Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 1	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 26.9 / p. 13	

CHANGE REQUESTED: Vans chassis (Exhibit III) vehicles are exempt from Altoona testing (unless modified in a manner not consistent with Ford QVM). A 5-year / 100,000-mile test is not available for this class/category of vehicles.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 4 March 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Revised response: Based on the documentation provided for the proposed vehicle type in this asset class, Altoona testing is exempt.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 1	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Body, Section 3	

CHANGE REQUESTED:

FMVSS 220 is a School Bus certification, we respectfully request the R60 dynamic rollover certification ILO of the FMVSS 220, Document is attached.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

The FMVSS 220 standard titled: "School bus rollover protection" (US DOT, 1998) is commonly used in the United States to evaluate rollover crashworthiness of wide variety of buses. It is also voluntarily used to test smaller, paratransit (cut away) buses for the integrity of their structure in the absence of a dedicated standard. Its quasistatic nature offers an attractive, easy to perform test that provides good repeatability of results.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 2	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Structure, Section 4	

CHANGE REQUESTED:

We repectfully request that you accept our manufacturers standard construction ILO the stated construction. Please see attached

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 25 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided the following are met: The floor to ceiling distance shall be 78 inches minimum at the center aisle, roof panel shall overlap the side panels by 1 inch minimum, roof and side skin panels shall be .024 inches thick minimum, insulation shall have a minimum R-value of 8, skins and insulation shall be fire resistant in compliance with the Federal Transit Administration recommended Fire Safety Practices for Transit Bus and Van Materials. The completed body shall meet the requirements of FMVSS-220 and all other FMVSS, ADA and Buy America requirements.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 3	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Door Construction, Section 6	

CHANGE REQUESTED:

We repectfully request that you accept our door opening of 29" ILO 30".

AGENCY RESPONSE

Reviewed By: T. Kuczynski

Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 4	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Interior Flooring, Section 7	

CHANGE REQUESTED:

We repectfully request that you accept our composite sub- flooring ILO the wood based products. Using a composite flooring there is no rotting or water damage that will occur to the bus floor.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided thickness is maintained per the specification requirements and all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 5	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Insulation, Section 9	

CHANGE REQUESTED:

We repectfully request that you accept our manufacturers 1" polystyrene block to match the 1" construction ILO the 1.5", this 1" meets the required R-Value as stated in the solicitation.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided the R-value of 8 or above is maintained, is fire resistant, and shall pass the testing requirements specified in the Federal Transit Administration recommended Fire Safety Practices for Transit Bus and Van Materials Selection and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 6	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Electrical System, Section 10.11	

CHANGE REQUESTED:

We repectfully request that you accept our manufacturers standard OEM 300A Alternator ILO the 220 AMP requested in the solicitation.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

The additional amperage for the alternator is acceptable.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 7	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Battery, Section 10.12.1	

CHANGE REQUESTED:

We repectfully request that you accept the OEM installed battery compartment designed for the OEM batteries ILO removal and installation in an aftermarket box and tray. The chassis comes standard with a tray and box specifically designed by the OEM.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Not enough information provided to determine location of OEM placement of batteries .

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 8	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Wiring, Section 10.13	

CHANGE REQUESTED:

We repectfully request that you accept ATO fueses integrated into our electrical control system ILO auto and manual reset breakers. Breakers do not meet our manufacturers high quality standards.

AGENCY RESPONSE

Reviewed By: T, Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

All add-on electrical components controlling the power to the bus body electrical circuits shall be located in a separate electrical junction box.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 9	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Roof Hatch, Section 11.2	

CHANGE REQUESTED:

We repectfully request that you accept a Spheros Low Pro roof Hatch ILO the requested Transpec.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 10	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Flooring, Section 14.10	

CHANGE REQUESTED:

We repectfully request that you accept our manufacturers floor coves up the sidewall to the bottom of the seat track ILO of using a separate piece of material.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved to utilize one continuous piece of flooring material provided all other requirements of Section 14.o (Floor and Floor Covering) of the specification are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 11	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Step and Stepwell, Section 15.2	

CHANGE REQUESTED:

We repectfully request that you accept Altro step treads and sides to match the flooring ILO of RCA rubber that is no longer available.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approve of material change to Altro. Dimensions to remain per the requirements of the specification.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 12	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Windshield and Windows, Section 17.2	

CHANGE REQUESTED:

We repectfully request that you accept our manufacturers standard 32x34 windows ILO of the requested 36x32.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 13	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Additional Specifications, Section 25.6.4	

CHANGE REQUESTED:

We repectfully request that you accept 3/16" poly plastic laser cut signage ILO of decals where practical in the bus, we find these hold up longer and are less likely to be damaged.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 14	**DATE:** 02/22/22
PROPOSER: ABC Companies	**PHONE:** (817) 683-1304
PROPOSER SECTION / PAGE#: Additional Specifications, Section 25.7.14	

CHANGE REQUESTED:

We repectfully request that you accept the use of an add-on PA module in conjunction with the OEM radio to meet the specification and/or the use of an all in one aftermarket solution.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved the use of an add-on PA system module or all in one after market solution that is compliant with all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines.

Vehicle Specifications

Make: Turtle Top **Model: Terra Transit**

TERRA TRANSIT - HD

Chassis Specifications

Section 1

1.1 The Terra Transit is built on the Ford Motor Company F-550 chassis or Freightliner S2C Custom Chassis.

Standard Equipment **F-550:**

GVWR Capacity:	19,500 pounds (8,845 kgs)
Engine-Gas:	6.8L EFI Triton V10
Engine-Diesel:	6.7L OHV Power Stroke V-8
Transmission:	Automatic 6 Speed Electronic with Overdrive
Alternator:	Extra Heavy Duty 240 amps
Batteries:	750 CCA each / 78 amp hr
Suspension/Shocks:	4.88 Limited-slip Rear-Axle with Payload Plus Upgrade which includes Upgraded Frame, Rear Axle and Springs, Front and Rear Stabilizer Bars, Heavy Duty Shocks Absorbers
Fuel Capacity:	40 Gallon Tank (Gasoline or Low Sulfur Diesel), Aft-of-Axle
Tires:	225/70Rx19.5G BSW All Season
Wheels:	19.5” Argent (Silver) Painted Steel
Brakes:	Four-wheel Disc with Anti-Lock Brake System (ABS)
Mirrors:	Manual Telescoping, Folding with Power/Heated Glass, Heated Convex Spotter Mirror with Integrated Clearance Lamps/Turn Signals

Standard Equipment – **Freightliner S2C Custom Chassis:**

GVWR Capacity:	26,000 pounds (11,793 kgs)
Engine – Diesel:	Cummins ISB 6.7-240 HP
Transmission:	5 Speed Automatic Allison 2200 PTS
Alternator:	320 amps Leece Neville
Batteries:	Dual 1900 CCA Group 31
Suspension/Shocks:	Front: 10,000 lb. Taperleaf and Shock Absorbers
Suspension/Shocks:	Rear: Air Ride 23,000 lb. with Dual Leveling Valves, Rear Swaybar and Shock Absorbers
Fuel Capacity:	60 Gallon Tank Low Sulfur Diesel, Aft-of-Axle Location
Tires:	245/70R19.5 16 Ply Radial with Spare

Wheels:	Steel
Brakes – Hydraulic:	Bosch Hydraulic Brake Package
Brakes – Air:	Air Brake Package
Mirrors:	Dual Heated Remote / Convex – Door Mounted
Driver Seat:	Bostrom High Back Air Suspension Seat with Air Lumbar Support

1.2 Other Equipment Items – Ford Chassis: Ford High Series Exterior Upgrade Package which includes front chrome bumper and grille. Additionally, dual sealed-beam fixed lens headlamps, power door locks and windows, driver and passenger air bags, and engine block heater, 50 state emissions compliant, tilt steering wheel, cruise control, daytime running lights, and AM-FM stereo / digital clock / USB input jack.

Optional CNG/Propane Gaseous Engine Prep Package needed if intended for alternative fuel conversion.

1.3 Other Equipment Items – Freightliner Chassis: power locks, power windows, adjustable tilt and telescoping steering, cruise control, 50 state emissions compliant, engine block heater, daytime running lights, front tow hooks, back-up alarm, chrome grille, chrome front bumper with collapsible ends, power steering, engine and trip hour meters, dual electric horns, Multiplex chassis electronics, and electronic engine integral shutdown protection system

1.4 OEM tires are retained on the chassis. Vehicle's tires are inflated with nitrogen prior to leaving the factory. Nitrogen maintains tire pressure longer, uses less fuel and tires run cooler on nitrogen compared to compressed air. A front-end alignment must be chosen on the order form or performed by the dealer to meet QVM specifications.

Steel Frame Construction **Section 2**

2.1 Steel frame construction consists of 11-gauge "U" shaped mounting rails that span the OEM chassis frame. 2"x3" 16-gauge tubes are spaced across the mounting rails and extend the full width of the body at approx. 22" intervals to form cross members.

2.2 OEM rubber isolator bushings are placed between the chassis frame and the "U" mounting rails bolted through the floor and torqued to specifications. The bushings provide a cushion between the frame and body, which allows the suspension and the frame to work independently of the body.

2.3 A drive shaft guard is welded at each drive shaft joint to the frame rails to lessen or eliminate the whipping action caused by a loose drive shaft in the event of a failure.

2.4 18-gauge galvanized steel heat shields are installed per Ford Qualified Vehicle Modifier (QVM) specifications to protect the body and OEM components from heat directly above the exhaust.

2.5 The vehicle will be equipped with a heavy-duty, corrosion resistant exhaust system. Attachment is through exhaust hangers and clamps attached to the component body. Routing configurations will vary depending on order content. The exhaust system meets OEM emissions requirements.

Steel Sidewall Construction **Section 3**

3.1 The sidewall construction consists of vertical 1” x 2” x 16-gauge steel wall tubes welded to a 1” x 3” x 16-gauge horizontal steel tube at the top and a 1” x 1” x 16-gauge steel tube at the bottom.

3.2 The window frame is completed by adding 1”x1” and 1”x2” 16-gauge tubes welded between the wall tubes and completed with pre-formed 1” x 18-gauge steel straps form the window radius corners.

3.3 Rolled 50,000 PSI 11-gauge steel seat track is welded to the 16-gauge steel tubes below the window openings. The seat frames are then bolted into track nuts placed in the seat track and torqued to specifications.

3.4 The entire sidewall assembly is welded to the 2” x 2” x 11-gauge perimeter floor angle.

3.6 The rear wall construction framework consists of welded 1” x 1” x 16-gauge steel tubing and 1” x 2” x 16-gauge steel tubing which includes openings for a rear egress window or optional rear door(s).

Steel Roof Construction **Section 4**

4.1 Attached to the top sidewall rail construction are formed roof bows. These are made of 1” x 1” x 16-gauge steel, formed to match the roof contour. The roof bows are welded to the 1” x 3” x 16-gauge top sidewall tubes from front to rear of the body assembly. Additional 14-gauge steel plate is welded front to back in strategic locations to provide additional strength.

4.2. There is a double bow at the front and rear of the cage assembly forming a front and rear support beam to provide additional support.

Floor Construction **Section 5**

5.1 The floor framework consists of 13-gauge inverted “U” shaped cross members mounted on 11-gauge inverted hat channels. The crossmembers span the chassis frame and extend the full width of the body. The frame is finished with a 2” x 2” x 11-gauge steel angle around the perimeter. 7-gauge steel frame extensions are welded at

the rear of the OEM frame rails on extended models. The wheel well sections are made with 14-gauge steel plate.

5.2 A 1” x 4 1/2” x 1” x 14-gauge steel channel is inverted and runs the full length of the floor approximately 29” in from both the driver side and passenger side. This channel is placed on the centerline of the seat track position for seat frame attachment. Rolled 50,000 PSI steel seat track is welded to these channels every 4”, staggered per side. The seat frames are then bolted into track nuts placed in the seat track and torqued to specifications.

5.3 A 3/4” x 2” x 3/4” x 14-gauge steel channel is inverted and runs the full length of the floor to support the passenger aisle. This channel is also welded longitudinally between each frame rail, where necessary, to give added support to the flooring material. Additional steel plate may be added for vehicles requiring floor supported hardware in use for options. Additional support may also be needed for perimeter mounted seating and paratransit equipment and luggage equipment.

5.4 The entrance door step pan assembly consists of an 11-gauge steel step pan treads and risers with steel front and rear 14-gauge side jamb panels braced with 1” x 2” x 16-gauge steel tubing and a steel door header plate.

5.5 The steel floor framework is overlaid with Coosa BW20 3/4” Composite Panel flooring (high density, closed-cell polyurethane foam reinforced panel with woven roving and continuous strand fiberglass). The panel is cut to width in order to reduce seams and tongue and groove routed prior to installation. The panel is attached to the floor structure with a ¼” bead of industrial adhesive applied to the surface of all steel structures. Additionally, bugle head screws are placed at a minimum of every 12” along all edges and within the floor decking. The composite panel joint is sealed using floor filler compound and sanded.

5.6 At the end of the construction process when all components have been attached to the underside of the floor, the perimeter joints and all other joints are sealed with expanding-type foam resin sealant prior to undercoating.

Cage to Body Mounting **Section 6**

6.1 The steel cage construction is attached to the cab using cage to cab braces and steel tubing. This assembly consists of vertical and horizontal welded steel tubes as a roll cage with the vehicle cab and as channel assemblies to attach the vehicle cab to the cage welded on one end and “huck” riveted on the other end.

6.2 A channel floor assembly is attached to the component body floor. This assembly is a 2” x 2” x 11-gauge steel angle designed to join the component body floor and cap. Attachment to the floor of the cab is accomplished through “huck” rivets and angled welded support tubes.

External Body

Section 7

7.1 Crane Composites Nobel® Select Exterior Sidewall Panels are used for the external body sidewalls. The composite material is a high gloss, exterior, gel-coated panel with UV protection and environmental properties. The external body consists of one individual panel from the roof line to the skirt, which reduces seams in the exterior.

7.2 Before the body panels are attached to the steel cage construction after the primer has been applied and dried, a ¼" V-bead of high-strength bonding adhesive/sealant, is applied to the steel cage to bond the composite panel to the steel. After the adhesive is applied, the composite panel is attached to the steel cage construction and secured with 1/8" pop rivets along the perimeter of each panel. After the body panels are secured in place the window openings are routed out and removed. A drip rail gutter, the length of the sidewall body panel, is added with waterproof rivets above the window cutouts.

7.3 The sidewalls are insulated with closed cell foam 1" type #1 density EPS expanded polystyrene. The insulation provides high-quality sound deadening and temperature control properties.

7.4 The skirting area is framed on the backside of the skirt with 1" x 1" 16-ga steel tubes and 2" x 2" steel angle. A 2" aluminum retainer trim is screwed into place with exterior perimeter fasteners separating the wall from the skirt area. A cosmetic paintable vinyl seal trim covers the retainer trim and fasteners.

7.5 Wheel flares are made of white TPO paintable material attached with high strength adhesive/sealant and rivets.

7.6 The front cap is constructed of durable reinforced fiberglass and is a one-piece assembly, built for strength. The cap is attached to the vehicle cab and the roof bow assembly with high strength adhesive and 1" aluminum retainer trim screwed into place over the seam and capped off with a paintable vinyl cover for cosmetic appeal. The transitions (from body to cab) are attached in the same method and bolted to the roof cap.

7.7 The rear cap is constructed of durable reinforced fiberglass is a one-piece assembly, built for strength. It is attached to the rear wall and cage assembly with high strength adhesive and 1" retainer trim screwed into place over the seam and capped off with a paintable vinyl cover for cosmetic appeal.

7.8 The body roof is a one-piece Flex Roof commercial Roof Membrane. The roof membrane follows the curve of the roof bows and overlaps the top of the sidewalls. This seamless one-piece roof design minimizes the potential for leaks.

Bumpers and Mud Flaps

Section 8

8.1 The vehicle is equipped with the chassis manufacturers' standard front bumper.

8.2 The standard rear bumper is a heavy-duty powder coated steel assembly. Mounting is achieved through steel bracket assemblies attached directly to the vehicle frame extension. A rear Romeo RIM HELP® bumper is available as an option.

8.3 The vehicle is supplied with Turtle Top rear mud flaps installed with supports.

Ceiling and Sidewalls

Section 9

9.1 The interior ceiling and sidewalls are finished with reinforced fiberglass panels. They are a light weight, thermoplastic composite sheet comprised of fiberglass and polypropylene resin which is formaldehyde free. The panels are durable, bright white, reinforced plastic material. It's cleanable, and stain and scratch resistant. The ceiling is adhered to the interior surface of the roof bows using 3/8" rivets at each ceiling bow. The sidewalls are one-piece sections from the top header tube to the top of the wall seat track and the sidewalls are adhered to the interior surface with rivets at the top and bottom of the sidewalls into the wall bows.

9.2 Standard floor covering is coved up the sidewall to the bottom of the wall seat track (if bus style seats are installed) forming a seamless transition from the wall to the floor of the bus reducing water intrusion during cleaning.

9.3 Optional ceiling and sidewall materials consist of vinyl or limo cloth. Also available is an antimicrobial vinyl ceiling and sidewall material which reduces the risk of contamination from bacteria and fungus.

Floor Covering

Section 10

10.1 Industrial contact adhesive is applied to the composite panel sub-flooring and black industrial grade Altro® flooring prior to mating the flooring to the sub-floor panel. The flooring material is cut to width to reduce seams and is coved up the side wall and back wall extending up to the seat track. Additional colors of flooring are available from the Altro® brand.

10.2 The entrance step-well treads and risers match the floor covering material and include color contrasted metal reinforced step tread nosing edges. The step nosing is installed with adhesive and #8 x 3/4" zinc screws. Step tread coverings are coved up the riser for a cleaner look and eliminating additional seams.

Stanchions, Grab Rails and Barrier Panels

Section 11

11.1 The stanchions and grab rails are manufactured from 1¼" OD high grade, low carbon type 304 stainless steel tubing. Where possible, the stanchions are bent or welded to eliminate fasters. An angled hand rail is installed at the left of the entrance door. Additional entry grab handles and ceiling overhead grab rails are available as well as colors and covers.

11.2 Modesty barrier panels are standard on the passenger side just rearward of the entrance door. The modesty barrier panel is made of stanchion material and vinyl/fabric covered foam padded ½" plywood. The driver's side modesty panel is optional and can include an optional plexiglass driver barrier shield.

11.3 All stanchions, grab bars, passenger assist devices, and barriers comply with all applicable ADA requirements for strength and placement.

Entrance Doors

Section 12

12.1 Driver cab door and co-pilot cab door delete and co-pilot seat delete is standard for the in-cab front passenger bi-fold entrance doors. The commercial style bi-fold entrance door panels are from A & M Systems. The door systems is an electrically operated opening/closing door system which is driver controlled through the switch panel.

12.2 Doors are corrosion resistant through the use of aluminum, stainless and zinc plated components. Door panel frames are a black anodized finish and door leaf glass panels are tempered AS2 tinted glass.

12.3 Torque arms are located on the upper hinges. The hinged edge of the door has a radius edge to ensure proper mating to the vertical surface and is sealed with a large D shaped bulb seal to prevent air and moisture from entering the entrance door area when closed. The edges of the doors have a flexible rubber safety seal which seals the door area from weather and air infiltration. It will also prevent serious injury if someone should inadvertently be caught in the closing of the door.

Windows

Section 13

13.1 The bus compartment side body windows are solid flat windows in both stationery and egress forms. Windows are a 5/32" thick dark tempered glass panel measuring 31" x 36 3/4". All windows are installed using the manufacturers provided trim ring in every screw location provided. Optional T-sliders or dual-pane windows are available. Entrance door in-cab necessitates an A-panel window in the cab for driver visibility.

13.2 The standard rear wall passenger compartment window is an emergency egress window which measures 31” x 36 3/4”. Instead of a rear wall egress window, a rear emergency exit door (with or without windows) or rear luggage area access door is optional.

13.3 All egress windows meet applicable C/FMVSS 217 standards.

Electrical System and Lighting **Section 14**

14.1 The electrical system operates by the use of an ignition-controlled power distribution printed circuit board designed for high reliability and ease of trouble shooting. A driver-friendly controlled switch panel of heavy-duty rocker switches remotely operates the main control board and contains the climate control system and ADA lighted indicators. The switch panel is also based on the same proven printed circuit board technology used in the main control board and is connected to the main control board by a highly reliable multi-conductor data cable.

14.2 The major controlling, protection, and other electrical components are located in easily accessible compartment above the driver. The 12 Volt circuit protection is achieved using ATO automotive fuses.

14.3 The system is supplied directly from the OEM battery and a #2 gauge cable protected by a 125 amp slow-blow fuse battery shut-off switch. All battery cable connections are double-crimped and protected by heat shrink water-tight sealed tubing. Battery cables and external wires are protected by high temperature split convoluted conduit. All external connections are coated with an anti-corrosion spray to help prolong terminal life and avoid voltage loss. Where battery relocation is chosen as an option, the box and slides used will be protected from environmental elements and corrosion resistant. The enclosure will keep the batteries from being exposed yet provide adequate ventilation.

14.4 Wiring consists of rugged, custom built wiring harnesses for all interior and exterior components. Wires run the length of the vehicle on the driver and passenger sides. Cable tie bases are secured to the steel framework of the body using screws and all wires are attached to the bases using durable nylon ties. All wiring is constructed of high-temperature type-GXL wire for 12 Volt circuits providing a safe and reliable electrical system. Weather-Pack connectors are used for all exterior applications. Butt-style connectors are restricted. Each wiring circuit is color coded and labeled for ease of identification. All cabling is solder sealed and machine crimped. Wiring follows Ford QVM recommendations.

14.5 All interior and exterior lights are LED lamps. Lighting is designed for ease of use and maintenance. Convenience lighting is installed in the cab and stepwell. All lighting products are wired for use with the driver controlled switch panel or with optional paratransit equipment, and/or through automatic switches. Exterior lighting consists of long lasting heavy duty LED running, clearance, brake, and stop/tail/turn lamps.

Additional optional interior and exterior lights are available such as destination signage, optional reading lights, stepwell and exterior lighting. All lighting products meet or exceed the standards specified in C/FMVSS 108.

14.6 Optional back-up alarm, reverse camera systems or rear object detectors are available.

Auxiliary Heat and Air Conditioning

Section 15

15.1 OEM cab heating and air conditioning provide cabin comfort for the driver. Passenger compartment heating and air conditioning systems are installed per customer specifications. Choices for air conditioning include ACC Climate Control, ProAir / American Cooling Technologies (ACT), and Trans/Air® Manufacturing. Configuration choices include skirt or roof mount condensers.

15.2 Heating options comprise of auxiliary coolant heater systems. Standard vacuum shut-off valves can be exchanged for manual shutoff valves as an option.

Seating and Seat Belts

Section 16

16.1 For the driver/co-pilot seating equipment, all OEM belts and securement hardware are retained and re-installed per the vehicle equipment manufacturer's IVM (Incomplete Vehicle Manual). The driver's and co-pilot's seats are OEM seats and can be recovered with fabrics matching the passenger compartment seating.

16.2 Passenger compartment transit style seating is installed into seat track; channel runs the full length of each sidewall and the floor. Rolled steel seat track is placed on the centerline of steel channel for strength. The seat frames are then bolted into track nuts placed into the seat track and torqued to specifications. Optional seating configurations are available such as perimeter seating and foldaway or flip seating located over wheelchair positions for ambulatory passenger use when a wheelchair position is not used.

