

# SWINGG: The Sine-Wave-Interactive Night-Gazing Giant

*Firefly 2024 Creativity Grant Proposal*

## **Overview**

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The SWINGG is the oversized porch swing of dreams. Designed in heavy steel and wood, it is meant for the simplest and most profound sort of interaction – that of rest, of gathering with friends to rock gently and look up at the sky.



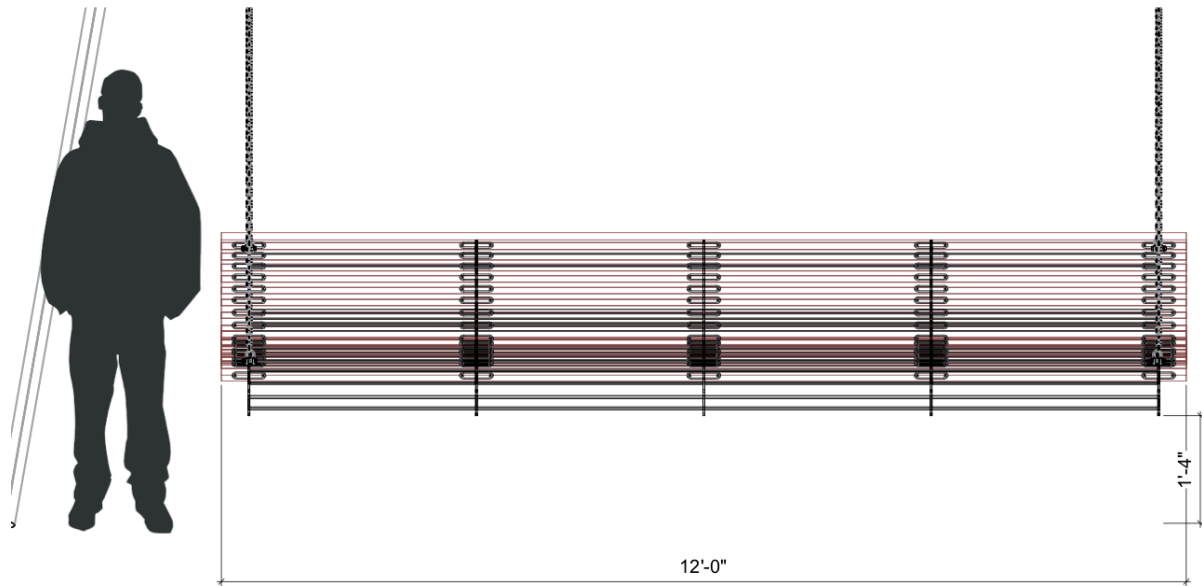
## **Experience & Technical Design**

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The included images are **preliminary concept sketches** of the SWINGG, meant to show the overall shape and scale, the basic fabrication approach, and the interaction potential of this art.

Our priorities as this design evolves are **structural integrity, safety, participant comfort, and durability** with repeated installations.

The SWINGG allows participants to gather on a large-scale hanging bench, designed for reclining with a curvature modeled after a zero-gravity lounge rather than a traditional porch swing.

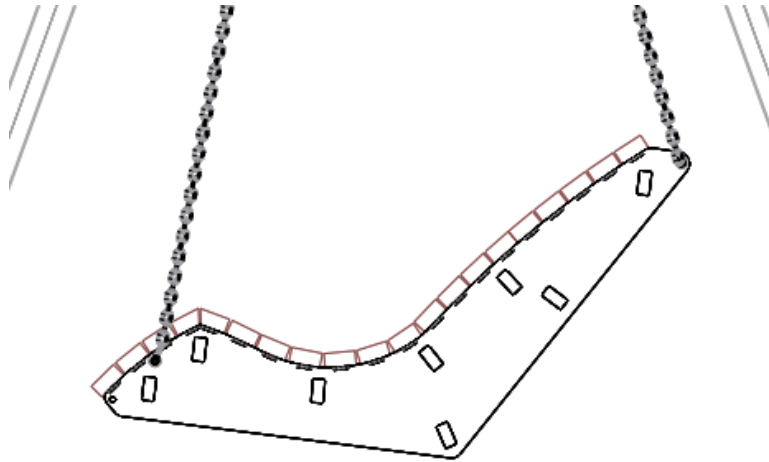


It is intended to be **accessible** and **inclusive** to participants, with a low-to-ground height and a curvature that accommodates as many different human proportions as possible. (Part of the budget consideration includes CNC-cut plywood prototypes for testing the curvature with a variety of people.)

In construction, the curvature of the **bench** will be defined by a series of CNC plasma-cut shapes out of 0.25" steel plate.

These plates will have cutaways for spans of heavy-wall rectangular steel tubing (welded in place) to provide lateral stiffness, and cutouts for 0.25" steel tabs (also CNC plasma-cut and welded in place) to bolt the wooden decking down.

(Using bolts instead of deck screws allows for removal and replacement of the decking as needed.)



The decking is budgeted based on extremely durable **hardwood decking** that can easily support the weight required at 5/4 (1.25") thickness. We will be exploring options based on deals available, with an eye both to aesthetics as well as rot resistance. If locally-milled or New England native woods can be found that would satisfy the project needs, that would be ideal. **Gaps** of 1/8" to allow for wood expansion will be maintained by ripping each piece with an appropriate angle if needed for the curvature of the bench.

All edges and surfaces of the wood decking will be softened with sanding and sealed so that participants in various states of dress can be comfortable.

For lifting and transportation purposes, the bench may ultimately be divided into **two 6' segments** with end plates bolted together. There may be some lengthwise supports that remain 12' and bolt in place to provide extra stiffness, if there is a break at 6'.

