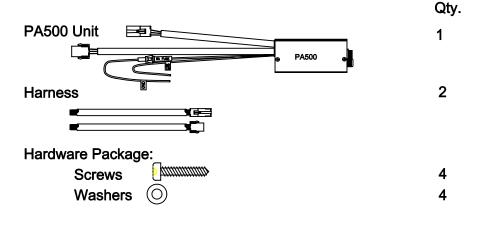
wai ii e	
AM/FM Stereo with CD Player	MS1000
AM/FM Weatherband Stereo w/Cassette Player	MS407
AM/FM Stereo w/Cassette Player (Analog Tuner)	MS220
AM/FM Stereo w/Cassette Player (Analog Tuner)	MS306
Weatherproof Housing	MRH211
50 Watt 6 1/2" Speakers (White/Black)	AMS6
30 Watt 5" Speakers (White/Black)	AMS5
30 Watt 4" Speakers	AMS4
Marine Radio Antenna	AN125

To order any of these products, please call 800-688-3135

Visit our website at: www.asaelectronics.com

Manual Contents:	
manual Contents.	Page
Manual Contents	1
Package Contents	1
Panel Cutout (Optional Installation)	2
Typical Wiring Connections	3
PA500 Wiring	4-5
Optional Flange Mount Installation	6
PA500 Applications	7
Speaker Connections	8-9
Troubleshooting	10
Specifications	11
Optional Product List	12
Installation Notes	13

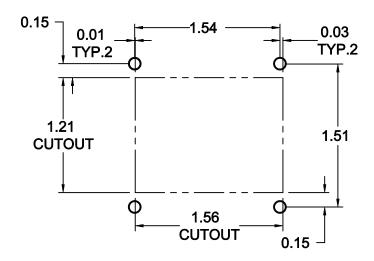
Package Contents:

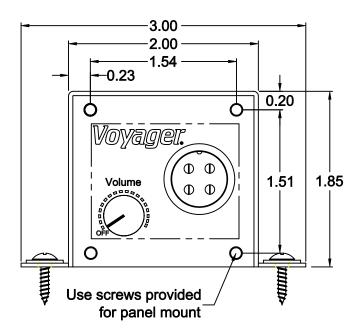


Manual Voyager.

Panel Cutout (Optional Installation):

The PA500 may also be mounted through a panel (as shown below). In this method, the microphone volume may be adjusted or turned on/off to meet the operator's preference.





Troubleshooting:

Symptom	Possible Cause	Possible Solution
Has audio from radio but not PA500	- PA not turned on - Volume set too low on PA	- Turn PA on - Adjust volume of PA to higher level
	- In-line fuse blown - Input and output wired backwards	 Check and replace in-line fuse Reverse input and output wiring
(With BVMB02) No audio,has popping sound on speakers	- Phantom PCB (P/N 8515245) not installed	- Need to install Phantom PCB
High pitched squeal (feed back)	- Volume on PA set too high	-Turn volume on PA down
Hand held MIC keyed and gets	- Volume on PA set too	- Turn volume on PA down
feed back	- Volume on MIC set too high	- Turn volume down on MIC
PA500 will not turn on, (does not have power)	- In-line fuse on PA blown	- Replace fuse

Specifications:

4 Channels 22 Watts per channel, 4 ohm load

Current Draw 7 Amp Max. Frequency Response 100-10,000

Size 3.08" x 1.85" x 4.0" (W x H x D)

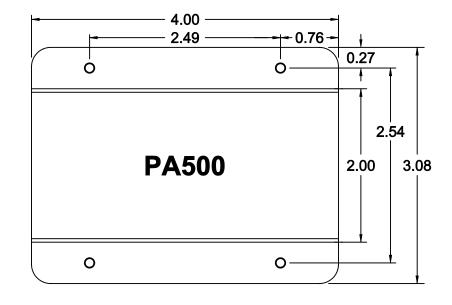
Weight 15 oz.

Speaker Connections:

3 Pair- 4 Ohm Speakers **(+) Curb Side** 6 Ohm **Right Front Total Impedance** \odot **(+) Driver Side** 6 Ohm Left Front **Total Impedance** Align Speakers with "+" on top and "-" on bottom as shown 4 Pair- 4 Ohm Speakers (+)**Curb Side Right Front** 4 Ohm **Total Impedance** \odot

Optional Flange Mount Installation:

The PA500 may also be mounted in a "blind" location, using the mounting holes on the flanges. In this case, the microphone volume must be pre-set by the installer prior to the completion of the installation. The 30 ft. microphone extension/adapter cable (P/N 1401035) or the 36" microphone extension/adapter cable (P/N 1401040), is to be used to allow connection of a PTT (Push To Talk) type microphone by the operator.



(+)

Left Front

Align Speakers with "+" on top and "-" on bottom

Driver Side

Total Impedance

4 Ohm

Typical Wiring Connections:

INPUT NOTES:

Wire Radio according to Manufacturer Spec.

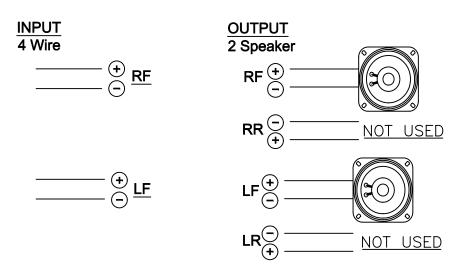
PA500 can accept any radio (up to 4 Channels).

