Disaster Response Trailers: Ideas for Buying, Designing, Building, and Equipping

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MERCY in action DISASTER RESOURCES

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Table of Contents

Forward

The year 2004 saw an unprecedented four hurricanes strike Central Florida – Charley, Frances, Ivan, and Jeanne. After the skies cleared from Charley, my wife and I asked our pastor about what volunteer clean up assistance the Lutheran Church would sponsor. There was no process in place, so we set out on our own. As we were traveling to affected areas, we saw trucks and vans pulling enclosed trailers, marked with another denomination's "Disaster Response" sign. We kept asking, "*Where are the Lutherans?*" We never saw any.

Two months later we attended a disaster response volunteer training class, and the following spring I attended another volunteer training from the denomination whose trailers we had seen. Their equipment trailer was well equipped and organized, and the idea for developing our own disaster response equipment trailer was born. Thank you to the Greater Orlando Baptist Association (GOBA)!

In 2005 the Disaster Response Ministry of Messiah Lutheran Church, Tampa, Florida, began. Through a grant from Thrivent Financial For Lutherans and generous donations from our members, we purchased a trailer and equipment. With the GOBA trailer as a guide, we designed and built out our trailer, yet it wasn't quite finished before we went to our first mission site in Biloxi, Mississippi, after Hurricane Katrina. That experience taught us much about stowing equipment and making use of available space. In the years since, we have added, removed, and modified several items on our trailer, but it is still in the same initial layout because we found through experience that works well for us.

Over the years, several congregations have asked me for guidance when obtaining a trailer, not only in purchasing but in designing and equipping. To meet that request, I created a presentation for disaster volunteer training, and this guide is an outgrowth of that presentation.

In 2016, LCMS Disaster Response, in partnership with the Lutheran Woman's Missionary League, provided grants to 26 congregations and organizations to build and equip disaster trailers around the United States. Our original guide was given as a resource for those congregations to use. As those trailers are become operational, an update is necessary, incorporating the growing collective wisdom. More congregations are joining the ranks of LCMS Disaster Response, which means more trailers will be created and employed.

With that in mind, this new version of the guide will aid congregations as they obtain, design, build out, and equip their disaster ministry equipment trailers. A properly designed trailer allows a church to be good stewards of the blessings that God has entrusted to them. It is a more efficient and effective ministry as they serve God through serving their neighbors out of response to His great love. Always remember: **this resource belongs to God; we are merely stewards**.

Thank you to those who have contributed to design elements and this guide:

- Greater Orlando Baptist Association (GOBA), for the inspiration and ideas their trailer stimulated.
- The Southern Baptist Association Men's Ministry – Disaster Response, for ideas gained from looking at many of their trailers.
- Messiah Lutheran Church, Tampa, FL, for generous donations to purchase our trailer and equipment, and for the volunteers (Bob, Jeff, Tom, and Jim) who have spent many hours in designing and building our trailer.
- Chapel of the Cross Lutheran Church, St. Louis, MO, (Ted Weidner and Ken Kreitner), for photos and ideas.
- Christ Lutheran Church, Lincoln, NE, (Beth Vavrina), for photos and ideas.
- Eternal Shepherd Lutheran Church, Seneca, SC, ("Deek" Decker), for photos and ideas.
- First Baptist Church, Upper Marlboro, MD, for their laundry trailer.
- Southern Baptist Convention of Maryland/Delaware, for their shower trailer.
- Messiah Tampa team member Karen Morter for editing.

This guide is a fluid document. If you have ideas or photos that may be beneficial to other churches, please send them to me and I will incorporate what I can in updated versions.

May God bless your involvement in the disaster response ministry. May the Holy Spirit use you and your trailer to touch lives of those affected by a disaster with the love, grace, and mercy of our Lord Jesus Christ.

Joel Mathews
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Chapter One: Getting Ready

Your church may want to begin a disaster response ministry or may desire to expand an existing mission, or to get equipment necessary for a team. What is the best course of action?

Before you Begin
Before you purchase a trailer or equipment, take time to think through and list responses to the following considerations:

- This is a big financial investment for your church to make! Are finances available to cover the initial purchase? There will be ongoing expenses of maintenance and repairs, supplies, new equipment, replacement equipment, and training. Will they covered?
- Do you have congregational support for this ministry? Not only financial support, but volunteers to perform the work? If not, is it possible to partner with another church?
- Do you have non-pastoral leadership for this ministry? The pastor should NOT be the leader of this ministry. A leadership team may work well, sharing the governance load. Not everyone will be available for every callout, so it is best to cross-train personnel and have backup for every position on the team.
- Do you have pastoral support? Without the pastor being on board (they do not have to be a part of the team, but need to be apprised), the ministry will have difficulty surviving and flourishing.

Develop a disaster ministry mission statement. If the mission is stated concisely, it is easier to stay on track. Team goals and objectives are also helpful.

There are only two options for hauling your equipment: a truck or a trailer. There is little difference between utilizing a self-contained truck or a trailer to carry your equipment. For the purposes of this guide, we will focus on a trailer, but the same process and principles can be applied to a truck.

The following needs to be considered (covered in detail later):

- How will it be used?
- Who will use it?
- Are there personnel who can operate it?
- Will insurance cover it?
- Who will maintain it?

Why a Trailer May be the Best Option

- A trailer allows any regular-sized pickup truck to pull it, without special insurance coverage or the driver needing a special license or. A truck may have restrictions as a commercial vehicle (state laws vary), or your church or insurance company may have restrictions on who can operate it. A trailer generally does not have these limitations.

- A trailer is less maintenance than a truck. Since it does not have an engine and has significantly fewer moving parts, there is much less maintenance.
- Insurance costs to a church are generally much less for a trailer than a truck. Check with your church's insurance agent for coverage and a cost comparison.
- A trailer can be dropped and set up at a work site and remain, and the tow vehicle is then freed to transport people or supplies.
- A trailer is a great way to store, secure, organize, and transport team tools and equipment.
- A trailer can also provide great visibility and "advertisement" of the ministry and your church, showing that Lutherans are in the midst of the disaster.

The "Right Way"

Understand from the beginning that there is **NO RIGHT WAY** to build out your trailer. Whether your team has a firm and inflexible storage plan or a less regulated plan, if it works and fulfills its purpose, then it is "right." For example, a trailer that carries large equipment will have different design needs than one carrying smaller tools and equipment. Learn, borrow, and adapt ideas from others, such as these:

Chapter Two: The Process

After it has been determined that your church will be involved in the disaster response ministry and has the financial and human resources to support this ministry, now is the time to put the plan into action.

CAUTION: Do not simply purchase a trailer and throw equipment inside! Remember, if you take care of your equipment, it will take care of you. If you don't properly use and maintain your tools, you will spend much more time and money in repairs and replacement.

The following steps are recommended when determining how to fit and store equipment in the trailer, and will be discussed in detail:

1. Determine use
2. Go shopping
3. Secure funding.
4. Make your purchases.
5. Build it out.

Determining Purpose
In architectural design there is a saying "**Form Follows Function.**" In other words, *what you purchase will be determined by how it will be used*. One doesn't build a four-story office building when all that was needed was a garage.

Consider:

- How it will be used determines what you will need to do with it to make it work for your team.
- How it will be used determines what size and type of trailer is needed.
- How it will be used determines what equipment is needed.
- What equipment you need will determine how it is designed.

Four questions to ask:
1. *What is your team going to do?* If the response will be mainly to flooded areas, different equipment is needed than if cleaning up after tornadoes or fires. Likewise, if your team will primarily be doing rebuilds, equipment needs will be different than performing cleanup.

Before buying anything, assess the team's strengths and weakness to determine just how the trailer will be used. Arriving on the heels of a disaster and doing clean up, waiting until later and doing rebuild, or supporting a specific function (i.e., communications, day care, medical, shower, food, etc.) require different equipment and tools.

Consider the following uses and how each determines the type of equipment needed:

- Cleanup and chainsaw: secure storage space for chainsaws, space for tools, ladders, bins and tubs, oil and gas, hard hats and chaps, generator, etc.

- Flood muckout: pumps, pressure washers, generators, brooms, shovels, hoses, sledgehammers and wrecking bars, mold masks and Tyvek suits, storage bins and tubs, etc.

- Rebuild: air compressor, saws, hand tools, power tools, ladders, tarps, paint equipment, tubs and bins, etc.

- Shower and laundry: shower stalls, washers, dryers, water heater, pump, plumbing, generator, LP gas tanks, etc.

Photos: (Left) Shower trailer shower stalls. (Right) Laundry trailer with washers, dryers and work counter.

- Food preparation: stoves, sinks, LP gas, exhaust fan, window, counters, bulk item storage, cambros, mixers, pots and pans, etc.

- Command center and communications: counters, white boards, radios, cabinets, copier, computers, etc.

- Day care: cribs, playpens, changing tables, games, toys, sanitation equipment, tubs and bins, etc.

- Heavy equipment: a flatbed or large enclosed trailer with chains and tie downs, etc.

2. *Who will use the trailer?* If your disaster team is the exclusive user, then it can be set up with permanent options. If another group will share the trailer, then the layout needs to be flexible or mutually agreed upon to fit both groups.

3. *Where will it be kept?* If you don't have the space to keep it safe and protected, enclosed trailers, particularly those marked as a "Disaster Response" trailer, can be a lucrative target for thieves – they know there is expensive equipment inside.

Weather is another consideration. In Florida and other Southern states, it does not take long in the extreme heat for trailers to start showing effects of the sun and elements. Heat inside will dry rubber or make plastic brittle or melt. On the other hand, extreme cold may freeze fluids and make plastic brittle. If at all possible, trailers should be stored inside, out of the elements.

4. *What is needed to tow the trailer?* Most disaster response trailers, unless transporting heavy equipment, can be towed by an average (i.e., 1500-size) pickup truck. Operating within your trailer and tow vehicle's weight ratings is important; don't undersize the tow vehicle.

Who has the truck or tow vehicle? Do you have more than one available in case the driver cannot go along? Do they have proper and adequate insurance? A trailer is of no use if there is nothing with which to tow it.

Summary

Before you make your first purchase, determine what form your ministry will take. Answering that will guide decisions for how the trailer will be used, what equipment to carry, and the layout design. The location for storing the trailer and available towing also should be decided.

Once you know the above, it is time to go shopping!

Chapter Three: It's Shopping Time!

There is a trailer of any size and type available to fit every need. How does your ministry choose the right one? One might be tempted to go to a local trailer dealer, point to a trailer, and say, "I want that one." Since your team will have to live and work with that choice, there are important considerations prior to signing on that dotted line.

This guide focuses on enclosed cargo trailers that will serve as an equipment trailer. Many items discussed also apply to other types of trailers.

Check around

Not all trailers are made the same. Just as with automobiles, there is a range of quality and options. Generally, you get what you pay for, and buying cheap may mean a trailer that will not hold up to the use and abuse that comes with disaster response. Don't be penny wise and pound foolish.

Stick to well-known or common brands. A manufacturer that has been around for many years has learned to incorporate quality workmanship. They use commonly available parts, which is helpful when needing repairs. They stand behind their product with a warranty. A sample of common brands and where made follows:

- Kaufman (NC) –www.kaufmantrailers.com
- Georgia Made Trailers (GA) – www.georgiamadetrailers.com
- Legend Premium Trailers (MI) – www.legendmfginc.com
- Wells Cargo (IN, GA, TX, UT, PA) – www.wellscargo.com
- Pace American (IN) – www.paceamerican.com
- CargoMate (IN, GA, TX, OR) – www.cargomatetrailers.com
- Haulmark (IN) – www.haulmark.com
- Gatortail (GA, FL) – www.gatortail.com

Do an online check of manufacturers to see what they offer, what options are available, and dealer locations. Talk with others who have similar trailers to see how their trailer is working for them, and ask about the pros and cons.

Look for the "National Association of Trailer Manufacturers" (NATM) compliance decal. Trailer manufactures must comply with hundreds of safety related regulations. Trailers featuring this decal are built by manufacturers who have gone through a verified compliance by NATM, which visits member facilities to ensure the manufacturer's processes are in place to build trailers in accordance with these mandatory standards. Visit www.NATM.com for more information.

Narrow the Choices and Buy

Visit dealers to see inventory and prices. Do they have traiilers with options, or do they have to order what you want? It may be a better use of funds to order and get what you want, than taking what is available and trying to make it work. Do they just sell, or do also they service trailers? It is good to have a place for trailer servicing, but it does not have to be the dealer where it was purchased.