16.3 Many different seat options, sizes, and fabric choices are available. Passenger seating products are supplied by Freedman Seating Company or Premier Products. All frames and seats are constructed using the highest quality standards to meet customer comfort expectations and safety. Seats encompass various configurations from stationary, reclining, single, double, flip, fold-away with options such as arm rests, foot rests, grab bars, seat belts, and assorted other features. For passenger safety, seating products have been tested to meet or exceed FMVSS 207/210 and FMVSS 225 for child restraint seats.

16.4 Different fabric choices are vinyl or fabric. All materials and fabrics meet or exceed C/FMVSS 302 flammability standards.

16.5 Bus transit style forward facing seating have lap seat belts installed as standard. Optional 3-point shoulder belts are also available on certain seating styles.

Primer, Paint and Undercoat **Section 17**

17.1 The entire steel cage body assembly is painted with a primer for corrosion protection prior to sidewall and roof assembly. Precautions are used to ensure the primer is applied to proper parts and assemblies.

17.2 The Terra Transit standard exterior finish is white fiberglass gel coat. Optional overall commercial cab and body paint is available. Turtle Top uses Akzo-Nobel automotive finishes when overall paint is chosen as an option for a superior exterior paint and protection finish. AkzoNobel and Turtle Top are leaders in the use of automotive waterborne low VOC compliant paint products which meet VOC content emissions limits governed by federal and state air quality requirements. Optional paint choices include commercial color painted ground effect skirting. Optional lettering and graphics are also available.

17.3 At the end of the construction process the joints on the underneath side of the vehicle are sealed with an expanding-type foam sealant prior to undercoating. Then the vehicle is thoroughly sealed with a water-based undercoating material. The foam sealant and undercoat material seals against moisture, dust infiltration, and underside noise. Special consideration is taken to ensure no undercoating is applied to any OEM parts per QVM specifications.

Options **Section 18**

18.1 Optional Equipment Items: electric entrance door key switch, rear door exit or luggage door, rear luggage compartment, overhead luggage racks, cargo restraint barrier, exterior skirt storage, audio and video packages, speaker packages, exit warning lights and alarms, roof hatch, destination sign, spare tire, rear camera, heated and remote exterior mirrors, rear suspension packages as well as other features for passenger comfort and convenience.

18.2 Paratransit: Braun or Ricon® wheelchair lift, Q-Straint/Sure-Lok® occupant and wheelchair restraints, and ADA signage.

Dimensions

Section 19

Terra Transit:

Interior Height:	77”
Interior Width:	93” (wall to wall)
Exterior Height:	119” (excluding any roof top A/C system)
Exterior Width:	96.25”
Ground to 1st Step Height:	9.875”
Step Riser:	9.125”
Step Depth:	8.5”
Interior Floor Length:	208”, 241”, and 274”

F-550 Terra Transit:

Overall Vehicle Length:	338.5" (28' 2.5"), 371.5” (31’ 11.5”) and 404.5" (33' 8.5")
Wheelbases:	205.3” wb (208” floor), 217.3” wb (241” floor) and 235.3” wb (274” floor)

Testing

Section 20

20.1 All Turtle Top vehicles are manufactured and tested in accordance with all applicable Federal Motor Vehicle Safety Standards as described in 49 CFR Part 571 in coordination with the chassis manufacturers’ Incomplete Vehicle Manual. Turtle Top also meets applicable Transport Canada Canadian Motor Vehicle Safety Regulations (CMVSS Standards). Testing documentation is available from the Turtle Top Engineering Offices upon request.

20.2 Turtle Top is a certified vehicle modifier of both Ford and GM incomplete vehicles, and is a member of the NTEA (National Truck Equipment Association), CTEA (Canadian Transportation Equipment Association), MSBMA (Mid-Size Bus Manufacturers Association), and is registered with the National Highway Safety Administration as a vehicle manufacturer. Turtle Top is a Transit Vehicle Manufacturer (TVM) eligible to bid on federally funded transit agency contracts in accordance with the regulations on Disadvantaged Business Enterprises (DBEs) as administered by the Department of Transportation (DOT) Federal Transit Administration (FTA) Office of Civil Rights.

20.3 All vehicles manufactured by Turtle Top are consistent with the highest quality standards; all vehicles are inspected continuously throughout the build process. Quality assurance teams are responsible for the daily implementation of the Turtle Top QA program and to ensure each Turtle Top vehicle meets or exceeds quality standards.

Commercial Motor Vehicles

Section 21

1.0 A certified driver's license (CDL) is not needed to operate the vehicle if the total occupancy (driver plus passengers) is 15 or under; 16 total occupants and above requires a CDL. The vehicle's GVWR is more than 10,001 pounds; therefore the vehicle may need a U.S. Department of Transportation number. The vehicle operator may need a valid medical examination and the driver may need to meet the requirements of the Hours-Of-Service (HOS) regulations. Check the state's or province's regulations where the vehicle will be registered and also the U.S. or Canadian federal motor carrier guidelines for specifics.

Turtle Top
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New Paris, Indiana USA 46553
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REVISION 1 – ADDS FREIGHTLINER CHASSIS OPTION SLS-4.15.21

CRASHWORTHINESS AND SAFETY ASSESSMENT OF TURTLE TOP TERRA TRANSPORT BUS (WB 138")

Transit Office

Florida Department of Transportation

Crashworthiness and Impact Analysis Laboratory

FAMU-FSU College of Engineering

August 27, 2009

CRASHWORTHINESS AND SAFETY ASSESSMENT OF TURTLE TOP TERRA TRANSPORT

Table of contents

1. SUMMARY

A comprehensive crashworthiness and safety assessment of the Turtle Top Terra Transport paratransit bus (on a Chev-12,300# 138” wheelbase) was conducted and is presented in this report. A numerical approval procedure was selected for this assessment with finite element analysis per “Crash and safety testing standard for paratransit buses acquired by the state of Florida” [1]. Rollover and side impact of the bus were investigated. This methodology was supplemented by an extensive testing program of the bus materials, parts and connections. It provided a direct insight into the bus strength as well as was used as a validation and verification tool for computational mechanics analysis. A finite element model of the Turtle Top bus was developed for this study as shown in Figure 1.

Figure 1: Finite element model (top) and an actual bus (bottom) of Turtle Top Terra Transport paratransit bus.

The welded 1" x 16-gauge steel cage, primer coated, with continuous vertical tubes positioned in pairswith a 1” separation and discontinuous horizontal elements (such as waistrails) that are welded between the pillars, was found to be very robust and crashworthy. The cage tubes did not buckle locally in our testing and allowed for the full development of plastic hinges during both static and dynamic impact loading.

The connection tests revealed the weak design of wall to floor connection, in particular when tested without the flooring present, due to welding on only one side of the connection.

Rollover and side impact of the bus were investigated using the finite element model validated by several laboratory tests. The following conclusions have been reached:

- The bus passes the rollover test procedure with added mass for passengers.
- The bus passes the side impact tests with the IIHS 3460 lb (1.54 tons) movable barrier at 30 mph.

The following sections of this report provide technical information regarding the laboratory testing, model validation and crashworthiness analysis of the Turtle Top bus.

Recommendations for improvement

There are two modifications recommended for the investigated bus structure.

One of the critical structural elements in the superstructure of cutaway buses, and the most vulnerable to extensive deformation, is the front most body structure and the transition zone between this and the chassis. An additional connecting element (roof bow) is recommended for the Turtle Top Bus, as shown in Figure 2, along with improved connections between the two areas. This solution should reduce deformation of the frontal part of the bus during roll-over test.

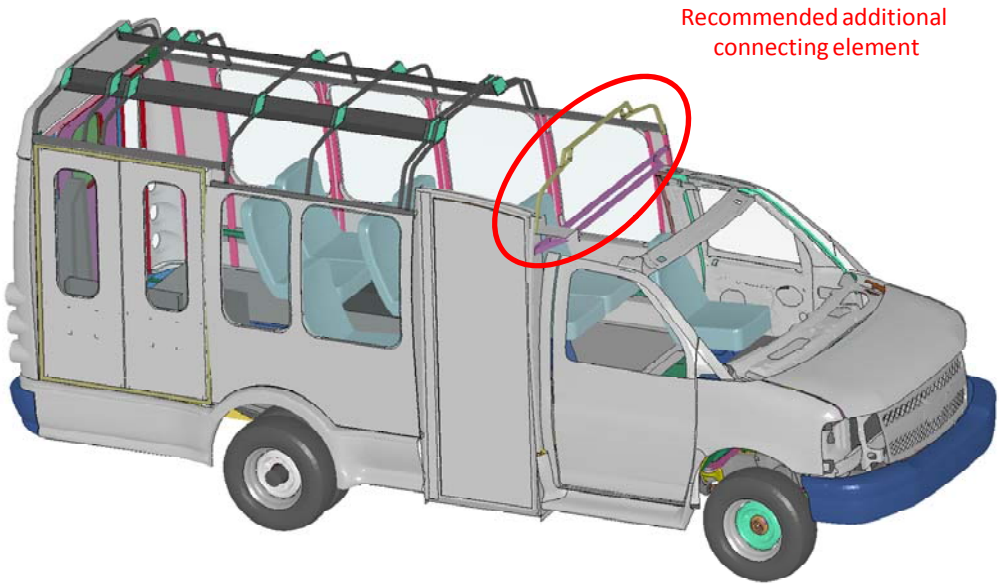


Figure 2: Location of the recommended additional connecting element.

In the original bus wall-to-floor connection the line welds connecting the two pieces were located only along the top inside edge. This resulted in significant deformation and small resistance of the connection during the bending test. For wall-to-floor connections additional welds should be placed between floor tubing and the wall horizontal channel at the lower outside edge. These additional weld spots are shown in Figure 3.

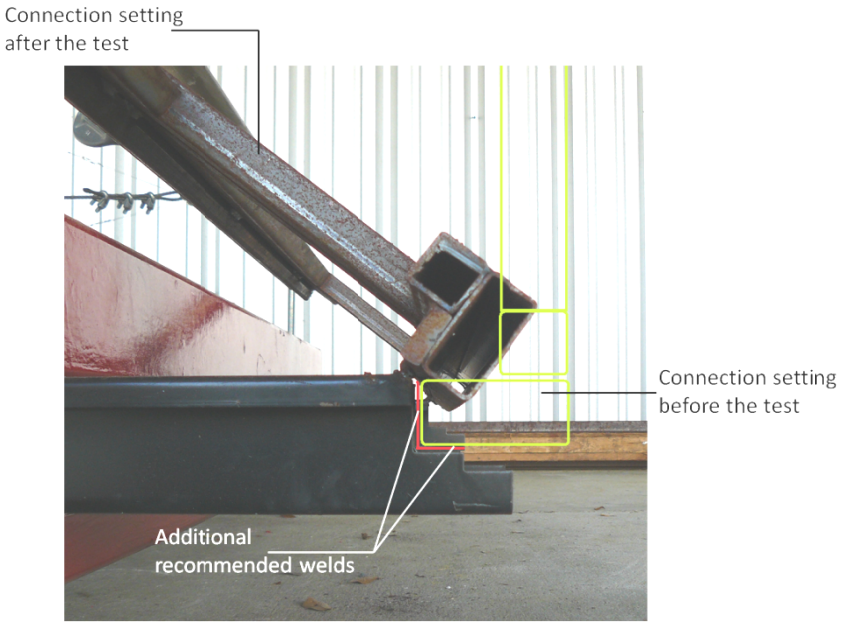


Figure 3: Wall-to-floor connection setting before and after the test, additional recommended welds have been shown.

2. SCOPE

This document was prepared to describe a comprehensive crashworthiness assessment of a Turtle Top Terra Transport bus. The report follows the procedure for numerical approach presented in "Crash and safety testing standard for paratransit buses acquired by the state of Florida" [1]. Validated finite element models were used for analyses of standardized rollover and side impact tests. All tests and simulations were performed according to the flowchart presented in the Figure 4 below.

Material characterization testing was conducted at the Military University of Technology, Warsaw, Poland. The large-scale connection tests were done at the Structures Laboratory of the Florida Department of Transportation. The Turtle Top Inc. Company provided the AutoCAD drawings of the bus, and supplied the testing connections and material samples for testing free of charge. Bus manufacturer also provided the data of the center of gravity (COG) position for the Turtle Top Terra Transport bus.

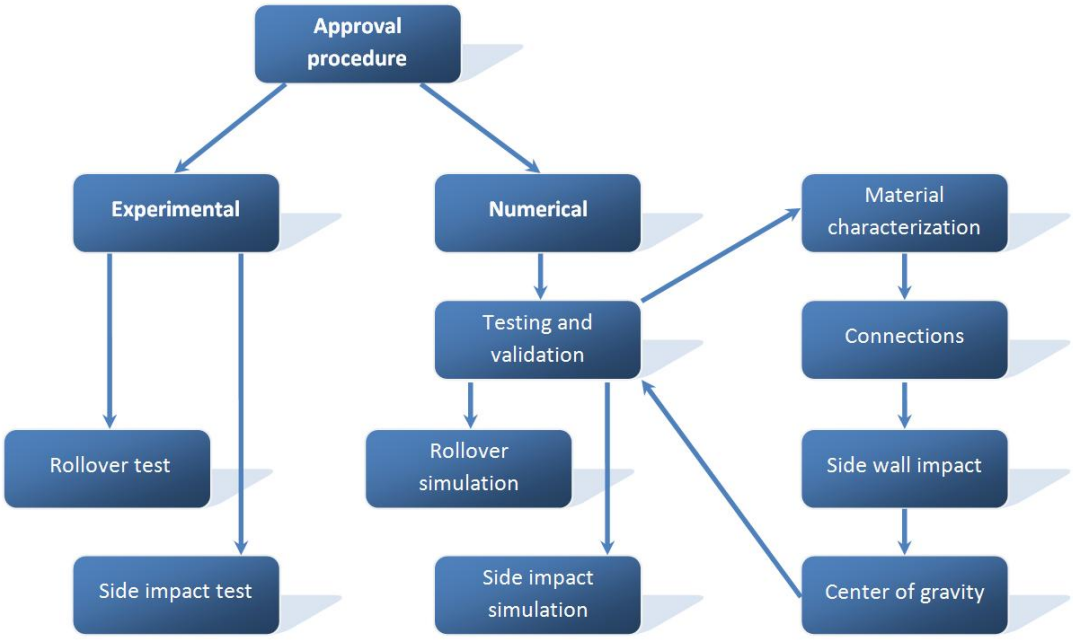


Figure 4: Approval procedure flowchart [1].

3. TESTING AND VALIDATION

3.1 Material characterization

The main goal of the material testing is to identify actual material properties of the major structural components. All data from material characterization testing was used as input for the finite element model.

3.1.1 Structural steel

Structural parts of the passenger compartment (walls framing and roof bows) are built of hollow structural sections HSS 1.0”x1.0”x16ga using mild steel. Two types of tests were performed on the tube samples: tensile coupon and 4 point bending.

TENSILE TEST

For the tensile test four “dogbone” coupons were cut out from tube samples and used for obtaining the stress-strain relationship characterizing the material. The tests were conducted on INSTRON 8802 with FastTrack software. The averaged basic mechanical properties derived from the tests are provided in the Table 1. Figure 5 shows the results of the tensile test for steel coupons obtained from Turtle Top tube samples.

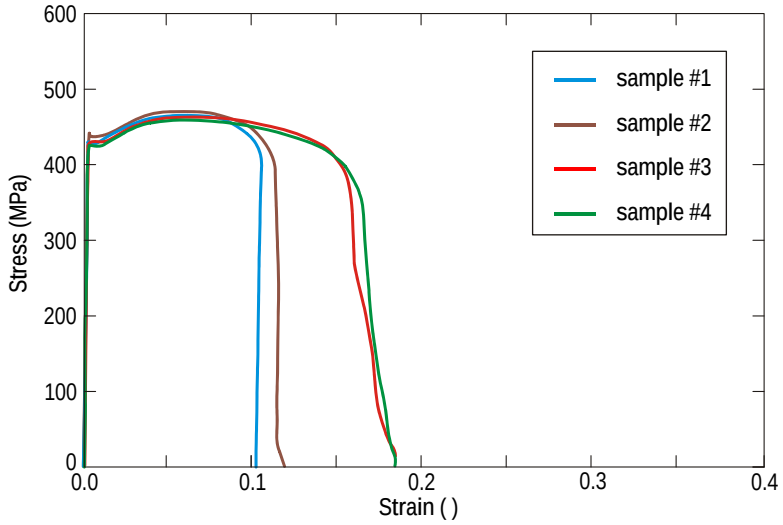


Figure 5: Stress strain relationships for mild steel coupons used in the Turtle Top bus structure.

Table 1: Mechanical properties of steel**.**

Yield strength (MPa)	Modulus of elasticity (GPa)	Elongation at break (%)
389.4	207.3	18.0

BENDING TEST

Structural members of paratransit buses are subjected to bending during rollover and side impact accidents. Therefore, four point bending tests are performed as a direct measure of the tubes strength.

The test setup for the tube bending is presented in Figure 6. A four feet long beam rests on circular supports three feet apart. The load is applied to the beam at two points one feet apart (d_1 and d_3) at $\frac{1}{3}$ and $\frac{2}{3}$ of the beam length respectively. The displacement of the bottom (moveable) traverse is denoted as d_0 and stored in the system together with the load applied. Additionally, deflection of the beam in points d_1 and d_3 (under the load points) and d_2 (middle of the beam) are recorded.

Figure 6: Testing apparatus for four point bending.

The limiting ratios for uniformly compressed flanges of rectangular box and hollow structural sections subject to bending are calculated per AISC Steel Construction Manual Table B4.1 [3] using formulas:

$$\lambda_p = 1.12\sqrt{\frac{E}{F_y}}; \quad \lambda_r = 1.40\sqrt{\frac{E}{F_y}}$$

for compact limit and noncompact limit respectively. For the mild steel used in the Turtle Top buses these limits are:

$$\lambda_{p\_T} = 1.12\sqrt{\frac{207300}{389.4}} = 25.8 \qquad \lambda_{r\_T} = 1.40\sqrt{\frac{207300}{389.4}} = 32.3$$

Table 2 contains geometrical properties of the tested cross section. The HSS 1.0inx1.0inx16ga is in the compact region.

Table 2: Geometrical properties of tested tubes.

Tube provider	***Dimension***	***Slenderness*** $\boldsymbol{\lambda = \frac{b}{t}}$	***Cross section classification***
Turtle Top	HSS 1.0inx1.0inx16ga	$\frac{22.056}{1.672} = 13.19$	compact

Results of the tests are shown in Figure 7 and Figure 8. The cross section of the tubes was considered as compact, λ was low, and local buckling was not present. As a result of this deformation mode the plastic hinges are developed for all cross-section including adjacent areas.

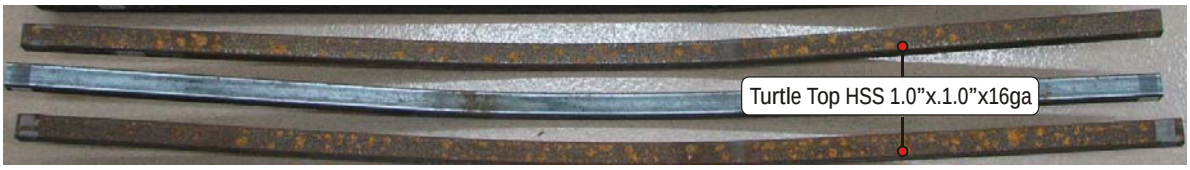
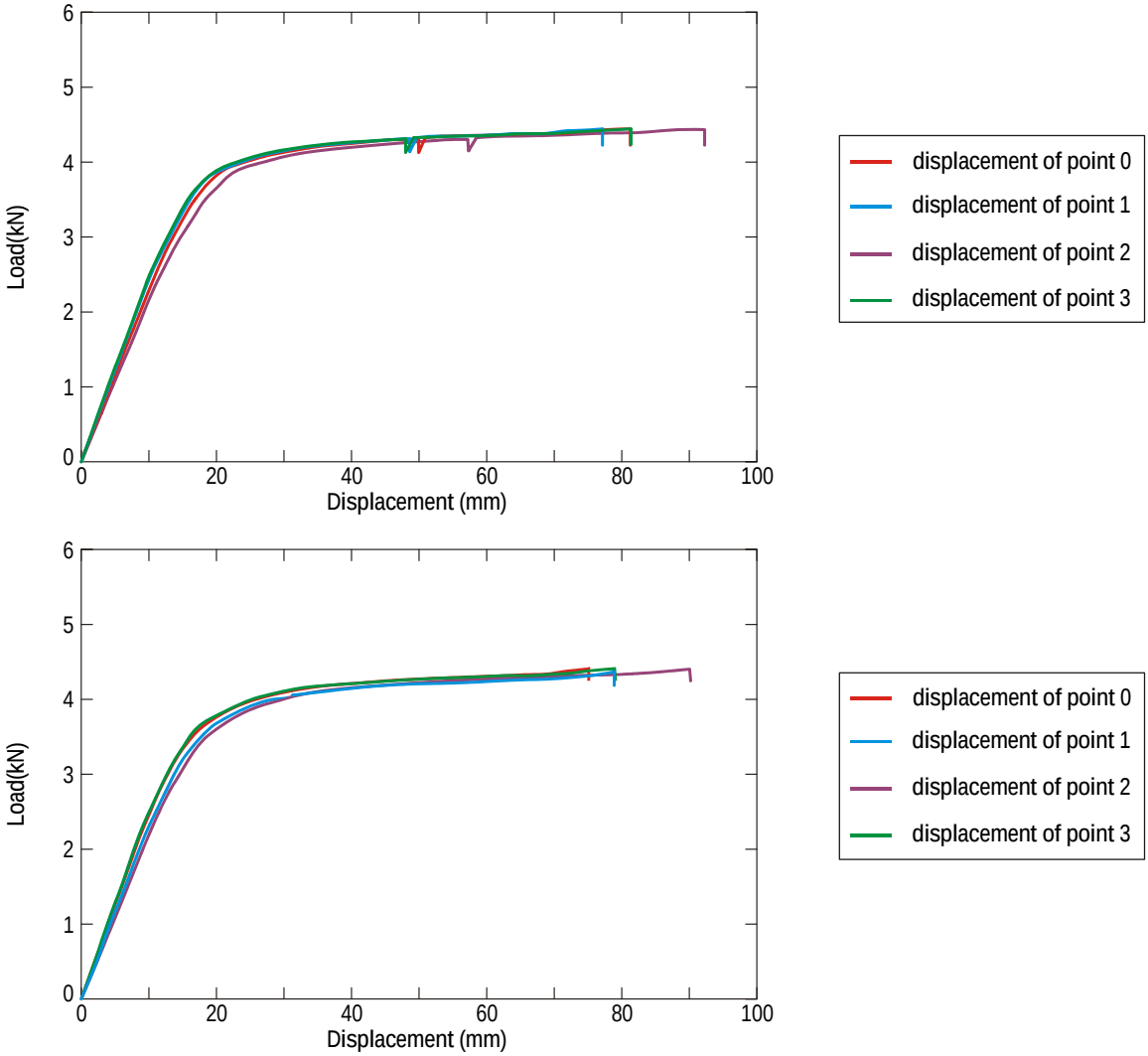


Figure 7: Deformed tubes after four point bending tests.