Maintain appropriate load requirements.
(4 ohm minimum suggested)

Radio to PA500

RA RF +	Gray
RA RF -	Gray/Black
RA LF +	White
RA LF -	White/Black
RA RR +	Violet
RA RR -	Violet/Black
RA LR +	Green
RA LR -	Green/Black

Optional Examples:



PA500 Applications con't.:

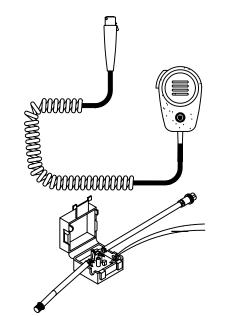
The PA500 may be used with the BVMH22 hand held microphone and either the 30' extension/adapter cable (P/N 1401035) or the 36" extension/ adapter cable(P/N 1401040). If the Boom MIC with Foot Peddle (P/N BVMH02) is used, the Phantom Wiring Harness (P/N 8515245) is required.



30' Extension/Adapter Cable P/N 1401035

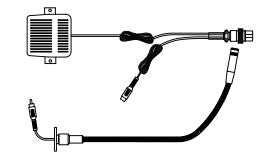


36" Extension/Adapter Cable P/N 1401040



Hand Held Microphone P/N BVMH22





Boom MIC with Foot Peddle P/N BVMHB02

PA500 Applications:

The PA500 may be used directly with the following microphones:

BVMH01 Hand Held Microphone

BVMH28 Boom Microphone

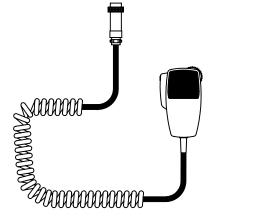
In applications which require remote mounting of the PA500, either the 20 foot extension/adapter (P/N 1401003) or the 36" extension/adapter cable (P/N 1401020) may be used



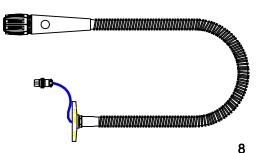
20 Ft Extension Cable P/N 1401003



36" Extension Cable P/N 1401020



Hand Held Microphone P/N BVMH01



28" Boom Microphone P/N BVMH28

To PA500 Speakers

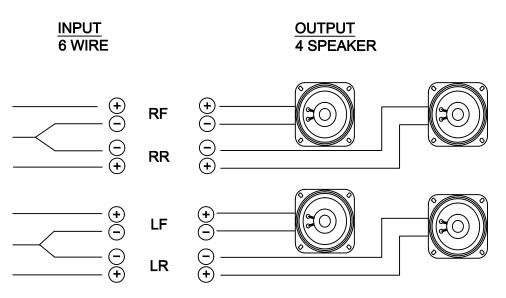
SP I	₹F +
SP I	₹F -
SP I	_F +
SP I	_F -
SPI	R +
SP I	₹R -
SP I	_R +
SP I	_R -

OUTPUT NOTES:

Do not ground any leads.

Do not tie output leads together.

It is permissible to use only Front or Rear Inputs and Outputs in 2 speaker /4 Wire Systems



PA500 Wiring:

Wiring Chart for Radio and Speaker Connections

Wire Color	Speaker Connection
Gray	Right Front +
Gray/Black	Right Front -
White	Left Front +
White/Black	Left Front -
Violet	Right Rear +
Violet/Black	Right Rear -
Green	Left Rear +
Green/Black	Left Rear -

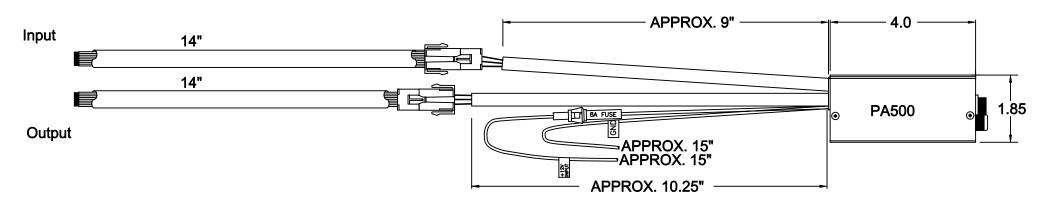
Hardware Kit:

Quantity- Type
4- M5 x 13mm Philips PH Tapping Screw



4- M3.5 Flat Washer





BEACONS 3000 Series Strobe







4" High Model w/ clear lens is our standard option

REPLACE (x) AND (xx) IN ORDER NUMBER FOR PERSONALIZED SELECTIONS

Product Number: 3 (xx) 7(x) (x) (x)

Watt Options: $1\emptyset = 10$ Watt or $2\emptyset = 20$ Watt

Flash: 7 = Double and Quad (included in product number)

Height Options: L = Low, 4" Dome or H = High, 6" Dome

Mounting Options: C = Flat/Pipe or M = Magnetic

LED Color/Dome Color Options: A = Amber LEDs/Amber Lens C = White LEDs/Clear Lens

Features

- > Lens with UV inhibitor prevents sun fade
- > Rated to last 20,000+ hours
- > Advanced circuitry designed tolerate high vibration applications

accessories

Branch Guard and Dust Cover (Beacon not included)



4" Height **#PESB41BG4**6" Height **#PESB41BG6**

Branch Guards (6" shown)