Do comparative shopping, don't just buy from the first dealer shopped. Try to bargain and don't be afraid to play one dealer against another for the best offer – it is the church's money you are a steward of and you need to get the most bang for the least buck.

Plan on making two or even three visits before you buy. If looking at two different brands, you may have to return a few more times to compare trailers. Take photos of the trailers to remember and compare what each has.

- On the first visit – look, touch, kick the tires, and ask about options. Look at the "fit and finish," or the quality of materials and workmanship. Construction materials and design matter. Don't consider price at this point. This trip is just to see and learn what is available.
- Second visit – look at the trailers again with a fresh eye, considering what was available at other dealers, what was learned from research, and further consideration of needs. Get a quote on the desired trailer with the options wanted.
- Third visit – make your purchase or place an order. Don't forget to use your church's tax-exempt certificate. Title the trailer in the church's name.
    - Very carefully **inspect the trailer** – inside, outside, top, bottom, and all around. Once you sign for it problems with the trailer are now your team's problems; get them resolved prior to signing.
    - Look for:
        - Missing screws on trim, body panels, and interior paneling.
        - Screw heads or washers that are not covering the hole. On the exterior, this is a source of water intrusion.
        - Screws that are not all the way in.
        - Roof – is it one piece or panels? Is it adequately secured to the roof frame? How well is it sealed – seams and screws? Are there low spots that will hold water?
        - Point of entry for wires going into body. These must have grommets; unprotected holes will fray the wires and short them out.
        - Presence of drip trim over the side door. Is it sealed next to the body?
        - Is the wheel well free of sharp edges?
        - Crawl underneath. Are all welds good, not broken or partial?
        - Does the undercoating adequately cover all wood and the beams?
        - Are floor screws through the beam steel or only through the wood?
        - Be sure all lights are LED and properly work, including the license plate light.
        - Do the brakes work?

- Does it have a door latch to hold the side door open? Is it plastic (better) or steel? Plastic may break, but is easy to replace. Steel bends and is not usable, and may not be replaceable.
- Are the tires in good condition, with no cuts, nicks, bulges, or screws sticking in the tread?
- Do the doors open, close, and secure properly, without binding? Does the ramp door easily and completely open and close? Go inside the trailer and close the doors. Do you see light around any door opening?

Standard and Optional Items to Consider

Trailers come with options. Some options are built in; others have to be special ordered. Here is what should be considered minimum standards when selecting an enclosed disaster response equipment trailer:

Standard Items

- **Tandem axles:** two axles instead of one. A tandem axle trailer has a greater load-carrying capacity (7,000 lbs. vs. 3,500 lbs.), better weight distribution, and handles better when towing because it is more stable. Don't even consider single axle trailers.

- **Electric brakes**. Supplemental braking systems help stop the trailer, resulting in stop in a shorter stop distance compared to no braking system. You do not want 1,800 to 4,000 pounds pushing your vehicle when stopping! Almost all states require a supplemental braking system on anything towed that weighs 1,500 or more pounds total weight. Electric brakes require a 7-pin connector and a brake controller installed on the tow vehicle. Check you state's specific trailer braking requirements.

- **Vent**. Whether it is a roof vent or side vents, heat and dangerous fumes need to have an escape.
  - Roof vents need to be manually opened. They also a source of potential water leakage. A vent cover can be added (e.g., MaxxAir II) that allows for leaving the vent open without letting rain in, and it is possible to travel with the vent open, as well. Vents are also available with a built-in fan.

  - Side vents usually have a vent high on the front and low on the rear to allow airflow from convection (heated/cool air) or vacuum when traveling. They do not penetrate the roof to allow water intrusion, but may not be screened, possibly allowing insects or mice to enter.


Photos L-R: Typical roof vent. Roof vent with MaxxAir cover. Typical side vent.

- **Plywood sides**. Do not buy a trailer with Masonite or Lauan sides; it should be at least 3/8-inch plywood. The other choices do not hold screws and rot from moisture.

- **Spare tire**. Whether it comes with one or not, a spare tire has to be carried. The tire should be mounted on the exterior front wall or on the trailer tongue so it does not take up valuable interior space. Make sure it has a lock and a cover, which are aftermarket items.

- **Strong tongue jack stand**. A flimsy jack stand will fail. Make sure it is sturdy and requires little effort to raise the trailer. Most jacks do not have a bottom plate, so obtain an aftermarket plate or wheel.

Optional Items

- **Diamond plate stone guard**. Protects the front from rocks that get kicked up.

- **Ramp door vs. barn doors.** Either is acceptable.
  - Ramp door – allows greater access and ease of loading and unloading

equipment. Ramp doors are heavier and more difficult to open, have a spring and cables, and require the full door to be opened each time.

- Barn doors – lighter and easier to open, allow for opening half of the door, and have simple hinges. Requires a ramp for access to load or unload equipment.

- **Side door**. While optional, it is recommended that your trailer have a side door. It allows for greater access to equipment and better ventilation when open. The drawback is that it reduces available space for equipment, as anything secured in front of the door must be moved before you can use the door.

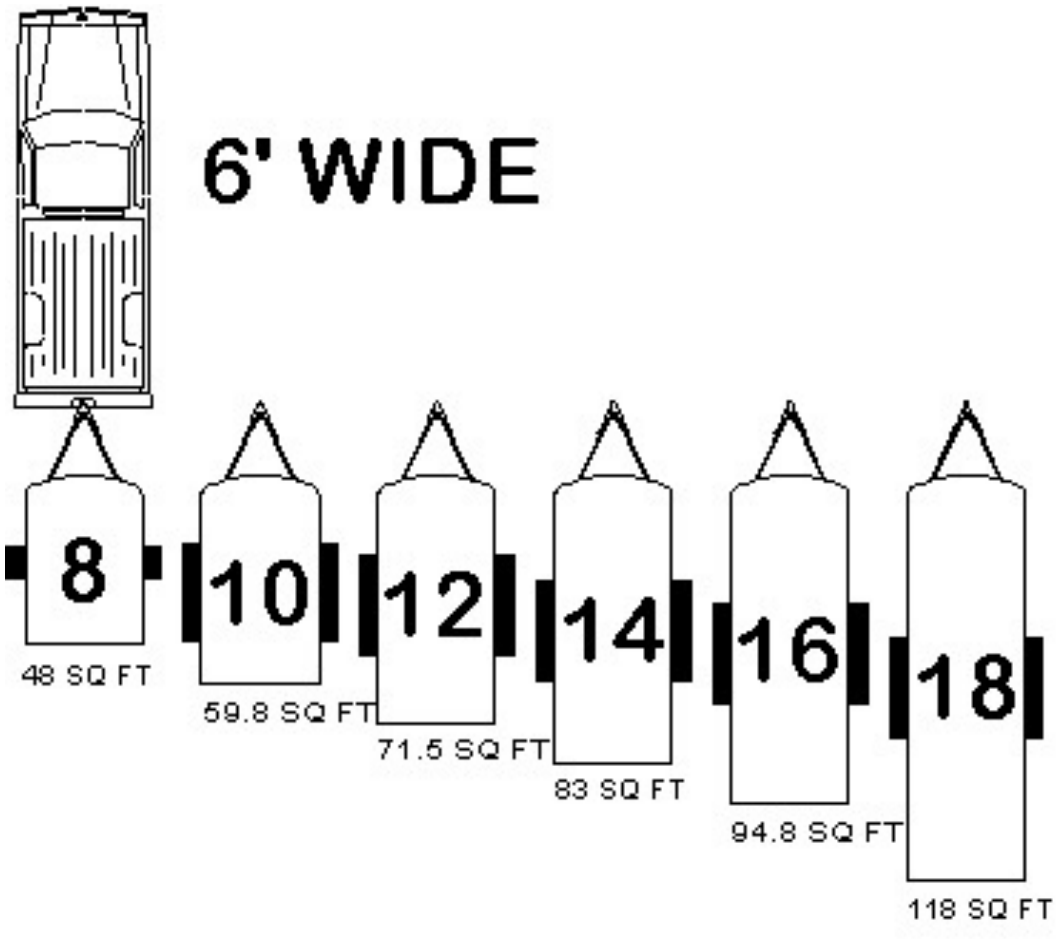
- **Flat nose vs. "V" nose**. Either works well but both come with trade-offs:

  - Flat – usually a little less expensive, easier to find, allows for easy mounting of spare tire to the center front, and equipment is easier to store at the front. It is slightly more wind resistant when traveling.

  - "V" – extends cargo space, and is more aerodynamic in travel. May not be able to mount spare tire on the front or may require adjusting inside to balance the weight. May be a little more expensive or difficult to find.

- **Color**. Most come in basic white. Logos and lettering do not conflict with a white background. Black is sometimes offered and is acceptable, but decal and lettering colors may blend into the background. Other color options may be available, but may be an additional expense and tend to fade sooner than basic white.

- **Size**. Size is a matter of function; it depends on purpose and cargo. As a rule, a 6' x 12' trailer is sufficient and ideal. A 6' x 14' trailer should be considered the maximum size. Anything less than 6' x 12' is not large enough to carry needed equipment. Anything bigger than a 6' x 14' is too wide and long to tow well, especially in disaster areas where streets may be clogged. A larger trailer requires a larger tow vehicle, is more difficult to store, and significantly reduces fuel economy for towing. The exception to this is if the trailer will be used for anything other than a cleanup/rebuild trailer (i.e., command center, laundry/shower, etc.).



Standard Equipment

- **Lights**. All trailers come with adequate marker and turn/brake lights on the outside and at least one light inside. All new trailers come with LED lights.

- **Tires**. Trailer tires are sized by the manufacturer to match the trailer. Trailers of the noted size usually have 15-inch tires installed. Do not use tires smaller than 14-inches. Radial tires are not critical. The trailer will come with Load Range D or E tires.

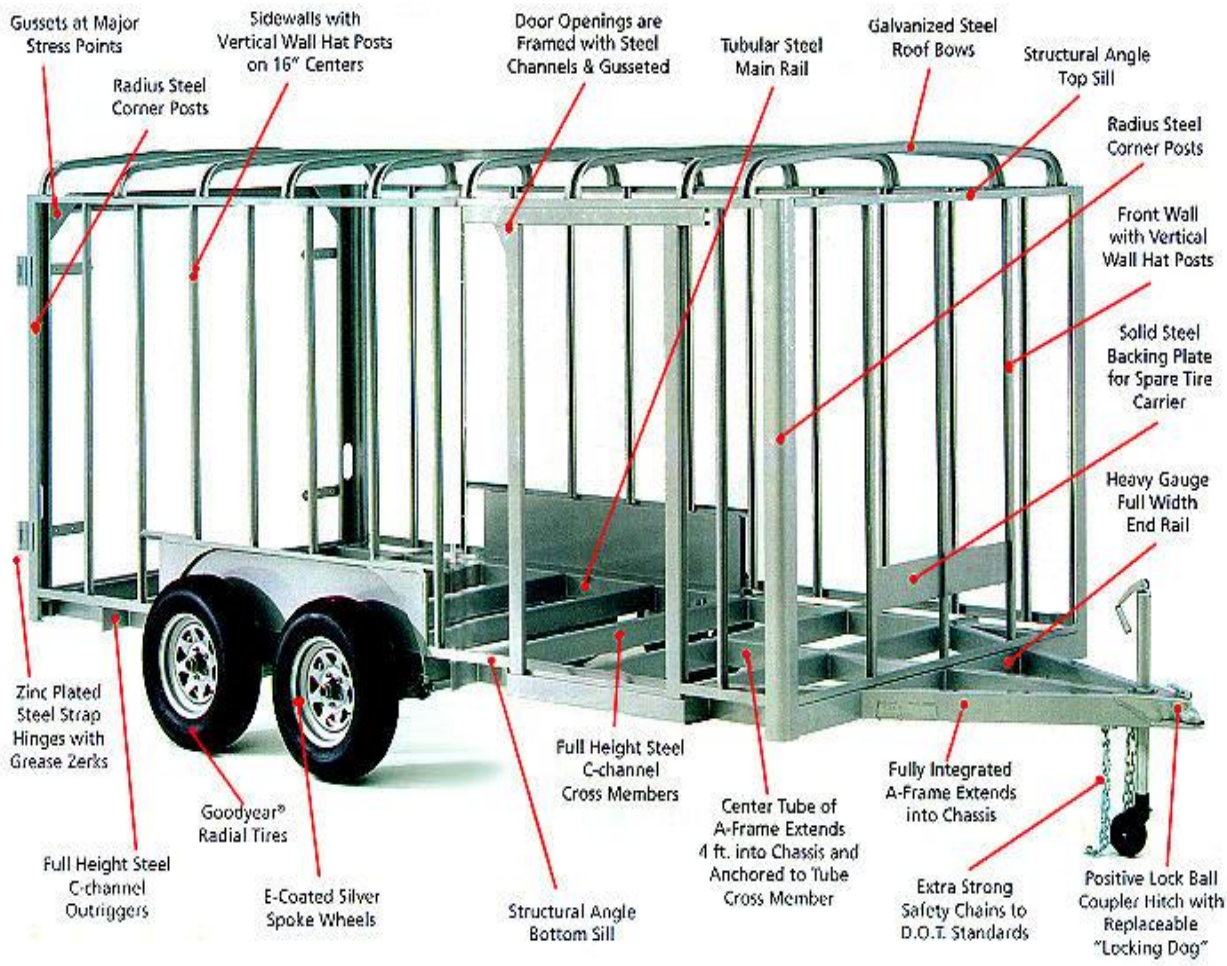
- **Floor**. Any enclosed trailer should have a 15/32 – inch pine tongue and groove plywood floor. Tongue and groove is preferred; ensure it is not OSB. This thickness is sufficient, unless planning to carry very heavy (2,000 pound plus) equipment, but then a different type of trailer should be considered.