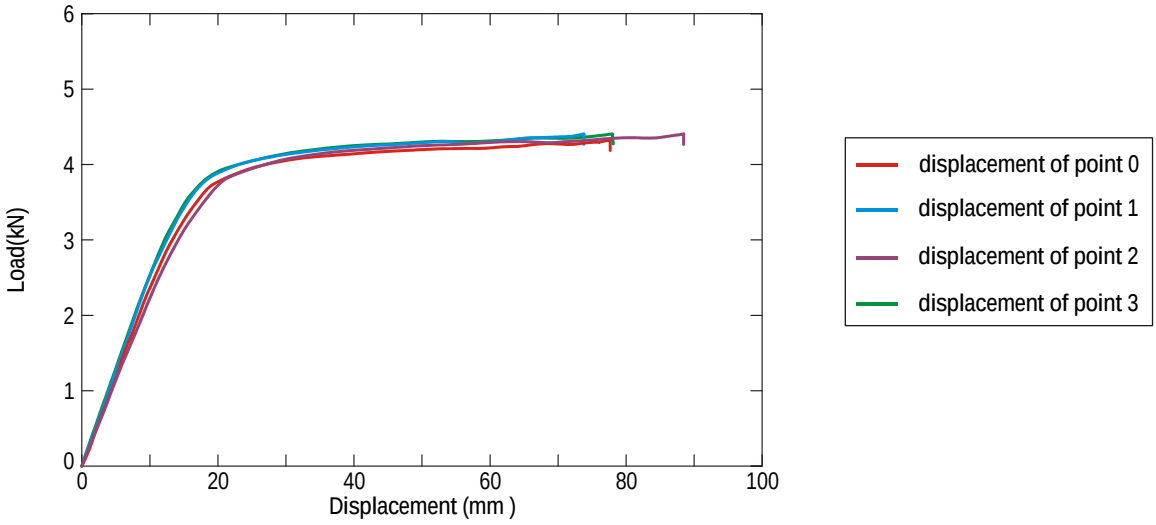


Figure 8: Load displacement curves for four point bending test on three samples of HSS 1.0”x1.0”x16ga.

Figure 8 contains curves for all three tested steel types. The curves represent the displacement of point d_i plotted against the exerted load.

CONCLUSIONS:

- Thin walled cross sections (like the ones used in other buses) should be avoided in the paratransit bus structure since they can buckle locally during bending.
- Compact cross sections (like the ones used by Turtle Top) do not buckle locally and thus they should be promoted among bus manufacturers as more efficient for the bus wall structures.

3.2 Connection bending tests

Crashworthiness of the bus structure during a side impact or rollover accidents depends substantially on its roof-to-wall and wall-to-floor connections. The strength limit of a connection should neither be reached by sudden elastic buckling of members nor by premature failure of welds or rivets. A well designed connection should exhibit an ability of high energy absorption which is only possible if yielding level in structural components is reached during bending tests.

In this test, a typical roof to wall or wall to floor connection is placed in the test apparatus as shown in Figure 9. The connection is clamped down to prevent the sample from moving during the test. An aluminum beam is mounted on the vertical section of the connection. This beam is at the location where a force will be applied to the connection, as well as where movement of the connection is tracked. With initial measurements taken, force begins to be applied to the connection using a hand winch connected to the beam though a steel cable. The magnitude of the force applied to the connection is measured with the use of a load cell located in the line with the loading cable. With the application of the load, the connection begins to deflect, which is measured with two displacement transducers on each side of the beam mounted to the sample. Forces and movements are measured until the connection sample exceeds a rotation of 45 degrees.

Using data acquired during the test, a graph showing the change in angle versus the applied moment is developed, which is a useful measure of the strength of a connection (compare Figure 12 and Figure 15).

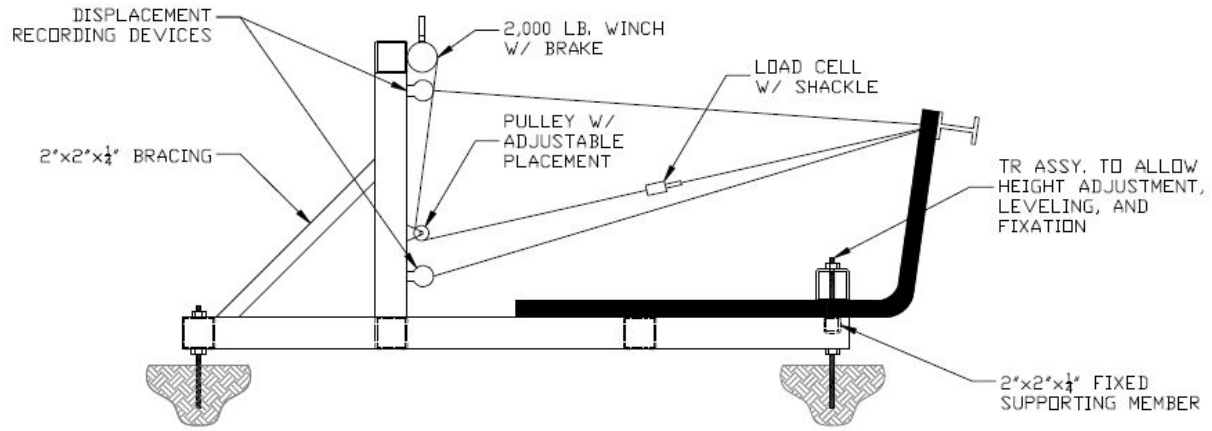


Figure 9: Test setup for connection tests.

3.2.1 Roof to wall connection

The connection testing of the two roof to wall connections provided was performed on April 17th, 2009. One sample was tested with a complete fiberglass shell skin, while the other sample was only the steel frame. The actual test setup is shown below as Figure 10. Each of the two roof to wall connections tested failed in a similar manner, as shown below in Figure 11. As shown in Figure 11, all plastic deformation is concentrated in the limited area of the connection between the cantrail beam and vertical portion of the roof members. The deformation in the developed plastic hinges is due to inelastic bending of the tube thin walls. The tube thin walls also contributed to the pull through of the cantrail.

Figure 10: Test setup for roof to wall connection test.

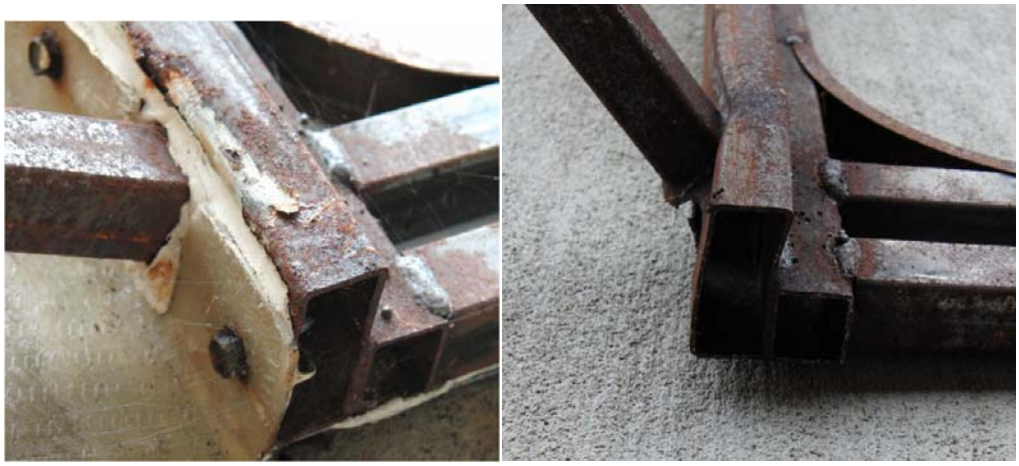


Figure 11: Mode of failure for roof to wall connections at vertical roof member.

Using data recorded with a data acquisition system, Figure 12 plots the experimental moment resisting capability of the two roof to wall connection samples tested vs. their change in angle. The maximum moment capacity for the skinned and shelled connection sample was 892 lb-ft (1,209 Nm) and 818 lb-ft (1,109 Nm) for the skinless sample. It also shows that the fiberglass shell contributes a slight strength increase to the roof to wall connection as it appears to help distribute forces more evenly along the cantrail as well as to brace the cantrail. This slightly different load path to the cantrail gave an increase in ultimate moment resisting capability of approximately 74 lb-ft (100 Nm).

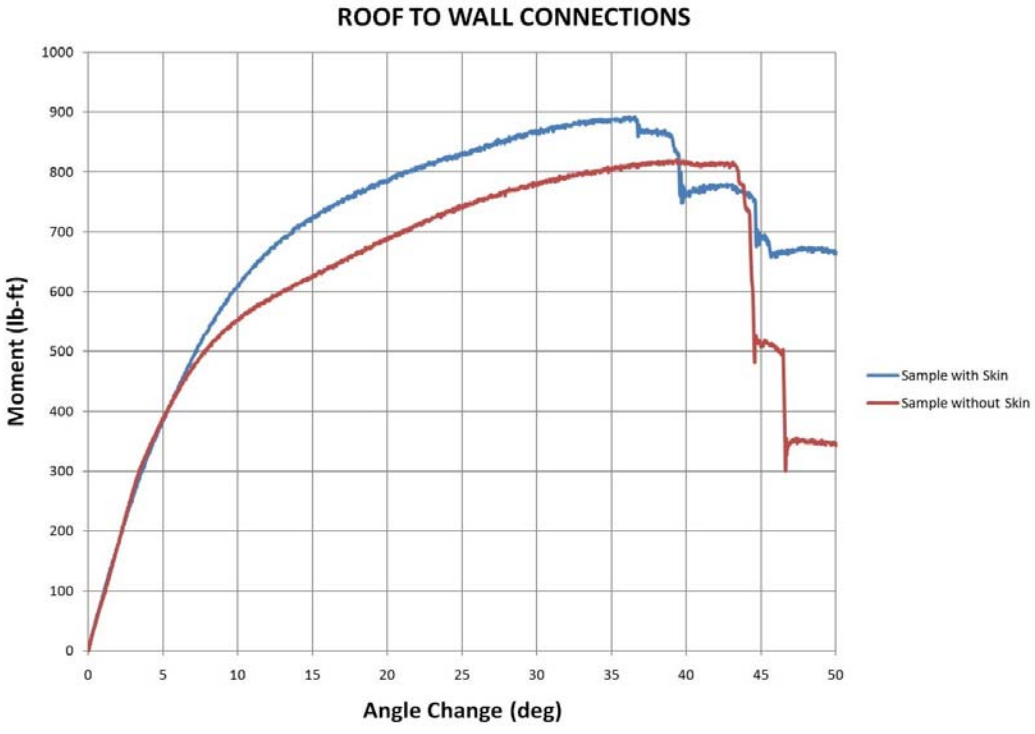


Figure 12: Experimental moment capacity of roof to wall connections.

3.2.2 Wall to floor connection

The connection testing of the two wall to floor connections provided was performed on July 7th, 2009. One samplewas tested as manufactured with skin and wood flooring, while the other sample was the steel frame only. Both samples showed similar failure modes as pictured in Figure 13. Although both samples failed similarly by pivoting around line welds, the sample with the skin and particle board flooring showed significantly higher moment resisting capabilities, which is discussed at the end of this section.

Figure 13: Mode of failure for wall to floor connections.

Figure 14: Localized damage to the skin as a result of testing.

Figure 15 presents the experimental moment resisting capabilities of the two wall-to-roof connection samples tested. The maximum moment capacity for the skinned connection sample was 1,190 lb-ft (1,613 Nm) and 119 lb-ft (161 Nm) for the skinless sample. In order for the sample with skin and flooring to pivot about the lines welds, it must crush the flooring, which attributed to the 1,071 lb-ft (1,452 Nm) increase in ultimate moment resisting capability. The sample without skin or flooring resisted the experimentally applied moment solely with the three single sided line welds. Pictured in Figure 14 is the damage done to the skin after the testing of the sample. Contrary to what Figure 14 appears to show, the skin on the sample provides minimal strength increase to the connection as it primarily provides another load path to the cantrail, which doesn't influence the crushing of the flooring.

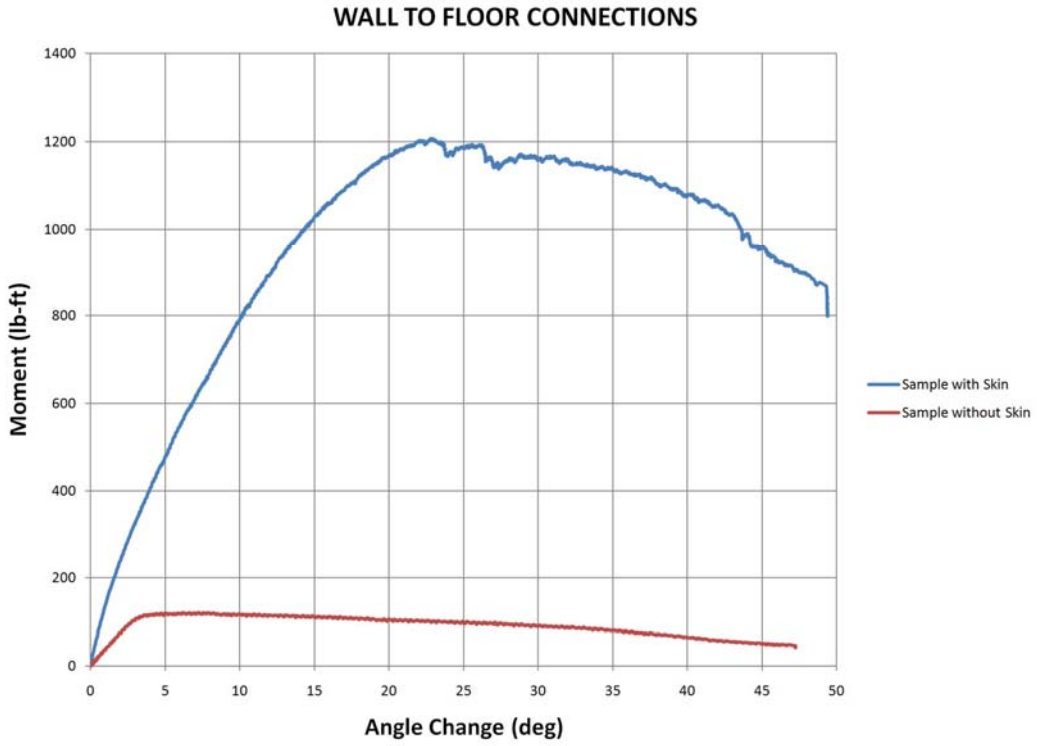


Figure 15: Experimental moment capacity of wall to roof connections.

CONCLUSIONS

- The tests revealed weak performance of the skinless wall to floor connection (see Figure 15)
- Additional welds on outside of the connection are recommended to improve the strength of the wall to floor connection (see Figure 3).

3.3 Side wall panel impact test

In this test, a typical sidewall assembly was placed in the impact hammer apparatus with the initial test conditions shown in Table 3 and Figure 16. The sidewall test assembly consists of the wall section from the cantrail to the floor level of the bus sidewall. With the test specimen resting on two 6 inch (150 mm)

diameter supports with variable span, the panel is impacted by a pivoting arm. The pivoting arm is comprised of a square impacting hammer with two perpendicular rectangular arms, which pivot freely about the axis of rotation. Prior to the test, the arm is raised to a pre-determined height with the use of a hand winch, and then released. The location of impact is determined by the midpoint of the average distance between the cantrail and floor level. Only the final deformation of the wall is recorded at the end of the test. The dimensions and the weight of the impacting device are listed in Table 3. The same drop height was used for both samples.

Table 3: Geometry of the panel and the impacting device.

Specification	
width of panels - a, in (mm)	47.25 (1,200)
length of panels - b, in (mm)	61.4 (1,559)
width of the hammer – A , in (mm)	96.5 (2,451)
cc length of the hammer arm – B, in (mm)	118.9 (3,020)
distance between the supports – C, in (mm)	56.9 (1,445)
mass of the hammer, lb (kg)	251.1 (113.9)

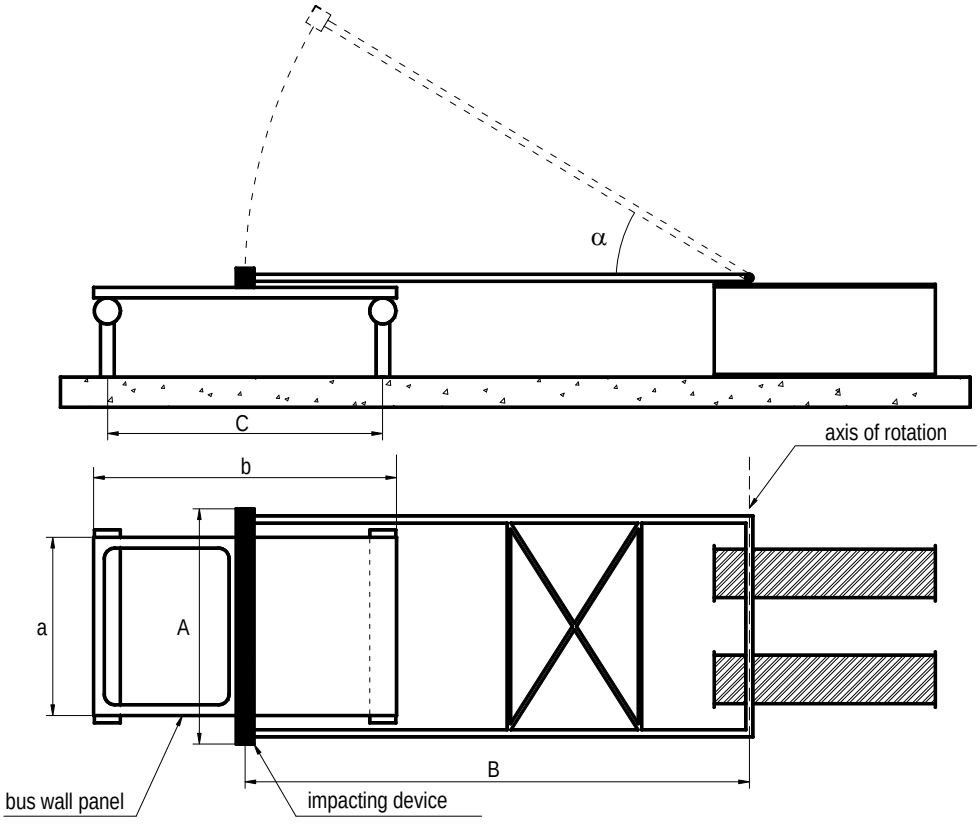


Figure 16: Test setup for impact hammer test.

The impact testing of the two wall sections provided was performed on the samples August 11th, 2009. Table 4 presents the final permanent deformation of the tested panels under the impact from the specified height. Figure 17 and Figure 18 show the final state of the skinless wall sample after being impacted with a drop height of 27.5 inches. Note that only the skinless wall sample is pictured below, as it is more difficult to see the slight permanent deformation in the skinned sample. Both: the sample with skin and the sample without exhibited similar performance. As pictured in the above referenced figures, the vertical columns were impacted and experienced very slight local deformation, causing minimal permanent deflection of the wall section.

Figure 17: Slightly deformed skinless wall sample.

Figure 18: Close-up of slight local deformation in skinless wall sample.

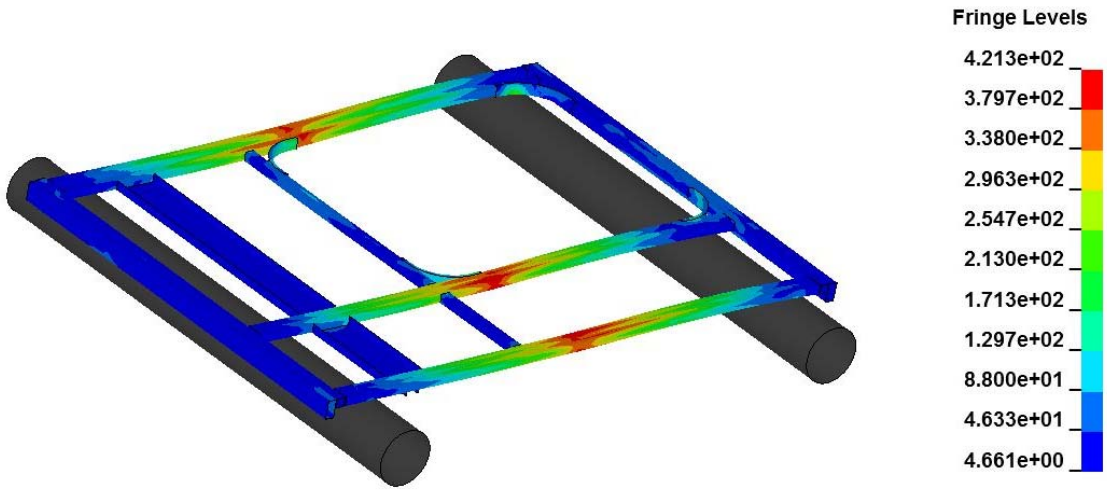


Figure 19: Effective stresses in skinless wall panel at instance of greatest deformation [MPa].

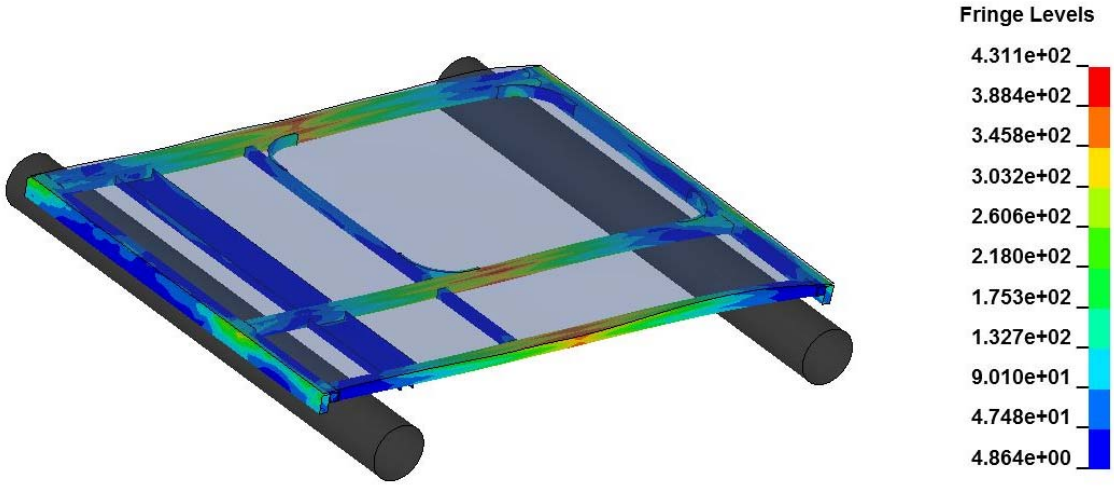


Figure 20: Effective stresses in skinned wall panel at instance of greatest deformation [MPa].

The skin provides an increase in the impact resisting capabilities of the sidewall samples, as it reduced the experimental final deformation by 0.4 inches (10.2 mm) as presented in Table 4 below. However, the skin in the tested panel was bolted into tubes only along two (top and bottom) edges. The tested samples performed well with more smaller continuous vertical members and their compact characteristics as stated in Section 4.1. It efficiently prevents local buckling of the sections and the development of plastic hinges in the panel. The developed FE models are presented in Figure 19 and Figure 20 graphically in addition to the numerical results located in Table 4.

Table 4: Deflections of the side wall panels.

	Drop height, in. (mm)	*Deflection in the experiment, in. (mm)*	*Deflection in FE model, in. (mm)*
Sample with Skin	27.5 (700)	1.1 (27.9)	0.9 (22.1)
Sample without Skin	27.5 (700)	1.5 (38.1)	1.1 (27.5)

CONCLUSIONS

- The tests revealed that the skin provides a slight increase in the impact resistance of the side wall panel (see Table 4)
- The use of multiple continuous compact tubes as vertical members in the construction of the side wall produce an efficient impact resisting assembly.

