



# Silverdale Lights

## Spiral Mega Tree Construction

A “Spiral” tree was first seen at Disneyland’s Luminaria in 2001, but it wasn’t until 2009 when the Weber family took this concept and developed an awesome effect for their animated Christmas light show. This highly desirable effect is not an easy addition to any Christmas display. There are challenges to mega tree designs and constructions as well as the mathematical calculations to properly pull off this awesome effect. While not rocket science, I doubt that Clark Griswold would have been successful at adding this to his display.

This guide will take you step by step on constructing your own spiral mega tree. There are risks associated with mega trees; please understand all the risk you take when constructing, maintaining and displaying a mega tree. Mother Nature is more awesome than this effect and her wind, lighting and other powers can cause damage to personal property and life. This is a guide and may not be all encompassing. Build at your own risk and be safe.

**If There Is Any Doubt, Then There Is No Doubt!**

## Let's get started . . .

First and foremost you must have a solid foundation and anchors if you expect your mega tree to withstand the high winds. You don't want to skimp on your first few steps because after many hours of work on your mega tree, it can be gone in one strong gust.

### Step 1 - Install a base sleeve for a solid foundation.



Dig a 30 to 40 inch deep by 14 inch wide hole where you want the base of your mega tree. Keep in mind that your guy wires should be around 45 – 50 degrees. So if you have a 20 foot tree, your anchors will be 20 to 16 feet, respectively, from center. Place a 2 inch Schedule 40 PVC pipe (preferably black) in the hole and backfill with QUIKRETE® Fast-Setting Concrete Mix. After ~2 bags, set the Orbit Irrigation 6 inch Round Valve Box level with the ground. This will cover your foundation sleeve in the off season. Continue to backfill with concrete within 4" of ground level. Allow to set for 24-48 hours before replacing soil and grass. You will need 2-4 bags of concrete depending on the width of your hole.



### Step 2 - Install anchors for guy wires.



Dig a 12 to 16 inch deep by 6 inch wide hole. Assemble a 12 inch galvanized eye hook with a nut, large fender washer and nut on the bottom of the eye hook. Place eye hook assembly in hole about 1 inch below ground level and then backfill with 1 bag of QUIKRETE® Fast-Setting Concrete Mix. You'll just dig out the surrounding area each year and replace it in the spring. This will keep your yard from being filled with four more valve boxes. Take several measurements so you can relocate your anchors during next year's setup.

### Step 3 - Assemble the Mega Tree Mast.

Install the Christmas Light Show Mega Tree Pulley Head to the first 10 foot section of galvanized pipe (black pipe will rust if you don't paint it). I highly recommend that you join the next 10 foot section by using their Mega Tree Pole Pin. The threaded connectors you find at hardware stores are made



from a cast iron and will snap with the perpendicular pressure from high wind gust. Slide on the Mega Tree Hook Head (shuttle). Now the bottom mast may take a little more work and you may need a custom part. I used 1½" galvanized pipe because it fit better into the 2 inch PVC sleeve that was in my base. This required me to have a custom Pole Pin made that went from 1¼" to 1½". Keep in mind if you go down this path, measure inside dimensions of your galvanized pipe. Subtract .125 inches so you won't have a press fit. Again, do not skimp here and use the threaded connector you find at the hardware stores. It would be better to use 1¼" and sacrifice the tighter fit in the sleeve than put a weak link at the bottom of your mega tree mast. The length of the bottom pole should be your sleeve depth plus 18 inches. This will bring your bottom ring off the ground allowing you access to the inside of the mega tree and keeping your lights out of the snow (northern displays.) The amount of lights you are putting on the tree will determine the size of the cable that will be used to raise your Mega Tree Hook Head (shuttle.) I would not use less than ¼" PVC coated cable for the main mast. Thread the ¼" cable through the pulley head and attached it to the shuttle. Do not miss this part!



**Step 4 - Adding guy wires and Topper.**



You will need at least 5/32" clothesline cable for guy wires. The nice thing about clothesline is that it is PVC covered. Start by enlarging the holes in the Mega Tree Pulley Head and putting thimbles through each guy wire support arms. Thimbles are very important because they spread the pressure and tension across the connection point. Thread your guy wire through each thimble and secure with cable clamps. Remember that you must tighten through the PVC covering. You will need at least 31 feet (20 foot tree) for each guy wire depending on your overall height and distance/angle of your anchors. Secure topper to the Pulley Head and don't forget to connect an extension cord.



**Step 5 - Assembling the Building Loops and Tightening Loops.**

For a 20 foot mega tree you will need to build several loops. These loops will give your tree a pleasing and uniform shape. You will build the mega tree in three sections by using three building loops and two tightening loops. The tightening loops will prevent sag between each section. I would recommend laying them in the sun before attempting to bend them to this degree. If it is already cold in your area when you get to this step, take them in the house overnight.



Section	Material	Length	Diameter*	16 Markings*
Top Building Loop	1/2" Schedule 40 PVC Electrical Conduit.	10'	3' 2"	7 ½ inches
Mid Tightening Loop	1/2" Schedule 40 PVC Electrical Conduit.	15'	4' 9"	11 ¼ inches
Middle Building Loop	1/2" Schedule 40 PVC Electrical Conduit.	20'	6' 4"	15 inches
Lower Tightening Loop	1/2" Schedule 40 PVC Electrical Conduit.	25'	7' 11"	18 ¾ inches
Bottom Building Loop	3/4" Schedule 40 PVC Electrical Conduit.	30'	9' 6"	22 ½ inches

\*These are based on full 10' pieces. Your actual measurement may be different depending on the insertion depth of the bell on your conduit.