Trailer Construction

All trailers are not built with the same level of quality. When shopping for a trailer, ask the dealer for a construction diagram or information on how it is constructed. Higher quality

trailers are more expensive. This is not the place to try to save a few dollars. The illustration below shows a typical trailer built to high quality standards, and can serve as a guide when shopping.

Note the framing structure. Wall posts are typically steel tubing on 16" centers, as anything over 16" tends to be less sturdy. Shelving and wall brackets will be anchored to these wall posts.



Summary

Don't just go out and buy the first trailer you see. Research options and do comparison-shopping. There are some standard features that should be included on your trailer specifications regardless of where you purchase it. There are other features that are optional. Take the time to determine what will be essential for the mission.

Chapter Four: Organize Your Trailer

Purchasing a disaster response equipment trailer and all equipment is not cheap! Once you have purchased your trailer and equipment you will need to organize it and build it out so it provides functionality and security for tools and equipment.

Funding Considerations
You could easily spend $15,000 or more on the trailer and equipment, depending on equipment bought, its quality, and where bought. Additionally, funds for ongoing support of the ministry will be needed. Where will those funds come from?

Before the first purchase, calculate total expenses. Cost calculations should include:
1. Cost of the trailer and all equipment.
2. Cost of the build-out.
3. Cost of the tool and equipment repair and replacement.
4. Cost of the ministry – fuel, supplies, etc.

Trailer and Equipment
Two sayings from the construction trades come to mind: "Buy the best and cry once. Buy cheap and cry many times," and "Buy quality where you need it, buy cheap when it doesn't matter." Don't skimp on buying quality equipment just to save a few dollars. It will cost more in repairs or replacing and in time spent when it breaks more frequently. Discount tool stores are a good place to buy tools when quality is not a factor.

Buy quality for:
- Trailer
- Power equipment – chainsaws, generator, power washer, pumps, saws, wet vac, air compressor, etc.
- Other tools – screwdrivers, wrenches, socket set, pry bars, etc.
- Other equipment – chainsaw chaps and helmets, axes, loppers, sledgehammer, shovels, etc.

Buy standard for:
- Tools – Hammers, saw blades, scrapers, utility knives, etc.
- Paint equipment – brushes, rollers, pans, etc.
- Personal protection – eye protection, gloves, dust or N95 masks, Tyvek suits, etc.
- Other equipment – tarps, hoses, buckets, gas cans, brooms, rakes, extension cords, etc.

Build-Out
Decide on your layout and materials needed to store and secure your equipment. The more complex or heavy-duty the shelves and bins, the more it will cost and weigh. This is another place not to cut cost or corners –

shelves need to be sturdy enough to stand up to hard use.

Materials

- Steel – strong, heavy, and more expensive. Use where strength is necessary such as brackets and anchors or for security, like in the ventilation screening and cabinet. Steel shelving is readily adjustable, whereas wood is not.

- Wood – strong, general purpose, but can be heavy. Use for shelves, cabinets, or as a surface for securing items. ½-inch plywood is sufficiently strong to support or to be a shelf. Wood should be screwed together, not nailed, so that it can be replaced or tightened.

- Plastic – light weight, multiple forms, functional, but can become brittle over time. Use for storage of items on shelves.

- Wire shelving – regular closet shelving, laid upside down on a wood frame, works well for general storage. The lip on the shelf helps prevent items from sliding off. The space between the wires allows ventilation.

- Insulation – enclosed trailers are not insulated unless self-installed. They get quite hot in the summer sun, which can shorten the life cycle on rubber and plastic. Consider placing 1-inch polystyrene insulation between the frame members. Make sure to cover it with Lauan (ceiling) or plywood (walls) to protect it.

Funding Options

Donations

Your church members may want to donate money or items to this ministry. Allow and encourage donations, but restrict what is accepted. Make a "Want List" – be very specific on make, model, size, quantity needed, etc., where quality matters.

Money is always needed. Establish a separate designated fund within your church's financial system. All donations and expenses for this ministry should flow through this fund for accountability. Funds for the following are essential:

- Training
- Travel to disaster sites
- Repair and maintenance
- Fuel
- Replacement of equipment
- Licensing
- Insurance
- Miscellaneous expenses

Some companies make donations to a faith-based ministry, others will not, depending on the management. Also, seek out corporate donations of either money or equipment.

Grants

Pursue grants from organizations. Community grants are available from private sources to groups that perform this type of ministry. Some church organizations that support disaster response ministries with grants are:

- LCMS Disaster Response
- Lutheran Women's Missionary League (LWML)
- Thrivent Financial for Lutherans

The Build-Out Process

Once again, form follows function! Trailer layout, needed equipment, and materials used to build-out will be determined by the specific purpose of the trailer. Make sure of the purpose before beginning. Careful thought about how lay out will more than pay off in efficient and effective functionality.

There is no single "right" design. There are many ideas presented in this guide; take the best ideas and adapt them to your design. No need to reinvent the wheel!

Inspiration

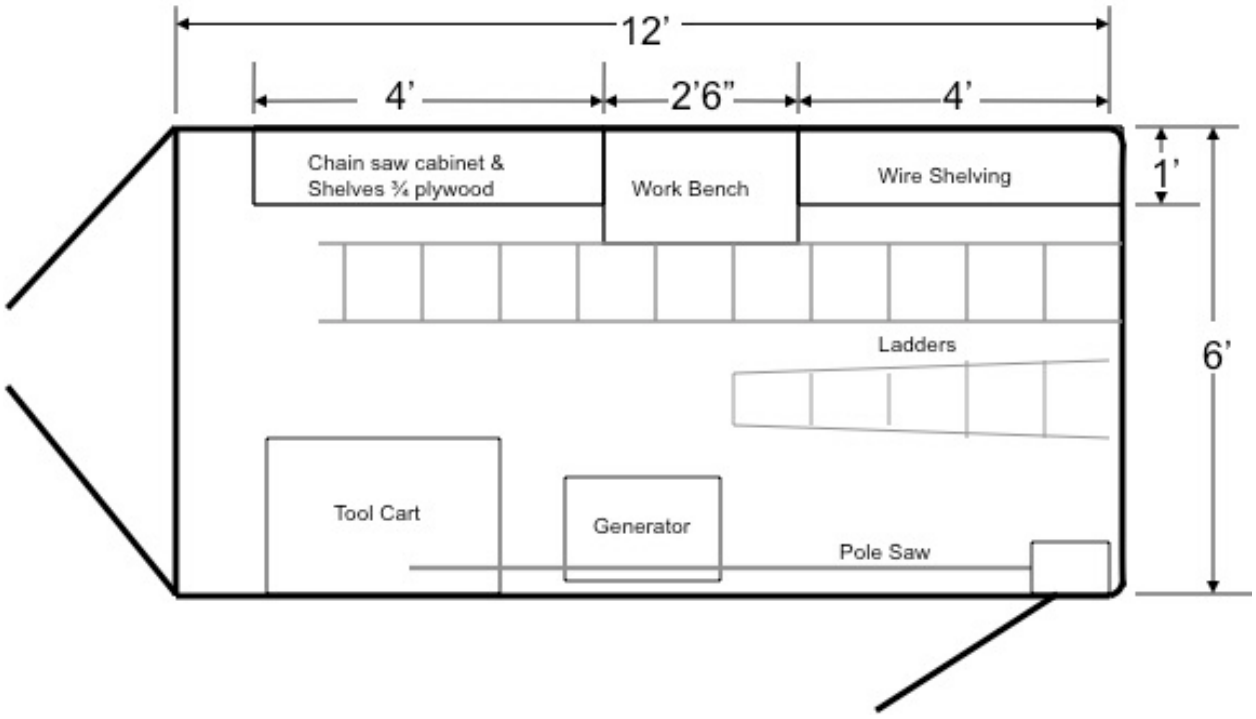
Ideas for designing your trailer are available in many places and are limited only by imagination, money, and materials.

- Do an internet search for trailer build-out images
- Talk to other churches that have trailers
- Look at what contractors in your area have done with their trailers
- Use this guide and ingenuity

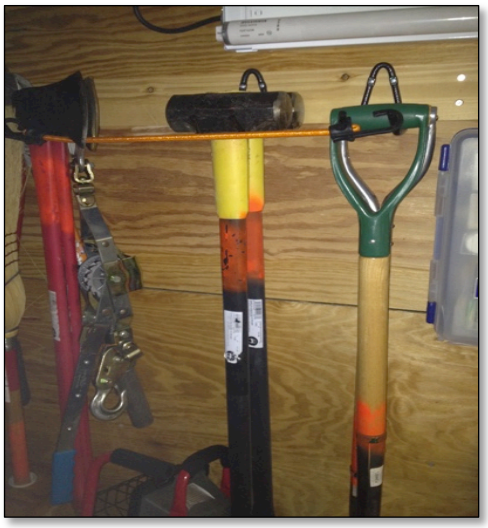
Design Considerations:
Ask the following questions before beginning:

- Will it be used to respond to a variety of disasters (e.g., tornado, flood, blizzard, etc.)? If so, a design that allows flexibility in changing out equipment to fit a specific response may be needed.
- Is the layout ergonomic? Does it "make sense"?
- Does it distribute the weight properly?
- Does it conserve weight?
- Does it allow for keeping equipment secure in transit, organized, easily accessible when needed, and out of the way when not needed?

Organization of Space and Equipment
Discuss ideas with your team. Spend time staring at an empty trailer, visualizing the possibilities. Sketch out proposals, then draw a scaled plan to ensure all items fit. It may be advisable to make newspaper cutouts of space and equipment to help visualize how well it works.



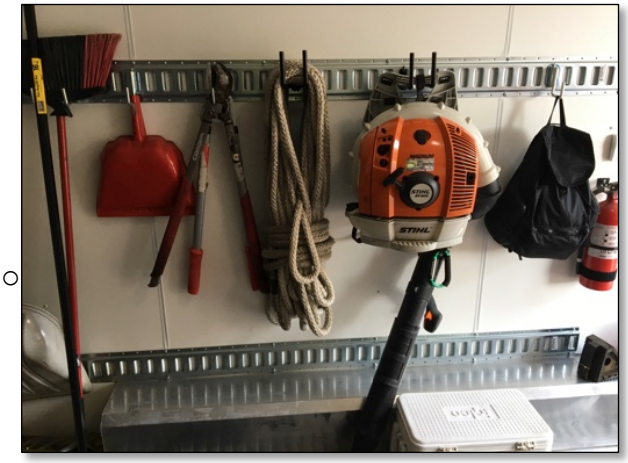
Effectively use available space. A trailer has five "walls" or flat spaces for you to utilize (including a ramp door). Use them.



- Walls (sides and front) – place shelves against walls and anchor to the frame, not the plywood side; use caution not to go through to the outside when drilling into a wall. Use hooks to hang tools and equipment above big equipment on the floor. Don't use valuable wall space to hang ladders.

- Ceiling – an often overlooked and under-used storage space, the ceiling is well suited for hanging ladders, pole saws, and other long tools. By using hooks and chains these items are easily secured to the ceiling frame.

• Floor – heavy equipment must be stored on the floor (keep weight low). Use equipment anchor points or strips, screwed or bolted to the floor, and secure moveable items with ratchet straps. Bungee cords will stretch. Anchors can also be mounted to the wall frame.