Dust Cover
6" Height #E36ØDC6

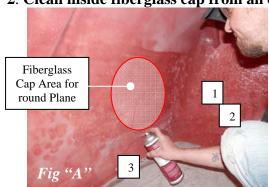
TECHNICAL SPECIFICATIONS

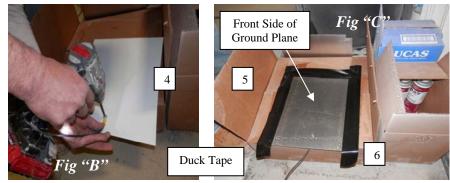
FLASH PATTERNS	2 flash patterns - double or quad (user selectable)
TECHNOLOGY	Xenon Helix Strobe Tube
INPUT VOLTAGE	10-30 Vdc
CURRENT DRAW	10 Watts: 1 Amp @ 12 Vdc, 0.5 Amps @ 24 Vdc or 20 Watts: 2 Amps @ 12 Vdc, 1 Amp @ 24 Vdc
OPERATING TEMPERATURE	-40° C to 50° C
DIMENSIONS	4" Dome with base: 4.75" (12 cm) H
	6" Dome with base: 6.7 " (17 cm) H x 6.3 " (16 cm) base diameter
MOUNTING	Permanent or Magnetic mount (polycarbonate lens and black base)
CERTIFICATIONS	SAE J 1318 Class 2 certified
WARRANTY	Two-year (strobe tube, one-year)

a division of Forest River, Inc.		Process Control Document	Fo	Form 751-01-18, Rev. B Updated: 08/29/2014	
Rev. B			I	No. 32-01-0006-19	
Implementation: 004/05/2	019	Title: FRONT CAP GROUND PLANE	JND PLANE Written by: Tim Smar		
Models Affected:	All				
Tools Necessary:	Screw Gun, 12"x 12" .063 Aluminum, Grinder, Duck Tape, Lucas Sealant, All-Purpose Total Pages: 01			Total Pages: 01	
	Spray Adhesive, Caulk Gun, 31-28-1023-15 Ground Plane Print				

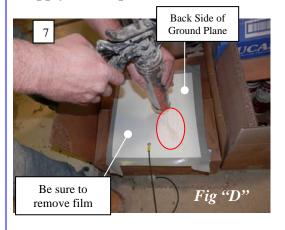
Process:

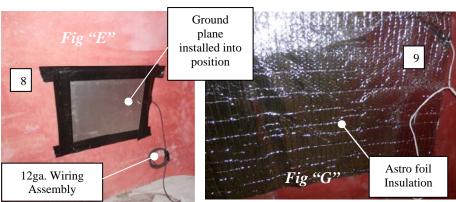
- 1. Begin process by locating ground plane location for installation.
- 2. Clean inside fiberglass cap from all debris with air hose.





- 3. Spray all-purpose adhesive to interior side of fiberglass cap were ground plane will be located.
- 4. Let adhesive tac up, apply 12ga. wire assembly to 12" aluminum ground plane with self-tapper. Fig "B"
- 5. Apply all-purpose adhesive spray to backside all 4 outside edges of 12" aluminum.
- 6 Apply duct tape to backside all 4 outside edges of 12" aluminum.





- 7. Turn 12" aluminum over and apply lucas caulk to backside of ground plane. Fig "D"
- 8. Install ground plane as shown, run 12ga. wiring assembly to grounding plug in electrical box
- 9. Apply Astro foil insulation to front cap covering ground plane.
- 10. After cap installation a conduit w/ pull wire is ran from ground plane area down the B-pillar to behind the driver seat so a future antenna cable can be pulled through.
- 11. After completion of cab area, to complete this process circular access panel is installed in the cab ceiling immediately below the ground plane.

Safe Fleet Transit & Coach Roof Hatches

Ventilator and Emergency Escape Hatches



Enhance your passenger comfort and safety with a hatch from the leader in bus safety equipment.

Safe Fleet roof hatches demonstrate over 40 years of proven performance and come in a wide variety of styles and configurations. Hatches are also customizable to meet your specific application needs. Each hatch features a low-profile design and meets all FMVSS and CMVSS regulations.



Adaptable

Low profile design adapts to wide range of roof surfaces



High Strength

Constructed of high strength UV stable materials



Made in the USA

Proudly manufactured in North Carolina with over 40 years of proven performance



Warranty

5 Year Manufacturer Warranty





The Safe Fleet – Transpec family of ventilators and escape hatches – designed to meet the wide-ranging needs of today's transit fleet.



Dual Purpose Safety Vent

The Dual Purpose Safety Vent is a combination roof ventilator/emergency exit that provides 5-position, fresh air ventilation and a simple release handle for emergency exit.

- Multi position fresh air vent
- Emergency exit
- Most popular model





Glass Safety Vent

The Safe Fleet Glass Roof Hatch is made of 4mm tempered glass with gray tint featuring an 18% light transmission and is also available in a motoriized version.

- Multi position fresh air vent
- Emergency exit
- Glass panel to allow natural light into the vehicle cabin





Power Safety Vent

The Power Safety Vent II provides all the features of the Dual-Purpose Safety Vent II with the addition of an electric fan for extracting condensation, stale or hot air from inside the vehicle to improve passenger comfort.

- Multi position fresh air vent
- Emergency exit
- High-capacity powered exhaust fan provides ventilation in the closed position



EMERGENCY EXIT







Motorized Safety Vent

The Motorized Safety Vent (MSV) is an electrically operated combination roof ventilator/emergency exit that provides fresh air ventilation as well as a simple release handle

that allows the hatch to hinge open for emergency exit. The ventilation portion of the hatch is controlled by a simple switch contained within the driver's compartment of the vehicle on which it is installed.