**Step 6 - Erecting the Mega Tree mast and anchoring.**



Do not attempt to lift the mega tree pole yourself. It is a very heavy awkward piece to handle and if you fail, you could cause some serious damage or injury to yourself. I have seen some people rent a cherry picker for hoisting the mega tree pole in place. This is the safest method. Your guy wires now should be dangling from your Pulley Head arms. Loop them at each anchor site and attach them to turnbuckles using a thimble and cable clamps. Remember that you must tighten through the PVC covering. Once you have all four lines connected to your anchors, tighten them so there is no slack. You do not want them overly tight. Install your hand winch and attach it to your hook head (shuttle).

### **Step 7 - Building the external shell.**

Using your hand winch, raise the hook head shuttle approximately 7 feet off the ground. It should be at a comfortable height for you to start adding cable and lights. Again using 5/32" clothesline cable, cut eight pieces to 46 feet. Hang and zip cord each external shell cable across two hooks on the shuttle. Then attach each line to the first building loop on the marks you made when assembling your loops. To keep these cables tight; lay four 18 inch patio blocks around the building loop. Lay the remaining cables straight out from the center of the mast. It is very important to keep this as neat as possible. You are about to add a ton of wire and lights to a very small area.



### **Step 8 - Adding the spiral lights.**

If you are building a hybrid mega tree with both the standard vertical strings and the spiral effect, I recommend that you add your spiral lights first. It is a whole lot easier to slide the lights for proper spacing without the vertical lights in place. To calculate the amount of light strings based on the effect you want to achieve, you can go back to your old high school math book or download a great spreadsheet created specifically for spiral tree calculations. <http://www.lightsonsixth.com/stuff/spiraltreespreadsheet-97.xls>



Assuming you are building a 16 channel, 20 foot tree with a 9.5 foot base and 2.5 turns of spiral motion; you will need two 100 light strings that are 22 feet long (lights only). When building your first of three sections, your first light string will go around 300 degree or 83%. I recommend adding light strings in a crisscross fashion. (ie: 1,9,5,13,3,11,7,15,etc). As you add your light strings, use zip ties to secure them to every other external shell cable, staggering each line. Keeping the remaining lights bundled with rubber bands will help you from getting yourself in a Griswold tangled mess. You will need a boat load of zip cords! The better you secure them, the better it will maintain its shape over time and weather. Once your first section is complete, remove the patio blocks and use your hand winch to lift the shuttle up another 6-8 feet. Again, it should be at a comfortable height for working. Place the patio blocks back on the next building loop and secure the 16 external shell cables. Now this section will have a tightening loop, so it's better to rap all 16 strings only attaching to the ends at first. If you are using two 100 light strings, you will have to add the other string during this step. Remember to zip cord the two strings together so that you don't have a gap of lights created by the plug leader. Lift the tightening ring in place and secure to your external shell cables. Then start zip cording the lights as you did in the first section; securing them to every other external shell cable, staggering each line.

The final section is same as the last. Raise your shuttle another 6-8 feet, attach your bottom building loop, add your lights strings, insert your tightening loop and zip cord.



### **Step 9 - Adding standard vertical strings.**

This is pretty straight forward. Carefully lower your shuttle and add the vertical light strings to the top. You will want to zip cord these as you raise your shuttle up. Stop short by about 3 inches from the top. The remaining lights get zip corded around the base of the bottom building loop.

### **Step 10 - Anchoring the base**



You now have the remaining 2 feet of external shell cable daggling from the bottom building loop. Create anchor pads with the patio blocks. Attach a Tapcon® Concrete Screws, fender washer and a little spacer to each side of the eight patio blocks. Place one block between every other external shell cable. Create a loop and secure with cable clamps. You will want your loop to be able to just slide around the fender washer. Too small and you can't easily remove them and too big and they come off in the wind. Raise your shuttle the final 3 inches.

I do not recommend that you secure any loops to the main mega tree mast. You want your mast to have the slimmest vertical profile as possible. Attaching the outer structure (loops) to the mast exponentially increases your vertical profile. This would require you to add another four guy wires in the middle of your mast. Without securing your loops and using the anchor pad as described here, the outer structure will be free to move without jeopardizing the integrity of your vertical weight bearing mast. My mega tree had no problems with 50 mile an hour gust, when others failed. Nothing is foolproof, but you want to minimize your risk.

Questions or comments can be sent to [scott@silverdalelights.com](mailto:scott@silverdalelights.com)

Good luck and be safe!

### **Links**

Silverdale Lights: <http://www.silverdalelights.com>

Spiral Mega Tree test pattern video & LOR sequence: <http://www.silverdalelights.com/video-99.htm>

Disneyland Luminaria Video (see the tree at 8:40): <http://www.youtube.com/watch?v=Udi-CgMwHRU>

Weber Christmas: <http://weberchristmas.snappages.com/the-home-page.htm>

Spiral tree spreadsheet: <http://www.lightsonsixth.com/stuff/spiraltreespreadsheet-97.xls>

Christmas Light Show (Mega tree parts): <http://christmaslightshow.com>