• Tongue – another, often forgotten, available space is the tongue of the trailer. The tongue can be used to carry a spare tire, a generator, or fuel cans.

CAUTIONS

- Hooks should be secured to 1x4 boards anchored to the frame; do not secure anything directly to the plywood sides.
- Keep heavy equipment low to maintain the trailer's center of gravity.
- Consideration must be given to any additional weight on the tongue, balancing it with weight distribution inside the trailer so as not to improperly shift weight to the hitch.
- Make sure weight is properly distributed front to back to maintain safe tongue weight, and is distributed side to side as it affects trailer sway and tire wear.

- Gasoline should not be stored in an enclosed trailer, and never in an enclosed cabinet, even with ventilation. Temporary storage inside a trailer during transit may be acceptable, but remove it after reaching your destination or for storage.

Ease of access – don't just throw everything into your trailer! Your equipment will be damaged, hard to find or get to when needed, and it will become a safety issue. Determine what will be used first or the most and place it where it is easily accessible. Place less used items farther in.

Secured for travel. Trailers have leaf springs, but do not have shock absorbers, resulting in a very bumpy ride. Everything that is not secured will shift. Use cabinets, bins, tubs, and tie downs to keep everything in place. See photos above for floor and wall anchor points and securing of items.

Doors should have heavy-duty locks – small padlocks will not work! Use commercial grade padlocks, "puck" locks, or shrouded locks. Your trailer hitch on the truck (receiver), the tongue, and the coupler latch should also have locks. There are various types available.

Photos L-R: receiver lock, tongue lock, coupler latch lock.

Additional Touches

There are several enhancements to consider that make the trailer easier to use:

Floor – consider painting or covering the floor with sheet vinyl or linoleum to provide a fluid resistant surface. This keeps fuel, oil, water, and other fluids from soaking into the plywood floor when spilled. If painting, use a garage floor-quality paint with painting sand for traction when wet.

Tool Cart – a tool cart is a handy way to keep long-handled tools secure and accessible. Shovels, rakes, and brooms are stored in PVC pipes on end. The cart is rolled out when needed. The drawbacks of a tool cart are that the cart must be moved out of the trailer each time a tool is needed, and it takes up valuable floor space and adds additional weight to the trailer. See Appendix E for a sample tool cart.

Ladder Storage – hang ladders from the ceiling, using a chain hooked to eyebolts. Place a piece of angle iron on the front of the trailer to rest the legs on, use a hook on a chain and door spring to provide tension to keep it in place. A ladder rack can be added to the roof to carry ladders, but make sure the anchors are well sealed to prevent water intrusion. Hanging ladders outside on the side of a trailer is not recommended – they are too low and workers tend to bump into them. Outside ladders are also at risk for theft. Hanging ladders on a wall inside uses valuable wall space that could be better used for other equipment or shelving.

Pole Saw – a kitty litter bucket laid on its side is the perfect size to hold the engine of the saw. Place it above the side door, with the bucket secured to the front of the trailer. A short piece of split 1½" PVC makes a good shelf for the saw end; secure with a bungee cord.

Chainsaw Storage – chainsaws are gold following a disaster. Consider securing them in a locking cabinet. They are expensive pieces of equipment; protect them from damage. Since they contain fuel and oil, the cabinet must be ventilated. See Appendix F for cabinet plans.

Top Left Photo: Cabinet at the rear of the trailer swings out and has space for 4 saws on the shelves, a long blade chainsaw in the front, and space for storage of other items.
Top Right Photo: Cabinet in closed position, allowing it to be closed or locked to keep saws out of sight when the trailer is open.
Bottom Left Photo: Vertical storage space for long chainsaw in front of cabinet.
Bottom Right Photo: Hooks for "Used" and "Ready" saw chains on the end of the cabinet.

Five saws are stored vertically at the front of this trailer, with additional space for oil and other equipment and supplies. These saws are not secured, but a chain could easily be run through the handles. Note the pole saw storage space in the upper right.

Restroom – it seems that there is never one available when you need it! Shepherd's Heart built a small camp toilet and sink inside an enclosed storage room in the front of their trailer. Not elegant, but very useful!

Work Table – having a place to work on equipment is invaluable. The area above and below can be used for storage. It should have a vise, electricity, and lights.

Electricity – The 12-volt light that comes with the trailer will not provide enough light to work by or put equipment away. Add some 120-volt LED lights by the side and rear doors, and over the workbench. Add an outlet on the workbench and by the doors to power tools. By directly wiring a power cord into a switch box you can power the electrical system by extension cord or generator. Make sure all electrical wiring is in PVC electrical conduit - grey, not white. (**Photo Right:** Power is supplied via an extension cord

fitted with a plug cap for the generator; a short adapter cord also allows it to be plugged into an extension cord.)

Air Conditioning – if your disaster work will be primarily in hot, humid climates you may want to consider installing an AC unit to provide relief for your team. Either a small window or RV roof AC may be used.

Conspicuity Markings – make your trailer visible at night. It comes with adequate front, top, and rear LED marking lights, but adding strips of red/white reflective tape to the rear and sides makes the trailer stand out at night with depth and perspective. Only trailers over 10,000 pounds GVWR and 80-inches wide are required to have reflective tape, but adding it is worth the minor cost and effort.

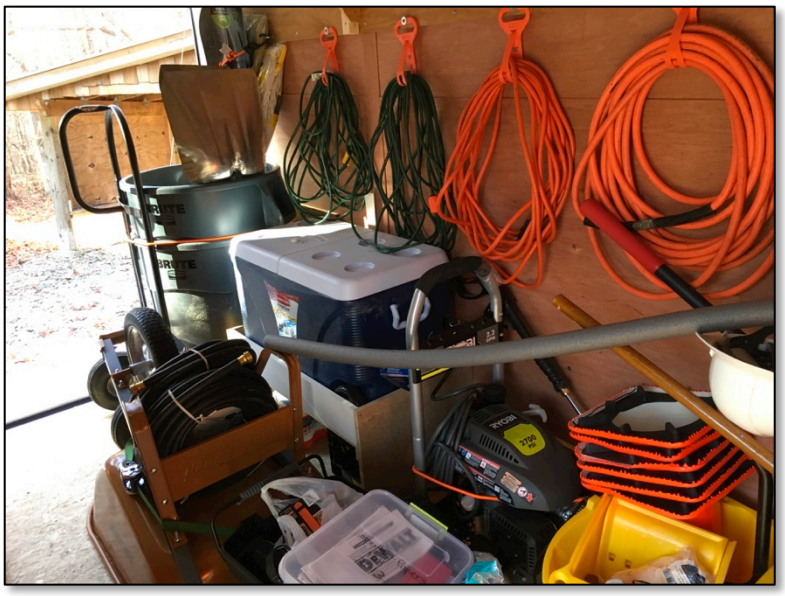
Fire Extinguishers – Your trailer should have at least one, if not two, 5-pound (minimum) ABC fire extinguishers prominently mounted for easy access. They should be rechargeable and part of your church's fire extinguisher inventory for inspection and replacement.

First Aid Kit – Purchase a quality kit that includes various wound care bandages, scissors, tweezers, eye wash, antiseptic, hemorrhage clotting agent, tourniquet, elastic wraps, and other items to handle

common injuries. It should be fastened to a wall where it is readily seen and easily accessed.

Summary

Making your disaster trailer safe, efficient, effective, and functional takes planning and thought. Preparation must also include a funding plan for the trailer, equipment, repairs and replacement of equipment, insurance, and response expenses. Your trailer should have ample space to carry everything without it being disorganized or cramped. Design a layout to make the most of all available space. Everything must be secured. Optional modifications to your trailer may make work at the disaster site much more pleasant.



Chapter Five: Weight Considerations

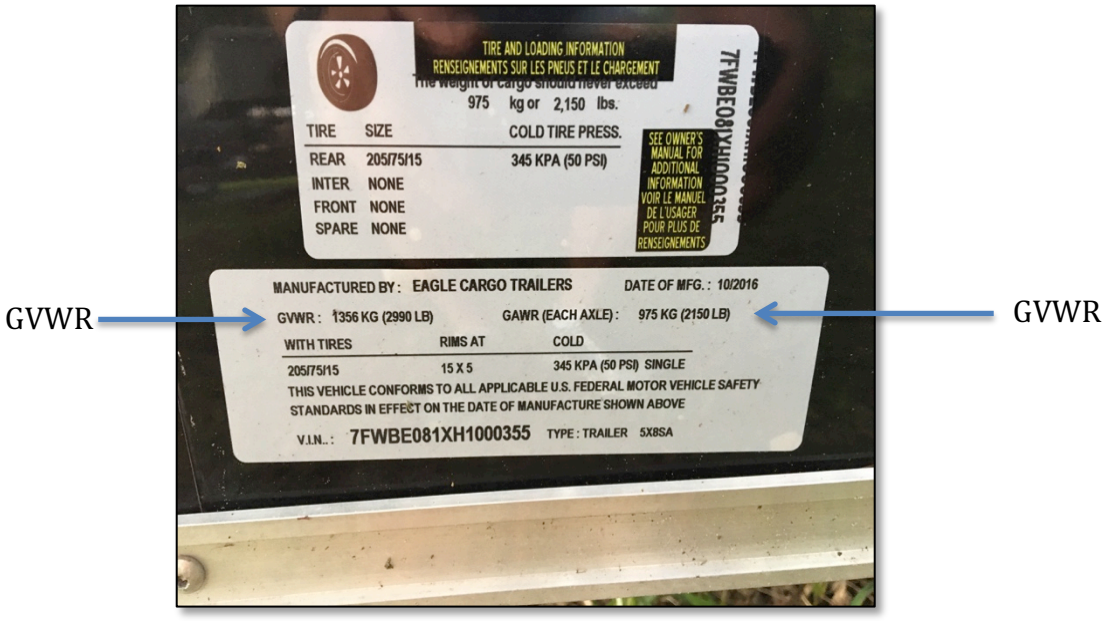
A critical consideration when designing your trailer's layout and equipment placement is weight distribution. An overweight or unevenly weight-distributed trailer is dangerous. It may cause reduced stopping ability, tire wear, sway, a broken suspension, or tire blowout. Just because there is plenty of room in the trailer does not mean you should fill it. Before discussing equipping of the trailer, an understanding of trailer weight and towing concepts is necessary.

Weight Ratings

Every trailer and tow vehicle is rated for how much it can weigh or tow. Weight ratings may be found on a plate on the trailer tongue or front corner, the doorpost of the tow vehicle, or in the tow vehicle owner's manual. The following are common term definitions:

1. **Curb Weight** – the empty weight of the tow vehicle or trailer, without any cargo, passengers, or accessories when it left the factory. This is really a meaningless figure unless you are pulling only an empty trailer.

2. **Gross Vehicle Weight Rating (GVWR)** – the <u>maximum</u> allowable weight of a tow vehicle when fully loaded. Do not exceed.



The **Gross Vehicle Weight (GVW)** is the <u>actual</u> total weight of the **tow vehicle** when fully loaded; includes passengers, cargo, full fuel tank, weight of the trailer on the tongue, and all accessories. Must not exceed GVWR.

3. **Gross Trailer Weight Rating (GTWR)** – the <u>maximum</u> allowable weight of a trailer when fully loaded. Do not exceed. A trailer label may show this as GVWR.

The **Gross Trailer Weight (GTW)** is the actual total weight of the trailer when fully loaded with all equipment, supplies, cargo, and build-out. Must not exceed GTWR.

You can determine the weight of the cargo (tools, equipment, and build-out materials) by subtracting the Curb Weight from the GTW.

4. **Gross Combined Weight Rating (GCWR)** – the maximum combined weight the trailer **and** tow vehicle can weigh when hitched together. Include a full fuel tank, passengers, and any other equipment, luggage, tools, or cargo that may be carried. The sum of loaded trailer weight and the loaded tow vehicle weight cannot exceed the GCVW (GVW + GTW = GCW).

5. **Gross Axle Weight Rating (GAWR)** – the most weight that an individual axle can carry when loaded. Tandem axles can carry about twice the weight of a single axle.

6. **Gross Tire Weight Rating** – the maximum weight a tire can carry at a specific cold tire pressure. Ratings are found on the sidewall of a tire. Check with the tire manufacturer for the maximum weight, maximum speed, and maximum air pressure for the tire. Never exceed.

7. **Tow Rating** – the maximum amount of weight that may be towed by a tow vehicle.

