FUEL SYSTEMS

Any modification of Fuel Tanks, Lines, Hoses or Connectors is the complete responsibility of the Second Stage Manufacturer. The responsibility for determining compliance to F/CMVSS 301 regulations is that of the Final Stage Manufacturer.

To verify F/CMVSS compliance, vehicle testing may be required. Questions regarding compliance with F/CMVSS regulations should be directed to your legal counsel, the National Highway Traffic Administration or Transport Canada.

WARNING: Always refer to the Ram Service Manual before servicing any portion of the fuel system. Fuel rail pressure must be released before opening any fuel system. Welding around or near fuel system components is not recommended. Shield or remove components as required to protect them from heat and weld splatter.

Modification of the fuel tank, its location, lines, hoses, evaporative systems can affect F/CMVSS 301 system compliance. **If the Final Stage Manufacturer modifies any portion of the fuel system, they assume the full system responsibility.**

FUEL FILL SYSTEM

NOTE: Use of fuel fill kits as provided by Ram Trucks is recommended.

NOTE: Fuel Fill system installation is the responsibility of the Final Stage Manufacturer.

NOTE: All fuel system components must be mounted securely for possible impact situations. Avoid contact with vehicle chassis. Keep system components away from sharp edges to avoid possible chaffing or cutting during an impact.

RAM FUEL FILL TUBE KIT

A new fuel fill housing will be included in box-off models and has been designed for easy installation (external flange mounted) and to insure proper fuel tube fill angle of 37°. Included in the kit are installation instructions, various fill and vapor hoses that can be cut and assembled per body applications, hose clamps, ground strap, and a hose connector. A DIESEL or GAS fuel label will also be included depending on application. See Ram Body Builder document titled FUEL TANK FILLER PIPE LOCATION /ATTACHMENT for fuel fill kit part numbers.

Installation Suggestion

- Install components in areas not affected during impact conditions.
- Ensure no fuel vapors can enter vehicle interior during fill or general operation.
- Always mount the fuel fill housing as high as possible and route the fuel fill tube on a continuous downward slope (approx. 37°) to insure good fuel fill quality.
- Mount the fuel fill tube upper housing with the vent tube at the 9:00, 12:00 or 3:00 position.
- When routing the vent tube, make sure there are no dips or sags. It should have a downward slope from the “fuel filler tube upper” to the fuel tank vent nipple. Tie strap it to prevent any sags that may accumulate fuel in the hose.
- Any metal fuel fill mounting structure must be grounded to the vehicle chassis. Always connect the ground strap from the fuel fill upper to the frame. This is a must! If the ground strap is not attached Electro static build up could occur during refueling.

AUXILIARY FUEL PORT

An auxiliary fuel tap is provided on gas and diesel fuel tanks to provide fuel for secondary power systems. This is located on top of the fuel pump module and is sealed with a connector. It is an SAE J2044 standard 5/16 fitting for both gas and diesel tanks. It can also be used as a barbed fitting and will accept a hose and clamp. This system will not drain the vehicle fuel completely. There will be sufficient fuel to drive back from the worksite.

Utilize due care when installing a secondary fuel system. Install a check valve in line to prevent OBD11 system faults. Installing a secondary fuel port may affect the vehicles ability to comply with F/CMVSS 301 (gasoline engines ONLY). Refer to the fuel tank filler pipe location attachment section for a picture of the port. **Final Stage Manufacturer assumes all responsibility for fuel system modifications and system compliance.**

EXHAUST SYSTEMS

Modifying the exhaust system is not recommended as it may affect compliance to F/CMVSS and/or CARB/EPA certification requirements. Do not remove any original equipment exhaust system components. Never add components to the system that increases back pressure. Do not remove OEM clamps or hangers. Final Stage Manufacturer assumes all responsibility for exhaust system modifications and system compliance.

6.7L Cummins Diesel

The Cummins 6.7L engine is integrated with a diesel particulate filter after treatment System for EPA and CARB Certification. The Diesel Particulate Filter assembly consists of a diesel oxidation catalyst, a diesel particulate filter, and temperature and pressure sensors integrated into a modular housing.

