21 Factors you better consider *before* spending your hard earned *money* on a 5th Gen 4Runner Roof Rack!

(because it won't do you any good after!)

| *Just a helpful guide to help you sort some of those pesky roof rack buying details.*

CORPS 1804

#1 Steel vs. Aluminum Material
Both are good, but some differences exist.

a. Steel Sheet or Tubing – Steel is an alloy made from Iron and Carbon which come in many formulas that produce different grades. Steel is solid, commonly used to make road and train bridges, heavy-duty off-road bumpers, skid plates, and is used to make vehicle frames. Steel is tough in that it has good surface hardness to resist gouging. The downside to steel is that it rusts when not properly covered with a durable coating. When making roof racks from steel, steel sheet typically starts as a flat sheet that has a pattern cut out of it, then it is bent into a final shape. At this point it can be welded or bolted together after coating. Steel tubing is cut to length, bent on a mandrel, and then welded together.

b. Aluminum Sheet or Extrusion – Aluminum is primary made up of aluminum with a small amount of other elements. The difference in elements and processing is what creates different grades. Aluminum is also strong, typically twice as strong as steel per weight but not as strong as steel per volume. That is why aluminum is usually thicker than its steel counterpart for the same applications. It is used in planes and spacecraft due to the combination of strength and weight savings. Surface hardness is okay, but less than steel's. Aluminum Sheet is cut to shape like steel, and then either remain flat or be bent dependent on grade. Aluminum Extrusions are created by heating the material to a semi-molten temperature then pushing it through a die to get a desired shape. It is a very high-end version of pressing Play-dough through a die plate to make different shapes. Aluminum Extrusions used as cross members on racks with side plates are commonly known as 8020. There is also aluminum tubing, which is not often used in roof racks due to cost and being easier to deform than steel.

#2 What is holding all the roof rack weight?

At first, it appears that the OEM rack has four large feet transferring the weight from the rack to the roof, but that is not he case. What is actually transferring the weight to the roof are eight small oval-shaped posts on the bottom of those feet. There are two posts on each foot, the total combined contact area of all eight posts is only 4.13 sq. in (.51709 sq. in. each). For reference, a standard 3" x 3" size Post-It Note has 9 sq. in. of area. This means the total area that transfers the weight from the rack to the roof is less than half the size of a Post-It Note.

Okay, so obviously there must be some very robust structure under the roof can hold that weight. Yeah, sure, look at the arrow to the left, and you can see the black metal threaded clips that the rack screws into and the surrounding structure. The clips are attached to a metal flange just above where the outer and inner sheet metal panels are joined together. This does form a pretty strong box section near vertical supports, which does help transfer the rack load through the body to the frame. But honestly, you kind of wish there was some sort of beefy roll bar in there for a little more peace of mind.

So, when you load up your rack, remember what is holding all that weight to the vehicle as you are cruising down the trail over a bunch of whoop-d-woos, catching air.

#3 Full Length, Three-Quarter Length, Half Length, who, what, why?

Generally, “length” refers to how much of the vehicle’s roof the rack covers. These are generalizations, not absolutes. Most full-length racks do not reach all the way to the windshield in the front, nor to the very back. Especially the very back, because doing so would block the rear hatch from opening. So, full length racks are not the full 97” of roof length, but several inches shorter. Three-quarter length racks on the 5th Gen 4Runner generally start around the front of the rear doors and go nearly to the back. So roughly about 62”, maybe a little longer if they extend forward of the front factory roof rack mounting points. If you’re doing your math, 62 divided by 97 equals 63.9%. - In marketing terminology, that is closer to 75% than 50%, so it is a three-quarter length rack. Never mind that 75% and 50% are purely arbitrary chosen percentages.

Okay, so what does this mean to a buyer? More room = more stuff = too much stuff? Here are some scenarios where we see the need for full-length racks.

- **You have a rooftop tent and want to store more items on the roof besides an awning.**
- **You want to have a light bar on your roof rack. Generally, they work better closer to the front of the roof than further back.**
- **You want to transport a canoe or sea kayak. A canoe will sit better on a longer rack since it won’t tip down and touch the front of the roof. A sea kayak can be secured closer to the kayak ends for better tie-down leverage.**

Other circumstances may dictate using a full-length rack, but these are the most common ones we see. Otherwise, the three-quarter length will do the job for most situations. There are very few issues with getting a full-length rack over a three-quarter size, so even if you do not have a “need” but a “want” for a full-length rack , that is fine. You will experience a cost difference, a little extra install effort and, at times, a little fussing with fairing adjustment o reduce wind noise

#4 Width is just as important as length.