8. **Trailer Tongue Weight** – the amount of weight or load carried by the trailer tongue that a hitch and hitch ball can safely carry.
   - Trailers with a GTWR of less than 2,000 pounds need to have a tongue weight that equals 10% of the GTWR.
   - Trailers with a GTWR above 2,000 pounds need a tongue weight between 10% and 12% of GTWR.

9. **Hitch Weight Rating** – the maximum load that a tow vehicle can carry on the hitch.

10. **Tow Rating** – the maximum amount of weight a tow vehicle can safely tow.

What This Means

1. Do not tow a trailer that GTW exceeds the tow vehicle's tow rating.

   Example #1
   Tow rating = 7,500 pounds = maximum GTW.

2. The combined GVW and GTW cannot exceed the GCWR.

   Example #2

Truck GVW	4,500 lbs.
Trailer GTW	3,750 lbs.
GCWR	10,000 lbs.

Combined Weight: 4,500 + 3,750 = 8,250 lbs.
10,000 – 8,250 = 1,750 lbs. under weight

3. Don't exceed the Gross Tire Weight Rating of the tires.

Example #3
Goodyear ST215/75-14 trailer tire, rated at 2,205 pounds

GTW	3,750 lbs.
Tire Rating	2,205 lbs.
x	2 tires
Tire Weight	4,410 lbs. maximum

4,410 – 2,750 = 660 lbs. under GTW

A tandem axle can carry more weight (7,000 lbs. vs. 3,500 lbs.)

4. Don't exceed the hitch weight rating.

Example #4

Hitch Rating	500 lbs.
Tongue Weight	675 lbs.
	175 lbs. overweight

GTW	3,750 lbs.
12% (>2,000)	450 lbs. max. TW

Weight needs to be shifted to the back of the trailer to reduce weight on the tongue to no more than 450 pounds. Hitch is rated at 500 pounds so 450 pounds of tongue weight is good.

Weighing a Trailer
You must know your trailer (GTW) and tow vehicle (GVW) to ensure you are within safe towing limits.

1. Weigh your tow vehicle and trailer at a truck stop or other truck scale. A small fee is charged at truck stops ($10-$15 at Pilot/Flying J truck stops on CAT scales). Highway weigh station DOT scales may be available at no cost after hours.

2. Weigh it fully loaded with the tow vehicle, full tank of fuel, number of passengers intended to be carried (or you can use a figure of 154 lbs./person), and any gear, equipment, and luggage that might be carried.

3. The scales used must be segmented. Stop on the scale with the tow vehicle on the first segment and the trailer on the second segment.

4. To obtain an axle weight of the trailer – useful to see if either axle is over-burdened - reweigh by stopping so each trailer axle is on a different scale segment.

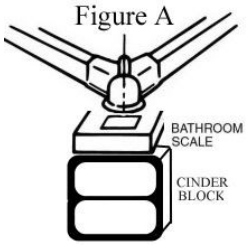
5. If on a CAT scale, they will ask whether it is a "First Weigh" or "Re-weigh." For your first time on the scale say, "First weigh." If weighing the trailer only, or getting an axle weight, after getting a combined total weight, say, "Re-weigh." It is often best to go inside first and let the weigh master know what your are going to do.

6. Once done, go inside and get a printout of the weigh. It will show "Steer Axle" for the first segment (tow vehicle), "Drive Axle" for the trailer, "Trailer Axle" which is usually blank unless the second and third segments were used, and "Gross Weight" as the combined total weight on the scale.

Determining Tongue Weight

Make sure the trailer and tow vehicle are on a flat, level surface. To get tongue of the trailer place the coupler of the loaded trailer on a bathroom scale at the towing height, without the jack touching the ground. Use blocks to raise the scale to that height. CAUTION: Make sure the scale can handle the weight! If it cannot, use one of the alternate methods.

Figure A

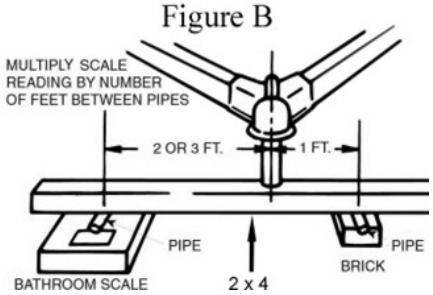


Alternate #1 for heavier tongue weights. You will need the following materials:

- Bathroom scale
- A block of wood the same thickness as the bathroom scale
- Two (2) short pieces of pipe
- One 4-foot 2 x 4

1. Place the block of wood 1-foot from the trailer tongue.
2. Place the bathroom scale 2-feet from the trailer tongue on the opposite side, in line with the wood block and trailer tongue.
3. Place a short piece of pipe on both the wood block and the bathroom scale.
4. Place the 2 x 4 across the two pieces of pipe; make sure the 2 x 4 is level.
5. Place the trailer tongue on the 2 x 4 so it is 1-foot from the wood block and 2-feet from the scale. (See diagram)
6. Multiply the reading on the scale by the total distance between the two support pipes (1' + 2" = 3'). This is the tongue weight

Figure B



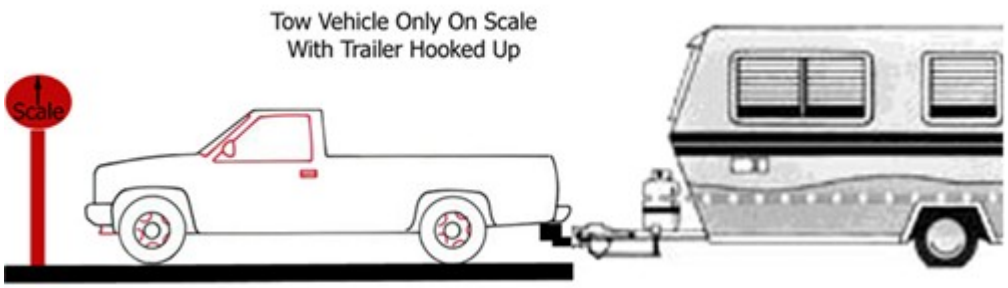
Alternate #2 for heavier tongue weights. You will

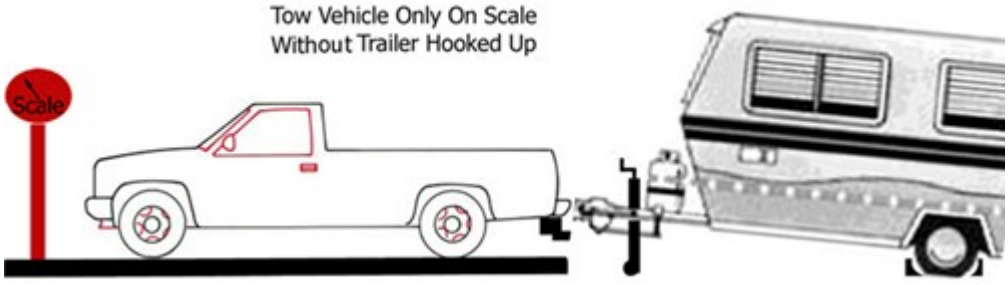
1. Weigh the truck and trailer on the truck scale, with the truck and trailer on separate scale sections of the scale.
2. After getting the total truck/trailer combined weight, disconnect the trailer on the scale so it is not touching the tow vehicle, and the jack is not on the truck scale section. (CAUTION: Do not do this if the scale is busy. It is best to unhook the trailer in the parking lot.)
3. Get a second total truck/trailer combined weight. (Or truck alone if trailer is unhitched in the parking lot.)
4. Subtract the tow vehicle weight without the trailer attached from the truck weight with the trailer attached. Difference is the tongue weight.

Example #5

Truck wgt. with trailer	4,775 lbs. (GCVW)
Truck wgt. without trailer	4, 500 lbs.
Tongue weight	275 lbs.
Trailer weight	2,700 lbs.
10%	270 lbs.

Tongue weight is 10% of trailer weight (GTW)





Determining Tire Weights
If you can get weights by weighing only one side of the trailer while at a scale you can determine if the load is balanced side to side. CAT scales do not facilitate doing this.

If you cannot get side weights, you can get a rough estimate by dividing the axle weight by 2. However, this does not take into consideration side-to-side weight differences. You may actually have a tire loaded over the rating, yet be under the axle weight rating.

Another way is to have someone observe the trailer as it is towed at various road speeds, or watch in the side mirror. If it sways then the load is unbalanced.

Tire Information
Having proper size tires with the proper load rating, filled at proper air pressure, with proper tread depth, not exceeding the maximum weight load limit, and without bulges, sidewall cracking, damaged or missing tread, will minimize tire blowout. This all-too-common failure can cause damage to the trailer and destabilize the tow vehicle, resulting in loss of control. Always check your tires before traveling.

- Always check manufacturer specifications for the tires, which can be found on their website. There may be some variance between manufacturers. A sample chart is on the next page.
- Only LT (Light Truck) or ST (Special Trailer) tires should be used on a trailer.
- Trailer tires should have a "D," "E," or higher Load Rating.
- The maximum load limit for weight is stamped on the sidewall (photo next page).
- A "Single" maximum load rating is for a single tire; "Dual" is for a dual tire. For a tandem axle trailer use the "Single" rating. A pickup truck with dual rear wheels would use the "Dual" rating (photo next page).
- Tire pressure is measured "cold," meaning at ambient air temperature. Sunlight and running a tire will increase the air pressure.
- Be mindful of the tire manufacture date. A 7-10 year old tire, even if it appears good, may be nearing the end of its useful life.

Date Code
26 = June 23-28
13 = 2013

- If the sidewall of a tire is showing cracking (photo below), it is time to replace the tire. The UV rays of sunlight dry and damage rubber. Tires should be covered while in storage.

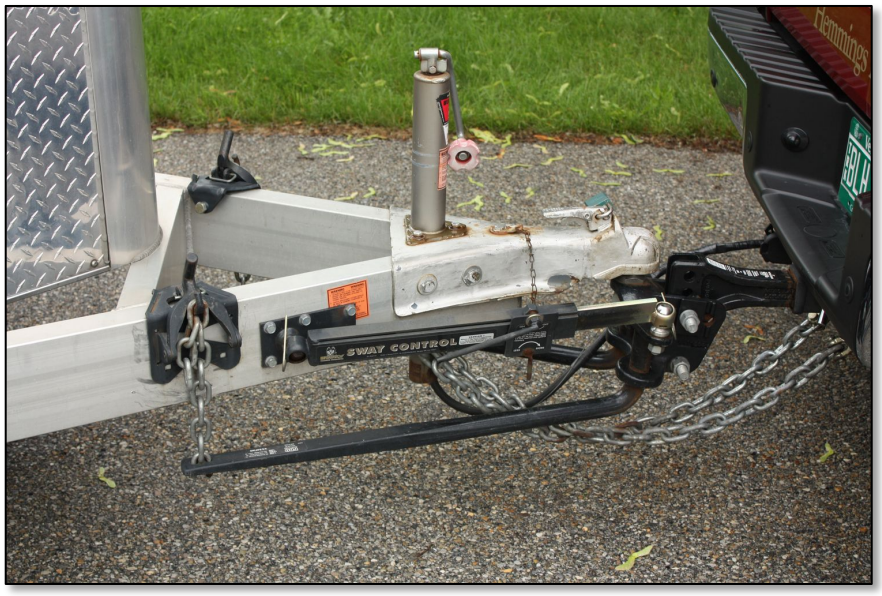
Above: Typical tire sidewall, showing tire type (ST), width (225mm), aspect ratio (75), radial (R), and rim size (15"). Note that it is a Load Range E, with a maximum single tire load of 2,830 lbs at 80 psi cold.