3.4 Center of gravity test

The center of gravity (CG) of the bus determines an unstable position and amount of kinetic energy in rollover tests. It indirectly influences the amount of energy absorbed by the structure during the deformation process. The measurement method used in this study is based on lifting a front axis of the bus with portable hydraulic lifts and measuring a change of weight distribution under rear axle. These measurements allow for determination of the CG location of the bus. The position of CG is defined by three parameters:

- longitudinal distance (l_1) from the centre line of front axle
- transverse distance (t) from the vertical longitudinal central plane of the vehicle
- vertical height (h_0) above the flat horizontal ground level when the tires are inflated as specified for the vehicle (see Figure 21 and Table 5)

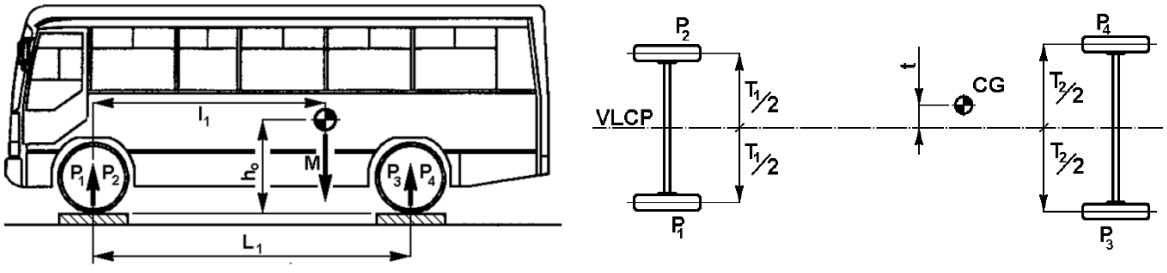


Figure 21: Location of center of gravity, [2].

The location of center of gravity is characterized by three parameters shown in the Table 5. Data from the FE model, and from a full scale CG test is included in the table. The actual Turtle Top bus was tested for CG as requested by the Turtle Top Bus Company.

Table 5: Center of gravity location in the FE model.

	FE model in (mm)	Full size CG test (mm)
l_1	81.9 (2079)	80.9 (2055)
t	1.1 (28)	- (-)
h_o	34.8 (885)	34.2 (867)

4. ROLLOVER TEST SIMULATION

The strength of the bus superstructure in rollover accidents is determined through a rollover test procedure [1, 2]. The procedure requires that a vehicle resting on a tilting table is slowly rotated on the weaker of its sides. When the CG reaches the critical position, gravitation causes a free falling off the bus into a ditch with a concrete floor placed 800 mm (31.5 in) beneath the tilt table horizontal position. The test setup is shown in Figure 22. The bus passes the test when no penetration into the residual space is observed during the deformation process (see Figure 23 for residual space definition, [1, 2]). Two cases were simulated for the bus with and without additional connections recommended in Section 1. For each case the mass of passengers was added to the model. The results for the bus structure with original connections are shown in Figure 24. Figure 25 presents results for the FE model of the bus with improved connections, detailed previously in this report. In both cases the bus structure passes the rollover test procedure - but for the improved structure the deformations are much smaller. This is especially apparent in the frontal part of the bus due to the effect of the stronger transition area.

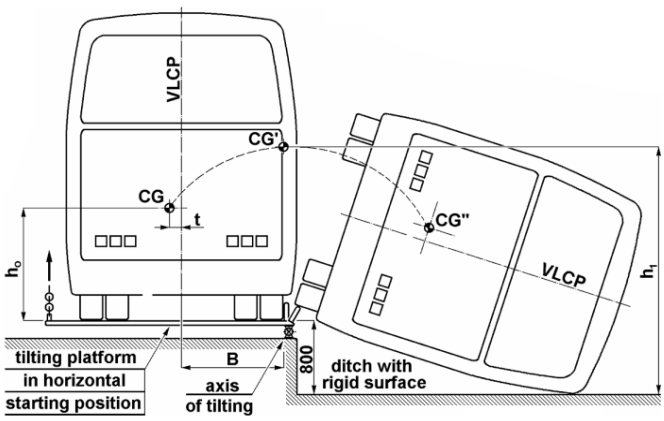


Figure 22: Rollover test setup [1, 2] (the dimensions are in millimeters).

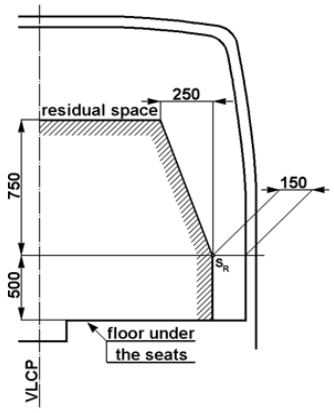


Figure 23: Residual space in bus cross-section [1, 2] (the dimensions are in millimeters).

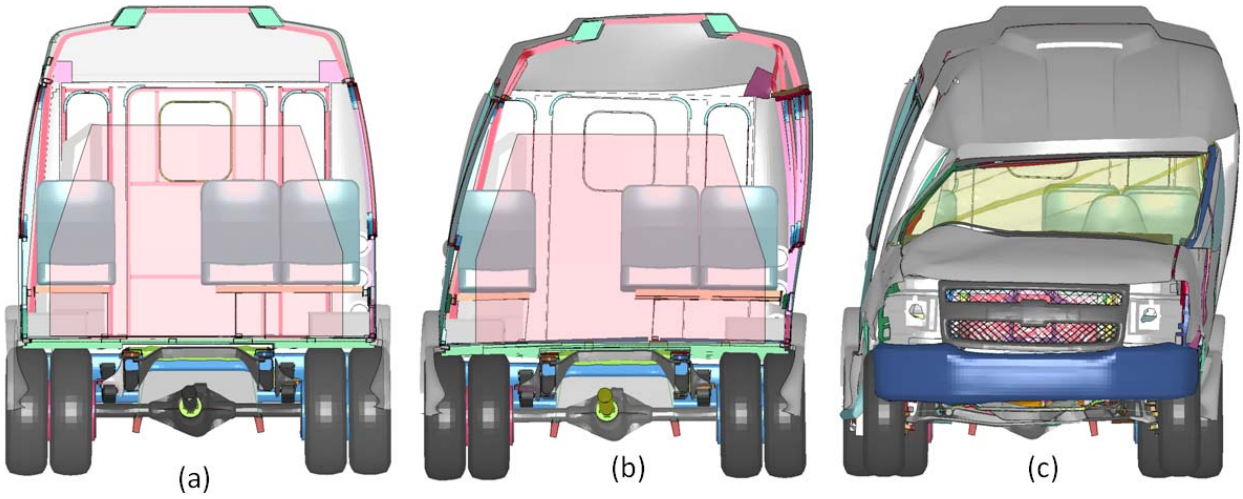


Figure 24: Deformation caused by simulated rollover test for the bus with original connections: (a) initial stage (b) deformed passenger compartment (c) exterior distortion of the bus.

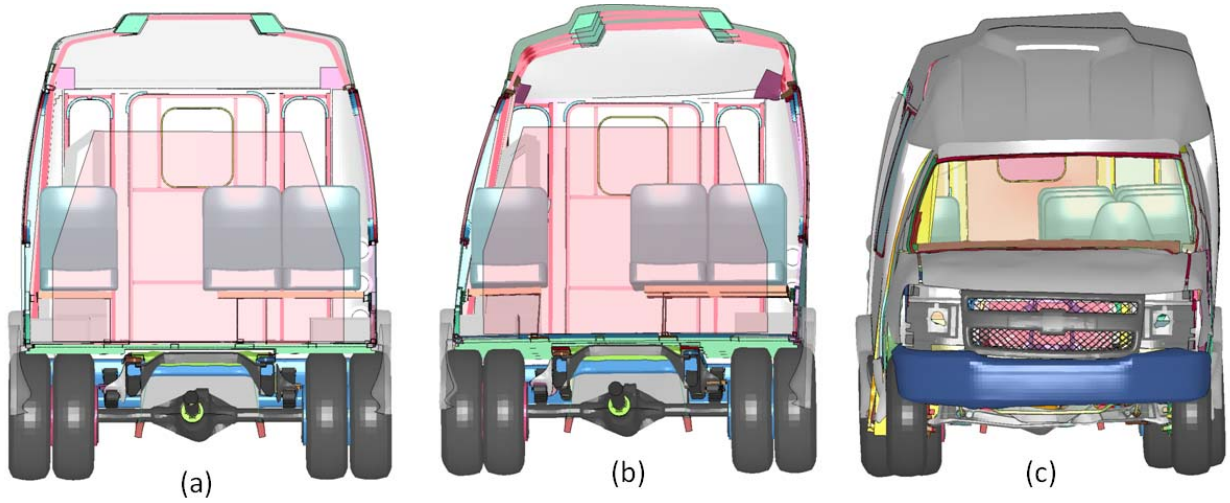


Figure 25: Deformation caused by simulated rollover test for the bus with improved connections: (a) initial stage (b) deformed passengers compartment (c) exterior distortion of the bus.

For original connection setup two rollover cases were investigated, rollover onto the curb side, and rollover onto the road side. As a result of these simulations the deformation indexes were calculated based on the equation given:

$$DI_{\alpha} = \frac{l}{400} \cdot \tan(\Delta\alpha_1) + \frac{(1250 - l)}{400} \cdot \tan(\Delta\alpha_2)$$

$$DI_{\alpha} = \frac{580}{400} \cdot \tan(\Delta\alpha_1) + \frac{(1250 - 580)}{400} \cdot \tan(\Delta\alpha_2)$$

$$DI_{\alpha} = 1.45 \cdot \tan(\Delta\alpha_1) + 1.675 \cdot \tan(\Delta\alpha_2)$$

Where:

l – is the distance between floor level and waistrail level,

α_1, α_2 – are the deformation angels.

Final results have been shown in Table 6.

Table 6 Deformation angles and deformation indexes for rollover tests.

Specification	***Rollover(curb side)***	***Rollover(road side)***
α_1	13.0	1.50
α_2	20.5	25.5
DI_{α}	0.96	0.83

CONCLUSIONS

- Turtle Top Terra Transport paratransit bus passes the computational rollover test procedure with mass of passengers added to the model for both the original and improved cases.
- The most deformation during the rollover test is in the front cap structure although the major impact is at the cantrail. A relatively weak front body structure (compared to the rest of the body) and weak connections between the bus body and the driver cabin is the reason for such behavior in the original bus.

5. SIDE IMPACT TEST SIMULATION

The test was conducted using the setup shown in Figure 26. The stationary Turtle Top bus is hit by the IIHS movable barrier (a barrier developed by the Insurance Institute for Highway Safety) with the mass of 1.54 tons and moving with the initial velocity of 48 km/h (30 mph). An open source FE model developed by the LSTC (Livermore Software Technology Corporation) was adopted for the computer simulations. The impact zone in the bus side wall was selected in such a way that the contact with doors, stairs, wheels and other parts stronger than regular side wall structure is limited.

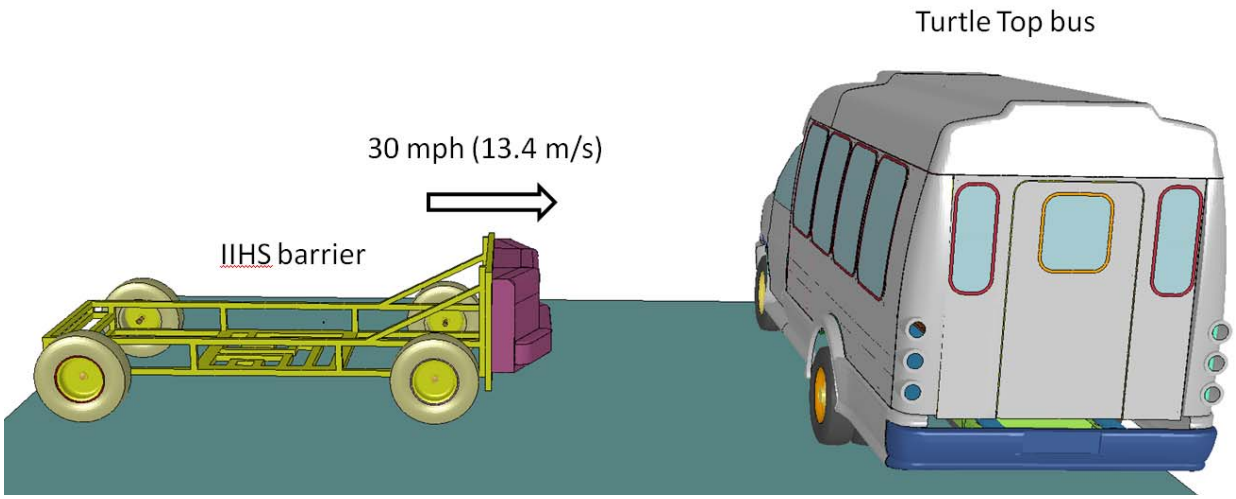


Figure 26: Side impact test initial conditions.

The numerical results of the test for both the original and improved structures are shown graphically in Figure 27 and Figure 28 . In both cases the residual space remains intact. The maximum permanent displacement of the bus's wall was 106 and 102 mm, for the original and improved bus respectivly. The added wall to floor connection spot welds and additional roof bow, have less effect on the bus performance during side impact than for the rollover test.

Figure 27: Final deformation of the bus body for the FE model without improved connections.

Figure 28: Final deformation of the bus body for the FE model with improved connections.

CONCLUSIONS

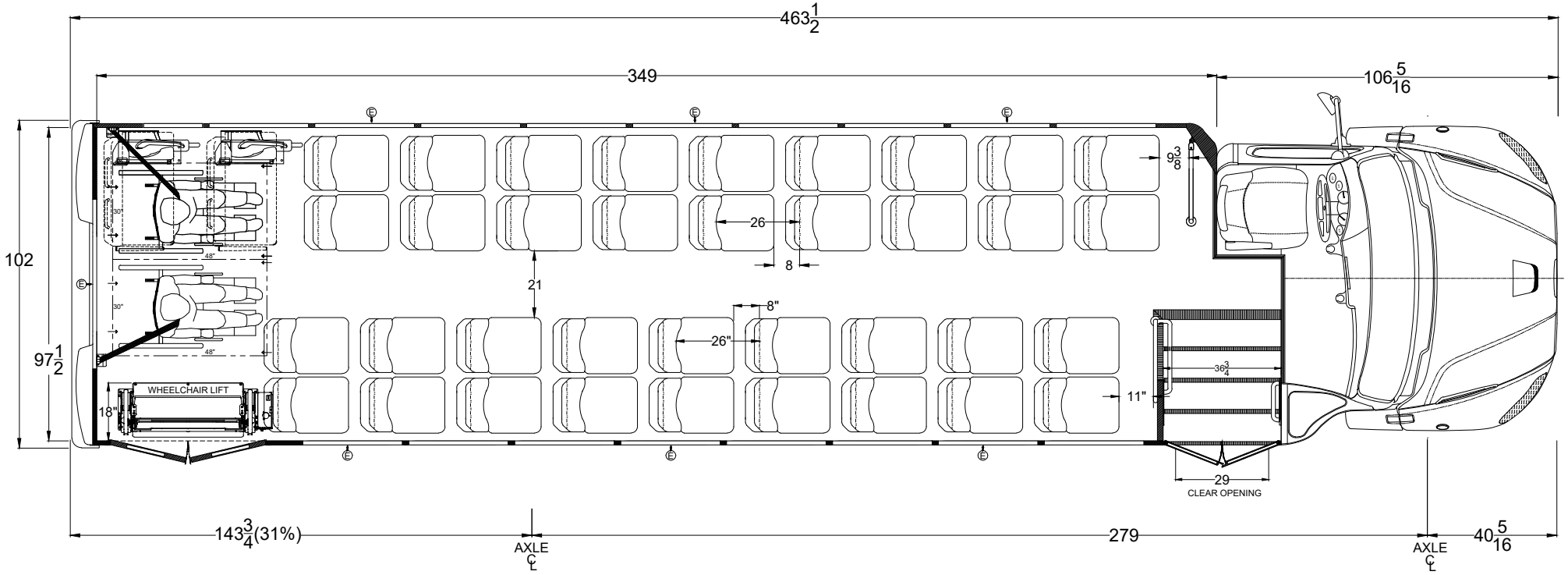
- The Turtle Top Terra Transport paratransit bus passes the side impact test procedure. Maximum intrusion inside the bus body was equal to 106 mm (4.2 in) whereas 150 mm (5.9 in) is admissible (see Figure 27).
- The public domain FE model of the IIHS barrier was used for the simulation of the impacting vehicle. The FDOT standard, in which the part dealing with the side impact is currently under revision, does not specify limit weight of the impacting vehicle. The IIHS barrier with mass 1.54 tons replaced in this study the Ford F250 pickup truck used previously. The Ford F250 pickup truck with mass of 3.00 tons which is recognized as one of the heaviest pickups. The type of impacting vehicle and the limit weight should be specified in the next version of the standard [1] based on further numerical studies and experimental validation.

6. REFERENCES

[1] Florida DOT: Crash and safety testing standard for paratransit buses acquired by the state of Florida. Rev. 2.01, August 10, 2007.

[2] United Nations; Strength of the superstructure of large passenger vehicles. Regulation 66. Revision 1. http://www.unece.org/trans/main/wp29/wp29regs/r066r1e.pdf, February 22, 2006, last access date: July 11, 2007.

[3] AISC, Steel Construction Manual. 13th ed, ed. AISC. 2005.



NOTES

FILE NAME :
220217-S5_FD29_RLD_36 FW SEATS_2 DBL FOLDAWAY_2 WC

CONTACT TURTLE TOP AT 800-269-2105 FOR AVAILABILITY OF THIS FLOOR LAYOUT IF DRAWING DATE HAS EXCEEDED 90 DAYS.

DATE:
2/17/2022

☑ 3 STEP ENTRY

TERRA TRANSIT

☐ 2 STEP ENTRY W/ WHEEL WELLS

"THIS DRAWING AND THE INFORMATION CONTAINED THEREON ARE THE EXCLUSIVE PROPERTY OF TURTLE TOP AND SHALL NOT BE COPIED OR DUPLICATED IN ANY MANNER WITHOUT OUR WRITTEN CONSENT"

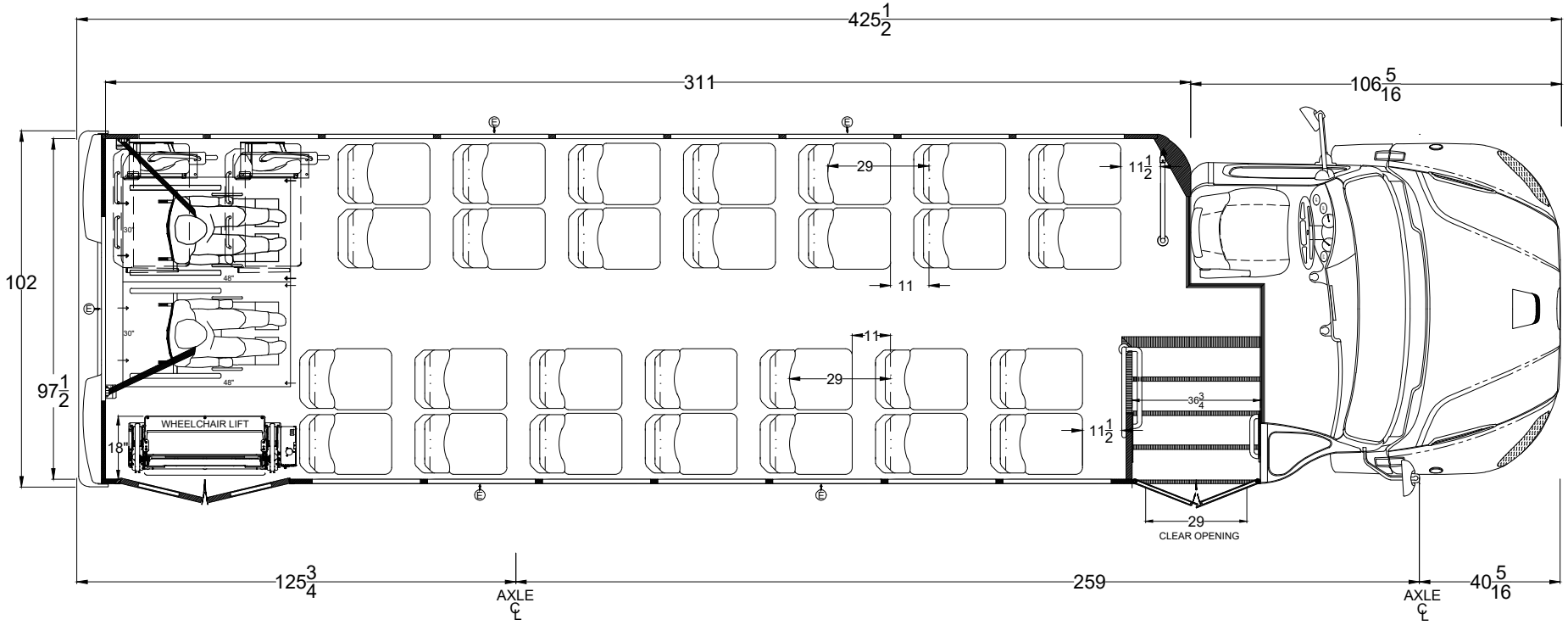
DRAFTSMAN NOTES:

TURTLE TOP

"To furnish the customer the best mid-sized bus in the industry in both quality of material and workmanship."

TURTLE TOP BODY MODEL:	OVER ALL LENGTH:	CHASSIS MAKE:	ORDER NUMBER:
TERRA TRANSIT-HD	463.5" (38' 7.5")	FREIGHTLINER S2C	QUOTE

DRAFTSMAN:	REVISION:	SCALE:		FLOOR LENGTH:	CHASSIS FUEL TYPE:	CHASSIS GVWR:	DRAWING NUMBER:
SLS	ORG	DNS	DIMENSIONING TOLERANCE = +/- 3"	349"	DIESEL	26,000 lbs	220217-S5



NOTES

FILE NAME :
220217-S6_FD29_RLD_28 FW SEATS_2 DBL FOLDAWAYS_2 WC

CONTACT TURTLE TOP AT 800-269-2105 FOR AVAILABILITY OF THIS FLOOR LAYOUT IF DRAWING DATE HAS EXCEEDED 90 DAYS.

DATE:
2/17/2022

☑ 3 STEP ENTRY

TERRA TRANSIT

☐ 2 STEP ENTRY W/ WHEEL WELLS

DRAFTSMAN NOTES:

TURTLE TOP

"To furnish the customer the best mid-sized bus in the industry in both quality of material and workmanship."

TURTLE TOP BODY MODEL:	OVER ALL LENGTH:	CHASSIS MAKE:	ORDER NUMBER:
TERRA TRANSIT-HD	425.5" (35' 5.5")	FREIGHTLINER S2C	QUOTE

DRAFTSMAN:	REVISION:	SCALE:		FLOOR LENGTH:	CHASSIS FUEL TYPE:	CHASSIS GVWR:	DRAWING NUMBER:
SLS	ORG	DNS	DIMENSIONING TOLERANCE = +/- 3"	311"	DIESEL	26,000 lbs	220217-S6

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 1	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 26.9 / p. 13	

CHANGE REQUESTED: Vans chassis (Exhibit III) vehicles are exempt from Altoona testing (unless modified in a manner not consistent with Ford QVM). A 5-year / 100,000-mile test is not available for this class/category of vehicles.

AGENCY RESPONSE

Reviewed By: Date:

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Per the FTA, Ford introduced a new 3.5L EcoBoost V6 gasoline engine that replaced the 3.7L V6 gasoline engine in Ford Transit chassis in 2020. Since this is a new engine design, FTA expects it to produce significantly different data in the Maintainability, Performance, Fuel Economy, Noise, and Emissions tests compared to the previous engine.