Just as length will affect how much you can put on a rack, width can also affect your rack capacity. Wider racks provide more flexibility to position gear where you want it. The most significant benefit is that you do not have to reach as far over the vehicle roof to get to your gear, reducing how much you have to lean on a wet, muddy, snow-covered, or dirty truck. A wide rack is also beneficial when you combine a rooftop tent with an awning. If your rack is as wide as your tent, 55” wide seams to be a common RTT width, the awning brackets do not have to old the awning as far out from the rack, which reduces stress on the rack.

#5 Weight – Like the doctor tells many of us, we should lose some, or even a little more.

We will start out with the easy part first, the weight of the rack. The 4Runner roof can only hold so much weight and the weight of the rack needs to be included in this amount. The more it weighs, the less remains to add gear to it.

Now to the hard part, because Toyota will not give us load ratings for the roof, and because some people are ready to litigate in a flash, roof rack manufacturers are hesitant to provide load ratings. So let's talk about some use scenarios and what thought processes you might want to consider when loading a rack.

Static Weight Load – "Static" refers to the vehicle not moving. In this situation, we are looking at gravity as the primary contributor to load weight. In this scenario, the vehicle is more like a building than a vehicle and has limited demands on its structure, allowing it to take on more weight. This works well for roof top tents (RTT), which have the weight of the users in them when parked but are free of them (at least should be) when moving. It is not hard to imagine that a rack may be holding 300- 400 lbs more when stopped than when moving. Now, if you are having monkey sex in the RTT, you should factor in a multiplier of 1.5 to the user's weight and make sure it does not exceed the tent's or rack's static weight load.* You can also reduce the amplitude of the monkey sex action to stay within the weight limits. (*We calculate the tent's height as a limiting factor to total monekyness.) Hopefully, any roof rack company you are looking at will give a static weight limit for you to follow. (We do!)

Dynamic Weight Load – This is the sketchy part. "Dynamic" refers to the vehicle moving. But how is it moving? Is it doing 25mph in a residential neighborhood, 15 mph on a rough trail tossing everyone side to side, or getting 5 feet of air while covering over 100' of sand dune? Each of these scenarios will have a different weight load limit. You should adjust the total weight on the roof rack accordingly. Just be sure to accommodate the unknown "event" in your calculation that might take you over the limit. Things like unmarked speed bumps in the neighborhood, the unseen hole you bottom out in on the trail, or the rock under the sand where you land your jump.

In conclusion… that was not a very satisfying answer to the weight-load limit question at all. I could say more, but legal will not let me. If pushed for an answer, we would say put as little on your roof rack as possible and drive empathetically to the weight you have up there. Also, realize that the weight on a rack adds up fast , so actually weigh your gear, add it all up, and maybe you find that 7-gallon shower tube full of water (1 gallon of water = 8lbs, x 7 = 56, plus 10 lbs for the tube weight = 66lbs) needs to get filled at camp or stays home and you take some body wipes.

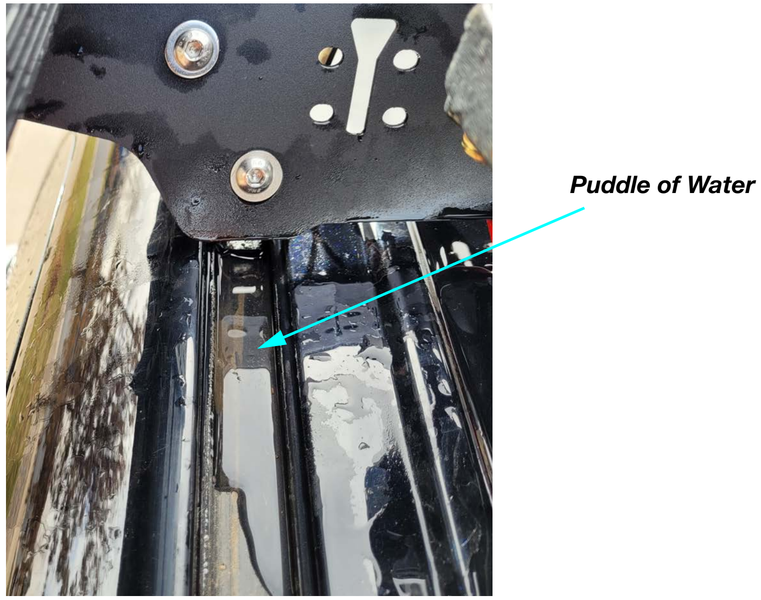
#6 Just be with the one you love!