GOODYEAR ENDURANCE Load Limits at Various Cold Inflation Pressures

Tire Size Designation	Usage		Tire Load Limits (lbs) at Various Cold Inflation Pressures (psi)													
		Inflation (psi) >>	25	30	**35**	40	45	**50**	55	60	**65**	70	75	**80**	**95**	**110**
ST205/75R14	Single	Load Range >>			B			C			**D**					
		Load Limit (lbs) >>	1170	1300	1430	1530	1640	1760	1850	1950	**2040**					
		Load Index >>			93			100			**105**					
ST215/75R14	Single	Load Range >>			B			C			**D**					
		Load Limit (lbs) >>	1270	1410	1520	1660	1790	1870	2010	2120	**2200**					
		Load Index >>			95			102			**108**					
ST205/75R15	Single	Load Range >>			B			C			**D**					
		Load Limit (lbs) >>	1220	1360	1480	1610	1720	1820	1940	2040	**2150**					
		Load Index >>			94			101			**107**					
ST225/75R15	Single	Load Range >>			B			C			D			**E**		
		Load Limit (lbs) >>	1430	1600	1760	1880	2020	2150	2270	2380	2540	2620	2720	**2830**		
		Load Index >>			100			107			113			**117**		
ST235/80R16	Single	Load Range >>			B			C			D			**E**		
		Load Limit (lbs) >>	1720	1920	2090	2270	2430	2600	2730	2870	3000	3140	3260	**3420**		
		Load Index >>			106			114			119			**123**		
ST235/85R16	Single	Load Range >>			B			C			D			**E**	F	G
		Load Limit (lbs) >>	1830	2040	2200	2400	2580	2760	2910	3060	3200	3360	3480	**3640**	3960	4400
		Load Index >>			108			116			121			**125**	128	132
ST255/85R16	Single	Load Range >>			B			C			D			**E**		
		Load Limit (lbs) >>	2110	2360	2600	2780	2980	3200	3360	3520	3640	3860	4020	**4080**		
		Load Index >>			114			121			125			**129**		

Sample tire specification chart.

Hitch Stabilizers
Use of a hitch stabilizer, i.e., sway bar, may be needed on heavier trailers or those that sway. The stabilizer also helps keep the trailer tracking straight, and may reduce tire wear.



Rating and Weight Record
Appendix B can be used for towing calculations and as a record of your tow vehicle and trailer ratings and rates.

Summary
To operate safely, be careful to not exceed weight ratings of the trailer and tow vehicle. Get the trailer and tow vehicle weighed to ensure it is within ratings. Pay close attention to the trailer tires, and use the correct tires, properly inflated, and in only use if in good condition. Exceeding weight ratings or running with under-inflated tires often results in tire failure.

Chapter Six: Equipping Your Trailer

After determining the purpose or function of your disaster response trailer and planning for the layout design or form for the equipment, the next step is to equip it. Time to go shopping!

Determine What to Carry

Make a list of equipment to purchase or have donated based on the purpose of the trailer. A sample is provided in *Appendix C*. Carefully review that list. Eliminate items that do not fit your mission. Add items not included that may be needed.

For power equipment, stick with quality big name brands: DeWalt, Bosch, Black & Decker, Porter Cable, Hitachi, Milwaukee, Rigid, etc.

> **NOTE:** Only two brands of chainsaws are worthy of consideration: Stihl and Husqvarna. Both are made for the professional, with high quality engineering and materials, and they will last a lifetime. Not so with other brands, so do not waste money buying them. Stick to one brand of saw so parts and maintenance are the same. These saws are available in Consumer (low), Rancher (mid), and Professional (high) quality levels. Consider purchasing two Professional saws with 18" – 20" blades, one larger Professional saw with a 28" – 30" blade, and one mid-level saw with a 14" – 16" blade. Also, a gas-powered extendable pole saw is a valuable saw to have.

Determine Cost
When planning for funding, estimating cost was sufficient. Now actual prices should be totaled, particularly if a church treasurer needs to write a check.

- Shopping online is the easiest way to determine costs. If suppliers are nearby, a visit may be advantageous. Talk to the store manager to see whether a discount is available. Personnel at the contractor desk will often do the pricing if provided a list.

- Remember, buy quality where quality is needed, cheap when it is not.

- Check discount tool stores, like Harbor Freight or Northern Tool Supply. Remember to check for quality, if needed.

- Comparison shop between different suppliers. As a steward of funds, the best equipment at the best price should be purchased. Don't hesitate to let them know what the purpose of this equipment is and ask for a discount – many will give a 5% or 10% discount for disaster response, but you must ask.

Getting the Equipment
Before purchasing, determine which items church members can donate and which ones must be bought.

- Be sure to use your church's tax exemption certificate on all purchases.

- Keep a detailed inventory of equipment. This is very important for insurance purposes and for keeping track of what you have – tools have a way of "walking off" or getting left behind. An inventory list should include:
  - Date of purchase
  - Make/manufacturer
  - Model number
  - Serial number
  - Quantity
  - Description
  - Cost – unit cost and total cost
  - Purchased or donated (if donated, have a donation value for your cost)

- For insurance purposes, over time it is necessary to track:
  - Current cost – what it would cost to replace
  - Actual Cash Value (ACV) – what it is reasonably worth if sold (this is an estimate). Remember, equipment depreciates in value over time, and most tools have a five-year depreciation.

- Create a spreadsheet to maintain the inventory list for easy updating. Use separate tabs for:

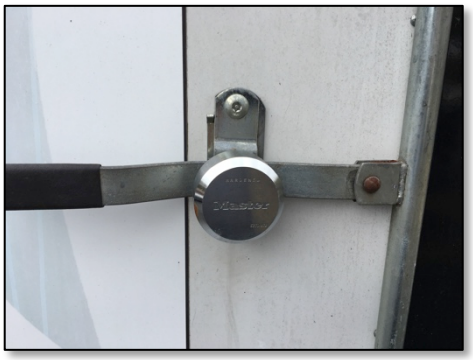
- Equipment
- Trailer – track the cost of building out
- Maintenance – track costs for maintaining and repairing the trailer and equipment
- Insurance – duplicate list of the equipment, with current costs and ACV
- Inventory – an itemized list of everything with just the quantity, make, model, serial number, and description for use in taking inventory or as a tool checkout list.

Marking Your Equipment

Make sure all tools and equipment are marked in some way. Use spray paint, engraved, church initials or name, or a special ID tag. All the tools collected and piled up look the same at the end of a long day. Know which ones belong on the trailer.

High value tools and equipment, like chainsaws, generator, power tools, etc., should be engraved with a church ID, or should have an asset ID tag applied. Asset tags can be found online, are self-destructing and almost impossible to remove.

Security



There will be expensive tools and equipment in your trailer. Do not skimp on securing it! Invest in the largest, strongest locks available. Most padlocks are easy to defeat with a saw, bolt cutters, open end wrenches, or a screwdriver. A hidden shackle reinforced padlock, such as a Masterlock ProSeries 6271KA, with high security hasp bolted through the frame or body and reinforced, will stop most theft attempts. If the rear door has two hasps, use two locks. Do not rely on the cheap door handle lock on the side door; it is easily defeated with a screwdriver or pry bar. Whether the lock is keyed or uses a combination does not matter. Ensure team members have copies of the key. If the lock cylinder can be rekeyed, or a new combination set, it allows for periodic lock control so know who has a key or the combination.

Store your trailer in a well-lighted location, preferably inside a privacy fence or building. If thieves cannot see it or get to it, they will move on. Also, don't secure the fence gate with a cheap lock.

Maintenance
Take care of that with which you have been entrusted. Tools and equipment are designed and made to be used, and normal wear and tear is expected. Breakage is expected. However, using the right tool for the job, using it in the manner it is designed for, and keeping it clean and in good repair will help that tool or piece of equipment last many years.

- All tools and equipment should be cleaned before storage.
- If a tool has a storage case, use it. It will be easier to store, protecting it as well as keeping parts together.
- Gasoline should not be kept in engines for more than a month. Use a gasoline stabilizer. Ethanol will destroy rubber gaskets and hoses. Empty the fuel tank and run the engine dry before storing. Consider using synthetic fuel-oil mix for chainsaws, it does not contain ethanol and can remain in the fuel tank.
- Chainsaws should be cleaned before returning it to storage, and chains should be sharpened. Periodically give chainsaws a tune-up and maintenance from an authorized dealer.
- Appoint a person to oversee maintaining the trailer, tools, and equipment.
- If a tool or piece of equipment breaks, get it repaired or replaced right away. Don't put it off or it will be forgotten. Keep a record of repairs.
- Some equipment has a use "life" and needs to be replaced after a certain amount of time. Replace it even if it doesn't look damaged or worn out if it ages this way.
- Set funds aside for maintenance and replacement.

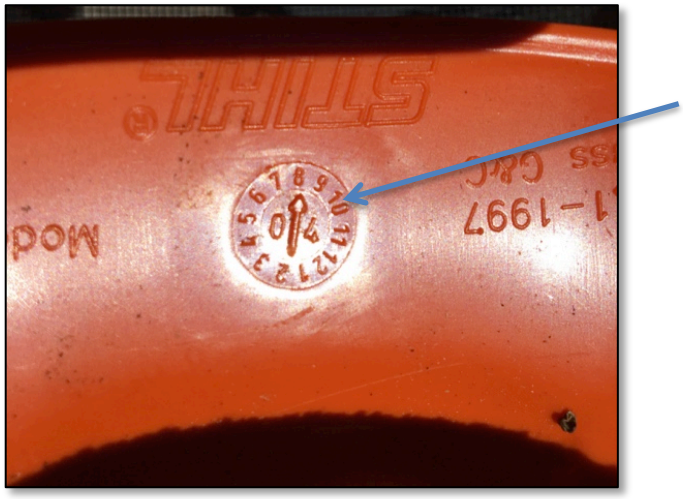


Photo: Date of manufacture on a chainsaw helmet.
8 (August)
04 (2004)

Summary
Church members can donate much of the equipment on your trailer, but certain equipment must be purchased to ensure quality. Make sure you have an itemized list to provide to members or stores, and for inventory and insurance. Comparison-shop to get the best value for the church's money. Ask for discounts and use the church tax exception certificate when making purchases. This is an exciting time for your team as the trailer comes together.

Chapter Seven: Other Things

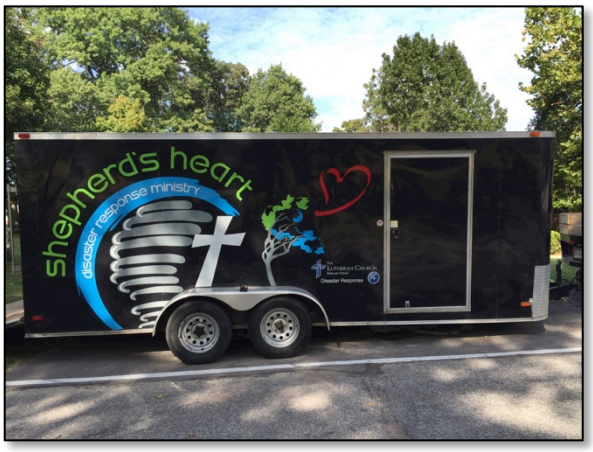
The constructed and equipped trailer is almost, but not quite, ready to hit the road.

Signage

A trailer can operate with bare sides. However, signage or graphics provide:

- Ready recognition in disaster areas that your team is part of a legitimate disaster response organization.
- A statement that Lutherans don't just sit behind the walls of their churches, they are out there helping and meeting needs of their communities. It is a witness statement.
- Recognition for your church and ministry. Let your community know you are there and you care!
- Contact information for your church.

Although it's acceptable to create your own graphic design representing your church, using the standard LCMS Disaster Response graphic design is recommended. This design is registered with FEMA and state emergency management agencies as a legitimate and trained disaster response entity. Using this graphic design also provides uniformity, consistency, and aids in recognition as a known disaster response organization. Contact LCMS Disaster Response for the free electronic graphic file.



Customize the standard LCMS Disaster Response graphic with your church's name, city, phone number, and website. This should be on both sides and the rear of the trailer.

It is easier and less expensive to use a graphic applique or wrap made by a company, and the graphic lasts longer, than if the graphics are painted on the trailer. The LCMS Disaster Response graphic design

file is free, but each team is responsible for the cost of making the wrap or graphic that is applied to the trailer.

Also consider having magnetic signs made for the sides of your tow and passenger vehicles to identify them as being from this ministry.

Insurance

All churches have insurance, but don't presume that your trailer, or even your ministry, is covered. Check! Coverage should include:

- Replacement of equipment from loss or theft
- Crash damage and liability
- General liability for your team
- Medical

Consult with your church's insurance agent to determine what coverage limits are needed.

> **ALERT:** Many church insurance companies do not provide coverage for any use of a chainsaw. Specifically ask your agent if this aspect of the ministry is covered or excluded. A separate rider may be required.

Summary

Advertise your ministry with graphics on your trailer. This also allows authorities in a disaster area to recognize the team. Make sure you have adequate and proper insurance coverage on your trailer, its contents, and team.

Chapter Eight: Hitting the Road

By now, the trailer is equipped and ready to go. Before, during, and after travel, there are several things that should be performed to keep your trailer safe. A checklist is found in Appendix D.

Pre-Trip

A pre-trip inspection should be completed each time the trailer is hooked up to the tow vehicle. This ensures that everything is operational and ready to go.