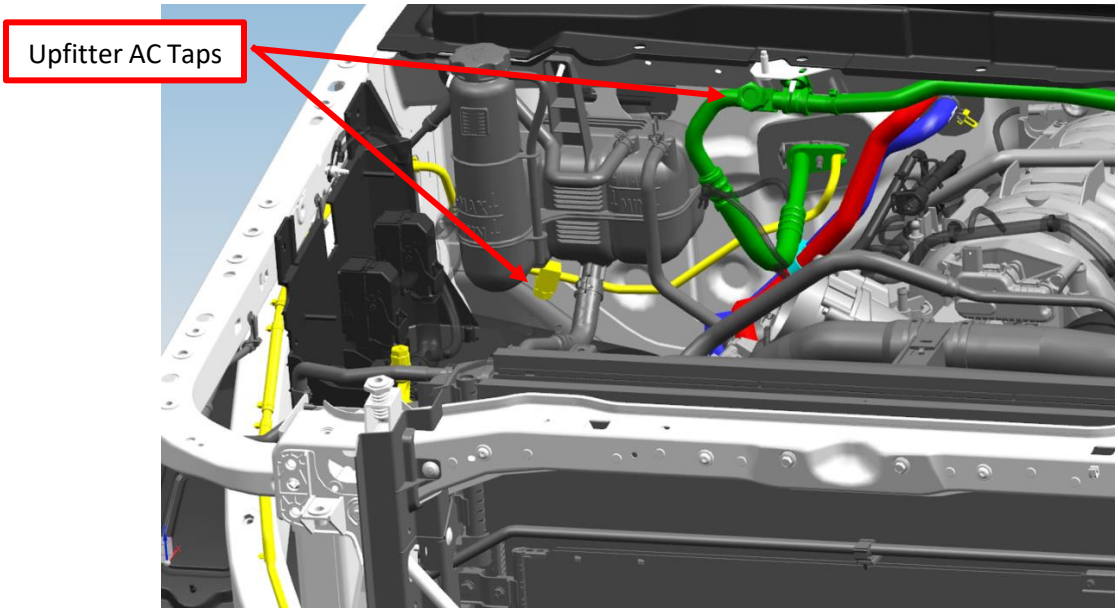
When removing the exhaust pipe for PTO installation it is recommended that the exhaust pipe clamp (PN: 52121859AD) and gasket (68071676AA) be replaced.

NOTE: Body Builders must not modify or relocate this assembly, or any components associated with it. Also there should be no modifications made to the exhaust from the turbo outlet to after the muffler.

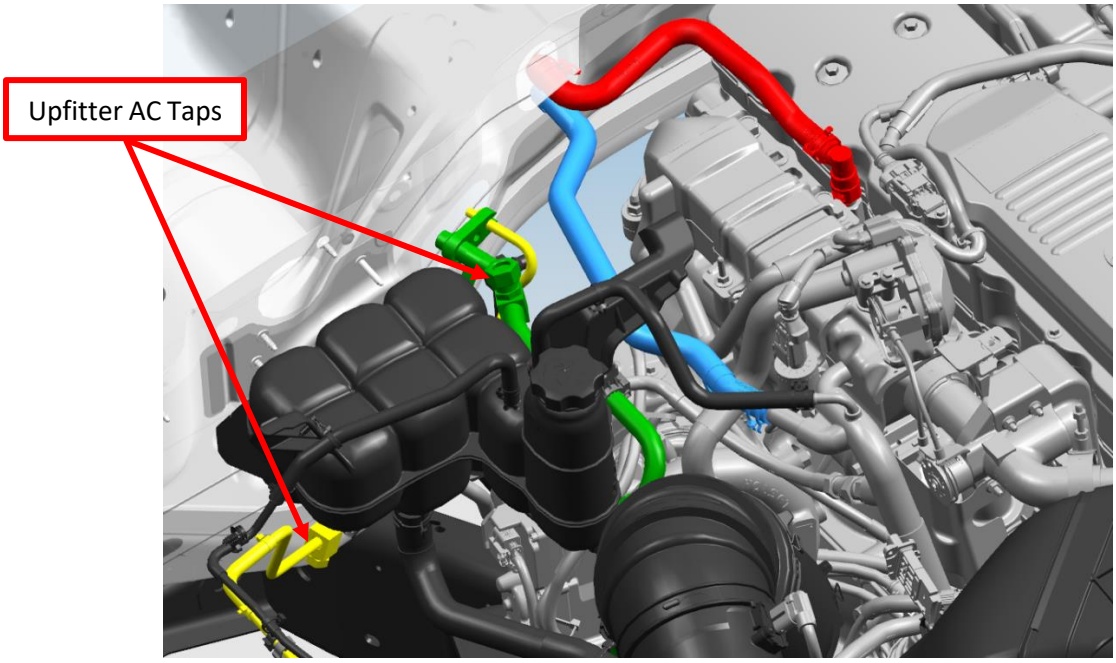
NOTE: Never remove heat shields provided as original equipment. It is also the Final Stage Manufacturers responsibility to install appropriate shielding to any secondary body or equipment installed onto the Chassis Cab. **Final Stage / Individual Manufacturers assume all responsibility related to modifications performed.**

COOLING SYSTEMS

Do not modify original equipment cooling system, fan, fan clutch, hoses and routing, or the shroud. Do not install secondary equipment that blocks the grill and bumper openings forward of the radiators. Doing so could result in unsatisfactory cooling system performance. Refer to a Service Manual for proper system fill procedures and service.



The above graphic shows locations of the heater hoses and AC lines at the passenger side rear of the 6.4L Gas engine. Yellow = AC Liquid Line, Green = AC Suction Line, Red = Heater Supply Hose Blue = Heater Return Hose.



The above graphic shows locations of the heater hoses and AC lines at the passenger side rear of the 6.7L Diesel engine. Yellow = AC Liquid Line, Green = AC Suction Line, Red = Heater Supply Hose Blue = Heater Return Hose.