If there is one rack you have your heart set on, **just get it!** Just make sure it will do what you need it too. No matter how much evaluating, justifying, or calculating value you do will beat out the joy of getting "the **ONE**". By getting the "ONE," you have changed your attitude toward the rack and will be more accommodating toward any minor issues during installation or adding accessories. If you select the logical choice (unless they are the same, then lucky you), you will quickly become frustrated and lose pride in ownership. Yep, you lost that lovin' feelin', now it's gone, gone, gone, whoa-oh!

#7 Powder Coat Finish

One of the most common finishes applied to steel or aluminum racks is powder coating. This very durable coating is typically much tougher and environmentally friendly than paint.

Aluminum can be tricky to powder coat because the surface needs the correct preparations for successful, long-lasting adhesion. The reason is that aluminum oxidizes quickly, and the oxide must be entirely removed for the powder coating to adhere correctly. This normally means adding extra steps to the powder coating process which in turn adds cost. Powder-coating aluminum may be less durable than powder-coating steel, particularly when exposed to extreme climatic conditions or heavy use.



#8 The roof is leaking! The roof is leaking!

Wow! So many comments on 4Runner forums are about water leaking into the vehicle after putting installing a rack.

So let us dig into this a little. For reference, Toyota has sold 1.3 million 4Runners from January 2010 to July 2023. Many have the roof rack design with the two side aluminum extrusions connected to die-cast metal feet (under the plastic covers). For these racks, Toyota uses a sealant between the die-cast feet and the vehicle to keep water from leaking into the interior. Nearly all roof rack manufacturers instruct installers to use a sealant, like Toyota, (who feels it is an excellent solution to do it on over a million 4Runners), around the mounting points when installing their racks. There should be no issue if this step is completed correctly. Care does need to be taken that the sealant covers the perimeter of the mounting point openings and that the mounting surface is free of dirt or any other foreign debris. Some companies produces rubber mounting bushings for their racks that eliminates the need for sealant, but even then, if the mounting surface is not clean, say you get a pine needle under the bushing, those might leak too. The best advice is to follow the manufacturer's instructions and complete all steps in the installation process.

Just in case you are think it is okay to skip the sealant step during installation, the rack mounting holes are on the bottom of grooves that run along each side of the roof. Rain, melting snow, and water from washing the vehicle that does not run off the front or back of the roof runs into these grooves and can be backed up around the rack mounting points. This means you have a ***puddle of water*** just sitting around the sealant or the bushing until it blows out while driving or evaporates. Or, if you chose not to use sealant, then it leaks into the vehicle.

#9 Toyota Design – Are we infringing?

1st - Toyota is good at developing design solutions that last. They do this by identifying where things fail and then improve them so they do not. This approach addresses the normal driving behavior of probably 90% of their customers, meaning that most people will drive within the limits of its ability.

2nd - Toyota will also “detune” a design to make it last longer. This is where a component is designed so that it cannot reach the limit of its capabilities—sort of the backward-looking view of over-designing a part. An example is a speed limiter, where the vehicle cannot go beyond a set speed, even though the motor could make it go faster.

3rd- Another approach Toyota uses to make their vehicles last longer is by telling the customer the vehicles limits. Like the Gross Vehicle Weight Rating (GVWR), the total amount of weight the vehicle is engineered to handle under regular use. Will it break if you go 5 or 10 pounds over? Probably not, but you are now eating up the extra margin built in to give you that longevity Toyota owners love. This is the approach we see with the stock 4Runner roof racks. Toyota has limited the weight on the stock crossbars to 132 lbs. Not much at all. Yet we see 4Runners out there with aftermarket racks sporting rooftop tents, overloaded cargo boxes, fuel cans, traction boards, vehicle jacks, and other items that add up to more than 132 lbs.