- Multi position fresh air vent
- Emergency exit
- Allows the ventilation feature to be controlled from driver's seat

	COLORS	STATIC VENT	OUTSIDE RELEASE	RETENTION CABLE (1 or 2)	HATCH AJAR Alarm	ADHESIVE SEALANT	MULTILINGUAL DECALS
MODEL	STANDARD FEATURE & OPTIONS						
T1070 Series Dual Purpose Safety Vent II	White. Light Gray, Dark Gray, Black, Beige				•		•
T1670 Series Power Safety Vent II	White. Light Gray, Dark Gray, Beige						
T2070 Series Motorized Safety Vent II	White. Light Gray, Dark Gray				•		
T2870 Series Glass Roof Hatch	White. Light Gray, Dark Gray, Black			•	•		



1245-SF-Hatch-BR-TR-091721

Copyright ©2021 Safe Fleet and its subsidiaries. All rights reserved. No part of this publication may be reproduced by any means without written permission from Safe Fleet. The information in this publication is believed to be accurate. However, Safe Fleet does not make any representation or warranty to that effect and does not assume responsibility for any consequences resulting from use of such information. Revisions or new editions of the publication may be issued (or not issued) in our discretion to incorporate such changes.

Vulcan[™] Series V12 HD/IP Mobile DVR

12-CHANNEL DVR

DIMENSIONS

· Height: 3.5 inches

· Width: 8.7 inches

· Depth: 11.6 inches

· Weight: 5.7 pounds

TWELVE (12) A/V INPUTS

• 8 channels D1, WD1, 720P, or up to 1080P + 4 channels IP up to 1080P

VIDEO OUTPUTS

• 2 channels

AUDIO OUTPUTS

· 2 channels

CAMERA COMPATIBILITY

- 8 channels D1, WD1, 720P, or up to 1080P (see NTSC)
- · 4 channels IP up to 1080P

STORAGE MEDIA

RECORDING MEDIUM

· One (1) 2.5" SATA hard drive and one (1) optional solid-state SD card

• 1TB (standard) up to 2TB (capable) (optional) 64GB SD card up to 512GB

RECORDING OPTIONS

· SD card slot for redundant recording

INTERFACE

NETWORK DATA CONNECTION

• One RJ45 x 1 (10/100 M/1000M)

EXPANSION

• RS232 × 2, RS485 × 2

GPS INTERFACE

· Built-in, compatible with optional GPS antenna

DRIVER ACTION DETECTION

PANIC BUTTON

- The remote status indicator (panic button) can be connected to show DVR power/record status without using a video monitor
- · The driver-operated panic button has the following functions:
 - · Solid green LED indicates that the unit has power and is recording
 - · Event marker (panic button)

DRIVER ACTION DETECTION WIRES

8 signal wires individually programmable to indicate alarm or event



BUILT-IN G-FORCE SENSOR

COMPRESSION FORMAT

- Video: H.264
- Audio: ADPCM, G.711A G.711U

RECORD RESOLUTION

1080P, 720P, WD1(928X480), WHD1(928X240), WCIF(464X240), D1(704x480), HD1(704x240), CIF(352x240)

PAL

• 1080P, 720P, WD1(928X576), WHD1(928X288), WCIF(464X288), D1(704X576), HD1(704x288), CIF(352x288)

RECORDING OPTIONS

- Continuous record: System will record all channels continuously while vehicle is running (factory setting).
- Alarm record: System will record when an alarm is triggered.
- Motion record: System will record when the cameras detect motion while vehicle is running.
- · Schedule record: System will boot and record according to user-selectable schedule.

ELECTRICAL & OPERATING REQUIREMENTS

AUTO ON/OFF DETECTION

ACC detection

DELAY OFF SETTING

• User selectable up to 24 hours

OPERATING VOLTAGE

• 8~36VDC

OPERATING TEMPERATURE

• -14°F (-25°C) ~ +158°F (+70°C); -40°F (-40°C) ~ +158°F (+70°C) with heater

POWER CONSUMPTION

• 0W-105.3W

POWER SUPPLY

INPUT RANGE

DC 8-36V

OUTPUT RANGE

DC5V/DC12V

OUTPUT CURRENT

• 5V@500mA, 12V@500mA

BUILT-IN POWER PROTECTION

LOW VOLTAGE PROTECTION

· User selectable and programmed at installation

HOUSING/CASING

- · Removable, shock-mounted
- · Vandal-resistant locking front cover
- · Shock-resistant: MIL-STD-810F
- Aluminum
- · Optional fan with filter, removable for cleaning

BUILT-IN WI-FI MODULE

OPTIONAL COMPONENTS

VIRTUAL SYNCHRONIZED MAPPING

- External Virtual Synchronized Mapping™ module with North American maps
- · Includes GPSV1 antenna
- · Embeds GPS tracking information synchronized with recorded video footage

GPS ANTENNA

FIREPROOF BOX BACKUP

CELLULAR MODEM

Specifications, features and applications of use are subject to change without notice. V 4/2017





Z GUARD TM 9902 STAR

A wax based undercoating intended to protect commercial vehicles from corrosion. The wax electrochemically inhibits the rate of corrosion and also, due to the film characteristics, provides a coating resistant to stone impingement and elevated temperatures.