Upfitter AC Tap Specifications.

Liquid line:
- 3/8” tube-o fitting
- Male threads on tee fitting: 5/8 – 18 UNF – 2A
- Female threads on anodized aluminum nut: 5/8 – 18 UNF - 2B
- O-ring HNBR: 7.37 mm ID X 1.81 DIA cross section

Suction line:
- 5/8” tube-o fitting
- Male threads on tee fitting: 7/8 – 14 UNF – 2A
- Female threads on anodized aluminum nut: 7/8 – 14 UNF - 2B
- O-ring HNBR: 12.93 mm ID X 1.86 DIA cross section

California Green House Gas (GHG) Regulation.

The certifying vehicle manufacturer must provide instructions, via an Incomplete Vehicle Document (IVD) or similar written document, regarding compliance with the A/C leakage standard to the non-certifying secondary vehicle manufacturer, and a copy of the instructions shall be submitted to CARB as part of the certification application.

The aforementioned instructions must include the following statements:

- The state of California limits the air conditioning refrigerant leak rate to 11.0 grams per year or 1.50 percent of the nominal refrigerant charge per year, whichever is greater, per 17 CCR § 95663.
- This vehicle, when completed, will meet the leakage standard in 17 CCR § 95663 if no alterations are made to the vehicle air conditioning system as delivered and no additional air conditioning components are added.
- If additional air conditioning components are added by a secondary vehicle manufacturer, or if the air conditioning system is otherwise modified by the secondary vehicle manufacturer, the final completed system must meet the leakage standard in 17 CCR § 95663.

Please reference the J2727 Approximate Total System Refrigerant Emissions table below for the refrigerant systems leakage information.

J2727 Approximate Total System Refrigerant Emissions						
Model	**Engine**	**Evaporator**	**Refrigerant**	**Refrigerant Charge (grams)**	**J2727 Leakage (grams/yr)**	**Max Allowed Leakage (grams/yr)**
Ram 3500/4500/5500 Chassis Cabs	6.4L Gas	Single	R134a	595	8.7	11
Ram 3500/4500/5500 Chassis Cabs	6.7L Diesel	Single	R134a	595	8.5	11

CAUTIONARY NOTES TO BODY BUILDERS

To provide a safe and serviceable vehicle to the customer, certain precautions must be observed to ensure correct assembly and construction of the finished vehicle.

1. Do not revise tubes or hoses as service systems' performance may be seriously impaired.
2. Locate body cross sills to avoid interference with chassis parts, fuel lines or fuel gauge tank sending unit.
3. Body interior layout, body structure, accessory installation, water and holding tanks, fuel and propane tank, and motor generator locations should be designed to provide equal side-to-side loading on chassis to avoid vehicle lean and adverse effects on vehicle handling. The combined weight of the chassis plus all items installed by the body builder, and an additional load allowance for reasonably anticipated passengers, liquids, luggage, and other equipment should not exceed the GVWR for which the particular chassis is designed, and the weight should be distributed between the front and rear axles so the max front and rear GAWRs are not exceeded.

4. Undercoating or sound deadening material should not be sprayed on any chassis, power train or suspension parts. Hardware that requires special care includes such items as electrical wiring, radiator, engine, accessory drive, transmission, prop shaft, steering mechanism, springs, shocks, exhaust systems or linkages.
5. Use caution when installing the body near the diesel exhaust fluid (DEF) pump and lines. These components are susceptible to damage during installation if applied bodies are dropped on them. Repairs due to damage will be the responsibility of final stage manufacturer.

SPARE TIRE

Chassis Cab (box-off) models do not include the winch, spare tire and spare wheel, however, the spare tire and wheel can be ordered as an option (sales code TBE).

NEW VEHICLE STORAGE

Protection of new vehicles from damage and deterioration prior to retail delivery is the body builder's and his dealer's responsibility as is any expense incurred as the result of such damage or deterioration.

1. Check engine coolant and antifreeze protection
2. After storage for more than 21 days the battery should be recharged for 24 hours minimum. For storage in cold temperatures, the battery should be removed and stored at a temperature above freezing.
3. Inflate tires to recommended pressure
4. Place parking brake in "off" position
5. Observe necessary security precautions to avoid pilferage and vandalism
6. Keep windows closed, doors locked and trim covers intact and in position
7. Keep engine, steering wheel and cab back covers intact and in position when applicable
8. Do not use chalk or crayon on glass or painted surfaces. Scratches may result

HEAD LAMP/TAIL LAMP CIRCUITRY

Adding lamps to the head lamp/tail lamp circuits without a Separate relay may damage the electrical system. Please refer to the Lighting information in BBG documents titled EXTERIOR LIGHTING MODIFICATIONS/LED'S and AMPERAGAE CAPACITY PER CIRCUIT.