So, what gives? Well, it is the longevity that will give. How much less longevity? That depends on how much weight and how rough the driving is. More weight and more rough driving is less longevity.
So, more is less, ...more or less.

#10 You got a rack
Now, how much more are you going to need to spend?

Think of a roof rack as a Christmas Tree. Once you get a tree, you add lights, ornaments and other decorations that may have special meaning. Some people add a tree topper or a tree skirt. Some like to add to the tree every year, some like to keep it the same, and some want to change it all up each year.

Now look at roof racks, you can put all sorts of gear on it like ornaments on a Christmas Tree. The vast difference is that you can hang items on a tree with inexpensive hooks, while roof racks require some not-so-wallet-friendly custom mounting solutions. These solutions tend to be specific to certain each style of rack, so what works on one rack style may not work on another. Pricing can also vary by a wide margin too. Which takes researching which rack to buy to another level of complexity when trying to figure out a total rack cost. Just know is not difficult to spend more than 50% of the total cost of the rack on mounting solutions for a bunch of gear.

#11 Do you need a DIY friendly roof rack?

Do you have an unusual use for a rack? Can you not find a suitable attachment solution for your gear? Do you need a budget friendly attachment solution? If you are handy, and competent at developing a solution for your need, look for racks that will allow you to use what is at your disposal to mount your gear. Check out how each rack type develops solutions to mount gear to their rack, then see what can be worked out from items at your local hardware store, or the McMaster Carr website to build your solution. Just make sure you price out your design before committing; hardware and brackets add up fast, even from the hardware store, especially stainless-steel metric hardware.

#12 Get it for free!

Some rack designs have integrated features that you essentially get for free where as on other rack designs you will have to buy them. Some of these features may be camp light mounting locations, handles, fairings with cut outs for specific types of lights, and beer bottle openers. Hopefully, the rack manufacturers you are looking at lists those out for you, so you can include that in your evaluation.

Image from Rhino-Rack

#13 Are platforms for you?

Platform-style racks offer a full flat top surface with nothing sticking above it on all sides. There is what we would call, the “true” platform style, which usually consists of multiple wide aluminum extrusions with the ends terminating into other aluminum extrusions that are capped with rounded corner pieces. The extrusions are generally close enough together that you can walk around on them.

Some racks are “platform-like” in that they do not have any sides but you will not be walking around on them without some extra parts at added cost.

Round tube racks, side plate racks, and cross-frame racks can all be “platform-like.” If the rack has sides or side plates stick up above the “platform”, you may have to use special hardware to hold some gear or you may be limited where you can place it.

“Basket style” racks have sides that stick up a couple of inches all the way around and are great for strapping bags or boxes to the rack since they are typically made of tubes, which are great for tie-down points. However, you will need to lift your cargo a couple inches higher to get over the sides, an issue even for people over 6 feet tall when the rack is on a lifted vehicle with large tires.

#14 Center of Gravity – Static and Dynamic

Vehicle Stability - Another roof rack consideration is how the weight added to the top of the vehicle will affect the vehicle's stability on side-slopping trails or high-speed turns. The more weight you add to the top, the higher the center of gravity moves up in the vehicle, making the vehicle increasingly less stable.

Once the imaginary line drawn straight down from the center of gravity of the vehicle shifts to the outside of the contact point of the tires to the ground, the vehicle will roll over.

With similar possible results, centrifugal force increases with weight and speed, this is made worse the higher weight is on a vehicle, making quick high-speed turns or emergency maneuvers more dangerous. So, adjust how radical a trail you take or how fast you drive accordingly.

#15 Installation – The long and short of it.

Some racks are easy to install, and some take more effort. Some racks you can install yourself, others require a second person. For some, you need to tighten bolts; for some, you need to drill holes in the roof and add rivnuts. Some use standard tools, and some require special tools. In conclusion, if you can pay someone to install the rack for a price you are okay with, do that. If you are handy and want to do it yourself, watch several videos of others installing the model of rack you are considering purchasing. Remember, everyone has a different skill levels, and some videos may gloss over some areas that require more skill or skip them altogether, so watch a few different videos to get a solid feel of what you are getting into.