PHYSICAL PROPERTIES

Appearance % NVM by WT.		Black Liquid 50
Density		10.43 lb/gal
Viscosity (after reduction with water)	55	
per Brookfield RVT #5 Spindle 20RPM		2500
Viscosity per #4 Zahn cup		26 sec.
Mechanical Stability	4.0	Excellent
Heat Stability		Excellent
V.O.C.	82	0.00 lbs/gal
D.O.T. Flammability Rating	95	>200q F
pH		8.5
Cryptometer/#2 Wedge, ASTM D1212		15
60° Gloss		< 5 matt finish)
Sag (mils)		>15





Z GUARD 9902 STAR Film Properties

Performance testing reflects coating on unpolished Q panels with four day air-dried films at 3.0 - 4.0 mils dry.

Dry to touch at R.T., ASTM D1640 Dry-to-Handle at R.T., ASTM D1640 Pencil Hardness Flexibility 180° bend over conical mandral Salt Spray, ASTM B117, 1000 hours

Salt Fog Resistance (463PB-10-01), 240 hours.

- ♦ 500 F x 16 hours plus 240 hrs salf fog
- ♦ 325 F x 16 hours plus 16 hours humidity.

Salt Fog Resistance (WSS-M2P178-A), 240 hours.

 662°F x 1 hour; 1°C water quench; plus 240 hrs salt fog.

Salt Water Immersion, 5% NaCl, 100° F, 96 Hours Detergent Immersion, 100° F, 48 Hours Gravelometer, ASTM D3170, -20° F Poultice, GM 998-5470, 20 cycles Q.U.V., ASTM G53, 3000 Hours

Q.U.V., 100 Hours + Salt Spray, 336 Hours

Q.C.T., 3000 Hours

Humidity Resistance, ASTM D2247, 2000 Hours

Sag resistance

Impact (direct & reverse) ASTM D3281 Adhesion (FLTM B 1 6-1 B) cross Hatch

Scab corrosion resistance, 20 cycles

APPLICATION

10 <u>+</u> 2 minutes

20 ± 5 minutes

6B Pass

Field, scribe, edge clean; slight

blistering

Pass (No rust)

Pass (No rust)

Pass (No rust, nor blisters)

Pass (#8-9 corrosion rating or <0.1% surface rust per ASTM D 610-95)

Pass Pass Good(8A) Pass

Pass Pass Pass Pass

≥5 mils 160/40 inch-lbs.

5A Pass Pass

For ultimate protection, apply films to clean metals at a thickness of at least four (4) mils dry, by any of the following methods:

Airless spray, with a 33:1 1.5 - 3.5 GPM, .013 - .026 tip at 50-75 psi line pressure, 20 - 40 fan

www.ztechprotection.com

Z TECHNOLOGIES CORPORATION



Z GUARD TM 9902 STAR

A wax based undercoating intended to protect commercial vehicles from corrosion. The wax electrochemically inhibits the rate of corrosion and also, due to the film characteristics, provides a coating resistant to stone impingement and elevated temperatures.

PHYSICAL PROPERTIES

Appearance % NVM by WT.		Black Liquid 50
Density		10.43 lb/gal
Viscosity (after reduction with water)	55	
per Brookfield RVT #5 Spindle 20RPM		2500
Viscosity per #4 Zahn cup		26 sec.
Mechanical Stability	4.0	Excellent
Heat Stability		Excellent
V.O.C.	82	0.00 lbs/gal
D.O.T. Flammability Rating	95	>200q F
pH		8.5
Cryptometer/#2 Wedge, ASTM D1212		15
60° Gloss		< 5 matt finish)
Sag (mils)		>15





Z GUARD 9902 STAR Film Properties

Performance testing reflects coating on unpolished Q panels with four day air-dried films at 3.0 - 4.0 mils dry.

Dry to touch at R.T., ASTM D1640 Dry-to-Handle at R.T., ASTM D1640 Pencil Hardness Flexibility 180° bend over conical mandral Salt Spray, ASTM B117, 1000 hours

Salt Fog Resistance (463PB-10-01), 240 hours.

- ♦ 500 F x 16 hours plus 240 hrs salf fog
- ♦ 325 F x 16 hours plus 16 hours humidity.

Salt Fog Resistance (WSS-M2P178-A), 240 hours.

 662°F x 1 hour; 1°C water quench; plus 240 hrs salt fog.

Salt Water Immersion, 5% NaCl, 100° F, 96 Hours Detergent Immersion, 100° F, 48 Hours Gravelometer, ASTM D3170, -20° F Poultice, GM 998-5470, 20 cycles Q.U.V., ASTM G53, 3000 Hours

Q.U.V., 100 Hours + Salt Spray, 336 Hours

Q.C.T., 3000 Hours

Humidity Resistance, ASTM D2247, 2000 Hours

Sag resistance

Impact (direct & reverse) ASTM D3281 Adhesion (FLTM B 1 6-1 B) cross Hatch

Scab corrosion resistance, 20 cycles

APPLICATION

10 <u>+</u> 2 minutes

20 ± 5 minutes

6B Pass

Field, scribe, edge clean; slight

blistering

Pass (No rust)

Pass (No rust)

Pass (No rust, nor blisters)

Pass (#8-9 corrosion rating or <0.1% surface rust per ASTM D 610-95)

Pass Pass Good(8A) Pass

Pass Pass Pass Pass

≥5 mils 160/40 inch-lbs.