LIGHTING CONSIDERATIONS – CAB CHASSIS

As built, the Cab Chassis provides combined rear turn/stop lamp Lighting. A typical up fitter installation will remove the tail lamp assembly and replace it with one of their own. Care must be exercised to match the original equipment lamp loads so that proper fault detection by the electronic control module is maintained. Bulb out detection has been disabled on all chassis cabs with a GVWR of 10K and over and all pickup trucks with box delete. (Sales Code XBC)

FRAME ALTERATION INFORMATION

The following section shows suggested guidelines on modification of Ram frames for various after market applications.

CAUTION: *Use of proper safety equipment is recommended when performing any modifications or alterations*.

The Following Recommendations Are Consistent with Industry Standards

FCA does not recommend any modifications or alterations to the frame assembly. Modifications or alterations (i.e. hole drilling, welding, etc.) to the frame assembly are the responsibility of persons performing these modifications or alterations. Anyone altering the frame must assume complete responsibility for assembly, performance, reliability and compliance of applicable FMVSS requirements.

The following procedures and specific precautionary instructions are recommended for proper installation of special bodies and/or equipment on the Ram Frame. Failure to follow these recommendations could result in damage to the basic vehicle and possible injury to occupants.

Holes

Holes are not to be drilled in the top or bottom of frame rails. Holes to mount out-riggers, brackets, and supports must be drilled in the web (vertical sides) of the frame rail with the following restrictions:

1. Hole diameter should not exceed 20 mm. (0.75 in.)
2. Material between edge of hole and top or bottom of the frame rail must not be less than 40 mm. (1.60 in.)
3. The minimum edge distance between any two (2) holes must be larger than twice the diameter of the larger hole.
4. Any thru-fastener that torques down on both external surfaces of the rail must use an internal spacer to prevent crushing the rail tube.
5. All holes should be drilled in the frame using drilling practice and safety precautions.
6. Avoid drilling holes near the fuel tank, fuel and brake lines and other lines and wires to avoid damage to them.

Welding

Prior to any welding, the following must be done:

1. Avoid welding near the fuel tank, fuel and brake lines or components that may be damaged by the heat of welding. If it is necessary to weld near these areas, use wet cloths to cover these components. If it is necessary to remove the fuel tank, lines or other components, do it in accordance with applicable service manual procedure.

2. Components near the welding area which could be damaged by excessive heat must be removed or adequately shielded.
3. Disconnect the battery (ies).
4. Precautionary measures should be used to prevent electrical system components or wiring damage.
5. Frame e-coating must be removed from the welding and surrounding area.

Use proper welding techniques to avoid stress risers that may adversely affect frame performance.

After Welding:

1. Carefully inspect electrical components and wiring for shorts or other damage.
2. Apply protective coating to areas where coating was removed.

BODY MOUNT GUIDELINES FOR BOX REMOVAL OR DELETE

The following section shows suggested guidelines for Body Mounts for Ram 2500/3500 pickup applications.

CAUTION: *Use of proper safety equipment is recommended when performing any modification or alterations.*

These guidelines apply to second stage manufacturers who mount a body to the Ram Pickup Truck. This applies to trucks which have been ordered from the factory with the box deleted or those where the factory installed box is removed after delivery.

- The mounting location brackets on the chassis that are used for the pickup bed mounting should be utilized for installing the new body. On the short bed there are six mounting location brackets and on the long bed there are eight.
- Grade 10.9 M12 Fasteners (or equivalent) should be used. Torque to 60 ft-lbs.
- With the body in position the gap between the body mounting points and the chassis mounting brackets should be minimized to assure that there is no distortion of the chassis mounting brackets when the body mounting fasteners are torqued to specification. Metal spacers are recommended in cases where the gap exceeds 2 mm.

Since the guidelines might not be appropriate for every application of a body installation, following the guidelines listed above does not eliminate the responsibility of the second stage manufacturers to certify to compliance to FMVSS and CMVSS standards.

The final stage manufacturer who installs a second unit body on the chassis is responsible for compliance with FMVSS/CMVSS 204(1), 208(2), 212(3), 214(3 & 4),219(3), and 301(3) federal regulations. Questions regarding compliance with FMVSS/CMVSS regulations should be directed to your legal counsel, the National Highway Traffic Safety Administration, or Transport Canada.

BODY MOUNT GUIDELINES FOR 3500/4500/5500 CHASSIS CAB

These guidelines apply to second stage manufacturers who mount a body to the Ram Chassis cab. There are figures in the dimensions/frame and exhaust section that show pierced holes that are provided for shear plate attachment.

Body mounting Details

1. The applied body should be mounted a minimum of 3 inches away from the rear surface of the cab as measured at the center of the cab.
2. U Bolt attachment in the transition area of the frame i.e. the area behind cab where the frame transitions from a deep section to a narrow section is not recommended. Shear plate holes are provided in this area. The 84 CA frame does have a straight frame area beyond the transition where U bolts are allowed.
3. At the rear of the frame there are several options. Two shear plate holes are provided at the rear of the frame as shown in the dimensions/frame and exhaust section. These holes may be combined with the pair of holes that attach the taillight. They can be enlarged to 21/32" like the shear plate holes if required. This can be used to attach the body as well as a bumper/step/trailer hitch bracket. In addition, space is provided at the rear of the frame for U bolt access. There are relief areas at the corners of the rear fuel tank to allow U bolt installation with adequate clearance to the fuel tank.
4. Shear plates at the front attachment should be angled forward 45 to 60 degrees from the horizontal. This is easily done by centering the shear plates on the two frame shear plate holes and angling them forward.
5. Shear plate holes are sized to allow the use of 5/8 inch diameter fasteners. Grade 8 or higher fasteners should be used with hardened washers. They should be torqued to 65 ft-lbs.