Therefore, at least one bus model equipped with a 3.5L EcoBoost Ford engine must complete partial testing for Maintainability, Performance, Fuel Economy, Noise, and Emissions.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 2	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 26.13 / p. 14	

CHANGE REQUESTED: The upfitter for the Exhibit III vehicle class is not ISO-certified. They are a Ford QVM certified upfitter. Please see attached information.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

There is no information attached to support this request. Please submit with proposal.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 3	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 30 / p. 18	

CHANGE REQUESTED: Given the cost increases we have seen recently we are requesting that the cumulative limit of 25% PPI increases over 5-year contract be deleted and increases be allowed to follow PPI regardless of the amount of change over the 5-year contract.

AGENCY RESPONSE

Reviewed By: Date:

Approved ☐ Denied ☐ See Comment Below ☐

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 4	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4 / p. 64 & 103	

CHANGE REQUESTED: Please accept our standard structure/construction as detailed in the attached document.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 25 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided the following are met: The floor to ceiling distance shall be 78 inches minimum at the center aisle, roof panel shall overlap the side panels by inch minimum, roof and side panels shall be .024 inches think minimum, insulation shall have a minimum R-value of 8, skins and insulation shall be fire resistant in compliance with the Federal Transit Administration recommended Fire Safety Practices for Transit Bus and Van Material. The completed body shall meet the requirements of FMVSS-220 and all other FMVSS, ADA and Buy America requirements.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 5	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 5 / p. 65 & 103	

CHANGE REQUESTED: Please accept our standard roof structure/construction as detailed in the attached document.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 25 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided the following are met: The floor to ceiling distance shall be 78 inches minimum at the center aisle, roof panel shall overlap the side panels by inch minimum, roof and side panels shall be .024 inches think minimum, insulation shall have a minimum R-value of 8, skins and insulation shall be fire resistant in compliance with the Federal Transit Administration recommended Fire Safety Practices for Transit Bus and Van Material. The completed body shall meet the requirements of FMVSS-220 and all other FMVSS, ADA and Buy America requirements.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 6	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 10.1 / p. 67 & 105	
CHANGE REQUESTED: Please accept a Cummins ISB 6.7L diesel engine in lieu of a 6.8L diesel engine.	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 7	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 10.7.5 / p. 69 & 107	

CHANGE REQUESTED: The chassis spec calls for rear air suspension. Additional springs are not compatible with air suspension.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Additional springs not required if compliant with 10.7.3.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 8	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 13.3.17 / p. 76 & 115	

CHANGE REQUESTED: 24" seat belt extensions are no longer available from the belt manufacturer. We can provide 12" seat belt extensions.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 9	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 14.6, 14.7, 14.8 & 14.9 / p. 78 & 117	

CHANGE REQUESTED: Please accept Gerflor Tarabus as an alternate flooring for this procurement. See attached documentation.

Tarabus is 2.25 mm thick and is designed to be extremely durable and last the life of a heavy duty bus with a 12-year warranty.
Tarabus is a homogenous floor and has a pure 100% compact PVC wear layer. Gerflor uses no fillers such as chalk or quartz.
Tarabus has silicon carbide and emboss that makes the floor highly slip resistant and ADA compliant. (Independent ASTM D2047 slip testing data available on request)
Tarabus wear layer is very dense creating a floor that is easy to keep mop clean.
Tarabus has a glass fiber web that gives superior dimensional stability that resists shrinking and cracking.
Tarabus has a unique proprietary textile backing for superior adhesion, allowing a mechanical as well as a chemical adhesion.
Tarabus is extremely lightweight weighing 4.05 lb per square yard. ☐
All seams will be heat welded to eliminate the possibility of water intrusion.
Gerflor Tarabus meets FMVSS 302 and Docket 90 requirements.
Gerflor Tarabus is anti-microbial.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 25 Feb 2022

Approved X Denied See Comment Below

COMMENT:

Approve of material change to Tarabus provided all FMVSS, ADA and Buy America requirements are met. All exposed floor seams shall be sealed with an industrial grade butyl sealant or equivalent which conforms to ASTM C920.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 10	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 15.2 / p. 78 & 117	

CHANGE REQUESTED: Please accept Altro or Gerfloor flooring (per the request above) in lieu of ribbed rubber/RCA Transit Flor.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approve of material change to Altro provided all FMVSS and Buy America requirements are met. Dimensions to remain per the requirements of the specification.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 11	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 16.4.1 / p. 81 & 120	

CHANGE REQUESTED: Please clarify this specification/requirement: "The lower window shall have a see-through mechanism to prevent contact with mobility devices." This section already calls for upper and lower windows in the door.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 12	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 24.1.2.2 & 24.1.2.12 / p. 88 -89 & 128	

CHANGE REQUESTED: Is 24.1.2.12 requiring three analog HD cameras in addition to the IP cameras noted in 24.1.2.2?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT: Section 24.1.2.2 stipulates a total of 4 cameras located as described in the subsequent sections. Section 24.1.2.12 are 3 cameras for installation into the vans.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 13	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 25.7.8 / p. 98 & 138	

CHANGE REQUESTED: Please accept the OEM driver step in lieu of a running board. See attached photos.

AGENCY RESPONSE

Reviewed By: Date:

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

No photos attached, therefore determination of acceptability cannot be made.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 14	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 2.8 / p. 141	

CHANGE REQUESTED: Flat floor is not available on this vehicle class (Exhibit III)

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved, requirement 2.8 states "unless a flat floor is being provided."

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 15	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 3.6 / p. 142	
CHANGE REQUESTED: Roof gutters are not available on this vehicle class (Exhibit III).	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 16	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 3.8 / p. 142	

CHANGE REQUESTED: Fender wells are OEM Ford construction/materials and are not modified by the upfitter.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT: The requirement as stated in 3.8 remains, fender wells shall be constructed of galvanized metal at a minimum.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 17	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 3.10 / p. 142	

CHANGE REQUESTED: Please accept the OEM Ford license plate lighting. This is not changed during upfit.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 18	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 3.11 / p. 142	

CHANGE REQUESTED: This vehicle class uses a standard Ford chassis with interior upfit equipment. No water testing is performed by the upfitter.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 19	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 3.12 / p. 142	

CHANGE REQUESTED: Undercoating is as provided by Ford OEM.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved as long as undercoating is performed.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 20	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 3.13 / p. 142-143	
CHANGE REQUESTED: Paint will be Ford OEM standard in Bright White or Oxford White.	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 23 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 21	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4.2 / p. 143	

CHANGE REQUESTED: Transmission is a 10-speed automatic (Ford OEM).

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved - FMVSS and Buy America requirements remain.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 22	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4.6 & 16 / p. 143 & 152	

CHANGE REQUESTED: Load leveling suspension and height control is not available. Vehicle will have standard OEM Ford spring suspension and shock absorbers.

AGENCY RESPONSE

Reviewed By:T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved , provided there is a minimum of 5 inches of clearance between the break-over angle position of the vehicle exhaust pipe and the level ground when loaded with 1100 lbs. The vehicle shall be tested to FMVSS 126 Electronic Stability Control Test and meet all Buy America requirements.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 23	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4.8 / p. 144	

CHANGE REQUESTED: Van as specified will have dual rear wheels and will require six (6) wheels plus spare.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 24	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4.9 / p. 144	
CHANGE REQUESTED: Ford uses an electrically-actuated parking brake.	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 25	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4.11 / p. 145	

CHANGE REQUESTED: Please accept the Ford OEM rear A/C system and heater(s).

Transit Climate control performance	FRONT UNIT		REAR UNIT	
	KW	BTU	KW	BTU
Mass Flow rate (KG/H)	408		370	
Evaporator core performance	5.2	17,742.40	5.05	17,230.60
Heater core performance	9.1	31,049.20	8.8	30,025.60

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved performance data. System must meet all other requirements in Section 4.11 including Buy American requirements.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 26	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 4.12 / p. 145	

CHANGE REQUESTED: Please confirm that a PA system input is required in this vehicle class (Exhibit III - 10,360 GVWR). It is not possible to tie into the OEM radio. PA system must be stand alone.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved the use of an add-on PA system module or all in one after market solution that is compliant with all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 27	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 5.2 / p. 145	

CHANGE REQUESTED: Floor height at rear entry door is standard Ford height (approx. 28"). Vehicle will have a wheelchair lift - not a ramp.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided the 56 inch opening height is maintained and the wheelchair lift contains an ADA compliant 30 in width.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 28	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 5.4 / p. 145	

CHANGE REQUESTED: The lift is installed forward of the rear door. The door release will not be accessible from inside the vehicle because of the lift.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

The door release is required in the event of emergency egress.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 29	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 5.5 / p. 145	

CHANGE REQUESTED: A roof hatch is not required for this vehicle class and is not recommended as it would require modification of the Ford OEM roof structure.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 30	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 5.6 / p. 146	

CHANGE REQUESTED: Clarification: Lift door will be the rear door - right side slide door is not interlocked.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 31	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 5.7.2 & 5.7.3 / p. 146	

CHANGE REQUESTED: Lift door will be unmodified Ford OEM rear door. We strongly recommend adding the Ford option *18P* for the 253-degree rear door opening.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved to use the 18P Option 253 degree opening door. The remaining requirements in Section 5.7 apply.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 32	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 6.2 / p. 146	

CHANGE REQUESTED: Ford requires dual batteries for a lift-equipped vehicle.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Use of dual batteries are approved. If located in the cabin, AGM batteries are required. All FMVSS and Buy America requirements remain.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 33	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 6.4 / p. 147	

CHANGE REQUESTED: Please delete the requirement for a separate electrical junction box. Very little additional wiring is needed for the upfit.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 34	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 7.1 / p. 148	

CHANGE REQUESTED: 3/8 inch sound damping and heat transfer insulation is not used for our upfit. We use Advantech engineered subfloor covered with Altro or Gerflor transit flooring. Please see attached information.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved with condition that all FMVSS and Buy America requirements are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 35	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 7.3 / p. 148	

CHANGE REQUESTED: A lowered floor is not available on this chassis.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 36	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 7.3 / p. 148	

CHANGE REQUESTED: Please approve our standard Advantech engineered subfloor - see attached information.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 37	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 7.3 / p. 148	

CHANGE REQUESTED: Please accept that the flooring under the driver and passenger seat is Ford OEM and is not covered with Altro or Gerflor.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 38	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 9.5 / p. 149	

CHANGE REQUESTED: Are grab handles required on all passenger seats, including the rear row?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Grab handles are required on all passenger seats excluding the rear row. of vans

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 39	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 10.4.2 / p. 149	

CHANGE REQUESTED: Rear lights will be Ford OEM and are not LED. 18" rear center high-mounted stop lamp is not available. Ford does not offer a 3rd brake light on models over 10,000# GVWR.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 40	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 14.17 / p. 151	
CHANGE REQUESTED: Braun no longer includes schematics and trouble-shooting guides with their lifts.	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 41	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 14.22 / p. 151	

CHANGE REQUESTED: Braun has a lift belt that is designed to work with their lifts. Will you accept Braun's belt?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved provided all applicable FMVSS standards, ADA guidelines, and Buy America Domestic Content guidelines are met.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 42	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 16 / p. 152	

CHANGE REQUESTED: Please accept the Ford OEM standard suspension (springs with shock absorbers). Load leveling and height control is not available.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved, provided there is a minimum of 5 inches of clearance between the break-over angle portion of the vehicle exhaust pipe and the level ground when loaded with 1100 lbs. The vehicle shall be tested to FMVSS 126 Electronic Stability Control Test and meet all Buy America requirements.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 43	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 17.2 / p. 153	

CHANGE REQUESTED: Please accept Ford OEM privacy glass in lieu of Lucite SAR Bronze BZ-2412.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approved with 20% light transmission maximum in the OEM privacy glass.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 44	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 19.1.2.2 & 19.1.2.12 / p. 155	

CHANGE REQUESTED: Is 19.1.2.12 requiring three analog HD cameras in addition to the IP cameras noted in 19.1.2.2?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Section 19.1.2.2 stipulates a total of 4 cameras located as described in the subsequent sections to be located in the buses. Section 19.1.2.12 are 3 cameras for installation into the vans.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 45	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 19.2 / p. 155	

CHANGE REQUESTED: Please confirm whether the digital display/infotainment system is required in this vehicle class (Exhibit III). There is insufficient interior room to accommodate this equipment.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Yes, the digital display and infotainment system is required in all vehicles.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 46	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 19.3 / p. 157	

CHANGE REQUESTED: Please confirm whether the cellular/Wi-Fi modem is required for this vehicle class (Exhibit III).

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 FEb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Yes, the cellular/wi-fi modem is required is all classes of vehicles.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 47	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 19.4 / p. 157	

CHANGE REQUESTED: Please confirm whether the destination sign control and voice annunciation system is required for this vehicle class (Exhibit III).

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Destination sign and voice annunciator system is not required for this vehicle class only. The PA system, microphone and speaker requirements still apply. Buy America and ADA requirements apply.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 48	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.1 / p. 159	

CHANGE REQUESTED: Please delete the automatic hand sanitizer and face mask dispenser from this vehicle class (Exhibit III). There is insufficient room to accommodate this equipment aboard this chassis.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Hand sanitizer and mask dispensers are required for all classes of vehicles.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 49	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.3 / p. 159-160	

CHANGE REQUESTED: Do you require a passenger stop request system for the Exhibit III vehicle class?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

The stop request system is not required for this vehicle class.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 50	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.3 / p. 159-160	

CHANGE REQUESTED: Do you require a passenger stop request system for the Exhibit III vehicle class?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Duplicate request with #49

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 51	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.4 / p. 160	
CHANGE REQUESTED: Vehicles will be Ford OEM Oxford White.	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 52	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.6.1.1 / p. 161	
CHANGE REQUESTED: Voltmeter will be Ford OEM (if available).	

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 53	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.6.5 / p. 161	

CHANGE REQUESTED: A B-pillar exterior grab handle is not available.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☒ See Comment Below ☐

COMMENT:

Exterior grab handle is required.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 54	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.6.5 / p. 161	

CHANGE REQUESTED: Do you required a running board for the passenger side?

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved ☐ Denied ☐ See Comment Below ☒

COMMENT:

Passenger side running boards are required only on the Exhibit III Type 1 vans.

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 55	**DATE: 2/22/22**
PROPOSER: Creative Bus Sales	**PHONE: (512) 202-2920**
PROPOSER SECTION / PAGE#: Section 20.6.5 / p. 161	

CHANGE REQUESTED: Please accept that a Rear Help bumper is not available. Rear bumper will be OEM Ford.

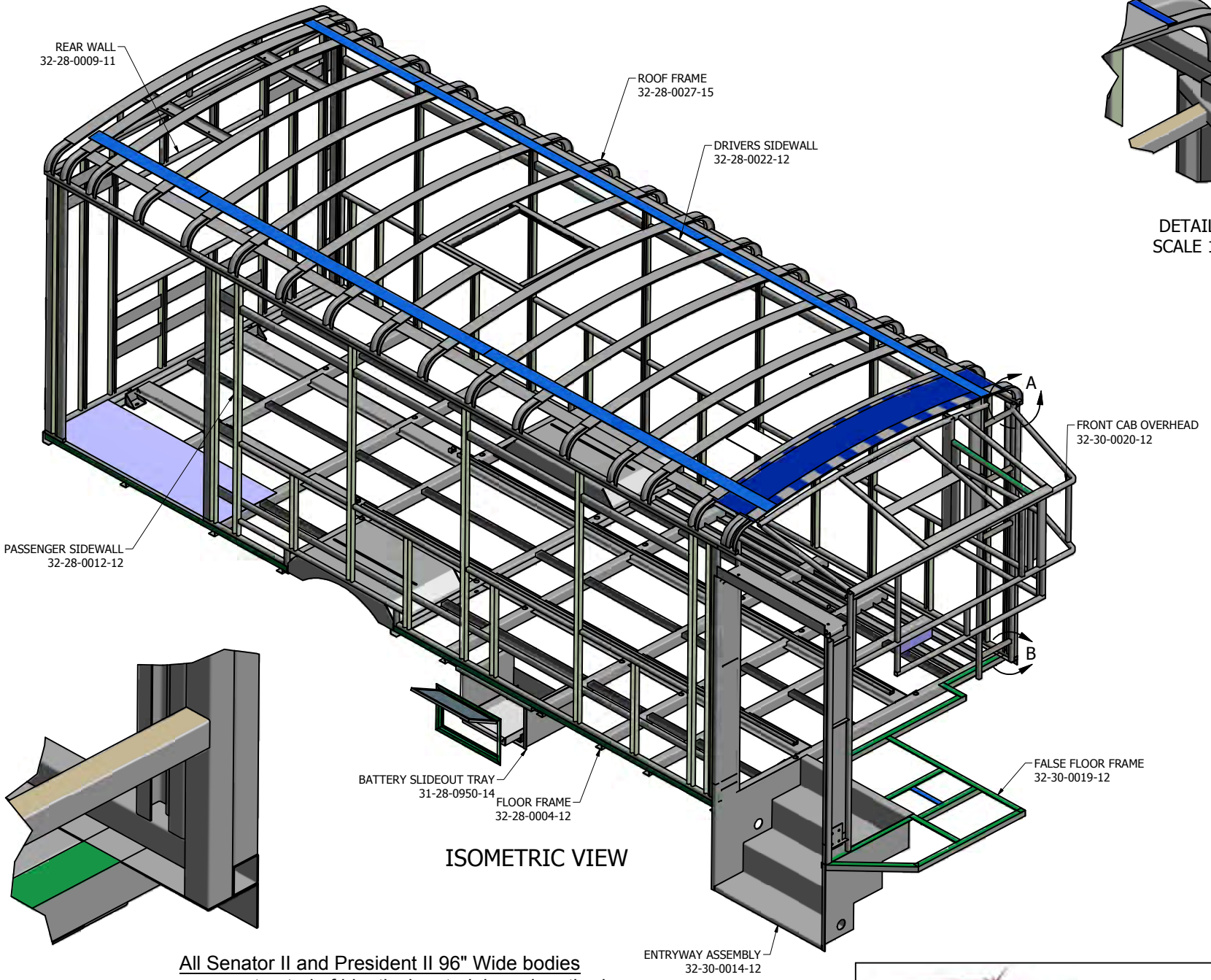
AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 24 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Incorrect section reference, should be 20.6.13 - OEM Ford rear bumper is acceptable, FMVSS and Buy America requirements apply.



ISOMETRIC VIEW

DETAIL A
SCALE 1 / 4

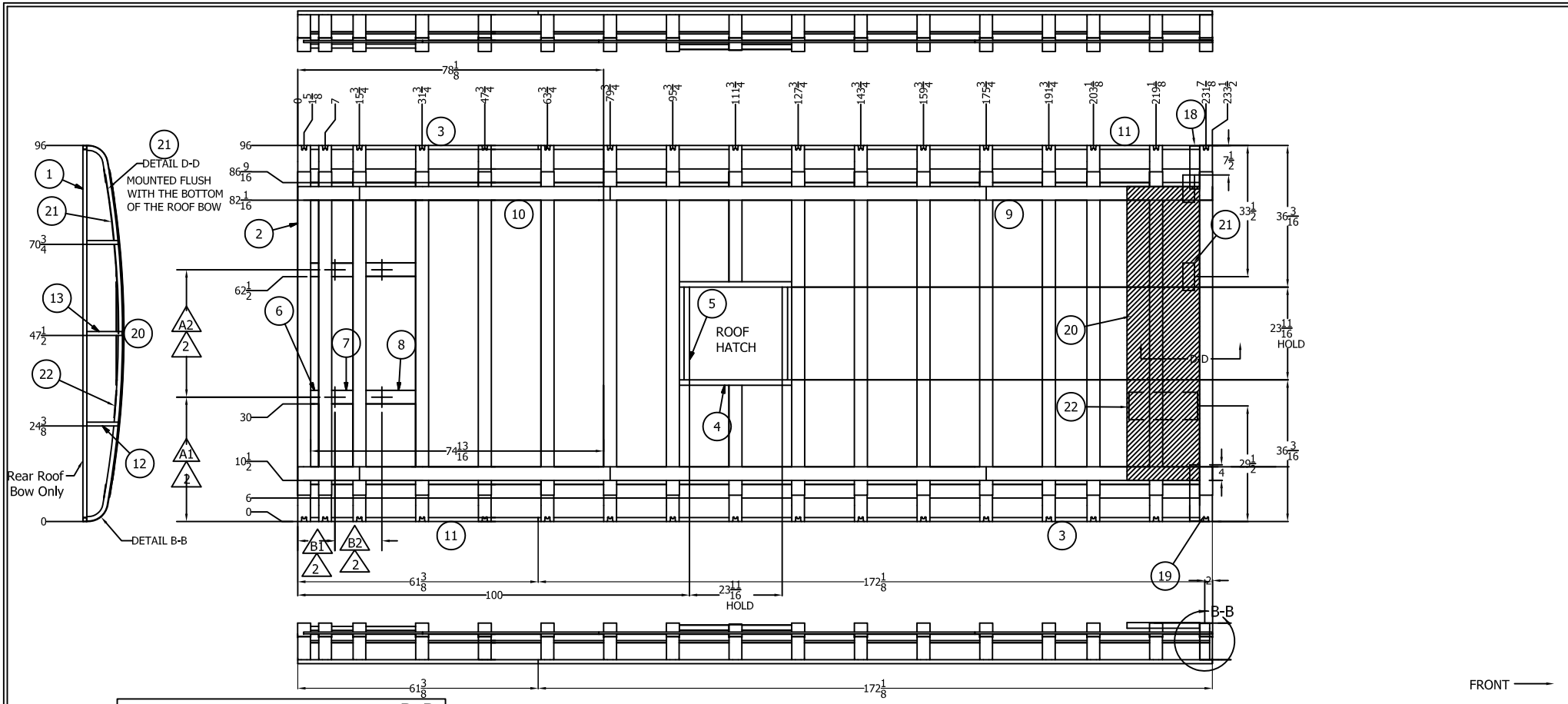
DETAIL B
SCALE 1 / 2

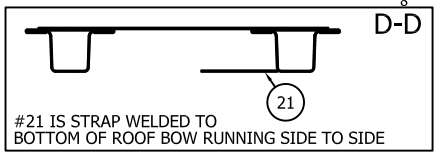
All Senator II and President II 96" Wide bodies are constructed of identical materials and methods. Battery tray is not available on President II. The OEM Freightliner Tray is used.

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
CAGES				

STARTRANS BUS
a division of Forest River, Inc.

DFTSN:	TAS	TITLE	FORD F-550 SENATOR II HD - 201" - 226" BOX CAGE W/C REAR LIFT, STANDARD FLOOR
DATE:	03/25/16	DWG NO	32-28-0008-16
		SHEET	1 OF 1





NOTES:

1- DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.
2- A/C BOLT PATTREN MAY VERY SEE SALES ORDER.
3- BEFORE CUT ROOF HATCH SEE SALES ORDER.
4- SCREW LOCATION AT SEAMS AND EDGES 8" ON CENTER ALL OTHERS LOCATIONS 16" ON CENTER.
5- SEALANT USAGE: 1/4" MINIMUM 3/8" MAXIMUM BEAD ON ALL ROOF FRAME TO LUAN SURFACES.