5A Pass Pass

For ultimate protection, apply films to clean metals at a thickness of at least four (4) mils dry, by any of the following methods:

Airless spray, with a 33:1 1.5 - 3.5 GPM, .013 - .026 tip at 50-75 psi line pressure, 20 - 40 fan

www.ztechprotection.com

Z TECHNOLOGIES CORPORATION

CERTIFICATION FOR AIR & WATER POLLUTION MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

The Vendor certifies that the vehicles proposed:
ARE in compliance with the regulations in 40 CFR Part 85, 40 CFR Part 86, 40 CFR Part 600, Clean Water Act and the air/water pollution criteria established by the Environmental Protection Agency of the United States Government.
ARE NOT in compliance with the regulations in 40 CFR Part 85, 40 CFR Part 86, 40 CFR Part 600, Clean Water Act and the air/water pollution criteria established by the Environmental Protection Agency of the United States Government.
2/9/2023
Date
Authorized Signature
Government Bid Team Manager
Title
Forest River Bus, LLC

Company Name

DISADVANTAGED VEHICLE BUSINESS ENTERPRISE VENDORS/ MANUFACTURERS CERTIFICATION

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

<u> </u>	The Vendor, <u>if a transit vehicle manufacturer</u> , hereby certifies that it has complied with the requirements of 49 CFR Section 26.49 by submitting an annual DBE goal to the Federal Transit Administration (FTA). The goal has either been approved or not disapproved by FTA. The Vendor, <u>if a non-manufacturing supplier</u> , hereby certifies that the
2/9/20	manufacturer of the transit vehicle to be supplied has complied with the above-referenced requirement of 49 CFR Section 26.49.
Date	rized Signature
	rnment Bid Team Manager

(Check appropriate statement)

Title

Forest River Bus, LLC

Company Name

BUY AMERICA CERTIFICATION ROLLING STOCK MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

Certificate of Compliance

The bidder or offeror hereby certifies that it will comply with the requirements of section 165(b) (3), of the Surface Transportation Assistance Act of 1982, as amended, and the applicable regulations of 49 CFR 661.11:

2/9/2023

Revised 10/27/14

Date	•
5#7/	
Authorized Signature	
Forest River Bus, LLC	
Company Name	
Scott Defrees	
Name	•
Government Bid Team Manager	
Title	•
Certificate for Non-Compliance The bidder or offeror hereby certifies that it cannot of 165(b) (3) of the Surface Transportation Assistance for an exception to the requirement consistent with s Transportation Assistance Act, as amended, and the	Act of 1982, as amended, but may qualify action 165(b) (2) or (b) (4) of the Surface
Date	
Authorized Signature	
Company Name	
Name	
Title	

FEDERAL MOTOR VEHICLE SAFETY STANDARDS CERTIFICATION

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

The vendor hereby certifies that it shall submit, as required by Title 49 of the CFR, Part 663 - Subpart D, it's self-certification information stating that the vehicle(s) will comply with the relevant Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 of the Code of Federal Regulations, Part 571.

2/9/2023	
Date	
Authorized Signature	
Government Bid Team Manager	
Title	
Forest River Bus, LLC	
Company Name	

BID FORM #6 U.S. Comptroller's Debarment List Certification

MANDATORY BID FORM - MUST BE SUBMITTED WITH BID

Forest River Bus, LLC	hereby certifies that it
IS or	
✓ IS NOT (specify one) included on the. U.S. Of information available at https://www.sam.gov	
2/9/2023	_
Date	
Authorized Signature	-
Government Bid Team Manager	
Title	-
Forest River Bus, LLC	
Company Name	-

MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

CERTIFICATION OF PRIMARY PARTICIPANT REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

contrac	imary Participant (applicant for an FTA grant or cooperative agreement, or potential etor for a major third-party contract), River Bus, LLC (COMPANY NAME) certifies
to the l	pest of its knowledge and belief, that it and its principals:
1.	Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
2.	Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or 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 Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.
3.	Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and
4.	Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
third-p	orimary participant (applicant for an FTA grant, or cooperative agreement, or potential arty contractor) is unable to certify to any of the statements in this certification, the pant shall attach an explanation to this certification.)
AGRE	RIMARY PARTICIPANT (APPLICANT FOR AN FTA GRANT OR COOPERATIVE EMENT, OR POTENTIAL CONTRACTOR FOR A MAJOR THIRD-PARTY RACT),
Forest F TRUT SUBM	RACT), River Bus, LLC HFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS ITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE ISIONS OF 31 U.S.C. SECTIONS 3801 <u>ET SEQ</u> . ARE APPLICABLE THERETO.

Revised 10/27/14

BID FORM #9 MANDATORY BID FORM – MUST BE SUBMITTED WITH BID

CERTIFICATION OF RESTRICTIONS ON LOBBYING

The undersigned (Vendor, Contractor) certifies, to the best of his or her knowledge and belief, that:

- 1. No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress regarding the award of a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance, or the extension, continuation, renewal, amendment, or modification of any Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance.
- 2. If any funds other than Federal appropriated funds have been or will be paid to any person to influence or attempt to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or any employee of a Member of Congress in connection with any application for a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance, the undersigned assures that it will complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," Rev. 7-97; and
- 3. The undersigned understands that the language of this certification shall be included in the award documents for all sub awards at all tiers (including subcontracts, sub grants, sub agreements. and contracts under grants, loans (including a line of credit), cooperative agreements, loan guarantees, and loan insurance.

Undersigned understands that this certification is a material representation of fact upon which reliance is placed by the Federal government and that submission of this certification is a prerequisite for providing a Federal grant, loan (including a line of credit), cooperative agreement, loan guarantee, or loan insurance for a transaction covered by 31 U.S.C. 1352. The undersigned also understands that any person who fails to file a required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

and accuracy of ea	htractor) Forest River Bus, LLC ach statement of its certification and disclosure grees that the provisions of 31 U.S.C. §§ 3801,	
2/9/2023	S#1	
Date	Authorized Signature	-
Government Bid	Team Manager	
Title		

CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS

The undersigned (Vendor/Manufacturer) certifies that the vehicle offered in this procurement complies with 49 U.S.C. 5318, as amended by MAP-21, and FTA regulations, "Bus Testing," 49 CFR Part 665.