The final stage manufacturer who installs a second unit body on the chassis is responsible for compliance with FMVSS/CMVSS 204, 208,212,214, 219, and 301 Federal regulations. Questions regarding compliance with FMVSS/CMVSS regulations should be directed to your legal counsel, the National Highway Traffic Safety Administration, or Transport Canada.

PARK BRAKE CABLES

The park brake cables are routed to provide the most efficient system possible. When up-fitting, do not modify, alter or re-route the cables. NOTE: If the cables are modified from their OEM positioning, the final stage manufacturer will be responsible for recertifying the vehicle to FMVSS 105.

If the up-fit has structure (brackets, bolts, etc) that requires the same space as the cables, try to protect the cables and their routing. In both the park brake applied and release positions, the cables cannot be pinched, have movement restricted, moved or held out of their location. The cable strand (silver in color) cannot be covered with a foreign substance (paint, e-coat, underbody coating, etc) within 3" (75 mm) of the front cable frame bracket and within 3" (75 mm) of the front

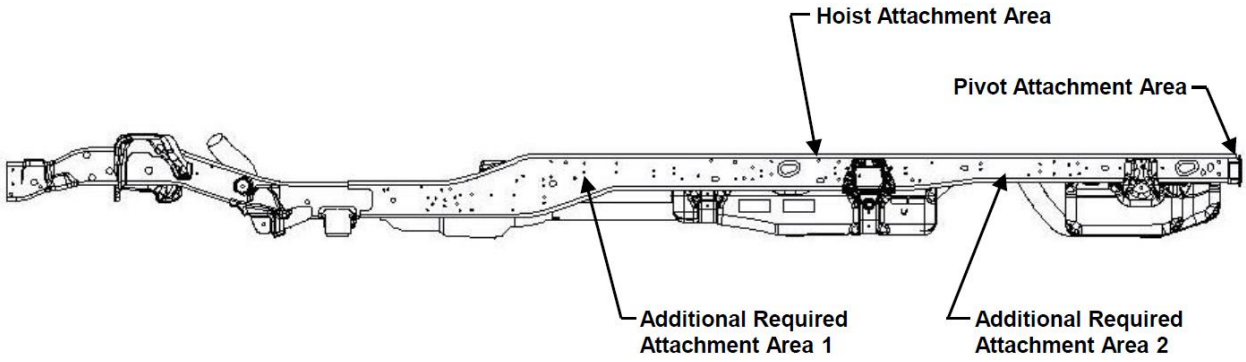
of the tensioner (bent nail, threaded rod, and bowtie equalizer). The cables and/or routing can be protected by using grommets, soft surfaces or other means that will not cause a rub condition. Cables should not rub on any surface as this could potentially cause damage to the cable and possibly degrade or impair parking brake performance.

NOTE: The tensioner (bent nail, threaded rod, bowtie equalizer) on the right rear parking brake cable moves forward in vehicle when the park brake is applied and moves rearward in vehicle when released. This is a conduit reaction system where the right cable must move forward when applied in order for the vehicle to park.

DUMP BODY INSTALLATION REQUIREMENTS

Four attachment points are required for 4500 and 5500 models.

- The hoist and pivot attachment areas can use typical industry standard attachments.
- The additional required attachment areas require attachment only for control of the downward load. In other words, shear plates are not required. A spacer 2 inch x 2 inch that contacts the sub frame and the top of the vehicle frame is sufficient.
- Attachment area 1 is just behind the cab in the front sheer plate hole area.
- Attachment area 2 is approximately at the centerline of the rear axle.



UP FITTER CAUTIONARY NOTE

The frame has been designed to support in-service loads assuming that up fitter attachments will be made so these loads are evenly distributed over the length of the frame. This avoids concentrations of load in the frame due to incorrectly chosen or too few attachment locations which could lead to issues with frame cracking despite being within the overall chassis design load limits. Attention must be given to the quantity, location and method of up-fit attachment to the chassis/frame. Up fits with a heavily biased load distribution require even more attention concerning attachment to the frame in order to achieve an even load distribution.

UP FITTER ATTACHMENT DESIGN GUIDELINES

For adequate mounting and load distribution using spacers between the frame and the up-fit which follow the form and profile of the frame rail is advised. This assures that the applied body's loads are distributed along the frame and not concentrated where higher stresses could occur. Longitudinal spacers with a taper at each end should be used along the top of the rail between the up-fit's sub-frame components and the frame rail whenever possible as shown in Figure 1 & 2. Note: These spacers should have clearance in them at each rivet location to avoid bearing stress on the rivets.