Weight and deflection calculations will be done to determine if the **cross beam** is sufficiently strong for the bench and participant load, or if it will need reinforcement. We have heavier steel on hand if it is necessary.

The hanging chains will be shackled to CNC-cut **mounting rings** welded to the cross beam (shown in overall orthogonal view).

The preliminary concept sketch leaves out some crucial components of the **support structure** that are still in design stages:

1. A CNC-cut interface plate for the angled support legs to cross and support the center cross-beam will be designed to ensure that this juncture is the strongest feature of the entire structure.
2. Each support leg will have an **anchor plate** welded at the end so it can be attached with a heavy **ground screw**.
3. An additional **outrigger leg** on each end may be added for side-to-side stability and an additional ground anchor point.

All steel will be finished durably for outdoor performance with a minimum of primer and exterior paint coat. We are currently finalizing the structure plan, so the aesthetics of the finish component are TBD.

### ***Installation Plan***

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An ideal placement will be in the field at Firefly, to allow vehicle access (pickup trucks/trailer) and a large footprint for the structure and anchors.

The structure is intended to break down into the cross-beam, the support legs, and (likely) two 6' sections of bench.

There are a few ways this can be installed on site with minimal equipment.

The tentative plan is:

1. Pre-assemble the cross-beam and support legs on their side on the ground with the bench pre-placed between them and loosely rigged (but not shackled) to the hanging points;
2. With a footing or chock in place to prevent dragging the structure forward, winch the entire structure upright by the crossbeam, using a truck- or ATV-mounted winch;
3. Once the structure is upright, winch the bench into place one end at a time and attach shackles to cross-beam.

Test assembly of the SWINGG will allow us to finalize the plan prior to installation at Firefly.

### ***Risk Analysis & LNT Plan***

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The initial risk with any project is **feasibility**, including skill and equipment access.

We are a team of two fabricators with over a quarter-century of experience between us, including on structural welding and installation, and we have access to commercial-level shop space and machinery for metal and wood fabrication, including CNC equipment.

This background also gives us an understanding of the **interactive** and **structural** risks involved in this project.

Interactive risks include sharp edges (mitigated with careful finish work), trip hazards on anchor guy lines (mitigated through visible flagging), and pinch risks with moving hardware (mitigated with sleeving or shielding moving parts where possible).

Structurally, with such a large bench, we expect up to 8 people at a time could attempt to interact with the SWINGG.

This means the structure needs to be **anchored** extremely well, but as a temporary installation without the use of poured footings.

The budget includes a line item for four (4) large hex-head ground anchors, one for each leg, but this may be a stand-in for a larger (but equally costly) number of shorter or different anchors as the structure design evolves.

The other structural consideration is the **hanging load**. Pending weight calculations on the final design of the bench itself, all hardware (shackles, chain, etc) will be rated for a minimum of 2000 lbs (1T) load capacity or more.

The entire structure will be test-assembled in advance.

There will be routine structure inspections during the event along with LNT sweeps, and a final LNT sweep at breakdown and loadout.

### ***Project Timeline***

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	March	April	May	June	Event
Finalize CAD					
Test cuts					
Order materials					
CNC cut steel					
Bench steel fabrication					
Support structure fabrication					
Decking milled/attached					
Paint/powdercoat					
Test assembly & teardown					
Site installation					

### ***Budget Estimates***

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With the structural plan in progress, budget estimates are ballparks.

Several bigger-ticket items – machine access, large steel for the supports, and some of the rigging hardware – are already on hand and will save an enormous amount of cost.

This is truly a piece intended for durability and repeated installation at future events. With this in mind, we believe the extra cost over the \$2k limit is wholly worthwhile.

If more detailed budgeting would be helpful in determining a higher grant level, we can provide updated material quotes as the design finalizes in the coming weeks.

ITEM	Purpose	Unit	Qty	\$ / unit	Total	Supplier
3" x 0.125" wall steel round tube	Support structure	24' stick	4	-	-	(In hand)
1" x 2" x 10ga rectangle tubing	Bench lateral structure	24' stick	6	\$75.00	\$450.00	Penn Steel or Turner Steel
0.25" hot roll steel plate	Curved supports, tabs, mounts, ground plates	4' x 8' sheet	2	\$450.00	\$900.00	(same)
3/4" plywood	CNC-cut curvature test chairs	4' x 8' sheet	2	\$50.00	\$100.00	Home Depot
5/4 Decking lumber	Bench	12' length	12	\$55.00	\$660.00	Lumber yard
Deck sealant	Finishing bench wood	n/a	n/a	\$100.00	\$100.00	Lumber yard
Rated anchor and chain shackles	Attaching bench to chain, chains to cross-beam	Each	6	\$25.00	\$150.00	US Cargo Control or similar
Rated lifting chain, 5/16" or 3/8"	Hanging bench	per foot	25	\$4.00	\$100.00	US Cargo Control
Hardware (bolts)	Connections at bench decking, support structure assembly	n/a	n/a	\$200.00	\$200.00	McMaster or similar
Heavy earth anchors (36" hex head ground screws)	Stabilizing structure without poured footings	per screw	4	\$140.00	\$560.00	American Earth Anchors
Turnbuckles, wire rope	Anchor lines	n/a	n/a			(In hand)
Consumables (grinding wheels, router bits, sandpaper, plasma cutting electrodes, welding wire, etc.)	Cutting and finishing steel and decking	n/a	n/a	\$200.00	\$200.00	Amazon, Needham Saw, similar
Paint/finish	Protecting steel from rust, adding decorative finish	n/a	n/a	\$300.00	\$300.00	Home Depot, Pike Powdercoat
					<b>TOTAL</b>	<b>\$3,720.00</b>