#16 Rack Height – Hi and Low Profiles

***You may want to pay special attention to this if you park in a garage, carport, car shelter, or parking garage, whether at home, work, airport, or shopping.*

Simply put, “Profile” represents the overall height of the rack. Platform style racks are typically low-profile, and the racks with sides, sometimes called “basket style,” are hi-profile. More often than not, the hi-profile racks are tube framed racks, but do not assume they are all are hi-profile; many are low-profile “platform-like.” The primary concern with profile height is having clearance to get under objects. For most of us this will be for man-made objects and not bopping around in nature. Low-profile racks are lower in height, which is fine, but you will also need to account for what goes on the rack as part of total height. If you get a roof rack to put a rooftop tent on, chances are that it will be taller than a hi-profile rack. If you are thinking of just adding some traction boards and Roto-Pax fuel containers, choosing a low-profile height might just be the difference between parking in the garage or parking outside, in the snow, scraping frost off the Windows every morning, all the dark frigid winter long.

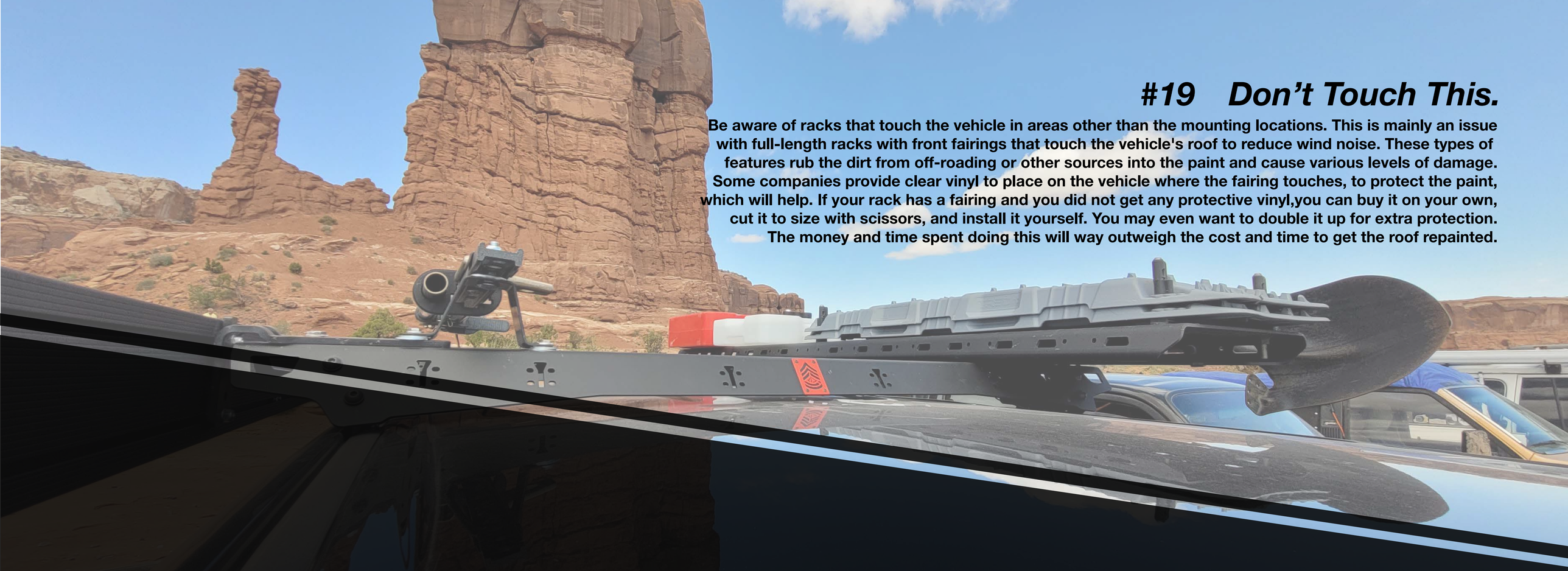
#17 Wait! How does this mount to the rack?

