



This instruction sheet is intended to assist dealers with performing comprehensive vehicle weight analysis. This is a recommended practice document and while each dealer may have its own standard operating procedures, the general process flow of weight analysis to be performed by QAP dealers are described in this instruction for use as a best practice.

Reference: Weight Analysis Process Flow sheet document (QAP-F30)

Overview and Purpose

The following instruction steps (used along with the companion weight analysis process flow sheet QAP-F30) detail the general sequence of operations QAP dealers conduct when evaluating if a proposed vehicle and mobility equipment modifications are appropriate for the clients needs. Understanding how the vehicle will be used and who will routinely be traveling in the vehicle are vitally important to knowing the vehicle you are about to modify will be able to be delivered. There is nothing worse that bringing in an order, investing a huge amount of time, material and labor costs, only to find out that the completed vehicle cannot be delivered. Not only will this upset the customer, but it can cost your dealership a ton of money. Everyone from the sales person, to the general or service manager, to the installation technician need to be knowledgeable of their key roles in this process. In this instruction we will identify the responsibilities for a typical dealer organization, but we recognize that every dealer may operate differently and that is fine, so long as someone has the assigned responsibility.

Instruction steps

The instructions are divided into two parts, the first Part A (steps 1-7) describes the efforts QAP dealers take on the front-end (sales) and second part B (steps 9-14) describes efforts that are



typically conducted in-process and post-modification by the dealer's general or service manager and the technician. The NMEDA Guidelines require both pre-sale and post-modification weight analysis to be completed, however only the post-modification weight analysis is required to be documented when the lesser of 100 lbs (or 1.5% of GVWR) net weight has been added to the vehicle as a result of all modifications.

Note that in these instruction steps, we are going to follow a straight-forward process. What we mean by that is there can be many deviations and additional questions and decisions to be made by the client and the dealer throughout this process and these deviations can sprout out to many alternate instructions that would make this instruction sheet very complex and time consuming, so for the purposes of this aide, we are going to stick with a typical installation that will require a documented weight analysis to be completed.

Part A - Pre-sale weight analysis activities (steps 1- 7)

- 1. Assessing the client's needs** – Before we can get started in earnest with weight analysis, we need to understand what the client wants when they come in the store. For example, are they buying a vehicle from you or do they wish to have a vehicle they already own to be modified? If you are modifying the client's vehicle, is their vehicle already converted? What equipment does the client want installed? Are they looking for lighter equipment such as a spinner knob, or equipment that could add weight to the vehicle such as a inside lift or power seat base.
- 2. Determine if the equipment is compatible with the vehicle** – Now that you know what equipment is desired in what vehicle. The next step is to make sure that the equipment is



compatible with the vehicle. This may include measuring the width of the mobility device and making sure it will fit. Measuring the seated height of the client in their chair, and things like this. From a weight analysis standpoint, if you are planning to install a hitch mounted lift, you will be verifying with the lift manufacturer if the lift is going to work with the client's wheelchair or scooter and will not overload the tongue weight rating of the vehicle's hitch.

- 3. Determine how the vehicle will be used on a routine basis** - Interview the client as to how the vehicle will be used on a routine basis. Note that routine basis means how it will be used on a typical day. During this evaluation, the dealer is looking to find out who is routinely travelling in the vehicle and what type of cargo will routinely be loaded into the vehicle. For example, knowing that the client has a large family, or a small family is important in understanding how many seating positions will routinely be used. Additionally, knowing (for example) that the client is routinely loading a large oxygen tank would also be important. We need to know everything (cargo) of significant weight that will routinely be loaded in the vehicle.
- 4. Estimate the expected payload weight** – The payload weight is the total combined weight of occupants and cargo that will be routinely be traveling in the vehicle. To estimate the payload weight the dealer needs to add the combined weight of the occupants to the combined weight of the cargo. For example, if there are typically two occupants who weigh 180 lbs and 225 lbs then the total weight of occupants is 405 lbs. If there is one scooter that weighs 330 lbs being loaded, then the estimated payload weight is 735 lbs. A further explanation of occupant and cargo weight is found in 4.1 and 4.2.