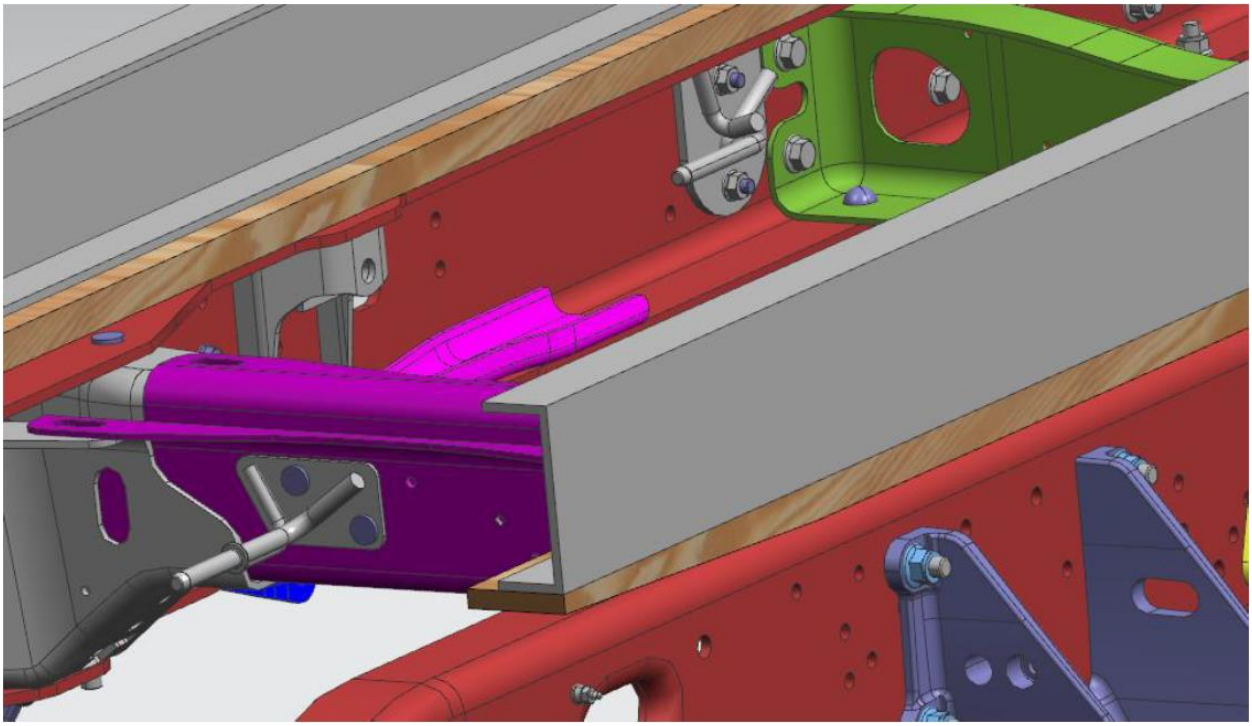


FIGURE 1

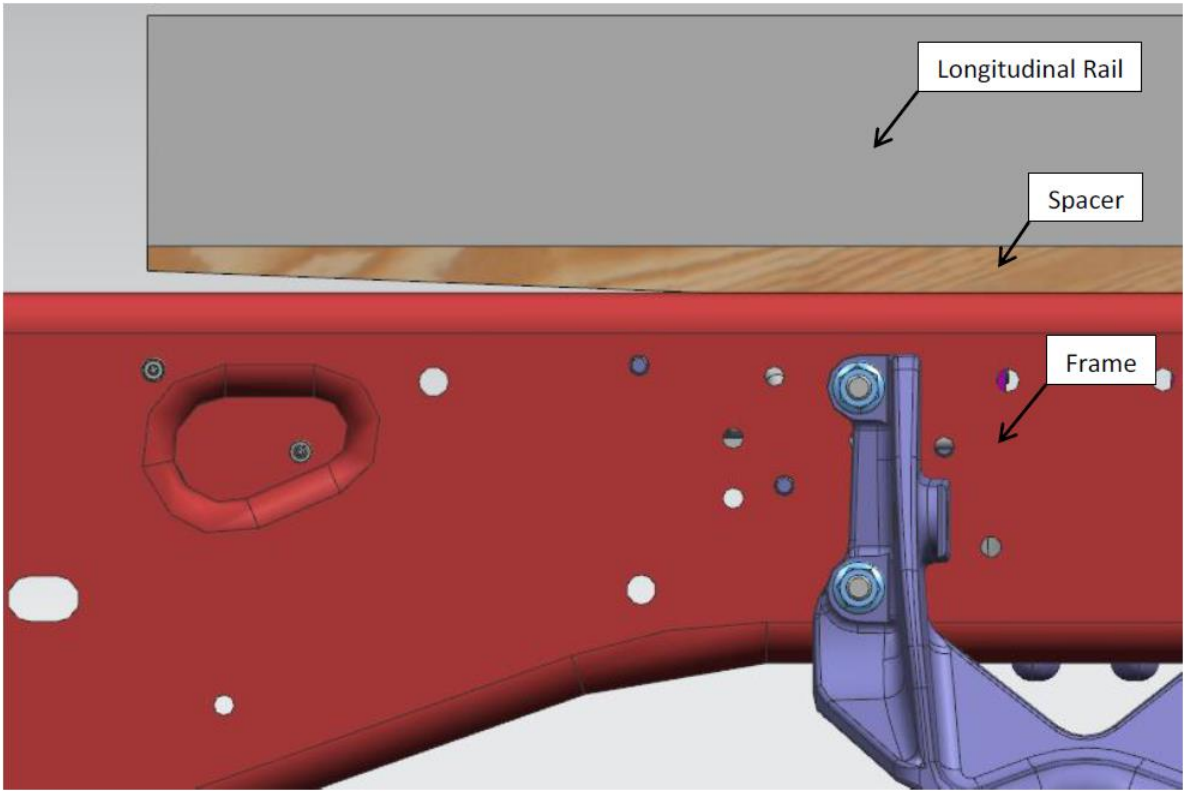


FIGURE 2

Multiple attachments between the up-fit body and frame are required to keep the up fit snug against the longitudinal spacer. Attaching the applied body at only the front and rear ends is not sufficient. A good common mounting practice is to attach every 18 inches where possible. If U-bolts are used as an attachment, at least one shear mount per side and multiple U-bolt attachments per side (depending on wheelbase) are required to keep the spacer and up-fit secure against the frame rail. If using U-Bolts for attaching the sub-frame to the vehicle frame, vertical spacer blocks must be installed between the upper and lower flange of the rail at the point of attachment in order to prevent damage to the flanges. Vertical spacer blocks must account for adequate clearance from all electrical or fluid lines installed along the rail. When using wood as a spacer, always ensure there is adequate distance or protection from exhaust system heat.

Note: Do not use U bolts on any other location other than flat sections of the rail. If the rail is changing depth in the area necessary to attach, always use a shear plate. Critical zones to avoid U-bolt attachment are show in **Figure 3 & 4.**