1. Check trailer lights – turn signals, brake, and marker.
2. Check electric brakes. Set brake controller at 25 mph to point where it locks trailer wheels, and then back it off slightly.
3. Check emergency "breakaway" switch. It locks up trailer brakes if it comes off the hitch.
4. Check hitch, ball, and coupling – should be secure, not loose; the coupling should set on ball all the way and locked with pin on the release.
5. Check safety chains – look for worn links, chain should not drag; crisscross chains.
6. Check electrical connections – 7-pin, if corroded it may not make good contact; tap out dirt/water before coupling; light coat of dielectric grease or spray.
7. Check tire pressure – check "cold"/ambient (before rolling), at manufacturer's recommended pressure. Under-inflation causes excessive heat and blowouts. Check the Tire and Loading Information decal on the trailer for proper tire inflation. Never exceed the tire manufacturer's maximum tire inflation pressure.
8. Check first-aid kit.

While on the Road

Driving a trailer is not like driving just a car:

- Extra weight pushes you and requires longer distance to stop. Maintain a longer interval between you and the vehicle ahead.
- Because of the extra length, your turning radius has moved back, so you must take wider turns so the trailer will not cut the corner.
- With extra height watch overhead branches and low clearances.
- Longer acceleration is required. It is not possible to pull out from a stop quickly, and it takes longer to get up to speed. Keep that in mind when pulling out or when passing.
- Speed – you should travel at the speed limit, or no more than 65 mph. Never exceed the speed rating of the tires or axle. Speed can cause overheating of the tire, causing a blowout, or over heating of the axle, causing a fire.
- Avoid sudden maneuvers. This can cause loss of control, fishtailing, and jackknifing.
- At fuel or rest stops take a minute to check the hitch, chains, electrical connection, and tires to ensure all is well.

At the Destination

Once you arrive at your destination, don't just drop the trailer and drive off. Take a few minutes to make sure things are set for the next you need to hook up.

- Inspect the trailer to make sure nothing is broken. Check around and under the trailer.
- Double check the hitch, coupling, safety chains, and electrical cord for wear or damage.
- Make sure all lights are working properly.
- Check tire lug nuts for tightness.
- Make sure your load and doors are secure. Be careful when opening doors as things may have shifted during travel.
- Chock the wheels.
- Lock the hitch coupler.
- Check the tow engine oil and coolant levels.
- Once the trailer has remained in place for a few hours, check tire air pressure.
- Make any repairs necessary.

Long-Term Storage

If the trailer is not going to be used again right away, it should be prepared for storage. After being in storage, periodically check and maintain the trailer so it is ready when needed.

- Park it with the tires on wood or plastic – sitting on asphalt, concrete, dirt or in water causes oils in the tire to leach out, causing dry rot (photo on right).
- Cover tires, especially the spare tire; the sun causes dry rot.
- Cover trailer to keep elements off, especially if under trees or in full sun. A shed or carport that has ventilation is better for storage.
- Keep tires at proper inflation. Letting the air go low causes the sidewalls to bulge and weaken, and creates flat spots on the tire.
- Wash regularly. The paint finish will become chalky or streaked. Use regular car wash soap or baby shampoo. Consider periodic waxing.
- Drive it around periodically - monthly is ideal – and this keeps the wheel bearings lubed and the tires round.
- Clean and inspect equipment. Replace broken or damaged equipment or parts.

Conduct an annual maintenance:

- Wash it
- Check roof seams for caulk sealing problems
- Grease wheel bearings
- Check wiring – rodents love wire insulation
- Ensure bees or wasps have not built nests in walls or underneath
- Check tires for cracking, wear, and flat spots

Summary

Owning a disaster response trailer is not a "get it and forget it" proposition. The trailer must be maintained and cared for before, during and after use, and for the long-term. Keeping this resource in proper condition is good stewardship of the gift your team has been given.

Final Thoughts

A disaster response trailer that is well planned, designed, built, equipped, and maintained is a blessing to have and a joy to use. Taking time at the beginning of the process to think through build-out and equipment storage will make using it much more easy, efficient and effective. Don't rush it! It is better and less costly to do it right at the beginning than to change it later. However, if it becomes apparent that something does not work well, don't hesitate to change it.

Although the above guidelines take work and perseverance, it is necessary to be good stewards of God's blessings. It helps you be more effective and efficient with these resources as you serve God by serving others. This ministry is a good witness to the community and those we assist by showing that Christians put their faith into action, not because we are earning any reward, but out of love for our Lord.

As you work through the design, building, and equipping process, should questions arise, please contact me by phone or email. I am more than willing to assist.

Share your experience. Once it is completed, others would enjoy seeing the fruits of your labor. Send me photos! Tell what you have learned, share unique design features, and thoughts about what might have been done differently. I would love to share those in future updates of this guide.

APPENDIX A
Resource Information

Organizations

Mercy in Action Disaster Resources
Joel & Kathy Mathews
(813) 215-8098
joel@MercyDisasterResources.org
www.MercyDisasterResources.org
www.facebook.com/mercydisasterresources/
Mercy in Action Disaster Resources provides assistance to LCMS Disaster Response, LCMS Districts, and congregations in disaster response management (volunteer and job coordination, logistics, documentation, and financial management), disaster response training (LERT, chainsaw, muck-out), and disaster preparedness planning.

LCMS Disaster Response
Rev. Dr. Ross Johnson, Director
(888) 843-5267
www.lcms.org/disaster
www.facebook.com/LCMSDisasterResponse/
LCMS Disaster Response provides general oversight of the church's response domestically and internationally. They conduct training and certification of volunteers (LERT), disaster response grants, and print resources.

Shepherd's Heart Disaster Response Ministry
Rev. Ed Brashier
Good Shepherd Lutheran Church
2456 Decatur Hwy.
Gardendale, AL 35074
(205) 296-3714
www.facebook.com/ShepherdsHeartMinistry/
Shepherd's Heart Disaster Response Ministry provides disaster response tree debris removal and training for LERT and chainsaw

Lutheran Church Charities
(224) 257-4389
3020 Milwaukee Ave.
Northbrook, IL 60062
www.LutheranChurchCharities.org
Lutheran Church Charities provides disaster response tree and debris cleanup, LERT and chainsaw training, as well as comfort dogs.

Southern Baptist Disaster Relief
www.namb.net/send-relief/disaster-relief/
The Southern Baptists started the church disaster response ministry. They are well organized and provide excellent disaster volunteer training and response on many levels. Check the website of your particular state's Convention for training.

Churches With Disaster Trailers
Messiah Lutheran Church, Tampa, FL

Chapel of the Cross Lutheran Church, St. Louis, MO

Christ Lutheran Church, Lincoln, NE

Eternal Shepherd Lutheran Church, Seneca, SC

Tool and Equipment Purchasing Sources:

General
- Home Depot (www.homedepot.com)
- Lowe's (www.lowes.com)
- Northern Tool (www.northerntool.com)
- Harbor Freight (www.harborfreight.com)
- Tractor Supply (www.tractorsupply.com)
- Amazon (www.amazon.com)
- Curtis Dyna-Fog (mold remediation fogger) (www.dynafog.com)
- North American Rescue (trauma kits) (www.narescue.com)

Chainsaw/Trees
- Stihl Dealer (chainsaws) (www.stihlusa.com)
- Husqvarna Dealer (chainsaws) (www.husqvarna.com/us)
- Bailey's (arborist and chainsaw equipment) (www.baileysonline.com)
- TreeStuff.com (arborist and chainsaw equipment) (www.treestuff.com)

Miscellaneous
- CAT Scale locations and how to weigh (www.catscale.com)

APPENDIX B
Towing Calculations, Weights, and Ratings Worksheet

Tire Information

	Tire 1	Tire 2	Tire 3	Tire 4	Spare
Manufacturer					
Tire Size[1]					
Date of Mfg.[2]					
Max. Load Rating					
@ PSI					
Date of Purchase					
Place of Purchase					

Record **Ratings** found on vehicle plates or owner's manuals and **Actual** weights from weighing or calculating.

Table 1: Tow Vehicle

ITEM	RATING	ACTUAL
Curb weight[3]		
Gross Vehicle Weight (GVWR/GVW)[4]		
Gross Axle Weight (GAWR/GAW)[5]		
Gross Tire Weight (GTWR/GTW)[6]		
Hitch		
Gross Tow Weight[7]		

Table 2: Trailer

ITEM	RATING	ACTUAL
Curb weight		
Gross Trailer Weight (GTWR/GTW)[8]		
Gross Axle Weight (GAWR/GAW) #1		
Gross Axle Weight (GAWR/GAW) #2		
Gross Tire Weight (GTWR/GTW)		
Tongue Weight[9]		

[1] Tire Size example: ST205/75/R15
[2] Date of Manufacture: 4-digit code or translated into calendar week dates and year.
[3] Curb Weight = empty, unloaded, as it left the factory (use factory figure
[4] Gross Vehicle Weight = fueled, fully loaded with all cargo and passengers.
[5] Gross Axle Weight = weight upon each axle
[6] Gross Tire Weight = weight upon each tire.
[7] Gross Tow Weight = weight of fully loaded trailer
[8] Gross Trailer Weight = weight of fully loaded trailer
[9] Tongue Weight = weight carried by the trailer tongue

Table 3: Gross Combined Weight[10]

ITEM	RATING	ACTUAL
Tow Vehicle (Table 1)		
Trailer (Table 2)		
Combined		

Table 4: Tire Weight (TW) Calculation[11]

TW = Axle Weight ÷ 2	**Weight**	**÷ 2**
Axle #1		
Axle #2		

Table 5: Tongue Weight Calculation

	Weight
Tow Vehicle Weight With Trailer (Table 1)	
Tow Vehicle Only Weight (Table 2)	
Subtract (Difference is Tongue Weight)	

Table 6: Passenger Weight Calculation[12]

Quantity Passengers to be Carried in Tow Vehicle	
Average Weight Factor per Passenger	154
Multiply for Estimated Passenger Weight	

Table 7: Fuel weight calculation

Gallons Carried		
Gasoline: Avg. Weight Factor per Gallon	6.3	Total:
Diesel: Avg. Weight Factor per Gallon	6.94	Total:
Multiply for Approximate Fuel Weight (lbs.)	Total:	

Actual Weights **cannot** exceed Ratings

[10] Gross Combined Weight = total weight of tow vehicle and trailer, fully loaded

[11] This is a rough estimate of the weight on each tire and does not take into consideration side-to-side difference.

[12] Passenger Weight Calculation to be used to adjust Gross Vehicle Weight of tow vehicle when weighed.

Appendix C
Tool and Equipment List

(**Note:** Not all of the tools and equipment listed need to be included on your trailer. Carefully review the list and determine the items and quantity actually required, based upon specified mission purpose.)