4.1. Determine the total combined weight of the occupants - While it can often be uncomfortable to weigh every person who will routinely be traveling in the vehicle, and as a person's weight may change over time, if the dealer is not going to physically weigh each passenger, the dealer should make a judgement as to the weight of the client and any others who will be routinely be traveling in the vehicle. The purpose for this is twofold, one is to better understand if the 150 pounds used by NHTSA for seating positions will give an accurate conclusion when determining if a vehicle could be routinely overloaded. And the second reason is to know how much total occupant weight will routinely be loaded in the vehicle.

4.2. Determine the total combined weight of the cargo – Everything other than occupants is cargo. In most cases this will be the client's mobility device, but it also includes anything else including service animals, recreational equipment and more. Note the physical weight of any mobility devices such as wheelchairs and scooters that will routinely be loaded in the vehicle. The best practice would be to document the make model and weight of each device and keep that on file. And while it is true that the dealer has no control over the client purchasing or obtaining new equipment, the dealer will have a record of what equipment or devices were used by the client at the time of sale and that can be important information for future reference. Also note any other cargo of significant weight that will be loaded in the vehicle. Focus on items that will be routinely be loaded such as an oxygen tanks and other necessary equipment.

5. Determine if there are any special weight concerns - Once the dealer has all the pertinent information on how the vehicle will be used, who will be routinely be traveling in the



vehicle, what devices and cargo will routinely be loaded in the vehicle, and the size of the client and the client's family, the dealer can determine if there is any concerns regarding weight or the potential to routinely overload the vehicle. If there are no concerns move to step 6, otherwise the dealer will have to determine of the vehicle (after modification) will be overloaded. If it is found the vehicle will be overloaded, the dealer needs to find an alternate solution that is acceptable to the client.

- 6. Determine if either of the axles (front or rear) can be overloaded** - The dealer at this point should reassess if the vehicle and equipment planned to be installed is appropriate for the client and if there are any concerns with the placement of the equipment or cargo could be a concern to overload one or more of the axles (GAWR). For example, if there is concern that the installation of equipment in a particular area of the vehicle could overload one of the axles, it is recommended that the dealer use some type of dunnage to simulate the weight and place it, then weigh the vehicle to find out if the axle weight limit could be exceeded.

Here is an example, if you have a large-size client (lets say 350 lbs) who will be driving from their scooter, and their scooter weighs 350 lbs, now you know you will be placing at least 700 pounds somewhere over the front axle. If the gross axle weight rating in front (GAWR-F) is 3100 lbs and your curb weight as shown on the four-corner scale measures 1300 lbs on left and 1281 on right, that is a total of 2581 lbs. When you take GAWR-F (3100) and subtract 2581 lbs, the most that can be loaded on that front axle without being overloaded is 519 pounds. And while the 700 pounds is not likely going to be directly on top of the axle, meaning there will be some balance over the axle, in all likelihood you would overload the



front axle and not be able to deliver the vehicle. This is why it is so critical to understand how the vehicle will be used, what the weight of the occupants and cargo will be, and where all of that weight will be placed. We highly recommend if it looks like you have a situation where the weight is a concern, that you take some dunnage to simulate the weight of occupants and cargo, place it where it should be in the vehicle, and put weigh it on your four corner scale *before* you do all that work and find out the vehicle cannot be delivered.

7. Pre-installation scale weight - measure the unloaded vehicle weight (UVW) (also known as curb weight) of vehicle prior to installation. Record weight as pre-installation curb weight. You should have the weights for all four wheels of the vehicle. These weights, when combined will tell you the front axle weight (actual), the rear axle weight (actual), and the curb weight (combined weight of all four wheels).

7.1. Calculate pre-installation load carrying capacity (LCC) - Using the formula: $GVWR - UVW$. Record this as the pre-installation load carrying capacity. For example, if the GVWR is 6050 lbs and the UVW (or curb weight) is 4821 lbs, then the LCC is 1229 lbs. You should already have this calculation done as it needs to be completed before the installation of any equipment.