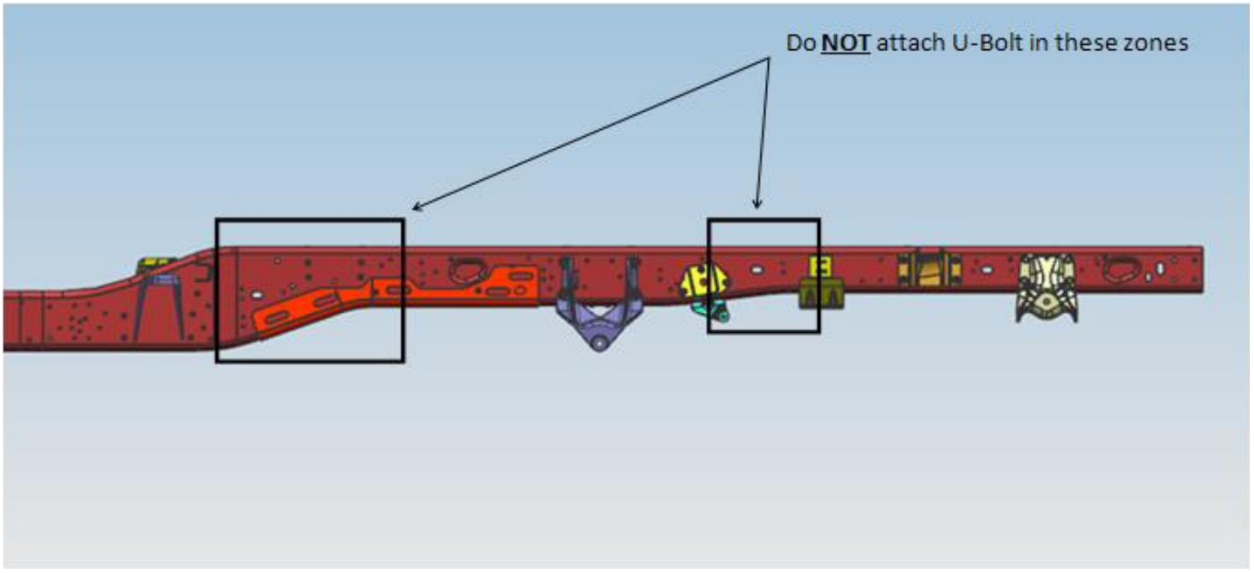


FIGURE 3

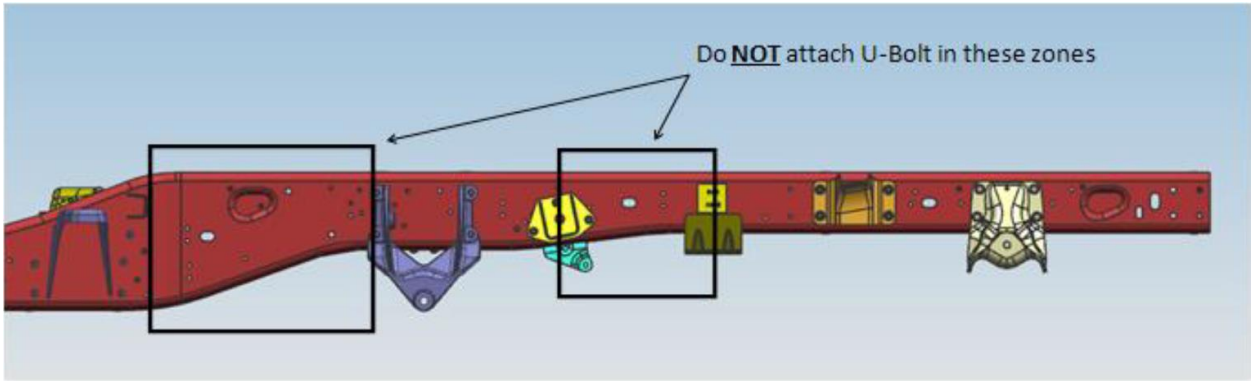


FIGURE 4

Though it is not recommended, where the use of a longitudinal spacer is not practical such as when the gap between the rail and up-fit sub-frame is too large, a minimum of 4 attachment locations per side are required along the rail to assure even distribution of load. An example of suggested attachment locations can be seen in **Figure 5**. These 8 attachments **cannot** be located in