** WHEN ADDING REAR LUGGAGE ADD THE SIZE OF THE REAR LUGGAGE TO DIM. B1.

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	1x1x94	Steel Tube 16ga. 1"x 1"x 94"
2	16	80225-000001	Allstar Ford and Chevy Roof Bow 96"
3	2	1 x 1 x 172.125	Steel Tube 16ga.x 1"x 1"x 172-1/8"
4	2	70009047-30.5	Steel Channel 16ga. 1-3/8"x1-3/8"x 30-1/2"
5	2	70009047-23.6875	Steel Channel 16ga. 1-3/8"x1-3/8"x 23-11/16"
6	2	20005S-3.75	Steel Channel 16ga. 1"x 3-1/2"x 3-3/4"
7	2	20005S-9.125	Steel Channel 16ga. 1"x 3-1/2"x 9-1/8"
8	2	20005S-14.375	Steel Channel 16ga. 1"x 3-1/2"x 14-3/8"
9	4	3.5 x 93-1/8	Steel plate 16ga.x 3.5"x 93-1/8"
10	8	3.5 x 96	Steel plate 16ga.x 3.5"x 96"
11	2	1 x 1x 63-3/8	Steel Tube 16ga.x 1"x1"x 63-3/8"
12	2	1x1x8	Steel Tube 16ga. 1"x 1"x 8"
13	1	1x1x9	Steel Tube 16ga. 1"x 1"x 9"
14	4	3.5 x 17.75	Steel plate 16ga.x 3.5"x 17-3/4"
15	0	8 x 11.3125	Steel plate 14ga.x 8"x 11-5/16"
16	0	8 x 8.5625	Steel plate 14ga.x 8"x 8-9/16"
17	0	8 x 3.25	Steel plate 14ga.x 8"x 3-1/4"

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
18	1		Steel plate 16ga. x 3" x 14-1/4"
19	1		Steel plate 16ga. x 3" x 13-1/4"
20	1		Steel plate 16ga. x 14" x 84"
21	2		Steel plate 16ga. x 3" x 7"
22	1		Steel plate 16ga. x 7" x 13"

REV. LET.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.
A	PRELIM PACKET:	TAS		03/23/16	

TOLERANCE UNLESS OTHERWISE SPECIFIED

WOOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2°

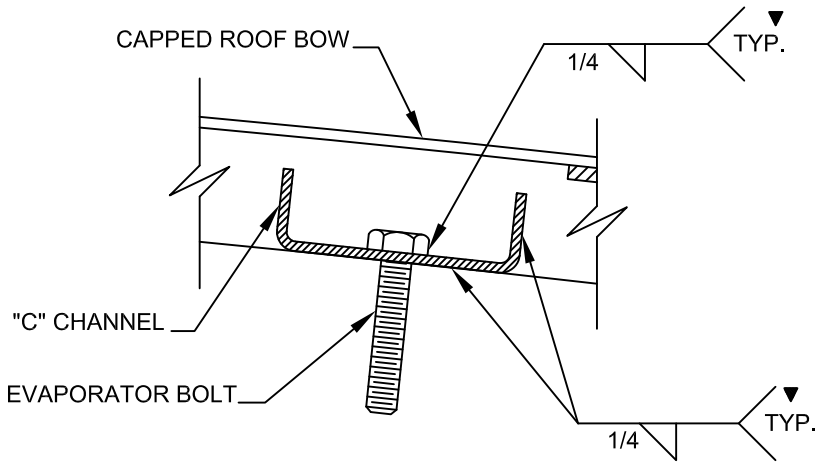
STARTRANS a division of Forest River, Inc.

DATE: 03/23/16
NAME: TAS

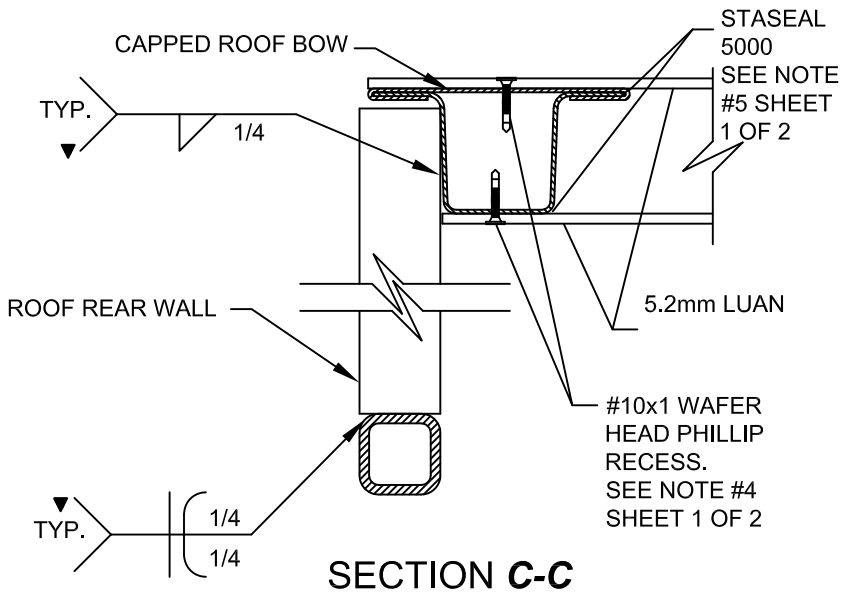
TITLE: FORD F-550 SENATOR II HD FRAME, ROOF362" BODY

DWG. No. 32-28-0006-15 SHEET 1 OF 2

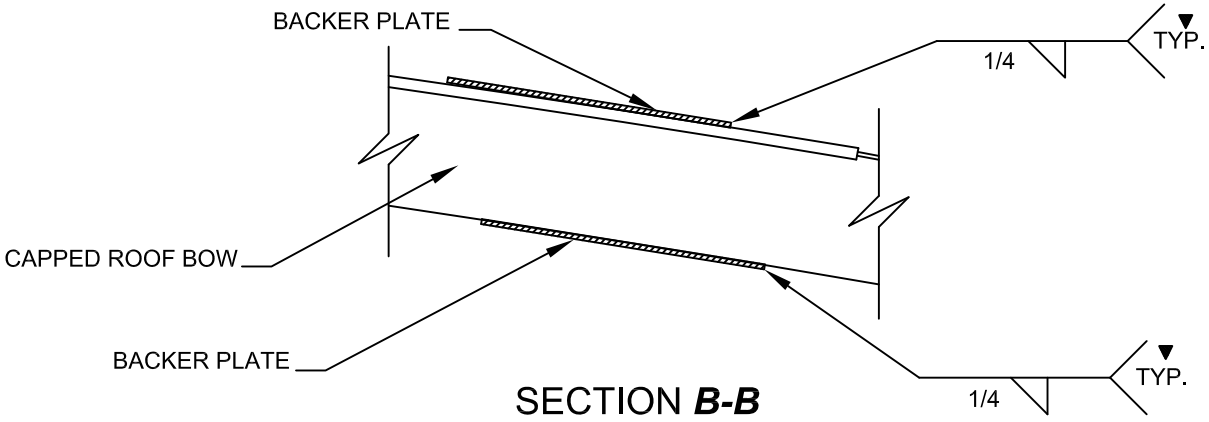
▼ CRITICAL CONTROL ITEM



SECTION ***A-A***



SECTION ***C-C***



SECTION ***B-B***

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	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

REV. LET.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.
A	PRELIM PACKET:	TAS		03/23/16	

TOLERANCE UNLESS OTHERWISE SPECIFIED

WOOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2°

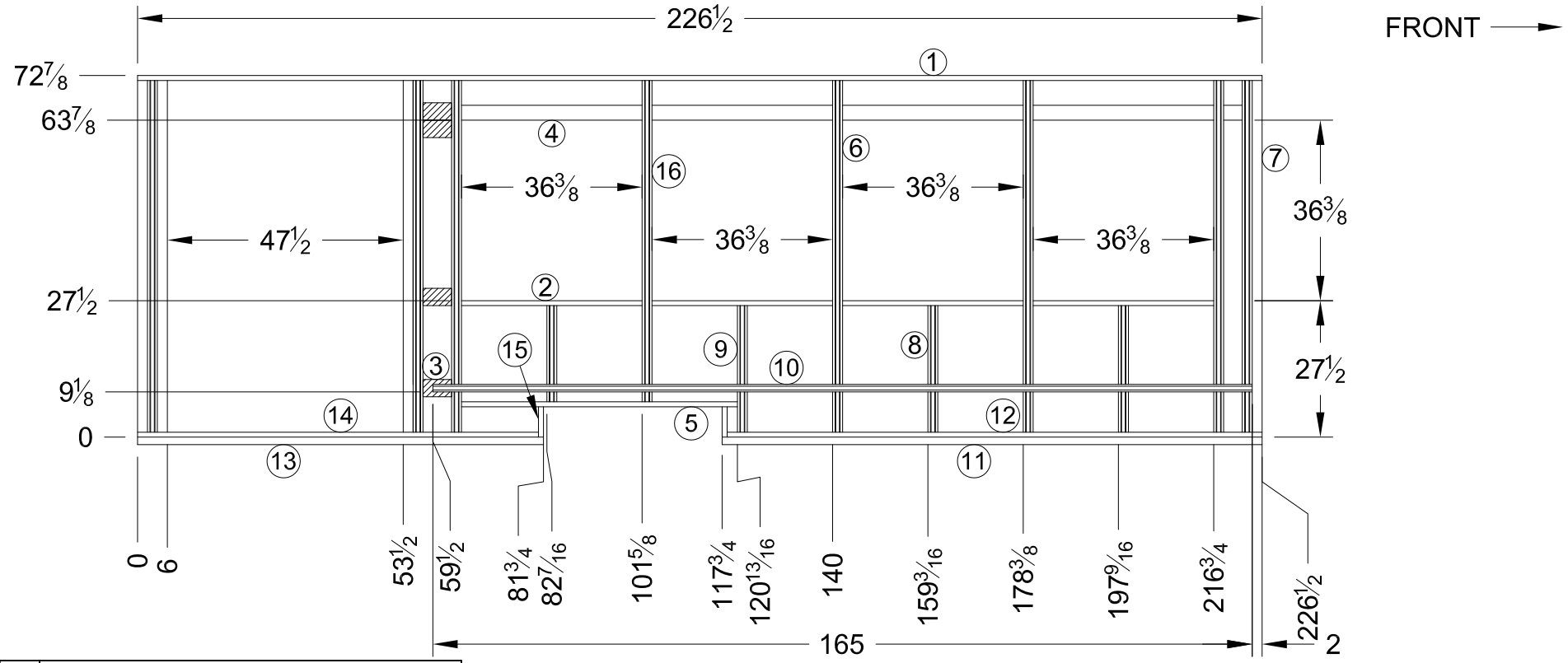
STARTRANS a division of Forest River, Inc.

DATE: 03/23/16

NAME: TAS

TITLE: FORD F-550 SENATOR II HD FRAME, ROOF362" BODY

DWG. No. 32-28-0006-15 SHEET 2 OF 2



16	1	WALL STUD: 1" x 2" x 64-3/4" Lg.
15	1	TUBE: 16GA. 1" x 1" x 6-1/8" Lg.
14	1	TUBE: 16GA. 1" x 1" x 80-3/4" Lg.
13	1	ANGLE: 11GA. 1-1/2" x 2" x 81-3/4" Lg.
12	1	TUBE: 16GA. 1" x 1" x 107-3/4" Lg.
11	1	ANGLE: 11GA. 1-1/2" x 2" x 108-3/4" Lg.
10	1	SEAT TRACK: 165 Lg.
9	1	WALL STUD: 1" x 2" x 19-3/8" Lg.
8	3	WALL STUD: 1" x 2" x 25-1/2" Lg.
7	4	TUBE: 1" x 2" x 70-7/8" Lg.
6	7	WALL STUD: 1" x 2" x 70-7/8" Lg.
5	1	TUBE: 16GA. 1" x 1" x 55-9/16" Lg.
4	4	TUBE: 16GA. 1" x 3" x 36-3/8" Lg.
3	4	STRAP: 11GA. 3-1/2" x5-3/4" Lg.
2	4	TUBE: 16GA. 1" x 1" x 36-3/8" Lg.
1	1	TUBE: 16GA. 1" x 1" x 226-1/2" Lg.

REV. LET.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.
A	PRELIM PACKET:	TAS		03/23/16	

TOLERANCE UNLESS OTHERWISE SPECIFIED

WOOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2°

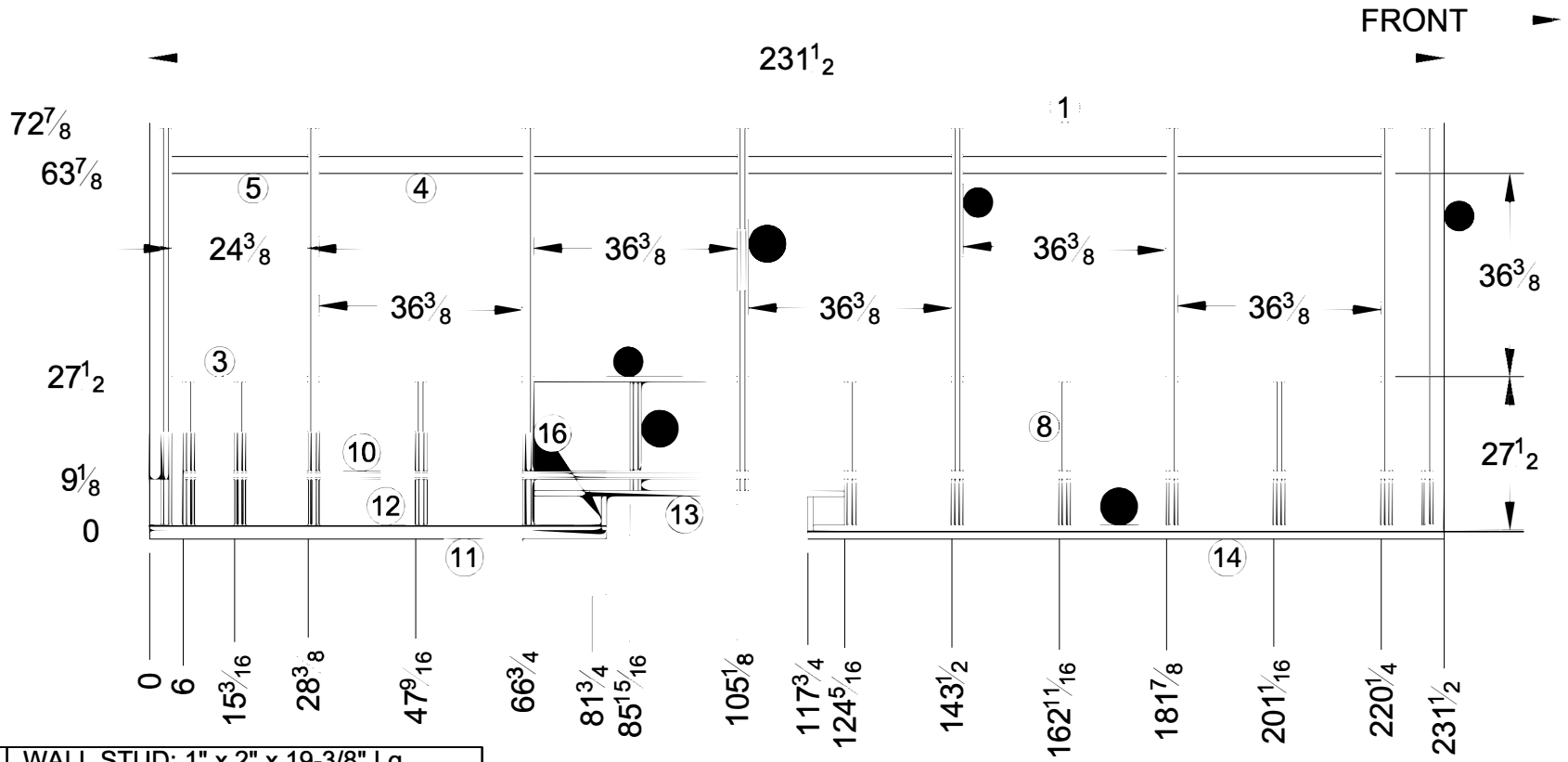
STARTRANS a division of Forest River, Inc.

DATE: 03/23/16

NAME: TAS

TITLE: SENATOR II HD FORD F-550 DRIVERS SIDEWALL REAR LIFT 96" WIDE 213"WB/362"BDY

DWG. No. 32-28-0022-12 SHEET 1 OF 1



17	1	WALL STUD: 1" x 2" x 19-3/8" Lg.
16	1	TUBE: 16GA. 1" x 1" x 6-1/8" Lg.
15	1	TUBE: 16GA. 1" x 1" x 112-3/4" Lg.
14	1	ANGLE: 11GA. 1-1/2" x 2" x 113-3/4" Lg.
13	1	TUBE: 16GA. 1" x 1" x 55-9/16" Lg.
12	1	TUBE: 16GA. 1" x 1" x 80-3/4" Lg.
11	1	ANGLE: 11GA. 1-1/2" x 2" x 81-3/4" Lg.
10	1	SEAT TRACK: 223-1/2" Lg.
9	1	WALL STUD: 1" x 2" x 64-3/4" Lg.
8	6	WALL STUD: 1" x 2" x 25-1/2" Lg.
7	2	TUBE: 1" x 2" x 70-7/8" Lg.
6	7	WALL STUD: 1" x 2" x 70-7/8" Lg.
5	1	TUBE: 16GA. 1" x 3" x 24-3/8" Lg.
4	5	TUBE: 16GA. 1" x 3" x 36-3/8" Lg.
3	1	TUBE: 18GA. 1" x 1" x 24-3/8" Lg.
2	5	TUBE: 18GA. 1" x 1" x 36-3/8" Lg.
1	1	TUBE: 16GA. 1" x 1" x 231-1/2" Lg.

REV. LET.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.
A	PRELIM PACKET:	TAS		03/23/16	

TOLERANCE UNLESS OTHERWISE SPECIFIED

W OOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2°

STARTRANS a division of Forest River, Inc.

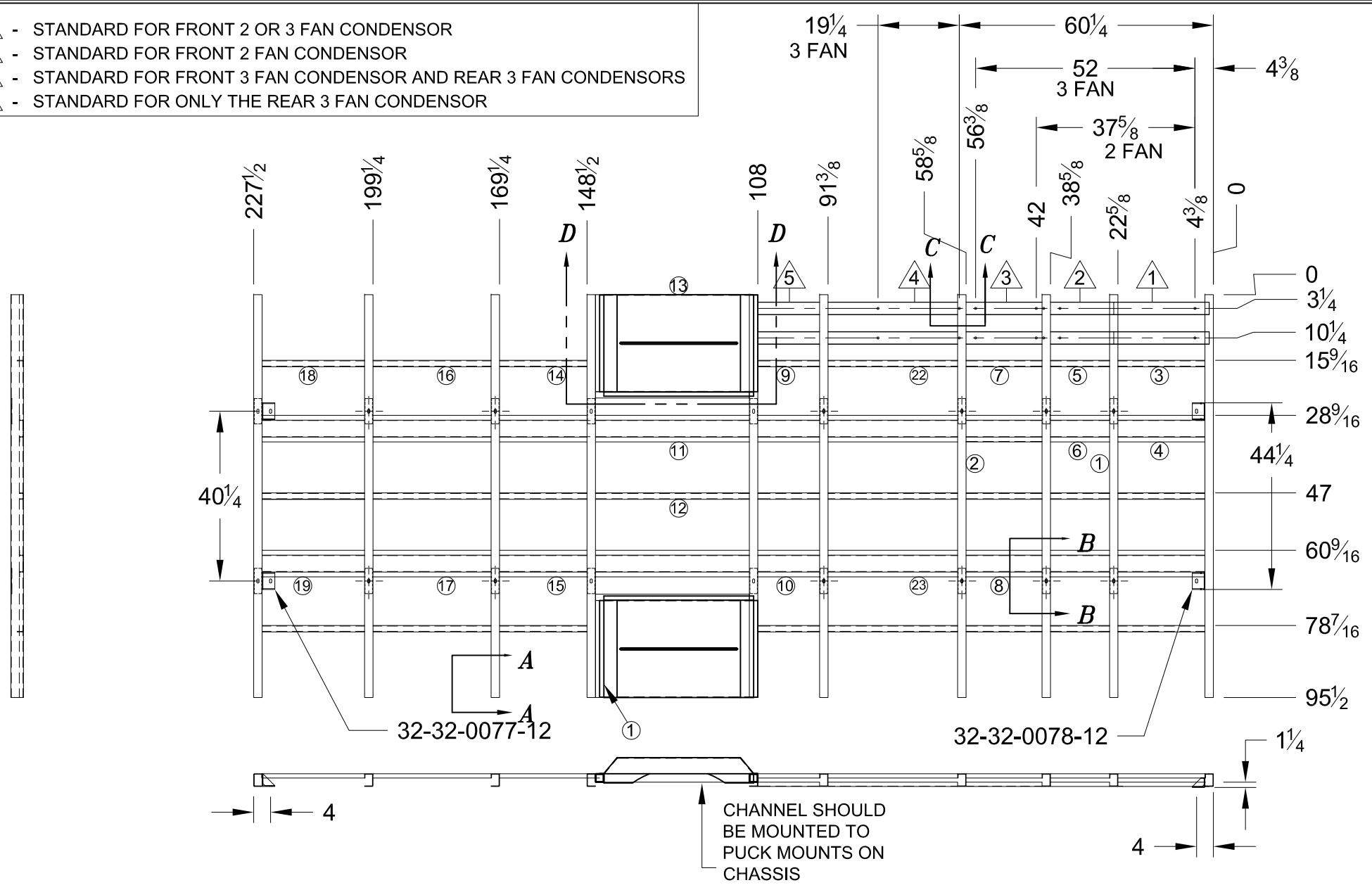
DATE: 03/23/16

NAME: TAS

TITLE: SENATOR II HD FORD F-550 DRIVERS SIDEWALL REAR LIFT 96" WIDE 213"WB/362"BDY

DWG. No. 32-28-0022-12 SHEET 1 OF 1

1 - STANDARD FOR FRONT 2 OR 3 FAN CONDENSOR
2 - STANDARD FOR FRONT 2 FAN CONDENSOR
3 - STANDARD FOR FRONT 3 FAN CONDENSOR AND REAR 3 FAN CONDENSORS
4 - STANDARD FOR ONLY THE REAR 3 FAN CONDENSOR



REV. LET.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.
A	PRELIM PACKET:	TAS		03/23/16	

TOLERANCE UNLESS OTHERWISE SPECIFIED

WOOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2°

STARTRANS a division of Forest River, Inc.

DATE: 03/23/16
NAME: TAS
TITLE: FLOOR FRAMING 213"WB/362"BDY FORD SENATOR II HD
DWG. No. 32-28-0004-12 SHEET 1 OF 2

#	QTY.	DESCRIPTION
23	2	Hat Channel: 11GA. 1" x 6-5/16" x 30-3/4" Lg.
22	3	U Channel: 11GA. 1" x 1-1/2" x 30-3/4" Lg.
21	0	Hat Channel: 11GA. 1" x 6-5/16" x 22" Lg.
20	0	Angle: 16GA. 1" x 1" x 22" Lg.
19	2	Hat Channel: 11GA. 1" x 6-5/16" x 24-1/8" Lg.
18	3	U Channel: 11GA. 1" x 1-1/2" x 24-1/8" Lg.
17	2	Hat Channel: 11GA. 1" x 6-5/16" x 27-15/16" Lg.
16	3	U Channel: 11GA. 1" x 1-1/2" x 27-15/16" Lg.
15	2	Hat Channel: 11GA. 1" x 6-5/16" x 20-3/4" Lg.
14	3	U Channel: 11GA. 1" x 1-1/2" x 20-3/4" Lg.
13	2	Wheel Well: 31-28-0879-13
12	1	U Channel: 11GA. 1" x 1-1/2" x 36-1/2" Lg.
11	2	Hat Channel: 11GA. 1" x 6-5/16" x 36-1/2" Lg.
10	2	Hat Channel: 11GA. 1" x 6-5/16" x 14-1/2" Lg.
9	3	U Channel: 11GA. 1" x 1-1/2" x 14-1/2" Lg.
8	2	Hat Channel: 11GA. 1" x 6-5/16" x 18" Lg.
7	3	U Channel: 11GA. 1" x 1-1/2" x 18" Lg.
6	2	Hat Channel: 11GA. 1" x 6-5/16" x 14" Lg.
5	3	U Channel: 11GA. 1" x 1-1/2" x 14" Lg.
4	2	Hat Channel: 11GA. 1" x 6-5/16" x 20-5/8" Lg.
3	3	U Channel: 11GA. 1" x 1-1/2" x 20-5/8" Lg.
2	9	Crossmember: 11GA. 2" x 3" x 95-1/2" Lg.
1	2	TUBE: 11GA. 2" x 2" x 23" Lg.