The undersigned understands that misrepresenting the testing status of a vehicle acquired with Federal financial assistance may subject the undersigned to civil penalties as outlined in the Department of Transportation's regular on Program Fraud Civil Remedies, 49 CFR Part 31. In addition, the undersigned understands that FTA may suspend or debar a manufacturer under the procedures in 49 CFR Part 29.

2/9/2023
Date
S#1
Authorized Signature
Government Bid Team Manager
Title
Forest River Bus, LLC
Company Name

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

COMPONENT NAME	MANUEACTURER NAME		% U.S.	%FOREIGN
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 20' 138"WB ON FORD E350	Glaval Bus		<u>74.78%</u>	<u>25.22%</u>
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	51.11%	
Rear/Front Bumper	Romeo	U.S.	0.66%	
Exterior Mirrors	ROSCO	U.S.	0.55%	
Rear Suspension	MorRyde	U.S.	0.96%	
A/C System	Trans Air	U.S.	5.54%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	0.42%	
Wheelchair Lift	Braun	U.S.	0.00%	
Wheelchair Restraints	Q'Straint	U.S.	0.00%	
Seating	Freedman	U.S.	9.22%	
DVR/NVR	AngelTrax	U.S.	1.42%	
Windows	Starquest Lippert	U.S.	0.99%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.96%	
Electical System	LGS Group	U.S.	1.53%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.63%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.78%	
		U.S.	0.00%	
		U.S.	0.00%	
		U.S.	0.00%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

	OST NOT INCLUDED IN THE MATERIAL COSTS ABOVE: FINAL ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE	4.33% \$3,097.57
AUTHORIZED SIGNATURE	Government Bids	2/9/2023 DATE
Scott Defrees		

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

			% U.S.	%FOREIGN
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 20' 138" WB ON FORD E350	Glaval Bus		<u>76.62%</u>	23.38%
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	48.66%	
Rear/Front Bumper	Romeo	U.S.	0.63%	
Exterior Mirrors	ROSCO	U.S.	0.52%	
Rear Suspension	MorRyde	U.S.	0.91%	
A/C System	Trans Air	U.S.	5.28%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	1.50%	
Wheelchair Lift	Braun	U.S.	5.70%	
Wheelchair Restraints	Q'Straint	U.S.	0.57%	
Seating	Freedman	U.S.	6.84%	
DVR/NVR	AngelTrax	U.S.	1.35%	
Windows	Starquest Lippert	U.S.	0.95%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.91%	
Electical System	LGS Group	U.S.	1.46%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.60%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.75%	
		U.S.	0.00%	
_		U.S.	0.00%	_
		U.S.	0.00%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

	OST NOT INCLUDED IN THE MATERIAL COSTS ABOVE: FINAL ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE	<u>4.13%</u> \$3,097.57
AUTHORIZED SIGNATURE	Government Bids	2/9/2023 DATE
Scott Defrees		

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

			% U.S.	%FOREIGN
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 20' 138" WB ON FORD E350	Glaval Bus		<u>77.06%</u>	22.94%
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	48.01%	
Rear/Front Bumper	Romeo	U.S.	0.62%	
Exterior Mirrors	ROSCO	U.S.	0.52%	
Rear Suspension	MorRyde	U.S.	0.90%	
A/C System	Trans Air	U.S.	5.21%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	1.48%	
Wheelchair Lift	Braun	U.S.	5.62%	
Wheelchair Restraints	Q'Straint	U.S.	1.12%	
Seating	Freedman	U.S.	7.66%	
DVR/NVR	AngelTrax	U.S.	1.34%	
Windows	Starquest Lippert	U.S.	0.93%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.90%	
Electical System	LGS Group	U.S.	1.44%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.59%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.74%	
		U.S.	0.00%	
		U.S.	0.00%	
		U.S.	0.00%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

TBD

FINAL ASSEMBLY % OF TOTAL COST NOT INCLUDED IN THE MATERIAL COSTS ABOVE:

FINAL ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE

\$3,097.57

Government Bids

2/9/2023

TITLE

Scott Defrees

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

			% U.S.	%FOREIGN
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 22' 158" WB ON FORD E350	Glaval Bus		<u>77.52%</u>	<u>22.48%</u>
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	46.75%	
Rear/Front Bumper	Romeo	U.S.	0.61%	
Exterior Mirrors	ROSCO	U.S.	0.50%	
Rear Suspension	MorRyde	U.S.	0.88%	
A/C System	Trans Air	U.S.	5.07%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	1.44%	
Wheelchair Lift	Braun	U.S.	5.48%	
Wheelchair Restraints	Q'Straint	U.S.	1.63%	
Seating	Freedman	U.S.	9.40%	
DVR/NVR	AngelTrax	U.S.	1.30%	
Windows	Starquest Lippert	U.S.	0.91%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.87%	
Electical System	LGS Group	U.S.	1.40%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.57%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.72%	
		U.S.	0.00%	
		U.S.	0.00%	
		U.S.	0.00%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

TBD

	OT INCLUDED IN THE MATERIAL COSTS ABOVE: ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE	<u>3.97%</u> \$3,097.57
AUTHORIZED SIGNATURE	Government Bids	2/9/2023 DATE