The installation difficulty of accessories or accessory mounts will vary between rack designs and each accessory. One accessory might be intricate, while the next is easy. What is easy on one type of rack might be hard for another. Sometimes, you may need to partially disassemble a rack to add a bracket or panel. Then there are times when you have a new piece of gear and need to move everything else around on the rack to make it work.

The best advice here is,....drum roll, please……do not install anything the night before, or the day of a trip. - Ah, you did not see that one coming, did you? Really though, please just do not do it. Your family, friends, and just about anyone else around you will appreciate a much calmer you than a stressed-out, sleep-deprived, and short-nerved you. The first time mounting gear on your rack will take time as you sort out what is what. It will not be such a big deal the fifth time you move that item on the rack, but the first time will be a bugger. It may also be that the fifth time moving that piece of gear is off of the vehicle and on to the garage shelf. Because no rig build is complete until you have taken off the last of your vehicle modifications.

#18 Hardware – Be aware!

All racks use hardware. Some use more common types, which you find in most hardware stores, and others are more specialized. In both cases, carry a few extras of whatever your rack uses, especially if the hardware is more specialized, like, you have to order it and have it shipped to you. Having the gear that is supposed to be mounted on the rack sitting in the vehicle, bouncing up against you on a two-week trip is no fun because you cannot find a pentagon head-shaped double step-down shoulder bolt with reversed threads and double drilled for a cotter pin at each end. Also, on your trip, have the tools needed to tighten whatever hardware the rack uses. Most of all, check all the bolts on a rack before a big trip and every couple of weeks to be safe and catch anything missing before you hit the trail.



#19 Don’t Touch This.

Be aware of racks that touch the vehicle in areas other than the mounting locations. This is mainly an issue with full-length racks with front fairings that touch the vehicle's roof to reduce wind noise. These types of features rub the dirt from off-roading or other sources into the paint and cause various levels of damage. Some companies provide clear vinyl to place on the vehicle where the fairing touches, to protect the paint, which will help. If your rack has a fairing and you did not get any protective vinyl,you can buy it on your own, cut it to size with scissors, and install it yourself. You may even want to double it up for extra protection. The money and time spent doing this will way outweigh the cost and time to get the roof repainted.

#20 How did I get dents under my roof top tent?

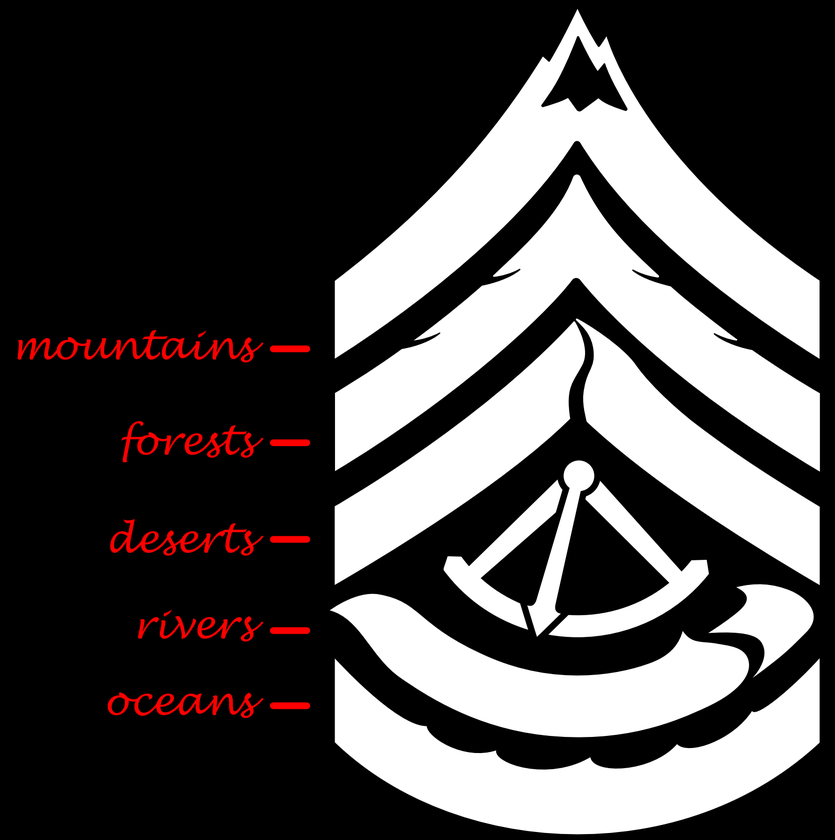
We do not hear about this much, but in our development, we have found that the roof grows in height when it gets hot. Our best guess is that it can grow up to 3/16 of an inch in the center of the roof and is more noticeable at the front than at the back. This should not be an issue for most people, but you want to watch how close your mounting hardware gets to the roof. The biggest and most common culprit would be roof top tent hardware that is extra-long and hangs way below the cross bars they are attaching to. Now, the roof top tent will shade the roof, so it should not expand as much, but just know it is possible. If you couple an expanded roof with nooner monkey sex, and long RTT hardware, you may be adding some dimples to the roof of your car. So, try to have at least half an inch or more of clearance between the roof and any hardware. Also, if it is hot enough to make the roof expand, it is way too hot to be in a RTT doing anything.