7.2. Determine DSP- Record the number of seating positions (DSP) and verify is same as shown on the vehicle (aka tire) placard.

7.3. Determine if the gas tank is full - If not full, record fuel tank level and then account for any missing fuel weight. To do this you will need to know the fuel tank capacity and how many gallons are missing. You will also need to know the weight of each gallon of



fuel. For example, unleaded gas that is 87 percent octane weighs about 6.3 lbs per gallon. To properly measure the UVW (aka curb weight) all fluids must be full.

8. **Complete all installations and modifications** – Complete all work per the work or shop order.

Part B – Post-Installation weight analysis activities (steps 9- 14)

9. **Post-Installation Scale Weight** – perform the same process as done pre-installation and then compare the results.

- 9.1. **Calculate post-installation load carrying capacity (LCC)** - Weigh the curb weight of vehicle after all installations and work has been completed. Record as post-installation curb weight.

- 9.2. **Determine the reduction in load carrying capacity** – This is a calculation of the post-installation LCC minus the pre-installation LCC. For example, if the pre-installation LCC was 1229 lbs and the post-installation LCC is 1079 lbs, then the reduction load carrying capacity is 159 lbs.

10. **Verify weight ratings have not been exceeded** - Verify that the GVWR or either the GAWR-rear or GAWR-front have not been exceeded. Use the post-installation scale weights to tell you this. The combined front wheel weights is the front axle weight and that should be less than the GAWR-front, and the same for the rear and less than the GAWR-rear. The overall curb weight is the combined weight of all four scale readings and that number should be less than the GVWR. If any of these weight ratings have been exceeded, the vehicle cannot be delivered.



- 11. Verify there is sufficient load carrying capacity** - Verify that there is sufficient load carrying capacity to allow for DSP x 150 lbs. For example, if there are 6 DSP and the post installation load carrying capacity is 1079 lbs. Then $6 \times 150 = 900$ lbs and 900 lbs is less than 1079 lbs (LC C is sufficient). On the other hand, if DSP x 150 lbs is greater than the load carrying capacity (insufficient), the vehicle cannot be delivered.
- 12. Determine if any labels need to be applied** – there is a possibility that one or two labels will need to be applied. If the reduction in load carrying capacity is equal to or greater than 100 lbs or 1.5% of GVWR (whichever is smaller) then a reduction in load carrying capacity label shall be applied. If the reduction in load carrying capacity is 220 lbs or greater, then the make inoperative label shall be applied and the load carrying capacity section of the make inoperative disclosure form shall be completed. If neither of these weight thresholds have been met and no labels need to be applied, then a documented weight analysis is not required and jump to step 14, otherwise continue to step 13.
- 13. Completing the documented weight analysis** – if it was determined in step 12 that a documented weight analysis is required, then the dealer, at a minimum, shall retain all the results from the scale readings in the customer file and indicate what labels were applied. The documented weight analysis should show the scale readings, the reduction in load carrying capacity (LCC), the weight of the client’s mobility device(s) as necessary and evidence that none of the weight ratings have been exceeded. Note that even though the NMEDA Guidelines requires a documented weight analysis only when 100 lbs or 1.5% of GVWR of net weight was added to the vehicle, that the best practice is to document the weight analysis evidence for ALL jobs regardless of how much net weight was added.



14. Client disclosures - The dealer should always disclose to the client what the remaining available load carrying capacity is as part of the dealer’s delivery process and coach the client in how to safely load the vehicle. It is recommended that the dealer supply the client with one of NMEDA’s “Consumer Safe Loading Guide” brochures (PUB-101). This brochure can be purchased from NMEDA using the supply order form or can also be downloaded as PDF one-page flyer from the NMEDA website (PUB-102).

This is the end of the weight analysis process. Note that this is a best practices document and that the requirements of the QAP Rules and the NMEDA Guidelines always take precedence over this instruction sheet.