	Qty	ITEM DESCRIPTION
Chainsaws [1]	1	Chainsaw - 14"
	2	Chainsaw - 20"
	1	Chainsaw - 28"
	1	Extendable Pole Saw
Chainsaw Safety[4]	4	Chainsaw Chaps
	4	Helmet w/ Screen
	4	Protective Gloves
	4	Protective Glasses
Misc. Chainsaw Equipment[5]	1	Throw Weight w/ Line
	1	Throw Line Storage Bag
	1	150' 5/8" Bull Rope
	6	Wedges - 10"
	1	Timber Jack or Cant Hook
	2-3 per	Chainsaw Chain
	1 per	Chainsaw Bar
	1	Misc. Chainsaw Parts
	1	Files (Round) for Chain
	1	Chain Filing Guide
	1	Chain Bench Grinder
	1	File (Flat) & Handle
	1	Chainsaw Edge Sharpener
	1	Chainsaw Lanyard
	1	Climbing Harness
	1	Flipline - 1/2" wire 10'
	4	Carabineer
	4	Carabineer - Locking
	1	Sling - 5/8" x 15'
Tree Trimming	1	Bow Saw
	1	Folding Pruning Saw
	1	Pruning Saw Scabbard
	1	Pole Pruner
	1	Extended Lopper
	2	Lopper - 2"

	Qty	ITEM DESCRIPTION
Hand Tools, Cont.	1	Socket/Wrench Set[2]
	1	Impact Wrench Set
	1	Screw Driver Set[3]
	1	Pliers Set
	1	25' Tape Measure
	1	24" Level
	1	6 in 1 Scraper
	1	2" Scraper
	1	4" Scraper
	2	Utility Knife
	2	Adjustable Wrenches
	1	Storage Box (Large)
Power Tools	1	Reciprocating Saw (cord)
	1	Reciprocating Saw (battery)
	1	Circular Saw
	1	Compound Miter Saw
	1	3/8 Drill
	1	3/8 Drill/Driver
	1	Framing Nailer
	1	Finish Nailer
	1	Leaf Blower
Trash	2	44 Gal. Trash Barrel
	2	Small Tub ("keg barrel")
	1	Wheel Barrow
	4	12' x 16' Tarp
Safety Equipment	1	10 x 10 Canopy
	1	Box Fan
	1	First Aid Kit (extensive)
	1	Trauma Kit w/ Blood Clot
	2	Fire Extinguisher
	4	Safety Glasses
	1	Ear Protector
	20	N95 Mask or Respirator[6]

Tree Trimming, Cont.	2	Axe
	1	Hand Clipper
	1	Machete
Heavy Tools & Equipment	1	Generator
	1	Air Compressor
	1	Dolly/Cart
	1	20' Extension Ladder
	1	6' Step Ladder
	1	2-ton Come-along
	1	5/16 x 20' Chain
	2	60" Bar
	1	Flat Bar
	1	24" Wrecking Bar
	2	36" Crow Bar
	2	Sledge Hammer
	1	24" Bolt Cutter
Garden Tools	2-4	Push Broom
	2	Corn Broom
	2	Dust Pan
	2-4	Square Point Shovel
	2-4	Round Point Shovel
	2	Scoop Shovel
	1	Spade Shovel
	2	Pitch Fork
	2-4	Leaf Rake
	2	Garden Rake
	1	Curb Valve Wrench
Hand Tools	1	Tool Box
	1	Rubber Mallet
	1	Tin Snip
	5	Hammer
	1	Hacksaw
	1	4# Hammer

Safety Equipment, Cont.	20	Tyvek Suit
	100	Nitrile Gloves
	4	Hard Hat
	10	Traffic Cone
	1	Portable GFCI Receptacle
Comms & Nav	2	2-Way Radio
	1	Carry Bag for Radios
	1	GPS
Wet Cleanup	1	Pressure Washer (2500 psi min)
	1	Water Pump (engine driven)
	2	Discharge/Suction Hose (2)
	4	Garden Sprayer (1 or 2 gal)
	3	50' Hose w/ Nozzle
	1	Wet-Dry Vacuum
	1	Mop Bucket
	1	Mop
	2	Squeegee
	1	Fog Machine[7]
Gas	2	1 Gallon Gas Can[8]
	5	5 Gallon Gas Can
		Chainsaw Fuel-Oil Mix
Misc. Equipment	4	Tie Down Straps
	1	Air Compressor Tire Inflator
	1	Air Compr Blow Gun
	1	50' Air Compressor Hose
	3	Portable Work Lights (stands)
	4	50' Extension Cord
	1	25' Extension Cord
	1	Fluorescent /LED Work Light
	1	3-ton Bottle Jack
	1	3-ton Floor Jack
	1	Bench Vise
	2	Wheel Chocks

[1] Chainsaws – Different size saws for different size jobs. See discussion in Chapter 6.
[2] Socket/Wrench set – have a full set of SAE and Metric sockets in ¼", 3/8" and ½" drive. Have a full set of SAE and Metric open end wrenches.
[3] Screwdrivers – include different size straight, Phillips, and Torx screwdrivers.

[4] Chainsaw safety equipment – sawyers work in pairs with a puller, so have two sets of safety equipment per sawyer/puller team.
[5] Go to an arborist supply website to see what these items are.
[6] N95 masks should be two-band with exhaust port or better. They must be rated "N95" for particle, a regular vapor filter will not suffice.
[7] Fog machine is a not a theatrical machine for special effects. It is used to fumigate crawl spaces or attics for mold mitigation. The Curtis Dyna-Fog "Hurricane" is a good model.
[8] Gas cans – use a 5-gallon can to carry straight gasoline, a 1-gallon can to mix with oil for chainsaws.

APPENDIX D

Trailer Checklist

Pre-Trip

- ❑ Hitch Property Secured
  - ❑ Ball is the correct size for the coupler
  - ❑ Coupler latch below the ball
  - ❑ Coupler locking pin in place
- ❑ Jack Raised to Full Height
- ❑ Trailer Light Cord Connected
- ❑ Lights Work
  - ❑ Right Turn Light
  - ❑ Left Turn Light
  - ❑ Flashers (both)
  - ❑ Brake Lights
  - ❑ Running Lights
- ❑ Emergency Break-away Cable Connected
- ❑ Safety Chains Connected (crossed)
- ❑ Check Tires
  - ❑ Tread OK (no bulges, nails, cuts, etc.)
  - ❑ Tire Pressure Checked (tires should be at _____ # PSI cold)
- ❑ All Equipment and Doors Secured
- ❑ Chocks Removed
- ❑ Brakes Test
  - ❑ Brake controller set to proper sensitivity (just before locking trailer wheels @ 25mph)
  - ❑ Brakes controller engages brakes
- ❑ Tow Vehicle Ready
  - ❑ Fueled
  - ❑ Oil, radiator fluid, wiper fluid

On The Road

Check at Each Stop (rest, fuel)

- ❑ Hitch properly secured
- ❑ Safety chains properly attached
- ❑ Light/brake cord attached
- ❑ Break-away cable attached
- ❑ Tires not damaged
- ❑ Any exterior equipment properly secured

At The Destination

- ❑ Trailer Unhitched
  - ❑ Jack down
  - ❑ Hitch pin put back in coupler
  - ❑ Safety chains secured
  - ❑ Break-away cable secured
  - ❑ Hitch locked to prevent theft of trailer
- ❑ Wheels Chocked
- ❑ Trailer Inspected for Damage (make any repairs necessary)
- ❑ Tires Checked for Damage
- ❑ Trailer Interior Checked (CAUTION: items may have shifted in transit)
- ❑ Doors Secured and Locked
- ❑ Tow Vehicle Oil and Coolant Levels Checked

At The End of The Work Day

- ❑ Clean All Tools and Equipment
- ❑ All Items and Equipment Stored
- ❑ Sweep Out Trailer
- ❑ Close and Lock Trailer

APPENDIX E

Disaster Team Tool Cart

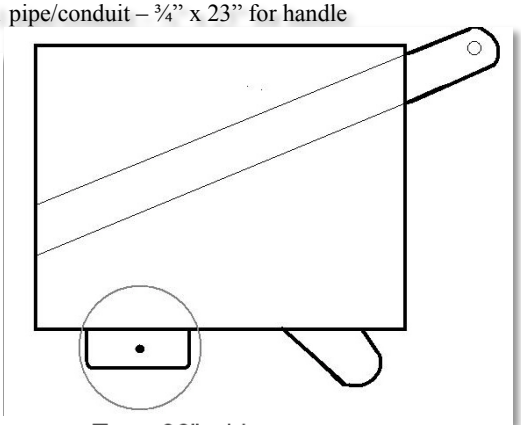
MATERIAL LIST

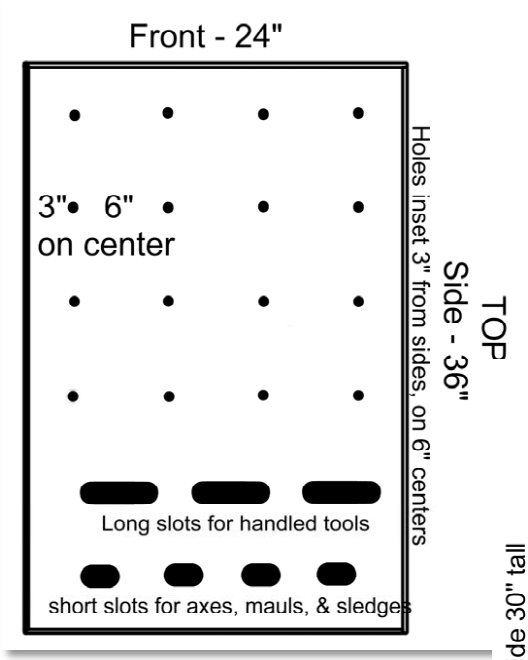
2 – plywood – 30”x36” for sides
plywood can be ½”- ¾ ”
2 - plywood – 26”x24” for top & bottom
plywood can be 5/8” or ¾”
4 – 2”x2”x 8’ for frame – clean and straight
3 – 1”x 3” x 8’ – framing and handle support
(can be 1”x4” or larger and we can rip down)
2 – 2”x 6” x 15” axle support
1 – 2” x 6” x 12” skeg support

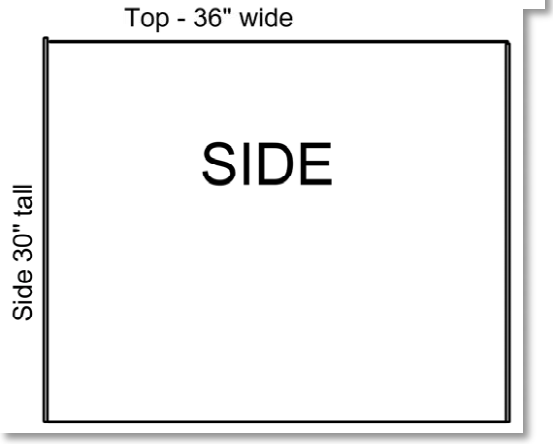
6 - 2” PVC pipe for sleeves

2 – wheels – 8”-10”
1 – steel axle to fit hubs
2 – washers for axle
2 – snap caps for axle

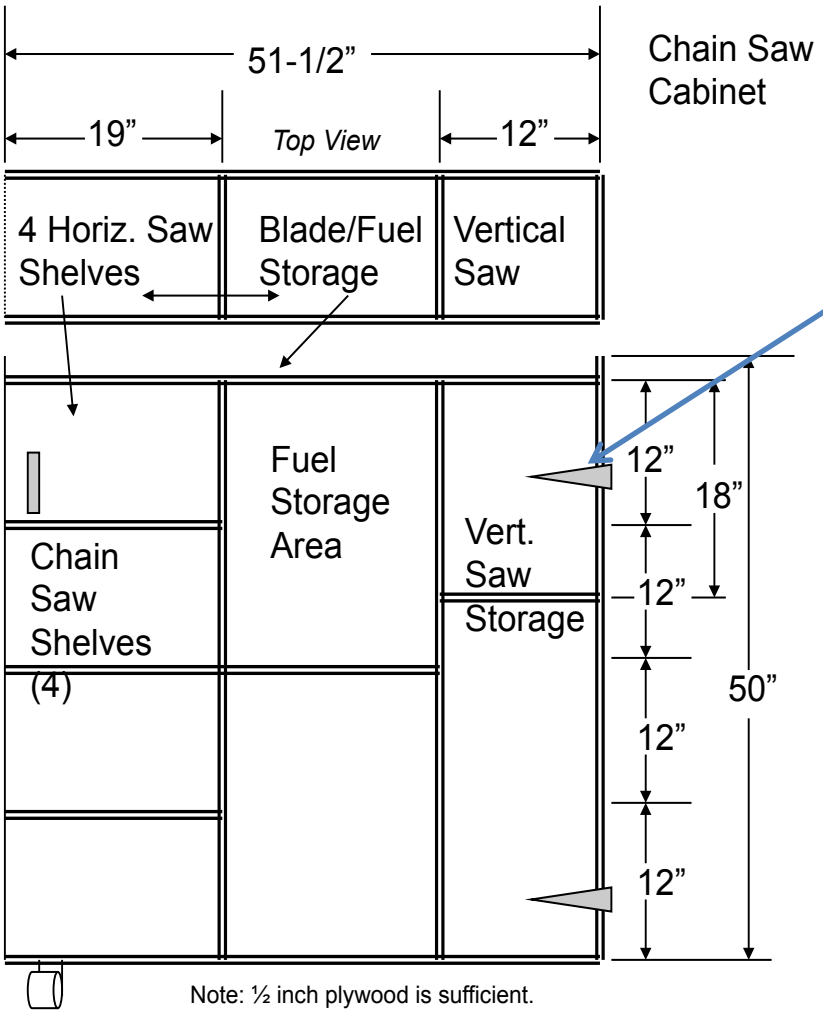
1 pipe/conduit – ¾” x 23” for handle







APPENDIX F
Chainsaw Cabinet



Notes:

- The cabinet is hinged at the front end so it can swing out for access.
- The rear end has heavy-duty castors to allow it to roll while supporting the weight.
- The four chainsaw shelves on the open back end fit a larger saw head with a 20” blade.
- A sheet of Lauan covers the chainsaw blades on the inside to prevent items rubbing against the chain (like oil containers).
- A hinged hasp on the open end allows the cabinet to be locked when closed.