Scott Defrees	
PRINT NAME	

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

			% U.S.	%FOREIGN
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 20' 138" WB ON FORD E350	Glaval Bus		<u>73.25%</u>	<u>26.75%</u>
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	46.52%	
Rear/Front Bumper	Romeo	U.S.	0.60%	
Exterior Mirrors	ROSCO	U.S.	0.50%	
Rear Suspension	MorRyde	U.S.	0.87%	
A/C System	Trans Air	U.S.	5.04%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	1.43%	
Wheelchair Lift	Braun	U.S.	5.45%	
Wheelchair Restraints	Q'Straint	U.S.	0.54%	
Seating	Freedman	U.S.	6.54%	
DVR/NVR	AngelTrax	U.S.	1.29%	
Windows	Starquest Lippert	U.S.	0.90%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.87%	
Electical System	LGS Group	U.S.	1.40%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.57%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.71%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

	NOT INCLUDED IN THE MATERIAL COSTS ABOVE: AL ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE	<u>3.95%</u> \$3,097.57
AUTHORIZED SIGNATURE	Government Bids	2/9/2023 DATE
Scott Defrees		

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

			% U.S.	%FOREIGN
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 20' 138" WB ON FORD E350	Glaval Bus		<u>73.25%</u>	<u>26.75%</u>
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	46.52%	
Rear/Front Bumper	Romeo	U.S.	0.60%	
Exterior Mirrors	ROSCO	U.S.	0.50%	
Rear Suspension	MorRyde	U.S.	0.87%	
A/C System	Trans Air	U.S.	5.04%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	1.43%	
Wheelchair Lift	Braun	U.S.	5.45%	
Wheelchair Restraints	Q'Straint	U.S.	0.54%	
Seating	Freedman	U.S.	6.54%	
DVR/NVR	AngelTrax	U.S.	1.29%	
Windows	Starquest Lippert	U.S.	0.90%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.87%	
Electical System	LGS Group	U.S.	1.40%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.57%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.71%	

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION: 2367 CENTURY DRIVE, GOSHEN, IN 46528

BODY V.I.N. OF UNITS DELIVERED UNDER POST DELIVERY BUY AMERICA:

	NOT INCLUDED IN THE MATERIAL COSTS ABOVE: AL ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE	<u>3.95%</u> \$3,097.57
AUTHORIZED SIGNATURE	Government Bids	2/9/2023 DATE
Scott Defrees		

Pre-Award BUY AMERICA CERTIFICATION

This certifies compliance with FTA Buy America Regulations set forth in 49 C.F.R. § 661.11 for each component that more than 70% of the subcomponents, by cost, are of U.S. origin/manufacture and is manufactured in the U.S. Manufacturer attests that the U.S. content of subcomponents, by cost is as indicated below.

	T	1	% U.S.	%FOREIGN
COMPONENT NAME	MANUEACTURER NAME			
COMPONENT NAME	MANUFACTURER NAME		CONTENT	CONTENT
PRIMETIME 22' 158" WB ON FORD E350	Glaval Bus		<u>74.27%</u>	<u>25.73%</u>
		MFG	% OF	
SUBCOMPONENT NAME	MANUFACTURER NAME	LOCATION	TOTAL	
Chassis	Ford Motor Co.	U.S.	44.70%	
Rear/Front Bumper	Romeo	U.S.	0.58%	
Exterior Mirrors	ROSCO	U.S.	0.48%	
Rear Suspension	MorRyde	U.S.	0.84%	
A/C System	Trans Air	U.S.	4.85%	
Wheelchair/Rear Door(s)	Challenger Door	U.S.	1.38%	
Wheelchair Lift	Braun	U.S.	5.24%	
Wheelchair Restraints	Q'Straint	U.S.	1.56%	
Seating	Freedman	U.S.	9.13%	
DVR/NVR	AngelTrax	U.S.	1.24%	
Windows	Starquest Lippert	U.S.	0.87%	
Entry Door Header/Door Panels	A&M Systems	U.S.	0.84%	
Electical System	LGS Group	U.S.	1.34%	
Battery Box and Tray	MorRyde/Stoutco	U.S.	0.55%	
Stanchion/Grab Rails	United Roll Form	U.S.	0.69%	
_				

MAJOR ACTIVITIES UNDERTAKEN AT THE FINAL ASSEMBLY LOCATION

All purchasing of raw and assembled materials including the chassis, fabrication and welding of the frame, prime paint, installation of all wood, fabric, FRP, aluminum and/or other body panel and/or trim materials, installation of doors and windows, HVAC components and systems, electrical systems, installation of any required options such as wheel chair lifts, tie down kits, seats, radios and optional electronic items, if any, complete undercoat, exterior paint and/or graphics if ordered, full road test, rain booth test and all other final quality functions as needed to ensure compliance with the contract.

FINAL ASSEMBLY LOCATION:	2367 CENTURY DRIVE, GOSHEN, IN 46528	
BODY VIN OF UNITS DELIVE	RED LINDER POST DELIVERY BUY AMERICA:	

FINAL ASSEMBLY % OF TOTAL	COST NOT INCLUDED IN THE MATERIAL COSTS ABOVE: FINAL ASSEMBLY \$\$ NOT INCLUDED IN THE COSTS ABOVE	<u>3.81%</u> \$3,097.57
AUTHORIZED SIGNATURE	Government Bids	2/9/2023 DATE
Scott Defrees		