CONDENSOR MATERIAL LIST:

1 - U Channel: 16ga. 1" x 3" x 20-5/8"Lg.
2 - U Channel: 16Ga. 1" x 3" x 14"Lg.
3 - U Channel: 16Ga. 1" x 3" x 18"Lg.
4 - U Channel: 16Ga. 1" x 3" x 30-3/4"Lg.
5 - U Channel: 16Ga. 1" x 3" x 14-1/2"Lg.

REV. LET.	DESCRIPTION OF CHANGE	BY	CHK	DATE	ECN No.
A	PRELIM PACKET:	TAS		03/23/16	

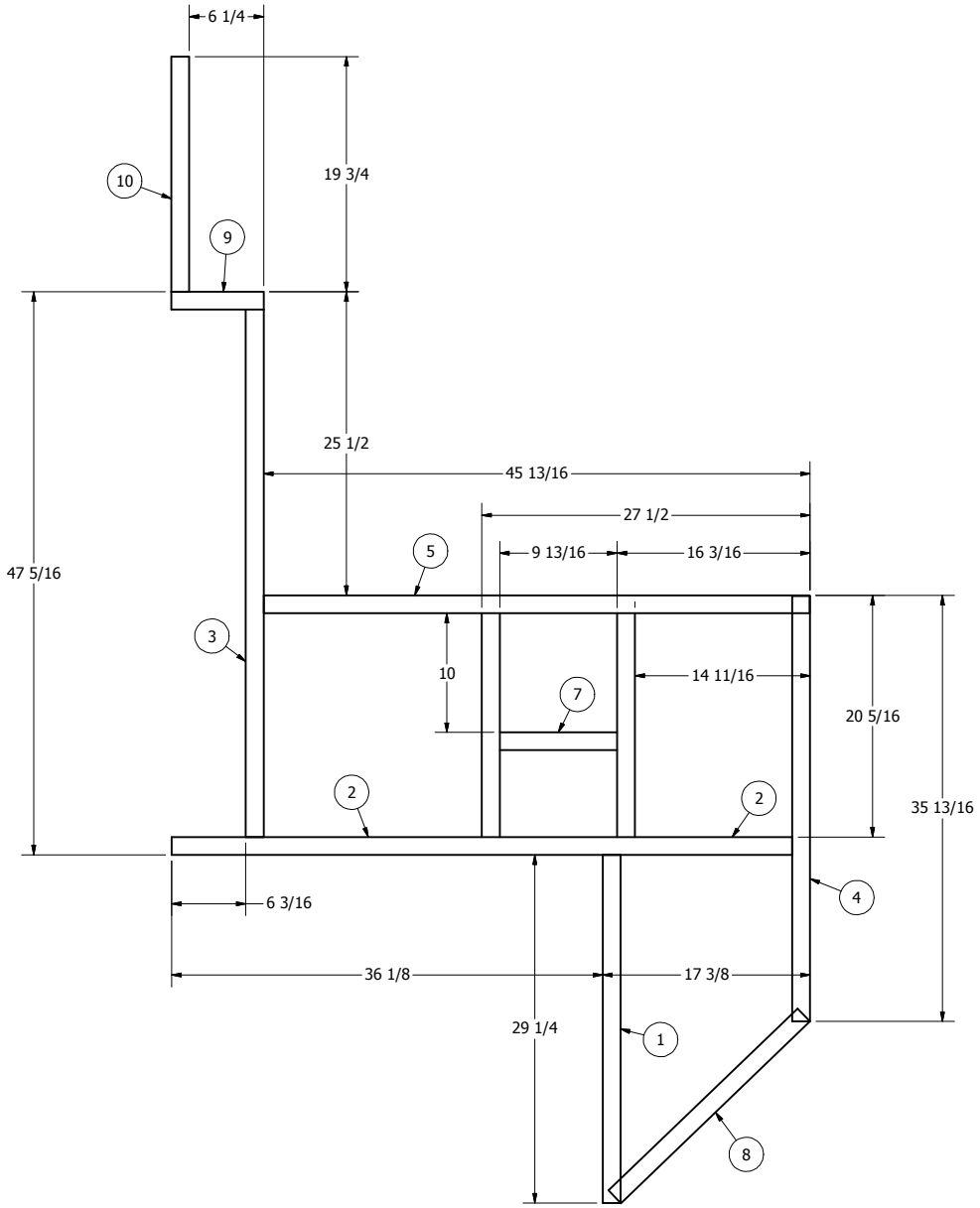
TOLERANCE UNLESS OTHERWISE SPECIFIED

WOOD	OTHER
± 1/8"	± 1/16"
± 1°	± 1/2°

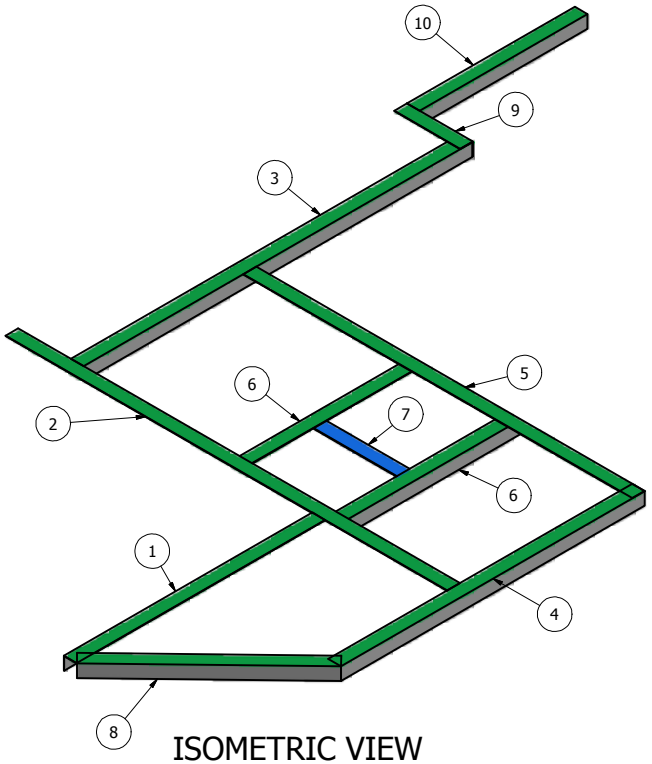
STARTRANS a division of Forest River, Inc.

DATE: 03/23/16
NAME: TAS
DWG. No. 32-28-0004-12
SHEET 2 OF 2

TITLE: FLOOR FRAMING 213"WB/362"BDY FORD SENATOR II HD



TOP VIEW



ISOMETRIC VIEW

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	02071056-29.25	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 29-1/4" lg. A-513
2	1	02071056-52	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 52" lg. A-513
3	1	02071056-45.75	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 45-3/4" lg. A-513
4	1	02071056-35.75	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 35-3/4" lg. A-513
5	1	02071056-45.5	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 45-3/4" lg. A-513
6	2	02071056-20.25	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 20-1/4" lg. A-513
7	1	1.5 x 12.75	Steel plate 11ga.x 1.875"x 20-3/16"
8	1	02071056-22	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x22" lg. A-513
9	1	02071056-7.75	STEEL ANGLE 11ga.x 1-1/2"x 1-1/2"x 7-3/4" lg. A-513
10	1	02071056-19.75	Aluminized ANGLE 11ga.x 1-1/2"x 1-1/2"x 19-3/4" lg. A-513

Note:
1). Material to be 16ga. x 1-1/2"x 1-1/2"x Steel Angle 11ga.
2). Viewed from Exterior.

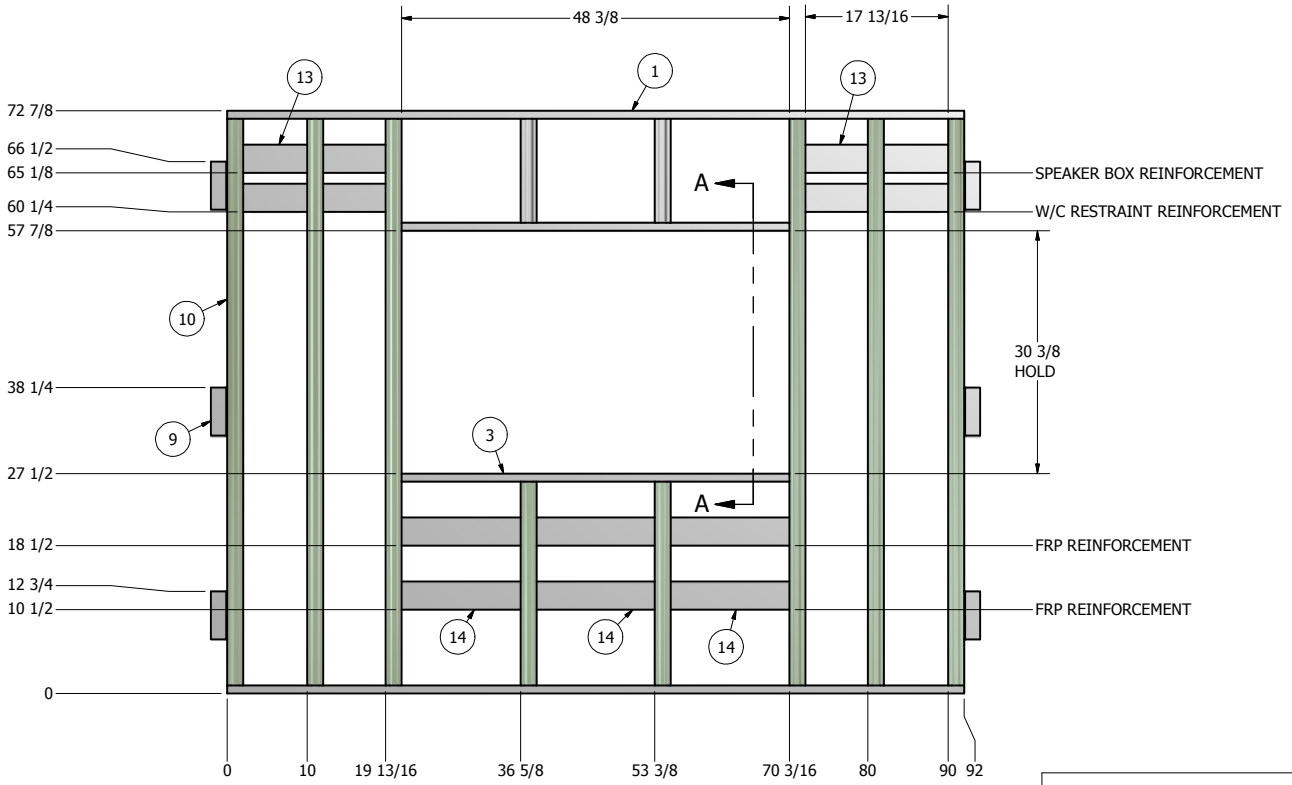
REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
CAGES				

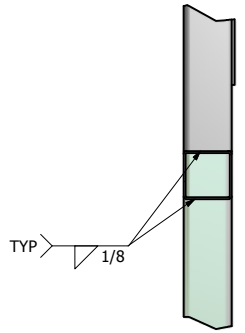
STARTRANS BUS
a division of Forest River, Inc.

DFTSN:	TAS	TITLE	FORD F-550 SENATOR II HD FALSE FLOOR
DATE:	03/23/16	DWG NO	32-30-0019-12
		SHEET	1 OF 1

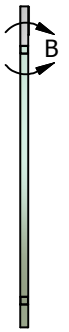
▼ CRITICAL CONTROL ITEM

USAGE: ALLSTAR XL W/REAR EGRESS WINDOW





DETAIL B
SCALE 1 / 2



SECTION A-A
SCALE 1 / 12

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	1x1x92	Steel Tube 16ga. 1"x 1"x 92"
2	2	1x2x70.875	Steel Tube 16ga. 1"x 2"x 70-7/8"
3	2	1x1x48.375	Steel Tube 16ga. 1"x 1"x 48-3/8"
4	1	1x1x38.5	Steel Tube 16ga. 1"x 1"x 38-1/2"
5	1	1x1x11.625	Steel Tube 16ga. 1"x 1"x 11-5/8"
6	4	1x1x22.75	Steel Tube 16ga. 1"x 1"x 22-3/4"
7	1	1x1x36.375	Steel Tube 16ga. 1"x 1"x 36-3/8"
8	3	1x1x36.5	Steel Tube 16ga. 1"x 1"x 36-1/2"
9	6	ANGLE 1x2x6	Steel Angle 16ga.x 1x 2x 6"
10	9	02062351.70.875	WALL BOW: 18ga.x 1"x 2"x 70-7/8" Lg. A-513
11	4	02062351.25.5	WALL BOW: 18ga.x 1"x 2"x 25-1/2" Lg. A-513
12	2	02062351.13	WALL BOW: 18ga.x 1"x 2"x 13" Lg. A-513
13	4	3.5 x 17.8125 STEEL PLATE	STEEL PLATE 11ga.x 3-1/2 x 17-13/16"
14	6	3.5 x 14.8125 STEEL PLATE	STEEL PLATE 11ga.x 3-1/2 x 14-13/16"

NOTES:
1-DRAWING VIEWED FROM EXTERIOR SIDE OF UNIT.

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
CAGES				

STARTRANS BUS
a division of Forest River, Inc.

DFTSN:	TAS	TITLE	FRAME, REAR WALL/WITH 30"X48" WINDOW 96" FORD F-550 SENATOR II HD
DATE:	03/25/16	DWG NO	32-28-0009-11
		SHEET	1 OF 1

Gerflor theflooringgroup	TARABUS SIRIUS	
DESCRIPTION		
Backing		NT
Thickness		2.25 ± 0.15 mm 0.088 ± 0.006”
Weight		2.20 ± 0.15 kg/m² 4.05 lb/Sq.Yd
Roll width		200 cm 6.56’
Roll length		24 lm 78.72’
PERFORMANCE		
Dimensional stability	ASTM D 1204	≤ 0.3 %
Abrasion resistance	ISO 9352 TABER TEST	300 ± 50 mg 0.01 ± 0.002 oz
Identation resistance	EN 433	≤ 0.2 mm < 0.008"
Low temperature resistance	D 42 1235 A	- 20°C / -4°F
Sound Damping Characteristics	ISO 717/2	∆l = 5 dB
Color fastness	ASTM D 4459	≥ 7
Slip resistance	ASTM D 2047	> 0.6
Fire resistance	FMVSS 302 (ISO 3795/76)	Conform
	Docket 90a (ASTM E648) (NFPA 253)	Class 1 (CRF> 0.45 W/cm²)
Resistance to chemicals	EN 423	Unaffected by diluted acids and bases Unaffected by domestic products (excluding solvents for plasticized PVC)

TOTAL PERFORMANCE IN ONE PANEL.

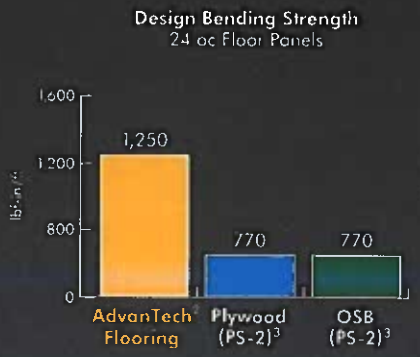
AdvanTech® flooring delivers strength, moisture resistance, quality and consistency plywood just can't match.

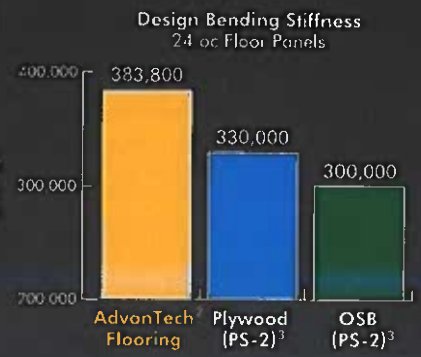
Industry-Leading Strength & Stiffness.

AdvanTech panel strength is demonstrated in ESR-1785 to have design strength and stiffness beyond those required by PS-1 and PS-2, the performance standard for plywood and OSB.

BUILT TO A HIGHER STANDARD ESR-1785

View these ESR-1785 values at www.icc-es.org.



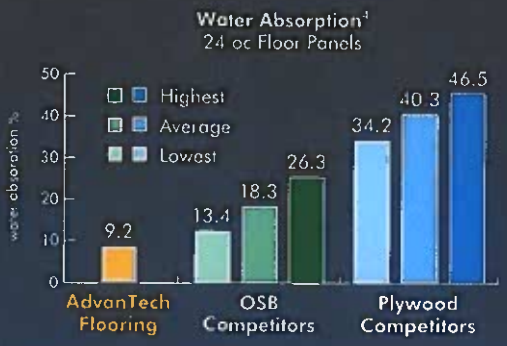


Moisture Resistance.

Every strand of wood inside AdvanTech flooring is coated with moisture-resistant resins. Even when cut, AdvanTech panels will not swell, warp or delaminate.

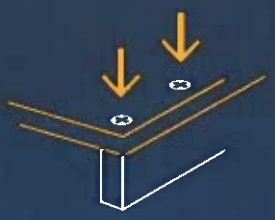
500 DAY NO SANDING GUARANTEE[1]

AdvanTech panels are backed by a 500-day no-sanding guarantee. Headaches caused by swelling, cupping and delamination are history!



Fastener Holding.

Featuring advanced resins and one of the highest wood densities of any subfloor panel, AdvanTech flooring holds fasteners securely in place.



Installation Ease.

A precisely engineered and durable tongue and groove profile helps ensure every panel of AdvanTech flooring installs quickly and easily.

Award Winning Quality.

AdvanTech flooring has been rated #1 in quality every year for over a decade in *Builder Magazine*'s annual nationwide survey of builders.[5] No other subfloor panel matches the award-winning quality and performance of AdvanTech flooring.

Environmental Responsibility.

SUSTAINABLE FORESTRY INITIATIVE

AdvanTech flooring is made by Huber Engineered Woods, certified by the Sustainable Forestry Initiative (SFI) for responsible environmental behavior and supporting prompt reforestation.

Performance Guarantee.

LIFETIME

Backed by a limited lifetime warranty[1] that is transferable between future homeowners, AdvanTech flooring delivers performance you can trust.

1. Limitations and restrictions apply. Visit AdvanTechPerforms.com for details. 2. ICC-ES Evaluation Report ESR-1785. 3. National Design Specification for Wood Construction Manual for Engineered Wood Construction. 4. All testing was conducted by an independent IAS accredited testing facility in September 2008. This small sample testing was done in accordance with the applicable ASTM standards and test methods. OSB values are based on lowest, average and highest water absorption levels of four competitors. Plywood value is based on the lowest, average and highest water absorption levels of three competitors. Competitor testing samples correspond to single manufacturing locations from one production date. 5. *Builder Magazine*'s 2012 Brand Use Study, 6,000 builders surveyed.

AdvanTechPerforms.com 1-800-933-9220

another innovation from HUBER

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 1	**DATE:** 2/22/2022
PROPOSER: Gerflor USA	**PHONE:** (602) 299-9994
PROPOSER SECTION / PAGE#: Floor and Floor Covering Section 14.6 Page 78	

CHANGE REQUESTED: For your consideration we submit this approved equal request for Gerflor Tarabus for this procurement.

Tarabus is 2.25 mm thick and is designed to be extremely durable and last the life of a heavy duty bus with a 12-year warranty.

Tarabus is a homogenous floor and has a pure 100% compact PVC wear layer. Gerflor uses no fillers such as chalk or quartz.

Tarabus has silicon carbide and emboss that makes the floor highly slip resistant and ADA compliant.
(Independent ASTM D2047 slip testing data available on request)

Tarabus wear layer is very dense creating a floor that is easy to keep mop clean.

Tarabus has a glass fiber web that gives superior dimensional stability that resists shrinking and cracking.
Tarabus has a unique proprietary textile backing for superior adhesion, allowing a mechanical as well as a chemical adhesion.
Tarabus is extremely lightweight weighing 4.05lb per square yard.
All seams will be heat welded to eliminate the possibility of water intrusion.
Gerflor Tarabus meets FMVSS 302 and Docket 90 requirements.
Gerflor Tarabus is anti-microbial.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 25 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

COMMENT:

Approve of material change to Tarabus provided all FMVSS, ADA and Buy America requirements are met. All exposed floor seams shall be sealed with an industrial grade butyl sealant or equivalent which conforms to ASTM C920.