the areas of the rail outlined in **Figure 6**. These are the areas of the shock skive out reinforcement which is rearward of the front auxiliary spring pad bracket and forward of the jounce bumper bracket, as well as, the area that has 3 holes forward of the rear spring rear hanger. Efforts to provide longitudinal spacers in areas where clearance is not an issue should still be made.

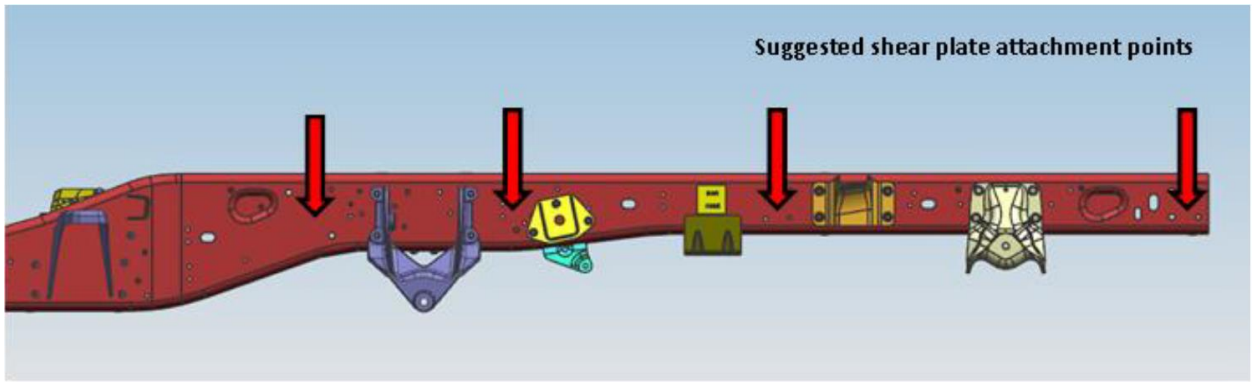


FIGURE 5

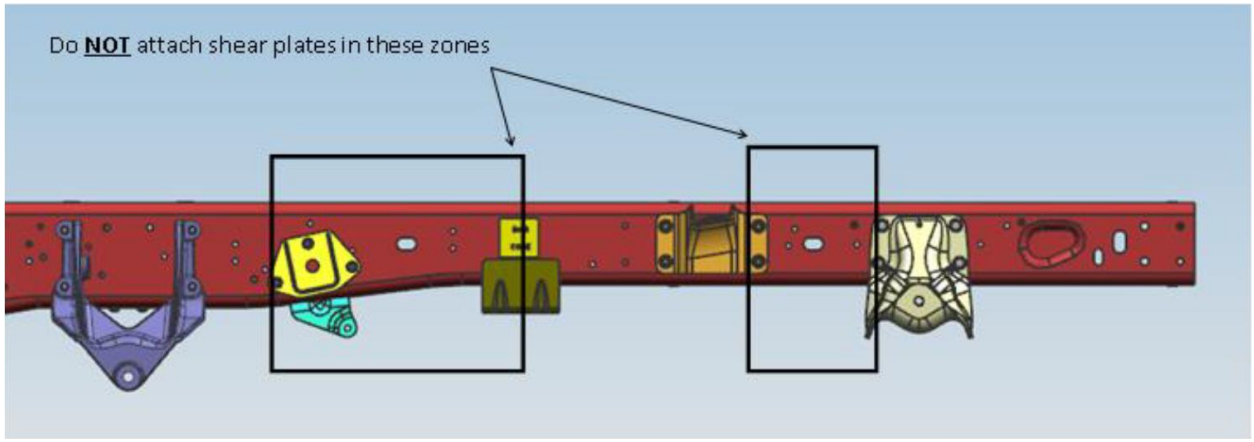


FIGURE 6