#21 Wind Noise

The air pressure at the top of the windshield and front edge of the roof is very high when traveling at speed. Air is getting squeezed together at this point as the vehicle is pushing it up out of the way. As you go faster, the air pressure increases and can start creating noise issues with racks. The two main types of rack noise generated from this are vibration and wind turbulence.

Vibration noise comes from the rack, or gear, shaking so fast that it produces sound. Sort of like a musical instrument, but your rack will not produce anything remotely enjoyable. If the vibration noise is only present when you have gear loaded on the rack, you may just need to move it around to reduce noise. If you only have the rack on and you hear vibration noise, it may be as simple as adjusting the fairing or moving the front cross bars to a different location.

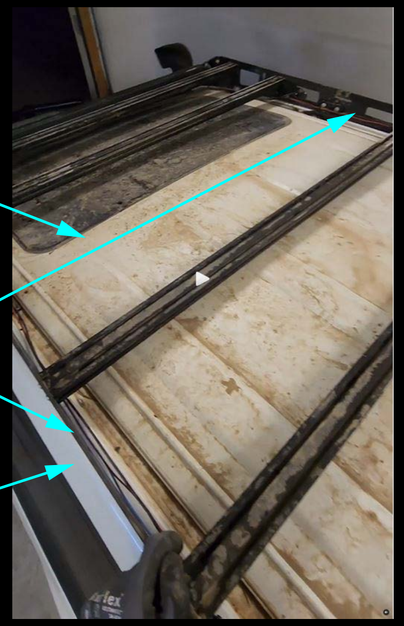
Air moving at different speeds next to each other causes noise in the form of turbulence. This sounds like a rushing noise or a roar. A simplified example of this is when you open a vehicle window at 60 mph, you get a rushing sound. The air in the vehicle is moving at a different rate than the air outside the vehicle, which causes the noise. If you are experiencing turbulence noise, this may be fixed with some fairing adjustment, or it might just be the rack design. The best advice is to find someone with the rack you want and ask to ride with them. When taking the ride, get up to highway speeds. The difference in noise levels between 55 mph and 65 mph can be drastic. From 65 mph to 75 mph, the increase in noise could be unbearable, like, lose your mind unbearable. Do yourself a favor here and do not talk yourself out of doing a high speed evaluation, your sanity will thank you. It should be noted that most racks will make some noise but find a rack that will let you have a conversation in the vehicle without yelling. Here again, turbulence is an issue more common to full-length racks. Three-quarter length racks are positioned in a lower pressure zone further back on the roof and typically make less noise.



Hey! We have one more bonus one for you.

Bonus! - NOT
“Working at the car wash!”

When you load up your rack with gear, you say goodbye to the automated car washes you drive through. Due to all the openings in rack designs and countless places on accessory items for car wash brushes to get caught in, it is best to stay clear of the automatic car wash and not damage the car wash, your gear, or both. The self-serve style car wash with the spray wand is now your friend, which is all right, because that wand will do a much better job getting dirt out from under your 4Runner than the automatic wash.



the end

Thank you for checking out our “21 Factors you better consider before spending your hard earned money on a 5th Gen 4Runner Roof Rack!” If you want to see how our racks compare to this list please visit **www.CORPS1804.com** for more information and to check out our other cool rugged gear.

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