Gerflor theflooringgroup	TARABUS SIRIUS	
DESCRIPTION		
Backing		NT
Thickness		2.25 ± 0.15 mm 0.088 ± 0.006”
Weight		2.20 ± 0.15 kg/m² 4.05 lb/Sq.Yd
Roll width		200 cm 6.56’
Roll length		24 lm 78.72’
PERFORMANCE		
Dimensional stability	ASTM D 1204	≤ 0.3 %
Abrasion resistance	ISO 9352 TABER TEST	300 ± 50 mg 0.01 ± 0.002 oz
Identation resistance	EN 433	≤ 0.2 mm < 0.008"
Low temperature resistance	D 42 1235 A	- 20°C / -4°F
Sound Damping Characteristics	ISO 717/2	∆l = 5 dB
Color fastness	ASTM D 4459	≥ 7
Slip resistance	ASTM D 2047	> 0.6
Fire resistance	FMVSS 302 (ISO 3795/76)	Conform
	Docket 90a (ASTM E648) (NFPA 253)	Class 1 (CRF> 0.45 W/cm²)
Resistance to chemicals	EN 423	Unaffected by diluted acids and bases Unaffected by domestic products (excluding solvents for plasticized PVC)

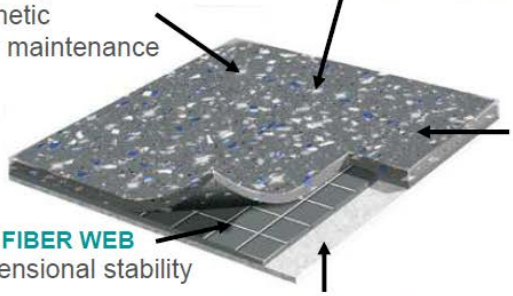
TARABUS

TARABUS NT CONSTRUCTION

Gerflor
theflooringgroup

EMBOSS
➔ Antislip
➔ Aesthetic

COMPACT WEAR LAYER
➔ Durability
➔ Aesthetic
➔ Easy maintenance

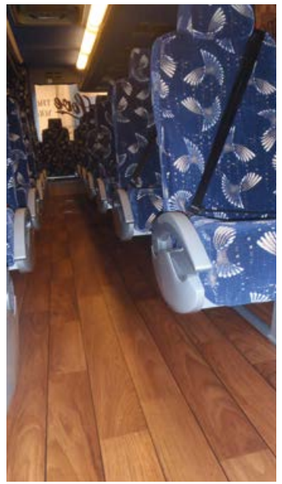


SILICON CARBIDE PARTICLES
➔ Durability
➔ Maximum antislip
➔ Aesthetic

GLASS FIBER WEB
➔ Dimensional stability

TEXTILE BACKING
➔ Gluing capabilities

HARMONIA (for coaches)



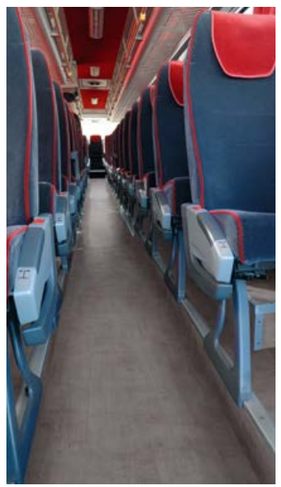
SHIP
0764 Nature

SHIP
0765 Exotic

SHIP
0766 Tropical

CLASSIC
1455 Tulipwood Orange

CLASSIC
1456 Rosewood Dark Brown



ANTICWOOD
0658 Soft Brown

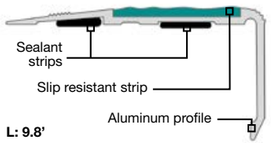
ANTICWOOD
0782 Marron

MINERAL
1136 Cement Light Grey

MINERAL
1584 Losa Anthracite

TARABUS

Stepbus

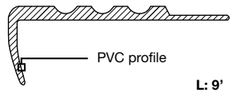


L: 9.8'

Step nosing

Yellow

White



L: 9'

TARABUS *Be* **CONNECTED!**

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PN X3059986 - 03 / 2016

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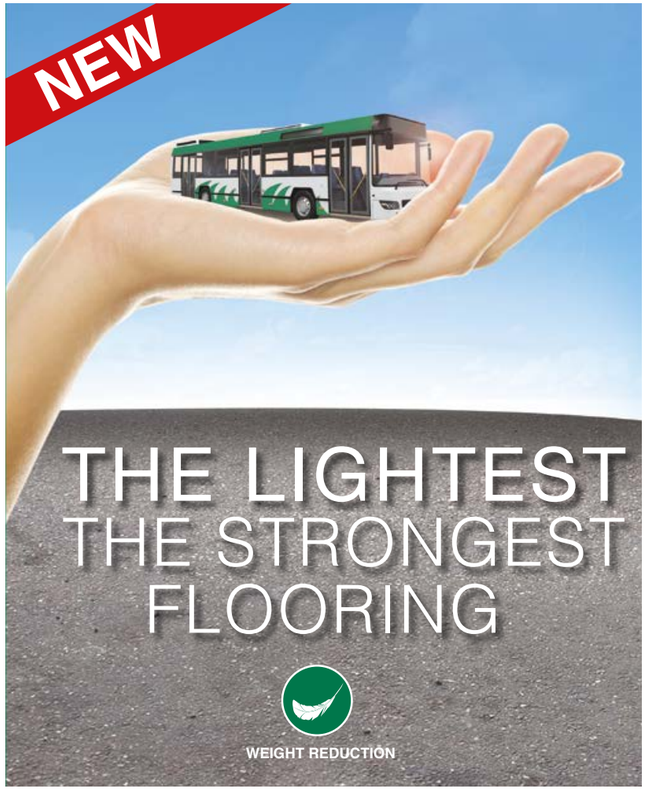
595 Supreme Dr
Bensenville 60106 IL USA
Tel : 877 GERFLOR (437 3567)
Fax : 847 394 3753
tarabus@gerflor.com
tarabusbygerflor.com

Gerflor
theflooringgroup

TARABUS

FLOORING FOR BUSES & COACHES



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TARABUS

GAYA WOOD Noma

8297 Yosemite

GAYA WOOD Walnut

3724 Kruger

6057 Everglades

4521 Yellowstone

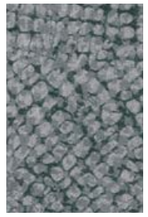
APOLLO

4776 Masan

4479 Kilimanjaro

4517 Fuji

GAYA MOSAIC

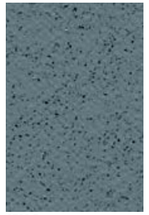


4482 Babel

4519 Galata

SIRIUS

6768 Griffon



6782 Dune

6727 Anthracite

6801 Graphite

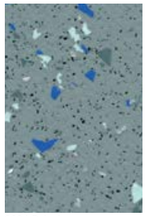
6451 Corsaire

LUNA

8816 Singapore

8729 Norway

HELIOS



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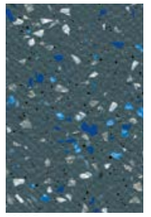
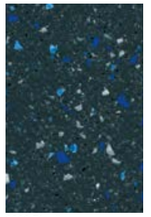
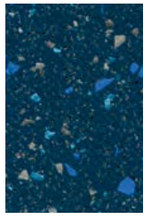


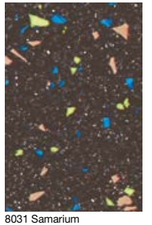
8805 Palladium



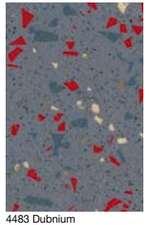
8806 Rhodium



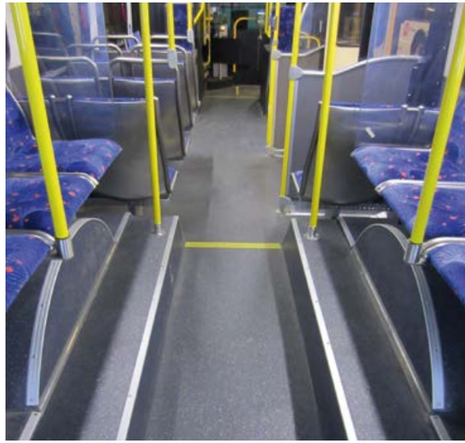
8486 Vanadium

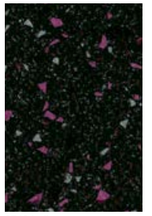


8031 Samarium

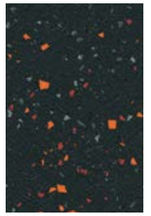


4483 Dubnium





3740 Indium



8803 Gallium

VENUS

6727 Anthracite

SAFEBUS

6602 Caledonia

6203 Borneo

Attachment A

Request for Change or Approved Equal

Please submit a separate form for each request for change/approved equal.

PROPOSER#: 2	**DATE:** 02/22/2022
PROPOSER: Gerflor USA	**PHONE:** (602) 299-9994
PROPOSER SECTION / PAGE#: Floor and Floor Covering Section 14.7 Page 78	

CHANGE REQUESTED:

For your consideration we submit the following for your approval as equal.
The flooring shall be 1/8-inch (minimum) smooth under the passenger seats and
over the remainder of the floor and step treads.
All step edges shall have Altro T36T Aluminum Step or Gerflor Tarabus Step Bus edge or Altro or Gerflor yellow nosing with a band of 2½ inches of bright yellow Altro or approved equal, inserted into the step edge using contact adhesive running the full width of each step.
An aisle width standee line of at least 2-inches in width of bright yellow contrasting color shall be in the aisle just behind stepwell.
The tread and step edge shall be bonded into one (1) piece.

AGENCY RESPONSE

Reviewed By: T. Kuczynski Date: 25 Feb 2022

Approved [X] Denied [ ] See Comment Below [ ]

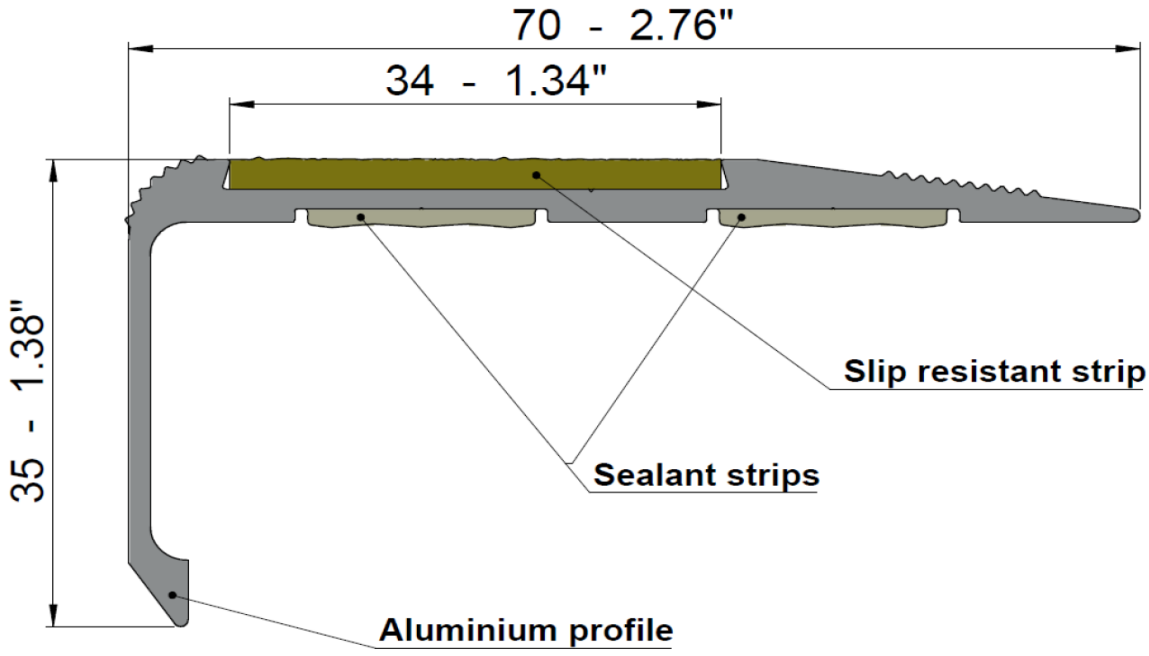
COMMENT:

Approve of material change to Tarabus provided all FMVSS, ADA and Buy America requirements are met. All exposed floor seams shall be sealed with an industrial grade butyl sealant or equivalent which conforms to ASTM C920.

STEPBUS

Technical Data Sheet

Description	Aluminium profile to be glued on TARABUS flooring. Profile delivered equipped with hol melt sealant strips. The profile is fitted with a slip resistant strip.		
Composition	Alloy of aluminium EN AW-6060 T5 in compliance with the standard EN 12020-2. Anodizing 15µm		
Technical characteristics	. Weight	g/ml	580 ± 20
	. Length	ml	2,98
	. Slip resistant strip (Grip) 3 versions		- Safebus BORNEO (Yellow) - Safebus CALEDONIA (White) - Without grip
	. Packaging 2 versions	ml	- 29,8 (x10) - 8,94 (x3)



Gerflor theflooringgroup

43,boulevard Garibaldi - 69170 Tarare (France)

Tel : +33 (0)4 74 05 40 00 - Fax : +33 (0)4 74 05 06 83

TARABUS SAFEBUS NT LW

Technical Data Sheet

Definition	Plasticized PVC, stabilised with a glass screen, with Csi particles on top layer. Non-woven under-layer.		
Presentation	. Design	Plain	
	. Surface texture	Calf	
	. Roll widht	200 cm	
	. Roll lenght	12 - 20 ml	
Technical characteristics	. Apparent thickness	ISO 24346	2,25 ± 0,15 mm
	. Weight per m^2	ISO 23997	2,30 ± 0,15 kg
	. Dimensional stability : 6h at 80°C	ISO 23999 ASTM D 1204	≤ 0,3 %
	. Abrasion resistance TABER - H18 wheels 1000 g 1000 g - 1000 Cycles weight loss	ISO 9352	≤ 300 mg
	. Slip resistance	DIN 51130	R10
	. Indentation test 50 daN/cm^2 - 150 mm Remanent strain	ISO 24343-1	≤ 0,2 mm
	. Low temperature resistance Impact test diam. 29 mm - E = 2 joules	D 42 1235 A	- 20°C
	. Phonic insulation	ISO 717/2	ΔI = 5 dB
	. Colour fastness	ISO 105 B02 ISO 4582/80 ASTM D 4459	≥ 7
	. Fire resistance	ISO 3795/76 FMVSS 302 ASTM E 648 95/28/CE R 118	0 mm/mn Conform (Ignited but extinguished) Class 1 Conform Conform
	. Chemical resistance	ISO 26987	Unaffected by diluted acids and bases Unaffected by domestic products excluding solvents for plasticized PVC

Gerflor theflooringgroup

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Tel : +33 (0)4 74 05 40 00 - Fax : +33 (0)4 74 05 06 83

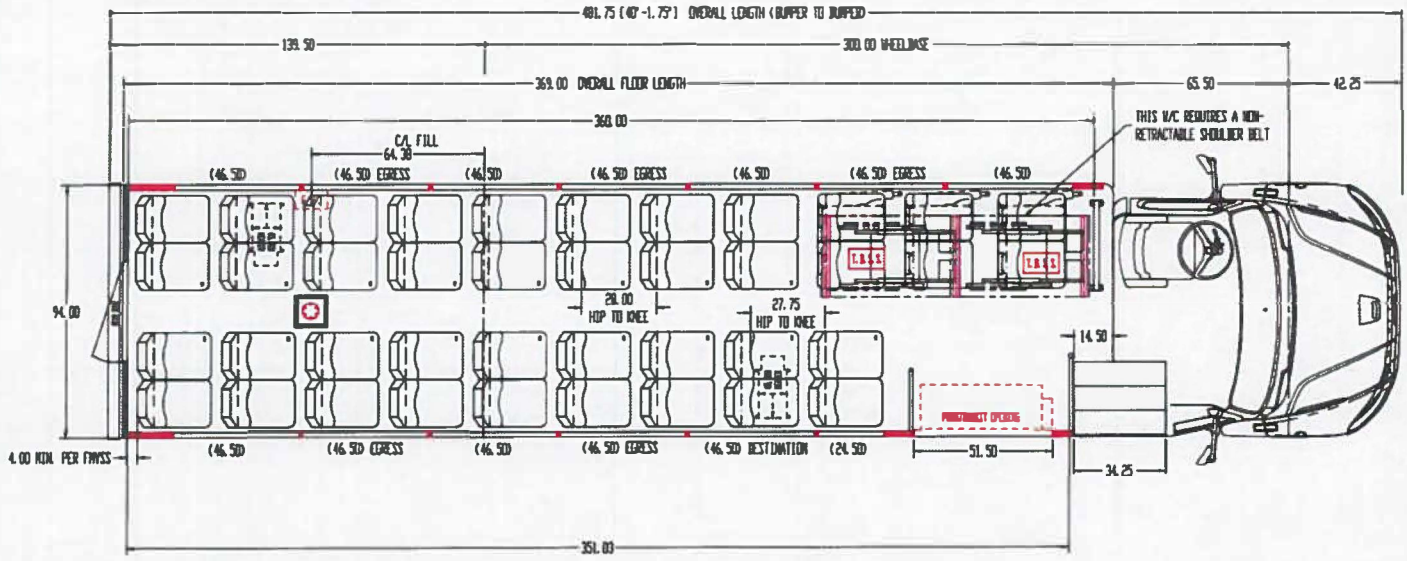
REQUEST FOR APPROVED EQUALS

RFP.#:	***22-034 Fort Bend Co.-Transit Vehicles***	RELEASE OF RFP:	***February 6, 2022***
PREPARED BY:	***Texas Bus Sales, Inc.***	DATE:	***Tuesday, February 22, 2022***
ADDRESS:	***1605 West 34th Street Houston, Texas 77018***	PHONE:	***(713) 681-3600***
MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: 1 SECTION; EXHIBIT I PARAGRAPH: 2. VEHICLE CLASS AND OVERALL DIMENSIONS

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the floorplan shown below.

40 – ambulatory passengers with two wheelchair positions occupied, three 3-step foldaways over those positions



RESPONSE **T**. Kuczynski **25 Feb 2022**

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** _____

COMMENT:

Proposed configuration is approved, all F**MVSS**, ADA and Buy America requirements apply.

REQUEST FOR APPROVED EQUALS

RFP.#:	***22-034 Fort Bend Co.-Transit Vehicles***	RELEASE OF RFP:	***February 6, 2022***
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MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: 2 SECTION; EXHIBIT I PARAGRAPH: 2. VEHICLE CLASS AND OVERALL DIMENSIONS

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the dimensions shown below;

Length:	40'
Wheelbase:	300"
Chassis	S2C
Engine:	6.7L Diesel
GVWR:	26,000
Passenger Capacity*:	40
Overall Width:	94"
Overall Height:	125.5"
Interior Width:	90"
Interior Height:	78"
Ground To Int. Floor:	39.75"
Ground To 1st Step:	12.75"
Step Riser:	9"
Step Tread:	9"
Step Width:	34.25"
Entry Door Clear Opening	30"

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: ____ **APPROVED AS MODIFIED:** X **DENIED:** ____

COMMENT:

Interior width dimension shall be 92 inches minimum.
All other dimensions listed above are approved. All other specification dimensions, FMVSS , ADA and Buy America requirements apply.

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MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: 3 SECTION; EXHIBIT I & II PARAGRAPH: 3. BODY

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the following body construction;

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.

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** ____

COMMENT: Roof panel shall lap the side panels by a minimum of 1 inch. Must meet FMVSS-220 and all other FMVSS, ADA and Buy America requirements.

REQUEST FOR APPROVED EQUALS

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MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: 4 SECTION; EXHIBIT I & II PARAGRAPH: 5 ROOF CONSTRUCTION

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the following roof construction;

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.

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** _____

COMMENT:

Must meet FMVSS-220 and all other FMVSS, ADA and Buy America requirements.

REQUEST FOR APPROVED EQUALS

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MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: 5 SECTION; EXHIBIT I & II PARAGRAPH: 3. BODY

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the following application of exterior sidewall material;

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.

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** _____

COMMENT:

REQUEST FOR APPROVED EQUALS

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RFA#: 6 SECTION; **EXHIBIT I&II** PARAGRAPH: **6. DOOR CONSTRUCTION**

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the following door construction;

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 90º 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

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** _____

COMMENT:

REQUEST FOR APPROVED EQUALS

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RFA#: 7 SECTION; EXHIBIT I&II PARAGRAPH: 9. INSULATION

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with an R value in the sidewalls of 6 and an R value in the roof of 8.

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: ____ **APPROVED AS MODIFIED:** ____ **DENIED:** X

COMMENT:

Sidewall and Roof R-value of 8 minimum. Insulation shall comply with the requirements of the Federal Transit Administration recommended Fire Safety Practices for Transit Bus and Van Materials Selection.

REQUEST FOR APPROVED EQUALS

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RFA#: 6 SECTION; EXHIBIT I & II PARAGRAPH: 14.6 FLOOR AND FLOOR COVERING

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the floor surface and stepwells shall be covered with Gerflor, Anthracite wall-to-wall, slip-resistant floor covering.

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** _____

COMMENT:

Approve of material change to Gerflor Anthracite provided all FMVSS, ADA and Buy America requirements are met. All exposed floor seams shall be sealed with an industrial adhesive grade butyl sealant or equivalent which conforms to ASTM C920.

REQUEST FOR APPROVED EQUALS

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MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: 9 SECTION; **EXHIBIT I & II** PARAGRAPH: **24.4.1 Destination Signs**

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with Hanover Destination Signs and Voice Annunciation system.

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: ____ **APPROVED AS MODIFIED:** X **DENIED:** ____

COMMENT:

Use of Hanover is approved; all other destination sign and annunciator specification requirements, FMVSS, ADA and Buy America requirements apply.

REQUEST FOR APPROVED EQUALS

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MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway*** DRich

RFA#: 10 SECTION; **EXHIBIT II** PARAGRAPH:

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: ____ **APPROVED AS MODIFIED:** ____ **DENIED:** X

COMMENT:

REQUEST FOR APPROVED EQUALS

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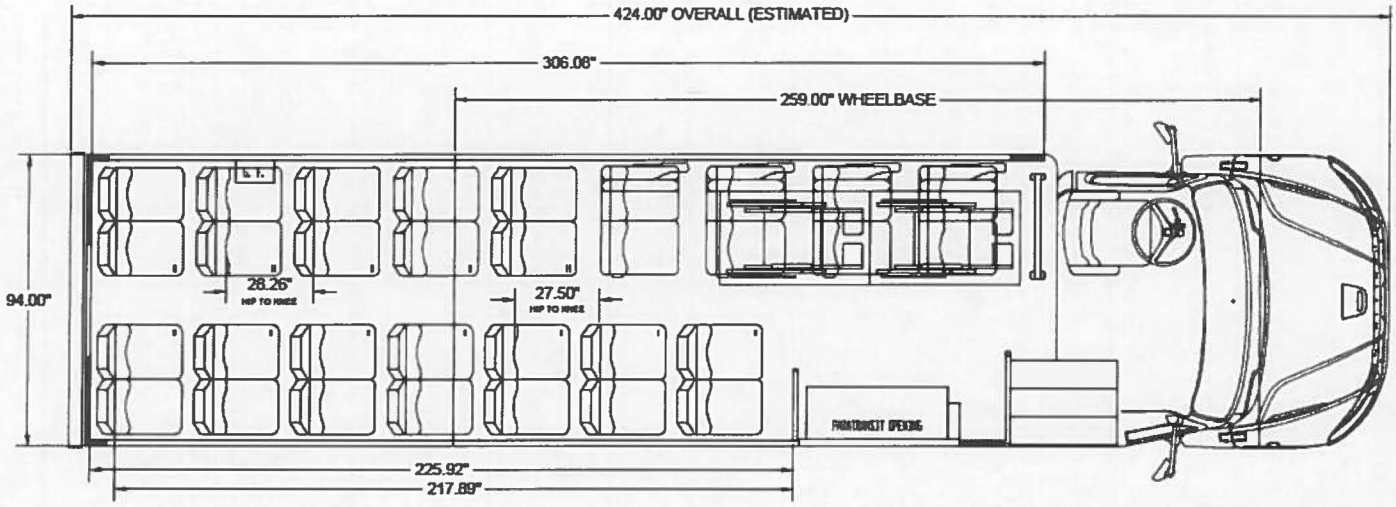
MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway***

RFA#: // SECTION; EXHIBIT II PARAGRAPH: 2. VEHICLE CLASS AND OVERALL DIMENSIONS

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the floorplan shown below.

32 – ambulatory passengers with two wheelchair positions occupied, four 3-step foldaways over those positions



RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: X **APPROVED AS MODIFIED:** _____ **DENIED:** _____

COMMENT:

Proposed configuration is approved, all FMVSS, ADA and Buy America requirements apply.

REQUEST FOR APPROVED EQUALS

RFP.#:	***22-034 Fort Bend Co.-Transit Vehicles***	RELEASE OF RFP:	***February 6, 2022***
PREPARED BY:	***Texas Bus Sales, Inc.***	DATE:	***Tuesday, February 22, 2022***
ADDRESS:	***1605 West 34th Street Houston, Texas 77018***	PHONE:	***(713) 681-3600***
MANUFACTURER:	***Champion Bus by Forest River***	REPRESENTATIVE:	***Darryl Rickaway*** DRick

RFA#: 12 SECTION; EXHIBIT II PARAGRAPH: 2. VEHICLE CLASS AND OVERALL DIMENSIONS

Texas Bus Sale respectfully requests the acceptance of a Champion Defender Champion Defender manufactured by Forest River with the dimensions shown below;

Length:	35'
Wheelbase:	259"
Chassis	S2C
Engine:	6.7L Diesel
GVWR:	26,000
Passenger Capacity*:	32
Overall Width:	94"
Overall Height:	125.5"
Interior Width:	90"
Interior Height:	78"
Ground To Int. Floor:	39.75"
Ground To 1st Step:	12.75"
Step Riser:	9"
Step Tread:	9"
Step Width:	34.25"
Entry Door Clear Opening	30"

RESPONSE T. Kuczynski 25 Feb 2022

APPROVED: ____ **APPROVED AS MODIFIED:** X **DENIED:** ____

COMMENT:

Interior width dimension shall be 92 inches minimum.
All other dimensions listed above are approved. All other specification dimensions, FMVSS , ADA, and Buy America requirements apply.